4 Development Directions for Regional Infrastructure

4.1 Infrastructure Bottlenecks under Growth Scenarios

4.1.1 Current Industrial Situation of the Corridors

In parallel with the macro analysis undertaken in Chapter 2, summary information on development potential in the region (especially of mineral resources development accompanied by cross-border transport improvements and an overview of a Mega Project) are presented in this section. More details may be found in Appendix B. The results serve as input to Section 4.1.3 on Infrastructure Bottlenecks under the Growth Scenarios. The figure below visually summarizes the mineral and agricultural potential in the Southern African region. (The number of corridor in Figure 4.1.1 corresponds to this section's paragraph number.)

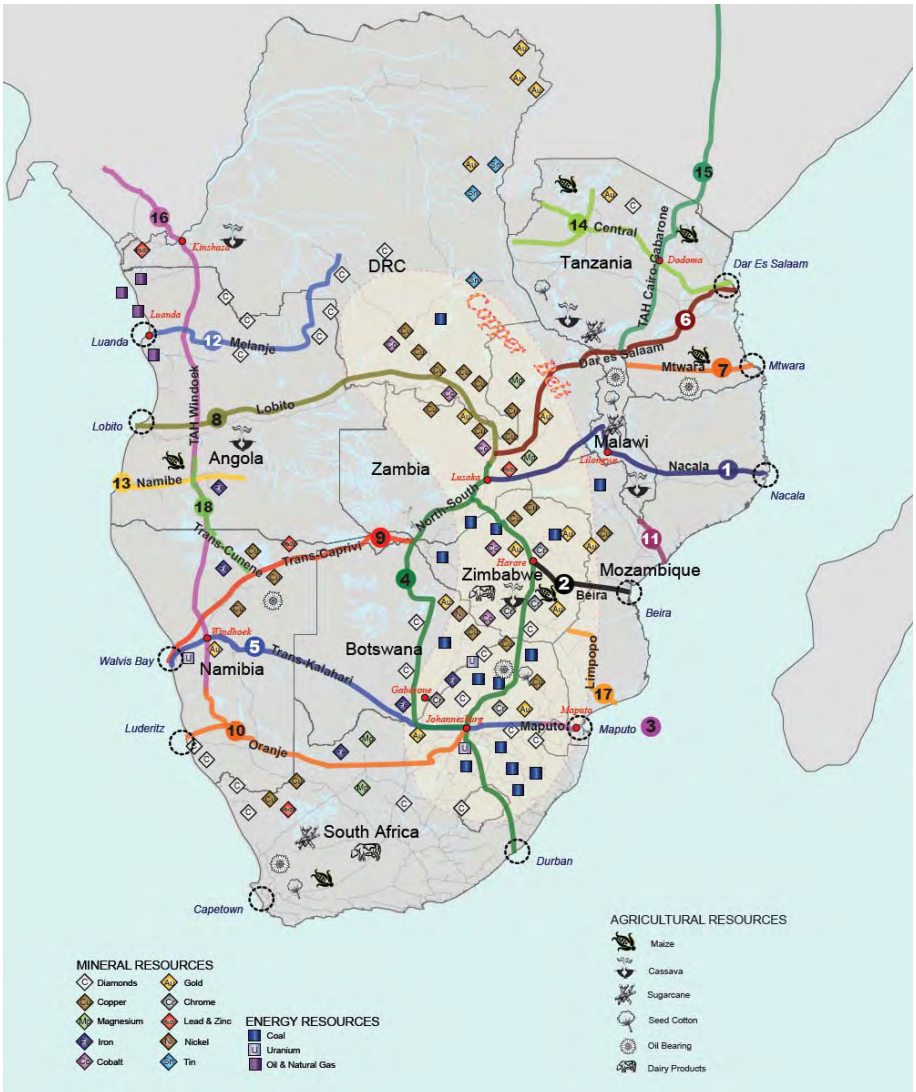


Figure 4.1.1 Mineral and Agricultural Resources and Corridors

(1) Nacala Corridor

Nacala is regarded as the best location for a deepwater port on the East African coast. The Nacala Corridor has consequently been at the forefront of ongoing initiatives to rehabilitate the rail link to Malawi, thereby creating a number of "anchor" tenants and promoting development

along the corridor. Together with Beira and other corridors (Sena and Tete), these developments have been linked to the possible export of coal from the Moatize and Benga coal fields as well as from the Muchana Vuzi coal fields north of the Cahorra Bassa Dam in Tete Province, Mozambique. The corridor is ultimately seen as linking Lusaka in Zambia with the Port of Nacala. There are an increasing number of exploration programs in southern Zambia, focusing on base metals – mainly copper and nickel as well as uranium prospects. All of these would benefit from development of the corridor.

Mozambique has some poorly explored base metal (nickel and copper) potential along the Nacala railway line, as well as some iron ore north of the line. These iron ore deposits are generally small but of good grade and could be exported as ore. (It is reported that exports will soon be started.). There is also niobium and rare earth potential in the carbonatites on the east flank of the Rift Valley.

For Malawi, together with the bauxite deposits in Mulanje, one of the largest and richest ilmenite deposits in Africa is found at Chipoka, near Salima. It is contained in mineral sands in the form of mineable dune sands located around the shores of Lake Malawi, with an estimated reserve of about 1 billion tons. Plans include a smelter with a capacity to smelt 26 million tons over a 25-year project life.

(2) Beira Corridor

The Beira Corridor historically was the main route into Zimbabwe, while also serving some Zambian traffic. Potential mineral deposits that could be advanced with the rehabilitation of the Beira Corridor included development of priority resources associated with the alkaline complexes, i.e., fluorite deposits and dimension stone at Montamonde, south of Tete. The fluorite has good grades and huge reserves. Potential also exists for the exploitation of industrial minerals, e.g. phosphates in alkaline complexes and limestone.

Along the Sena and Tete Corridors, the Moatize coal fields in the Zambezi Valley are currently being developed by Vale of Brazil and Riversdale Mining of Australia, which have plans to export coal via the Port of Beira, although there are serious investigations into developing the Nacala Corridor as well to act as the main export route.

(3) Maputo Corridor

The Maputo Corridor is the eastern segment of the Coast to Coast Corridor of ehich the Trans-Kalahari Corridor is the western segment. The area served by the corridor is well explored and there is little potential for new developments. Locations that could benefit are the eastern chrome deposits in South Africa as well as the variety of mineral and coal deposits close to the Kruger National Park and the South Africa/Mozambique border. There are current initiatives to reroute some of South Africa’s coal exports through Maputo.

(4) North–South Corridor

The North–South Corridor links the DRC through Zambia with the Port of Durban by road and rail, with routes via Botswana or Zimbabwe. As the Botswana routing is currently the main connection, this route already serves as much traffic as the current infrastructure can handle. The main mineral projects (including copper and cobalt, see Appendix F for more details) and potential industries along the corridor (other than in South Africa) are concentrated in the DRC and Zambia. Except for these, there seems to be no indication of any major mineral deposits or exploration areas under consideration in relation to the planned improvements to this corridor.

(5) Trans-Kalahari Corridor

The Trans-Kalahari Corridor is seen as having great potential for Botswana in terms of possible coal exports to Namibia as well as for export through Walvis Bay. Botswana also has a number of base metal (copper and nickel) projects nearing the development stage, most of which would benefit from a rail link to Namibia. With an uranium industry already present in Namibia, Walvis Bay is well equipped for the shipping of radioactive products, with such materials being brought by road from as far away as northern Mozambique (e.g. from the Marropino Tantalum Mine). There is increasing exploration for uranium in Zambia, as well as base metal projects in the south of Zambia, the developers must consider the long port delays at East African ports, which have led to most traffic being routed through South Africa, with much of this by road freight.

(6) Dar es Salaam Corridor (including the Central Corridor)

The Dar es Salaam Corridor is based on a rail link between Tanzania and Zambia and is also served by an oil pipeline between the two countries and the main road connection from Tanzania to South Africa through Zambia and Botswana. Mineral development served by the corridor in Tanzania is restricted to smaller gold deposits and the coal areas proposed to be linked to the Mtwara Corridor. The Government of Tanzania has focused on developing the Central Development Corridor (CDC, or Central Corridor), which is planned to cover the geographical area between Dar es Salaam Port in Tanzania and Lake Kivu in Rwanda. The objective is to create an economic growth region, which will stimulate increased cross-border and international trade and investment especially in physical infrastructure, tourism, mining, agriculture, and manufacturing.

Key potential mining and mineral beneficiation[1] projects involve nickel and related minerals, and are already being developed by, among others, Barrick Gold Corporation and Falcon Bridge Ltd. Recent announcements from African Eagle regarding a lateritic nickel project will add to the pressure for development of this corridor.

(7) Mtwara Corridor

Mtwara Port is a small functioning port, but the rail line linking the port to the main agricultural areas was taken out of service at the time of construction of the TAZARA rail link between Tanzania and Zambia. Considerable research has been completed on the corridors of Tanzania, supported by the Industrial Development Corporation (IDC) of South Africa and other international development partners.

The main mineral projects and potential industries for the Mtwara Corridor are the following:

(i) Mining of vanadium, titanium, and iron ore at Liganga;
(ii) Mining of coal around the Nyasa Lake including the Mchuchuma–Katewaki area;
(iii) Petrochemical industries based on the Songo Songo and Mnazi Bay gas fields;
(iv) A petroleum refinery and pipeline linking Mtwara–Mbamba Bay;
(v) Mining and processing of gypsum to manufacture cement and other products from deposits in the Lindi region; and
(vi) Mining and processing of rock salt to produce edible salt and chemicals from deposits in the Lindi region.

[1] Beneficiation is a process whereby extracted ore from mining is reduced to particles that can be separated into mineral and waste, the former suitable for further processing or direct use.

(8) Lobito Corridor

The Lobito Corridor is designed around the rehabilitation of the Lobito rail line linking the Port of Lobito with the DRC/Zambian Copperbelt. While this is one of the largest potential copper-producing zones in the world, the development and repair of many of the mines following the extended conflict in the DRC has been hampered by a lack of reliable transport to port facilities. In addition to the known copper potential associated with this corridor, there are also abandoned manganese mines at Kisenge in the DRC, close to the Angolan border, which were previously served by the Lobito rail line.

Copper deposits in the Menongue area were investigated in the 1950s, with some trial mining reported. Individual samples are reported to have 3–8% copper and up to 25 grams per ton of silver with reported gold traces. The area is covered by Kalahari sands and is unlikely to have been adequately explored. Also, the area has likely been seriously affected by the civil war in the DRC. Some “mine” symbols are also recorded on maps of the Alto Zambese area, where rocks of the Katanga Supergroup extend into Angola from Zambia. These areas would probably be more fully investigated with the greater prospect of realizing benefits after reestablishment of the Lobito corridor.

(9) Trans-Caprivi Corridor

The Trans-Caprivi Corridor would open up much of northern Namibia, but the main mineral potential lies in the copper mines of the Tsumeb area. With plants currently treating ore imported into Namibia, the development of this corridor would benefit the industry as well as provide a focus for ongoing exploration efforts to establish new mines in the area. The corridor would also open a potential regional market for the Zimbabwean coal mines at Hwange, but this would be in competition with the current investigations into exporting coal from the Mamabula coal fields of Botswana via the Trans Kalahari route.

(10) Oranje Corridor

Southern Namibia has a high level of exploration based on the successful Rosh Pinah Skorpion lead zinc mines. Other mineral deposits are likely to be smaller and involve pegmatite. The potential for cross-border benefits is unclear since the large iron ore mines of Sishen are served by the dedicated Sishen–Saldanah rail line.

(11) Shire–Zambezi Waterway

Refer to (1) Nacala Corridor and (2) Beira Corridor for details.

(12) Malange Corridor

The Malange Corridor is seen as vital for expanding diamond interests in the Angolan Lucapa area and across the border into the DRC. There are also iron ore and manganese deposits at Cassala-Kitungo (Cuanza Norte), about 200 km from Luand, where reserves are reported at 300–500 metric tons with 23%–33% iron, with 194 metric tons as proven reserves, of which only 84 metric tons can be recovered through open pit mining. Manganese deposits have been reported from the Lucala Manganese Rectangle, in Cuanza North and Malange provinces, in close proximity to the Cassala–Kitungo iron deposits. A number of small deposits of manganese ore ranging from 10,000 to 250,000 tons are concentrated in alluvial deposits. A total resource of 5 million tons of high-grade ore (55% manganese) has been reported.

(13) Namibe Corridor

The Port of Namibe was developed in Portuguese colonial times for the export of iron ore from the Cassinga mines in Angola. There have been numerous more recent initiatives times to

reopen the mines and repair the rail connection. There are no other known major mineral deposits that would be served by this corridor.

(14) Central Corridor

As described, the Government of Tanzania has focused on developing the Central Development Corridor (CDC, or Central Corridor), which is planned to cover the geographical area between Dar es Salaam Port in Tanzania and Lake Kivu in Rwanda. Key potential mining projects involve nickel and related minerals, as noted in (6) Dar es Salaam Corridor.

(15) Trans-African Highway Cairo–Gaborone Corridor

The corridor is a Trans-African Highway (TAH) Corridor, extending about 9,000 km between Cairo and Gaborone. The central sections of the corridor, especially those in Tanzania, Kenya, and Ethiopia, play an important role in the transport of locally produced goods as well as for overseas imports and exports. There are no known major mineral deposits that would be served by this corridor. (Note that only the sections in Tanzania were considered in this Study.)

(16) Trans-African Tripoli–Windhoek Corridor

This corridor is also a TAH Corridors. Its total length is about 9,600 km, making it one of the longest TAH corridors. It mainly traverses sparsely populated areas with modest economic activities. While there are abundant mineral deposits in Angola and Namibia, there are no major mineral deposits along this corridor, except for copper mines in northern Namibia. (Note that only the sections in Angola, the DRC, and Namibia were considered in this Study.)

(17) Limpopo Corridor

The Limpopo Corridor is served by the rail line from Zimbabwe to Mozambique. The Corridor Mineral Sands project in Mozambique could benefit from development of this corridor. Historically, the Port of Maputo has served much of Zimbabwe's and northern Botswana's mineral exports. However, there is little potential for this corridor outside of the corridor sands in Mozambique.

(18) Trans-Cunene Corridor

The Trans-Cuenene Corridor connects the Port of Walvis Bay with southern Angola up to Lubango, over a distance of about 1,600 km. As stated in (9) Trans-Caprivi Corridor, the main mineral potential along this corridor lies in the copper mines of the Tsumeb area..

4.1.2 Current Infrastructure Situation of the Corridors

In this subsection and in Appendix D, the current situation of the infrastructure in each of the 18 focus corridors is comprehensively presented. This subsection sets out the current status of "hard" infrastructure development on (i) roads, (ii) ports, (iii) waterways, (iv) railways, and (v) inland container terminals. Cross-border transport facilitation ("soft" infrastructure) issues are separately elaborated in Section 4.3.

(1) Nacala Corridor

The Nacala Road Corridor connects the Port of Nacala with Malawi and Mozambique through the Nacala–Nampula–Cuamba–Mandimba/Chiponde–Mongochi–Liwonde–Dedza–Lilongwe–Mchinji/Chipata–Luangwa–Lusaka. However, the route is not currently functional since most of the road sections from Nampula to inland countries are currently in poor condition. A number of

feasibility studies, detailed designs, and construction for development of this route are ongoing with the assistance of JICA, AfDB, EU, and KXIM[2]. Among these projects, the Nacala Road Corridor Project led by AfDB and involving the other development partners over three phases covers most of the expected road development work. However, there are still some road sections in poor condition for which no financing source is currently available.

The Port of Nacala has a depth of 15 meters and is endowed with natural topographic features that do not require regular dredging. However, the port is currently used mostly for international trade from/to Mozambique with a relatively low volume of transit cargoes due to the undeveloped road corridor and inefficient railway. The container terminal and general cargo terminal are operated by CDN[3] under a concession. Operation of only a fuel terminal is directly under CFM.[4] Rehabilitation of the existing container terminal is under consideration with JICA assistance. There is a new project to develop a coal terminal at the other side of the current terminals in the bay to handle coal from the Zambezi area. Development of a refinery is also being considered.

Table 4.1.1 summarizes container traffic at the Port of Nacala in 2008, the most recent year for which full data was available.

Table 4.1.1 Container Cargo Handling Volume at the Port of Nacala in 2008

(Unit: TEUs)

	National Transport	International Transport		Transshipment	Total
		From/ to Mozambique	Transit		
Export	1,374	18,225	3,282	-	-
Import	2,153	17,394	2,681	-	-
Total	3,527	35,619	5,963	2,734	47,843

Source: CDN

Table 4.1.2 General Cargo Handling Volume at the Port of Nacala in 2008

(Unit: 1,000 tons)

	National Transport	International Transport		Transshipment	Total
		From/ to Mozambique	Transit		
Export	9.5	199.3	73.4		
Import	27.3	384.3	149.4		
Total	36.8	583.6	222.8	33.8	876.9

Source: CDN.

Regarding the railway service in Mozambique, currently CDN is in charge of operation of the Nacala Railway together with the port operation, through a concession contract. Looking at the current demand for rail cargo, there is more transport of imported and processed goods from the Port of Nacala to the inland, while transport of goods for export from the inland (domestic resource and inland countries) is relatively less, with a proportional comparison of roughly 75% to 25%.[5] In the future, there is the possibility of coal transport from Tete Province, which would require a rail line extension between Moatize and the rail network in Malawi.[6] While the

[2] Refer to Appendix D.4

[3] CDN stands for Corredor de Desenvolvimento do Norte, S.A.R.L., "the North Development Corridor". A total of 49% of CDN's shares are owned by CFM while the remaining 51% are held by private consortia. In 2009 the former main shareholder, the US-based Railroad Development Corporation (RDC), sold all of its shares to a Mozambican investment group called INSITEC, which is a subsidiary of the Commercial and Investment Bank (BCI).

[4] CFM stands for Caminhos de Ferro de Moçambique.

[5] Source: JBIC/Mitsubishi UFJ Research & Consulting (2008), *The Preliminary Study for Master Plan Formulation on Nacala Special Economic Zone (ZEEN)*, Final Report.

[6] Vale, a major Brazilian mining company, has already expressed interest in investing in a new railway line connecting Moatize to the Nacala Railway. A feasibility study of construction of a new line will be completed by

service level along this railway has deteriorated due to a shortage of locomotives and wagons,[7] there have been recent improvements.

Regarding the railway in Malawi and Zambia along the Nacala Corridor, freight service is the main income source for Central East African Railways (CEAR), which is in charge of railway operations in all of Malawi. Similar to same case of CDN of Mozambique, the service level has deteriorated due to a shortage of locomotives and wagons and aging rail track, among other reasons. An important issue as now is vandalism to the rail track, which has caused heavy damage on critical structures, especially on bridges.[8] As a consequence, the section between Salima and Lilongwe is reported to be in extreme danger. Regarding the section southward from Blantyre and Limbe, the line has not been operated for more than 10 years as a result of the destruction of Chiromo Bridge, located near Bangula, caused by a severe flood in 1997. To connect Malawi with the Port of Beira by the shortest path, it is of urgent necessity to rebuild this section; however, there are no financial sources within CEAR for capital investments.[9]

Regarding inland container terminals (depots), it is reported that customs clearance and other procedures take 1–2 days for exports and 6–7 days for imports (which is faster than at the Port of Beira).[10] In contrast, for cargo transported to Malawi by the Nacala Railway, it takes about 25 days on average from the arrival at the port to arrival in Malawi,[11] due to the inefficiency of transshipment from sea transport to railway, mainly a result of the lack of locomotives and (freight) wagons rather than customs clearance constraints.

(2) Beira Corridor

The Beira Corridor serves road transport along the Beira–Mutare–Harare–Chirundu–Lusaka Route, which overlaps with the Harare–Chirundu–Lusaka section of the North–South Corridor, and the Beira–Tete–Blantyre Route, the so-called Tete Route, and the Beira–Nhamilabue–Nsanje–Blantyre Route, the so-called Sena Route, as the shortest route to the sea for inland countries including Malawi, Zambia, and Zimbabwe. For these inland countries which rely on foreign trade, it is important to secure some alternative corridors. However, the current condition of many road sections along the Tete and Sena Routes is not good. While rehabilitation is ongoing along some sections, financing has not been identified for the development of many of other sections.

The Port of Beira is the hub of the Beira Corridor and serves as the world's gateway to Mozambique, Malawi, Zimbabwe, and Zambia. As with other major ports in the region, the container handling volume at this port has been increasing rapidly in recent years; data for 2008 are presented in Table 4.1.3. However, because of limited channel depth, currently only feeder services mainly from Durban are available at this port (except for one small vessel from Europe) without any transshipment.

2011, after which Vale will decide upon a viable option for transporting Moatize coal to Nacala Port. The Australian mining company "Riversdale" is also planning to transport coal in Moatize to the Indian Ocean, mainly through the Sena Railway Line. (Source: Interview with CCFB).

[7] A report by the USAID/Southern Africa Global Competitiveness Hub concluded that "CDN has not demonstrated success. It is closely tied to the Malawi concession and performance there has been lacking." (Source: USAID/Southern Africa Global Competitiveness Hub (2009), T*echnical Report: Review of the Effectiveness of Rail Concessions in the SADC Region*).

[8] Interview with Central East African Railways.

[9] According to CEAR, the annual operating revenue is MWK 390 million (equivalent to USD 2.7 million) on average while the annual maintenance cost exceeds MWK 60 million (equivalent to USD 450,000) on average, which accounts for 15% of the total revenue.

[10] Source: JICA (2007), *The Project Formulation Study on the Promotion of Industrial Development in Major Corridor Areas in Mozambique.*

[11] See previous footnote.

Table 4.1.3 Container Cargo Handling Volume of Port of Beira by Transit Countries in 2008

(Unit: TEUs)

	Mozambique	Zimbabwe	Malawi	Zambia	DRC	Cabotage	Total
Export	18,445	2,113	7,712	696	0	-	28,966
Import	15,344	2,268	10,548	4,866	93	-	33,119
Total	33,789	4,381	18,260	5,562	93	2,886	64,971

Source: Cornelder.

The container and bulk terminals are operated by Cornelder, which is also the container terminal operator of Pemba Port with a large share held by a Dutch company under a 25-year concession; the other terminals (such as oil and coal ones) are operated by CFM, which is also responsible for future development of the port as well as dredging. The significant bottleneck at this port has been the lack of channel depth due to insufficient dredging. Although one dredger for maintenance dredging was provided by Japan in 2000 and another was added in 2007, the capacity of these dredgers has been insufficient for restoration of the Port of Beira. In order to address this problem, a project for restoration of the Port of Beira access channel to its original design characteristics with a depth of 8 m was planned to commence in January 2010 with a total project budget of EUR 43 million, funded by CFM, EIB, and ORET. The sandy materials dredged from the channel will be used as reclamation materials for the new coal terminal planned to be developed north of the oil terminal. In addition, a new dredger with a capacity of 2.5 million cubic meters will be provided by DANIDA in 2011.

For the railway operation, Companhia Dos Caminhos De Ferro Da Biera (CCFB, the Beira Railway Company) was established with a 25-year concession. The Beira rail system comprises two rail lines: (i) a 317-km Machipanda line (Beira Railway) linking Beira Port to the railway network in Zimbabwe (along the Beira Corridor); and (ii) a 600-km Sena line linking Beira Port to the Moatize coal mines via Inhamitanga, Caia, and Vila de Sena (along the Sena Corridor). While the operation of the Sena line or Sena Railway was terminated for more than 20 years due to civil war, the rail transport capacity was refocused to utilize the mining potential around Moatize and to enhance the connectivity from Beira Port to southern Malawi. CFM first started to revitalize the Sena Railway and CCFB is currently implementing a rehabilitation and reconstruction project along the entire line with the financial support from the World Bank and EIB. The Beira Railway (the Machipanda line) now carries a certain amount of traffic (mainly import/export goods from/to Zimbabwe and Zambia) and requires relatively little investment to continue operating profitably.[12] On the other hand, the Sena Railway requires extensive rehabilitation, and although the estimated economic benefits are substantial, due to a relatively slow growth of traffic it is said that the line is not commercially viable without a high share of public sector financial support. This issue may become less important after realization of several ongoing development plans for large-scale coal mining at Moatize; even now it is necessary to consider alternative routes to transport coal because of restrictions on the transport capacity of the rail track, even after rehabilitation.

(3) Maputo Corridor

The Maputo road corridor, with a distance of 500 km, connects the Port of Maputo in Mozambique and Johannesburg via the Lebombo/Ressano Garcia border crossing. Except for the part of the road about 100 km from the port to the border, the road is located within South Africa and is in relatively good condition.

The port is operated by the Maputo Port Development Company (MPDC) under concession to CFM (Empresa Portos e Caminhos de Ferro de Mozambique). Due to significant congestion at

[12] Interview with CCFB.

the Port of Durban, the Port of Maputo serves as a major feeder hub of the Port of Durban. Most cargo handled at the Port of Maputo is transported from/to Johannesburg with the advantage that it is the closest port to Johannesburg. While MPDC maintains a regular dredging program and part of the port master plan calls for further deepening of the channel to facilitate Panamax class vessels as demand arises, dredging to date perhaps remains less than what is required. The facilities at Maputo including cranes and warehouses are somewhat deteriorated. It is expected that the cargo demand will reach the port's capacity within a few years. In order to address the capacity limitations of the Port of Maputo, Mozambique is currently planning to develop a new deepwater port for petroleum at Techobanine, which is located south of Maputo. The new port will be the deepest port in Mozambique.

Regarding the railway along the corridor, the line extends from Maputo to Pretoria via Ressano Garcia, the border crossing between Mozambique and South Africa, with a total length of 580 km. The line on the Mozambique side is called the "Ressano Garcia Railway Line". The route follows the shortest path from Johannesburg to a port in the Indian Ocean (the Ports of Maputo and Matola) and the potential of rail transport along the corridor has been well recognized. On the other hand, the rail line is in excellent condition after cancellation of the rail concession and CFM invested USD 40 million to rehabilitate the line. Currently, rail freight transport along the Maputo Corridor consists of mainly bulk cargo, and container volumes are increasing with recent direct shipping calls to the Far East into the port of Maputo (including South African coal exports en route to the Matola Coal Terminal in Mozambique). Considering that the congestion at the Port of Durban will reach critical levels, importers and exporters are increasingly looking towards the port of Maputo as an alternative. In addition, railway service along the Maputo Corridor is now being refocused, following the revival of development cooperation between the South African rail operator Transnet (Spoornet) and the Mozambican state-owned company CFM.[13] While the line had a capacity of more than 9 million tons in 2009, traffic was only 2.5 million tons due to severe rolling stock shortages experienced by shippers. Most of this traffic is expected from smaller mines and coal for specialized markets that may lead the Port of Maputo to compete with Richards Bay, a bulk port in South Africa.[14]

While CFM still holds management responsibility for port and railway operations in Mozambique, the government decided to introduce privatization to the railway operation in 1991 and terminated subsidies to the port and railway operations in 1995. The government of Mozambique first decided to negotiate a concession for the Ressano Garcia Railway with a South African consortium led by New Limpopo Projects Investments (Pvt) Ltd. (NLPI) and Spoornet (Transnet). After five years spent in selecting a concessionaire,[15] a concession was finally awarded to the above-mentioned consortium plus CFM in December 2002. The duration of the concession agreement is 15 years, aiming at the privatization of the railway from the South African border through to the Ports of Maputo and Matola. However, in November 2005, the Government of Mozambique cancelled the rail concession, on the ground that the concessionaire did not substantially start to operate the line and invest in its rehabilitation. Finally, in 2006, the Government of Mozambique decided to continue operation under CFM[16] and the operation of the line was again handed over to CFM, which had operated the line 11 years earlier. The early attempt to concession the Ressano Garcia Railway can be concluded as a failure. However, the line has been fully rehabilitated and it is expected that it will be capable of handling the projected increases in traffic by running 28 slots per day with 60 wagons of net weight per wagon totaling a net weight per train of 3,600 tons.

[13] Interview with Maputo Corridor Logistics Initiative (MCLI).
[14] USAID/Southern Africa Global Competitiveness Hub (2009), *Technical Report: Review of the Effectiveness of Rail Concessions in the SADC Region.*
[15] Although this consortium won the concession in December 1997, an agreement was not reached due to internal difficulties within the consortium and the deal was terminated in February 1999.
[16] CFM and Transnet (Spoornet) signed an agreement of cooperation on the railway line in October 2006.

(4) North–South Corridor

There are two major routes of the North–South Corridor: (i) the Durban–Johannesburg–Beitbridge–Harare–Chirundu–Lusaka Route and the Durban–Johannesburg–Lobatse–Gaborone –Kazungula/Victoria Falls–Livingstone–Lusaka Route. The road corridor serves more than a half of the road transport to/from Botswana, Zimbabwe, Zambia, and Malawi. Basically, export cargos from these inland countries are transported through this road corridor to the Port of Durban and trucks with import cargoes from overseas and also South Africa return to those countries. Road conditions except those on some sections in Zambia that are currently under construction or planned to be developed are good or fair. However, the roads along this route tend to be damaged easily due to the heavy cargoes hauled, typified by copper from Zambia, which is transported by road due to limitations in railway transport capacity. The border crossing points between Zimbabwe/Botswana and Zimbabwe/Zambia are separated by the Zambezi River and have also been major bottlenecks. Although in 2002 a new Chirundu Bridge was constructed with a Japanese grant, the Kazungula border crossing currently lacks a bridge and therefore relies on two pontoons for ferry service. In response, the Feasibility Study on Kazungula Bridge Construction has been funded by AfDB with the study to be completed during first quarter of 2010, under the SADC North–South Transport Corridor Improvement Study. The new bridge is expected to dramatically reduce traffic congestion at the Kazungula border crossing; in addition to serving road transport, it will include provision for railway transport.

The Port of Durban has had the largest share of containerized cargo in Africa handling about 65% of the total containers through South African ports. Almost all major shipping lines including Maersk, MSC, OOCL, COSCO, EMC, PIL, NYK, Mitsui OSK, and K Line, make calls at this port, many of which use transshipment via feeder services from the Port of Cape Town. Durban is a hub of the North–South Corridor, serving as a gateway to international trade not only to/from South Africa, but also to/from Botswana, Zimbabwe, Zambia, and Malawi. The volume of container cargo handled at the Port of Durban, which reached 2.64 million TEUs in 2008, has been increasing rapidly as have throughputs at other major ports in Africa, following containerization and economic growth in the region. With the recent rapid increase in cargo handling volume, the port has been heavily congested, which has led to delays in container handling operations. Table 4.1.4 presents data on container traffic handled at the Port of Durban in 2008, the last full year for which data was available.

Table 4.1.4 Container Handling at the Port of Durban (2008)

(Unit: TEUs)

Landed	**Full**	**Empty**	**Total Landed**
Deep sea	839,755	140,686	980,441
Coastwise	5,998	6,443	12,441
Transshipped	223,533	70,135	293,668
TOTAL LANDED	1,069,286	217,264	1,286,550

Shipped	**Full**	**Empty**	**Total Shipped**
Deep sea	668,669	358,524	1,027,213
Coastwise	13,345	18,074	31,419
Transshipped	225,600	71,383	296,983
TOTAL SHIPPED	907,634	447,981	1,355,615

GRAND TOTAL 2008:	**1,976,920**	**665,246**	**2,642,165**

Source: TPT, Ports Authority of the Republic of South Africa

The railway system along the corridor in Zambia is comprised of two main lines: (i) a line from Livingstone (Victoria Falls) to the northern border to the DRC via Lusaka, Kapiri Mposhi, and Copperbelt cities (along the North–South Corridor); and (ii) a line from Kapiri Mposhi to the northeast border to Tanzania, which is called the TAZARA railway (along the Dar es Salaam Corridor). The government of Zambia determined to privatize its railways in March 2000 and Railway Systems of Zambia (RSZ) was awarded the concession for Zambia's railway system except for the TAZARA line. RSZ operates the line from the Zambian Copperbelt to Livingstone, where the railway system joins the Beitbridge Bulawayo Railway (BBR) system, with the same company operating the RSZ and BBR concessions. For USD 250 million, RSZ was awarded a 20-year freight rail operation concession and a 7-year passenger train operation between Livingstone and Kitwe.[17] In Botswana, Botswana Railways (BR) operates a railway network consisting of a main line (from Ramatlabama to Bakaranga via the capital city Gaborone) and two branch lines.

In Zimbabwe, National Railways of Zimbabwe (NRZ), a parastatal company, has managed the operation of railway services. In 2005 the ownership of the physical infrastructure assets was transferred to the government, with the result that NRZ is now only in charge of railway operation. In addition, a concession contract was concluded in 1997 between Beitbridge Bulawayo Railway (Pvt) Ltd (BBR) and NRZ. The construction of a new 317-km section between Beitbridge and Bulawayo was then implemented by BBR through a 30-year build, operate, and transfer (BOT) scheme, and completed in May 1999. With this new line, the time required from Durban in South Africa to the Copperbelt in Zambia and DRC was shortened by about one week compared to that before construction.[18] The concession has been successful in terms of improving service along the corridor, reducing transit times, and reducing concession fee payments made to the government.[19] Such a successful railway concession is a very exceptional case in Southern Africa.

(5) Trans-Kalahari Corridor

While the road conditions along the Trans-Kalahari Corridor are relatively good, a missing portion of the railway line and Walvis Bay Port have become bottlenecks. The railway along this corridor mainly serves coal exports from Botswana. TransNamib, a parastatal enterprise, is in charge of operation of the railway network in Namibia, consisting of 2,883 km, which includes the sections from Walvis Bay to Gobabis via Windhoek along the Trans-Kalahari Corridor. A proposed Trans-Kalahari Railway Project, which would connect Walvis Bay Port and Lobatse in Botswana over a distance of about 700 km, is now under consideration. The project would enhance connectivity between Namibia and Botswana as well as Gauteng Province in South Africa. The total project cost is estimated at about USD 1.4 billion.

The Port of Walvis Bay has no delays in meeting ship schedules or in cargo handling unlike other ports in Southern and West Africa due to smooth berthing when loading and unloading cargo from the vessels. There was an obvious and remarkable increase in container cargo handling volume in 2008 (the last year for which full data was available), when 200,719 TEUs were handled compared to 83,263 TEUs in 2005/6. Currently, a feasibility study of a new container terminal at this port is ongoing with the assistance of JICA. Construction is planned to commence in 2010.

[17] Phipps (2009) Review of Railway – Concessions in the SADC Region, *Southern Africa Global Competitiveness Hub.*
[18] See previous footnote.
[19] See previous footnote.

(6) Dar es Salaam Corridor

The Dar es Salaam Corridor originates from the Port of Dar es Salaam and provides access to/from the landlocked countries of Zambia, Malawi, and the DRC. Currently, most of the freight moving along this corridor is from/to Zambia through the Dar es Salaam (Tanzania) – Mikumi (Tanzania) – Iringa (Tanzania) – Makambako (Tanzania) – Mbeya (Tanzania) – Tunduma (Tanzania)/Nakonde (Zambia) – Isoka (Zambia) – Chinsali (Zambia) – Mpika (Zambia) – Serenje (Zambia) – Kapri Mposhi (Zambia) – Lusaka Route. Although the condition of most of the road sections along this route is relatively good, a section from Chinsali to Serenje has been damaged and spot rehabilitation is required. The underlying issue is that a number of heavy vehicles hauling copper from Zambia rely on this road corridor due to railway capacity limitations, which leads to road damage in the short term.

The Port of Dar es Salaam is the hub of the Central Corridor, serving as a gateway for international trade, through which export and import goods are hauled not only to/from origins/destinations in Tanzania, but also to/from Zambia, Burundi, and Rwanda. The port also handles, although in lesser volumes, cargo for Malawi, Uganda, Zimbabwe, and the eastern DRC. It requires regular dredging. The port container terminal has been seriously congested, with an average dwell time reported as 26 days in 2008. Because of the rapid economic growth in the region, the container handling volume has exceeded the planned container terminal capacity in recent years. Complicated port procedures involving various stakeholders and a high inspection rate are also key factors causing the long dwell time, reducing the cargo handling capacity.

The operation of the Tanzania–Zambia Railway Authority (TAZARA) railway has been jointly managed by the governments of Tanzania and Zambia through the establishment of a state-owned company. The line was heavily utilized at the time of apartheid in South Africa since its neighboring countries used the Port of Dar es Salaam for foreign trade. Currently, the transport volume has been increasing with the growing imports of products from China and exports of mining products from inland countries. A privatization program was considered but SADC urged that a suitable and appropriate operating structure be found for TAZARA, which would allow for improved and sustainable operations in the future, considering that a complete concession seems to be unattractive at the moment. For upgrading of the railway system as a whole, the Government of China provided a USD 10 million loan without interest in 2004, to procure facilities and equipment (e.g., spare parts, rail track, locomotives, communication equipment, cranes) as well as staff training.

(7) Mtwara Corridor

The Mtwara Corridor connects the Port of Mtwara in Tanzania with Malawi and Zambia through the Mtwara–Masasi–Mangaka–Tunduru–Songea Route. However, currently only the road from Mtwara to Masasi is surfaced. Although improvement of some sections has been committed by AfDB and other development partners (e.g. JICA and MCC), there are still long sections of missing links without any financing source for future development.

Mtwara is a natural basin port with a depth of 10 m and a total berth length of about 300 m. Because land transport from/to the port has not been well developed, currently traffic through this port is relatively low. There is a plan to develop the port with an industrial park, for which the Government of Tanzania has purchased land around the port. However, no clear plans for the future development of this port have been formulated.

(8) Lobito Corridor

The Lobito Road Corridor connects the Port of Lobito in Angola with major mining regions in the DRC and Zambia, providing the shortest route to the sea. The total length of the corridor is about 1,800 km. However, the existing road network needs rehabilitation in order for it to be effective route.

This Lobito Railway Corridor is designed around the rehabilitation of the Lobito rail line linking the Port of Lobito with the DRC/Zambian Copperbelt. Construction of the Benguela railway began in 1903 and was finished in 1929. In 1931 the newly opened Angolan port of Lobito received the first copper load from Katanga, DRC. Companhia do Caminhos de Ferro de Benguela (the Benguela Railway Company) was established in 2001. Although the Copperbelt in southern DRC and Zambia was connected with the Port of Lobito by railway before, the railway service has been terminated since the Angolan civil war. Rehabilitation of the railway section between Munhango and Luau was commenced in February 2009. The Chinese construction enterprise China Railway 20 Bureau Group Corporation (CR-20) will finish the replacement of trails in May 2010 and the inauguration of passenger train service between Lobito to Luau is expected in 2011.[20]

(9) Trans-Caprivi Corridor

The Trans-Caprivi Highway links the Port of Walvis Bay and the inland areas of Zambia with the southeastern region of the DRC, through Zambia (Livingstone and Lusaka). This 2,500 km road corridor was completed in 2008 after the opening of Katima Mulilo bridge in 2004. The condition of the road corridor is relatively good.

Although the current railway link is available only between the Port of Walvis Bay and Grootfontein (600 km), TransNamib is operating the railway section between Walvis Bay and Tsumeb via Usakos along the Trans-Caprivi Corridor. After the civil war in Angola and the destruction of the Benguela Railway, the SADC region had no direct railway link to the west coast. In particular, the mining sector in the Zambian Copperbelt has sought a rail-based import/export route via Walvis Bay Port to optimize the supply chain and global competitiveness. Currently, a study for Trans-Caprivi Railway Project is ongoing by the Governments of Namibia and Zambia.

(10) Trans-Oranje Corridor

The Trans-Oranje Road Corridor links the Port of Lüderitz, the second largest port in Namibia, and the Port of Walvis Bay, to Johannesburg through Windhoek. The total length from the Port of Lüderitz to Johannesburg is 1,678 km.

TransNamib is also operating the railway sections (i) between Windhoek and Keetmanshoop, and (ii) between Keetmanshoop and Lüderitz via Aus, both along the Trans-Oranje Corridor. The line between Lüderitz and Aus along the corridor was constructed during the colonial era. With the completion of the rehabilitation work at the port of Lüderitz in 1998, upgrading of the rail track was planned in order to accommodate the future traffic volumes, mainly consisting of mining products, to be exported through the new facilities at the port.

(11) Shire–Zambezi Waterway

The purpose of this project is to reopen the Shire–Zambezi Waterway from an inland port Nsanje in Malawi to the Port of Chinde in Mozambique, a distance of about 238 km. This would

[20] CFB Benguela Raiway website http://www.cpires.com/.

enable barges and medium seagoing vessels to ply between Chinde and Nsanje, thereby providing direct waterway access to the Indian Ocean.[21]

(12) Malange Corridor

The Malange Corridor development initiative is led by the Government of Angola and follows the Luanda–Ndalatando–Malange axis. The corridor is also being planned to link the mineral-rich areas in Angola with the Port of Luanda (Malange Corridor) and Namibe Port (Namibe Corridor). The Malange initiative will include development of the intermodal infrastructure connections at the Port of Luanda, reorganization of the maritime terminal, modernization of the technical nautical services units, modernization of navigational aids, and development of a dry port in Viana, on the western outskirts of Luanda. The railway line to Malange, capital of the province of Malange, has been extensively rehabilitated by Chinese firms, while the road also has been rehabilitated. Reconstruction of the railway line is scheduled to be completed by the end of 2009. The road is the main vehicle link to the diamond-rich eastern provinces of Lunda Norte and Lunda Sul, major earners of foreign income for Angola.

(13) Namibe Corridor

The Namibe Corridor is also being planned to link the mineral-rich areas in Angola with the Port of Namibe, together with the development initiative of the Malange Corridor. The Namibe Corridor will incorporate the development of a dry port at Lubango, development of multimodal facilities at the Port of Namibe port, and reconstruction and modernization of the Port of Namibe.

(14) Central Corridor

The Central Corridor is a key route for East Africa, serving as a gateway to the sea for not only central and western Tanzania but also for Uganda, Burundi, Rwanda, and eastern DRC.

The Central Railway Corridor includes the Dar es Salaam–Kigoma railway line network (1,254 km), connecting Bujumbura by boats on Lake Tanganyika, and to Rwanda by road. The road route is from Dar es Salaam via Dodoma, Singida, Nzega to Lusahunga into Rwanda and Burundi. Neither the road nor the rail networks is in good condition, especially from Dodoma up to Lake Tanganyika. Although various development partners and the Government of Tanzania have been conducting road rehabilitation/upgrading projects along this route, there has been no major improvement of the railway system, although AfDB has undertaken a feasibility study of a railway extension.

(15) Trans-African Highway Cairo–Gaborone Corridor

The standard of the Cairo–Gaborone section of the TAH is high in Egypt and along the southern sections of this corridor. The major capitals along this corridor generate average daily traffic of 4,000–5,000 vehicles per day or above.[22] Most of this traffic is local but there is also a fair level of long-distance, international movements of passengers and freight along the corridor, particularly along the central and southern sections. (Note that only the sections in Tanzania were considered in this Study.)

(16) Trans-African Highway Tripoli–Windhoek Corridor

War and civil turmoil, in combination with difficult terrain and climatic conditions, have discouraged the development of the TAH Tripoli–Windhoek Corridor. In particular, along the

[21] AllAfrica.Com http://allafrica.com/stories/200908110912.html.

[22] African Development Bank and United Nations Economic Commission for Africa, *Review of the Implementation Status of the Trans African Highways and the Missing Links,Vol.1, Main Report, 2003.*

central and southern road sections of this corridor, which include those in and Angola and the DRC, are severely damaged. (Note that only the sections in Angola, the DRC, and Namibia were considered in this Study.)

(17) Limpopo Corridor

Many sections of the Limpopo Road corridor are currently in bad condition and their improvement is essential to stimulate economic development along this corridor. Both the rail line and road along the Limpopo Corridor are currently being rehabilitated. Also, the road link between the Maputo Corridor and the Xai Xai Pafuri route is under consideration, together with the building of a bridge across the Limpopo River near Crooks Corner. The Limpopo Railway line was concessioned to Consortia 2000, a Portuguese-led consortium.

(18) Trans-Cunene Corridor

The Trans-Cunene Corridor carries the largest volumes of transit cargo imported through the Port of Walvis Bay mainly serving southern Angola. The road corridor links the Port of Walvis Bay with Lubango in southern Angola, over a distance of 1,600 km. Currently, the Government of Angola is planning road rehabilitation along the corridor including along a Lubango–Santa Clara section.

The railway corridor diverges from the road corridor at Otavi and runs up to Ondangwa. The total length of the railway link from the Port of Walvis Bay to Ondangwa is about 850 km. There is a missing rail link between Namibia and Angola along the corridor. The Governments of Angola and Namibia formally agreed to develop a new railway line along the Trans–Cunene Corridor in May 1997.[23] Construction of a new railway section connecting Tsumb and Oshikango, between Ondangwa and Oshakati, was commenced in 2001, and reached Ondangwa in 2006. The full section between Ondangwa and Oshikango will be completed around 2011. The new railway line between Tsumeb and Oshikango is an extension of the existing railway network in Namibia, which will enable to provide inter-regional rail connectivitiy between/among Namibia, Angola, Namibia, and South Africa. The condition of the road along this corridor is relatively good.

4.1.3 Infrastructure Bottlenecks under the Growth Scenarios

The detailed analysis in the previous two subsections elaborated the current situation of industrial distribution and the state of infrastructure along the corridors. Based on these facts, specific issues and bottlenecks will be examined in this section, with reference to each growth scenario set out in Chapter 3.

(1) Bottlenecks under Scenario a)

In Scenario a), mineral resources led development will be promoted through: (i) investment by major mining companies will be made in the sector, which is expected to resume fully after the current global financial crisis; (ii) investment in related sectors will be induced as the basic supporting infrastructure (including transport and electric power) required for development is constructed; and (iii) public and private investments in energy development projects will be promoted to provide sufficient electric power supplies.

As indicated in Section 4.1.2, the transport of mineral resources mined and/or smelted in the region heavily depends on road transport, leading to costly and repeated maintenance requirements. Railway transport, which is better suited to the transport of heavy, bulk commodities, is a superior mode for the transport of mineral resources, but it is currently

[23] Interview with Ministry of Transport of Namibia.

underutilized due to poor track conditions, a shortage of (freight) wagons and locomotives, and the failure of privatization initiatives. In addition, there are a number of missing links in the region's railway network along the east-west corridors, as well as serious track damage caused from Mozambique's civil war. The ports located at the end of east-west corridors generally have insufficient capacity for exporting mineral resources, except for some ports in South Africa and Namibia. Regarding the problem of electric power shortages, investors tend themselves to secure the large-scale electric power supplies required for resource development.

Specific examples of bottlenecks along the selected corridors are described below:

(i) Roads tend to be damaged easily along the **North–South Corridor**, with heavy cargoes (e.g., copper and cobalt from Zambia and Katanga Province, DRC) necessarily transported by road due to limitations in railway transport capacity along this corridor.[24] At present, transporting a single consignment of copper from the DRC Copperbelt to the southern ports or to Dar es Salaam port takes 2–3 weeks, while in Europe the same distance could take only 48 hours.[25], [26] In order to reduce road damage, weighbridges have recently been installed at major road sections in Malawi and Zambia, although some of them are not functioning properly.

(ii) The Government of Mozambique cancelled the rail concession along the **Maputo Corridor** in November 2005 on the ground that the concessionaire did not substantially start to operate the line and invest in its rehabilitation. In 2006 the Government decided to continue operations under Caminhos de Ferro de Moçambique (CFM)[27], which had operated the line 11 years earlier. This attempt to concession the Ressano Garcia Railway can be concluded as a failure. At present, the line is undergoing major rehabilitation and is expected to be capable of handling projected increases in traffic.

(iii) The hub of the **Beira Corridor**, the port of Beira, serves as the gateway to Malawi, Mozambique, Zambia, and Zimbabwe, and the number of containers it has handed has been increasing rapidly in recent years. However, because of the limited channel depth, currently only feeder services mainly from Durban are available at this port (except for one small vessel from Europe) without any transshipment cargoes. Although one dredger was provided by Japan in 2000 and another was added in 2007, the capacity of these dredgers has been insufficient to adequately increase channel depth.[28]

(iv) Along the **Sena and Tete Corridors** (considered to be of the **Beira Corridor** in this study), the Moatize coal fields in the Zambezi valley are currently being developed by Vale of Brazil and Riversdale of Australia, both having plans to export coal via the port

[24] The rail transport system as a whole operates at well below its original design capacity, although some railway sections require refurbishment and upgrading and improvement in operations, and consequently suffer from poor efficiency and hence capacity constraints, including speed restrictions, a shortage of operational railway wagons, a shortage of available locomotives, and a lack of operating capital for the purchase of spares and fuel. COMESA/SADC/EAC, *North–South Corridor Progress Report and Way Forward Paper Prepared for the North-South Corridor Meeting of Ministers*, 7 December 2009 Lusaka, Zambia.

[25] *Mining Weekly*, 10 April 2009.

[26] However, the performance of the concession of the Railway System of Zambia (RSZ) has reportedly been successful in avoiding a deterioration of the railway infrastructure and equipment. Notably, freight service over a long-haul corridor has been significantly improved compared with the previous situation. Also, regarding the Beitbridge Bulawayo Railways (BBR) in Zimbabwe, the time required from Durban in South Africa to the copper belt in Zambia and the DRC was shortened by about one week compared to that before the concession. USAID/Southern Africa Global Competitiveness Hub, *Technical Report: Review of the Effectiveness of Rail Concessions in the SADC Region*, 2009.

[27] CFM and Transnet (Spoornet) signed an agreement of cooperation on the railway line in October 2006.

[28] In order to address this problem, a project for restoration of the Port of Beira access channel to its original design characteristics with a depth of 8 m was planned to start in January 2010 with a total project budget of EUR 43 million, funded by CFM, EIB, and ORET. The sandy materials dredged at the channel will be used as reclamation materials for the new coal terminal planned to be developed north of the oil terminal. In addition, a new dredger with a capacity of 2.5 million cubic meters will be provided by DANIDA in 2011. (Source: Interview with CFM Beira Office)

of Beira. However, considering the physical limitations of this port, there are now detailed investigations into developing the Nacala Corridor to act as the main export route of the coal from Moatize. Figure 3.1.1 showed mineral resource distribution in Southern Africa.

(2) Bottlenecks under Scenario b)

In Scenario b), growth through intra-regional trade will be realized through (i) improved productivity and incomes in neighboring countries in the region through local procurement (e.g., of raw materials including agricultural products, services) by South African companies; (ii) induced investment by foreign companies (e.g., in consumer goods, agricultural processing, tourism, other services), resulting in the expansion of external trade with markets outside the region; and (iii) expansion of intra-regional trade that does not go through South Africa, including trade in agricultural products and livestock, intermediate goods, and consumer goods. This scenario is based on the hypothesis that the presence of South Africa in mineral resources development and infrastructure development will decrease and that the both physical distribution centering South Africa and that surrounding South Africa will be activated.

However, as indicated in Section 4.1.2, some part of the physical infrastructure along north–south corridors (especially bridges over large rivers) are not sufficiently developed. Furthermore, the smooth flow of goods and services is hindered by a lack of adequate "soft" infrastructure (e.g., institutions, policies, regulations). In the east-west direction, many road and railway sections are not functioning well, due to the following:

(i) Transport between South Africa and landlocked countries is hindered by barriers related to inefficient border clearance.
(ii) The rehabilitation and upgrading of some road sections along the east-west corridors is required.
(iii) There are a number of missing links in the railway along the east-west corridors, as well as sections urgently requiring track rehabilitation due to damage during civil war (which is a bottleneck that was mentioned in the previous section.).
(iv) Intermodal links are weak (e.g., road <=> railway, port <=> railway).

Specific examples of bottlenecks along the selected corridors are described below:

(i) Along the **North–South Corridor**, the border crossing points between Zimbabwe/Botswana and Zambia are separated by the Zambezi River and have been major bottlenecks. Although in 2002 a new Chirundu Bridge was constructed with a Japanese grant, the Kazungula border crossing currently lacks a bridge and therefore relies on two pontoons for ferry service. In addition, since the existing bridge for both railway and road transport at Victoria Falls, 60 km from Kazungula, is old, only trucks with loads of less than 20 tons are permitted to cross. In response, AfDB has been conducting a Feasibility Study on Kazungula Bridge construction, with the study planned to be completed during first quarter of 2010, under the SADC North–South Transport Corridor Improvement Study. The new bridge is expected to dramatically reduce traffic congestion at the Kazungula border point; in addition to serving road transport, it will include provision for railway transport.
(ii) On the **Tete Corridor** (considered to be part of the **Beira Corridor** in this study), the long suspension bridge (Samora Machel) over the Zambezi River, located at the western Mozambican city of Tete, has become a serious bottleneck on the main highway between Zimbabwe and Malawi, which connects with the North–South Corridor. The bridge was built in the 1970s in the Portuguese colonial era, and has been undergoing

major rehabilitation since September 2009.[29]

(iii) The **Nacala Corridor** route is not functioning well since most of the road sections from Nampula to inland countries are in poor condition (not paved). Although a number of feasibility studies, detailed designs, and construction works for development of this route are ongoing with the assistance of foreign development partners, there are some road sections in poor condition for which no financing source is currently available.

(iv) Regarding **the railway connection between Botswana and Namibia along the Trans-Kalahari Corridor**, a new construction project is planned, to connect Walvis Bay Port and Lobatse in Botswana, a distance of about 700 km. The project would enhance connectivity between Namibia and Botswana as well as with Gauteng Province in South Africa. The total project cost is estimated at about USD 1.4 billion.

(v) Regarding the **intermodal connection between the port and rail facilities along the Nacala Corridor**, it is reported that customs clearance and other procedures at the Port of Nacala take 1–2 days for exports and 6–7 days for imports, although this is quicker than at the Port of Beira.[30] In contrast, for cargo transported to Malawi by the Nacala Railway, it takes about 25 days on average from the arrival at the port to arrival in Malawi,[31] due to the inefficiency of transshipment from sea transport to the railway, mainly because of the lack of locomotives and (freight) wagons rather than customs clearance constraints.

Details on "soft infrastructure" constraints at specific border crossings are presented in Section 4.3.

(3) Bottlenecks under Scenario c)

In Scenario c), growth through diversification and advancement of industrial structure will be achieved, with (i) greater intra-regional trade with improved broader-based infrastructure and regulatory systems; (ii) improvements in production cost structure realized through a reduction in distribution costs and customs tariffs; (iii) advancement and diversification of industrial structures, which will strengthen competitiveness in markets outside the region; and (iv) with more efficient access to trading ports for each country, greater entry into outside markets.

However, as indicated in Section 4.1.2, the current situation of physical infrastructure leads to high distribution costs and does not provide efficient access to trading ports. Again, along east-west corridors, many road and railway sections have not been rehabilitated or upgraded. Moreover, the ports have insufficient capacity to cope with larger trading volumes.

More precisely, infrastructure constraints include:

(i) Rehabilitation and upgrading of some sections in the road network along the east-west corridors are required, as noted in the previous subsection.

(ii) There are a number of missing links in the railway network along the east-west corridors, as well as unusable track due to damage during civil war (again, as indicated in the previous subsection.).

(iii) The ports located at one end of the east-west corridors generally have insufficient capacity to cope with increasing traffic.

[29] The local news media reports that "the Tete bottleneck will be finally solved when a new bridge over the Zambezi is built, seven kilometres downstream from the Samora Machel bridge". AllAfrica.Com at http://allafrica.com/stories/200912290911.html.

[30] JICA, *The Project Formulation Study on the Promotion of Industrial Development in Major Corridor Areas in Mozambique* (originally from CPI), 2007.

[31] See previous footnote.

(iv) There is competition between and among ports in the region.

(v) EPZs/FTZs/industrial parks and various transport modes are not well connected (especially the connection between EPZ/FTZ and railway is lacking).

Specific examples of bottlenecks along the selected corridors are described below:

(i) Regarding **road transport along the Trans-Caprivi Corridor**, the route provides the shortest route between the Namibian ports of Lüderitz and Walvis Bay and Livingstone, Lusaka, and even Lubumbashi in the DRC. With completion of the Katima Mulilo bridge in 2004, one of the major bottlenecks was eliminated but there is still some road sections that need to be rehabilitated and upgraded, especially on the Zambian side.

(ii) Regarding **railway links along the Trans-Caprivi Corridor**, there is a missing link between Grootfontein (where transshipment facilities are available) and the Namibia/Zambian border. The Trans-Caprivi Railway Project is being studied by the governments of Namibia and Zambia. After the civil war in Angola and the destruction of the Benguela Railway, the SADC region had no rail direct connection to the west coast. Especially the mining sector in the Zambian Copperbelt seeks a rail-based import/export route via Walvis Bay Port to optimize its supply chain and global competitiveness.

(iii) The **Port of Nacala** has a depth of 15 m endowed with natural topographic features that do not require regular dredging. However, the port is currently used mostly for international trade from/to Mozambique with a relatively low volume of transit cargoes due to the undeveloped road corridor and inefficient railway. Rehabilitation of the existing container terminal is under consideration with JICA assistance. There is a new project to develop a coal terminal at the other side of the current terminals in the bay to handle coal from from Moatize in Tete Provice as described. Development of a special economic zone (SEZ) is also being planned although the size, target industries, and even location of the SEZ is still under consideration.

Table 4.1.5 summarizes the bottlenecks of infrastructure, corresponding to each growth scenario.

Table 4.1.5 Summary of Infrastructure Bottlenecks on Each Growth Scenario

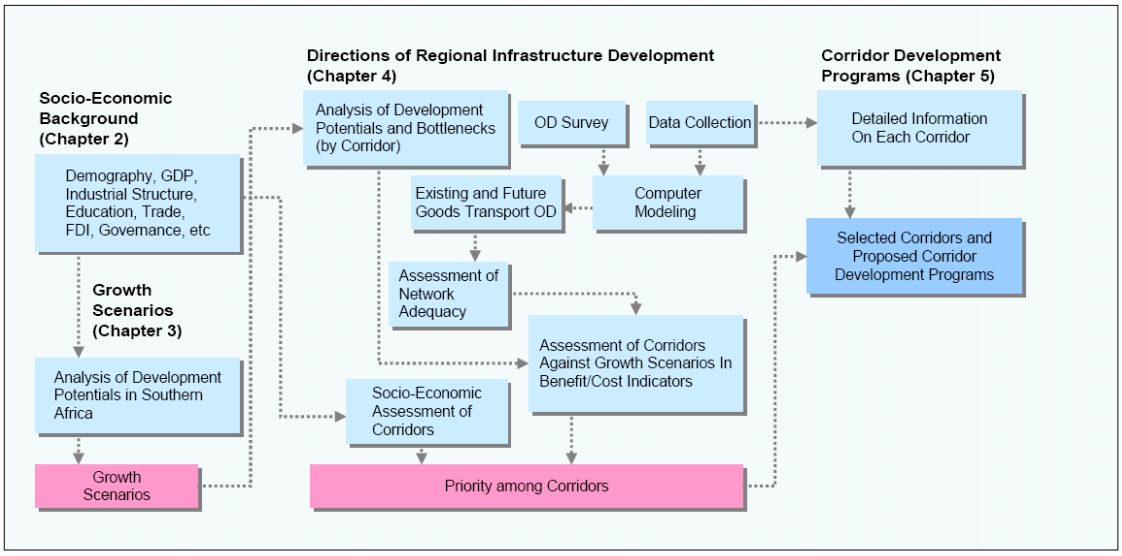
Growth Scenario	Details of Growth Scenario	Infrastructure Bottlenecks
Growth utilizing mineral resources development	✓ Investment by major mining companies in mineral resources development to be fully resumed after the global financial crisis. ✓ Investment in related sectors such as agriculture and forestry, tourism, and manufacturing to be induced as the basic infrastructure (including transport and electric power) required for development is constructed. ✓ Public and private investment in energy development projects promoted to secure electric power supplies.	✓ Underutilization of railways, an ideal mode for the transport of mineral resources, due to poor track condition, a shortage of wagons and locomotives, and the failure of privatization. ✓ A number of missing links in railways along the east-west corridors, as well as unusable track due to damage during civil wars. ✓ Generally insufficient capacity of ports located at one end of east-west corridors for exporting mineral resources, except for some ports in South Africa and Namibia. ✓ Investors tending to secure by themselves large-scale electric power supplies for resource development.
Growth through intra-regional trade	✓ Productivity, quality, and income of related countries improve through local procurement by South African companies. ✓ Investment by foreign companies thereby induced, resulting in an expansion of external trade with markets outside the region ✓ Expansion of intra-regional trade not going through South Africa for such products as agricultural goods and livestock, intermediate goods, and consumer goods.	✓ Poor performance of “soft infrastructure” (e.g., border crossings) for transport between South Africa and neighboring countries. ✓ Requirement for rehabilitation and upgrading of some sections of the road network along the east-west corridors. ✓ A number of missing links in the railway along the east-west corridors, as well as the malfunction of rail track due to a civil war. ✓ The shortage of intermodal links (e.g., road <=> railway, port <=> railway).
Growth through diversification and advancement of industrial structure	✓ Countries within the region to become more dependent on the intra-regional trade with improved broader-based infrastructure and regulatory systems. ✓ Improvement of the production cost structure realized through reductions in distribution costs and customs tariffs. ✓ Strengthening of competitiveness in markets outside the region through advancement and diversification of industrial structures. ✓ Entry into outside markets for each country promoted through efficient access to trading ports.	✓ Requirement of rehabilitation and upgrading of some sections in the road network along the east-west corridors. ✓ A number of missing links in railways along the east–west corridors, as well as unusable track due to damage during civil wars. ✓ Generally insufficient capacity of ports located at one end of east-west corridors for exporting mineral resources, except for some ports in South Africa and Namibia. ✓ Competition between/among ports in the region. ✓ The lack of connections between EPZs/FTZs/industrial parks/large-scale farms and transport (especially the connection between EPZs/FTZs and railway).

4.2 Derivation of Development Directions

4.2.1 Analysis Flow

The report has identified various factors that should be taken into account when formulating a coherent transport development program that will boost the economies of the Southern Africa. This section presents a general explanation on how the various factors may be combined to produce such a program.

Figure 4.2.1 illustrates the flow of various analyses and their logical inter-relationships.



Source: JICA Study Team

Figure 4.2.1 Analysis Flow

Various socio-economic indicators of the ten subject countries of this study Africa were collected and their trends were examined as presented in Chapter 2. These indicators include GDP, GDP growth rate, economic structure, trade, education, foreign direct investment, and governance. Since these countries are quite diverse, individual attention with different emphases was required.

Starting from the above overview, a more detailed analysis of the region was undertaken, taking into account the recent economic downturn caused by the global economic crisis commencing in 2008. The analysis assisted the identification of three growth scenarios for economic recovery and further growth of the region. Chapter 3 describes the analysis and outcomes.

A series of origin-destination (OD) surveys were carried out in the region at 10 major border crossings across the region. Using the survey results and data from other sources as input, a computer model of goods traffic movements was constructed. A comparison of estimated and projected goods movements with the exiting transport network (road and rail) resulted in the conclusion that no new transport corridor is necessary for the foreseeable future.

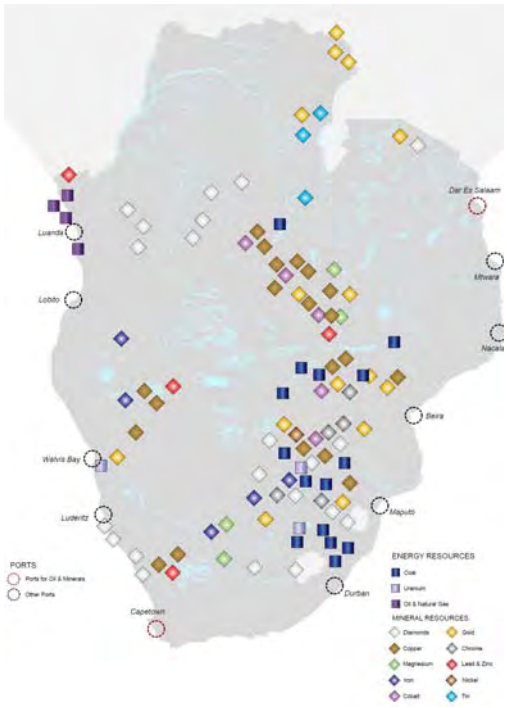
Existing corridors were examined in relation to the three growth scenarios and bottlenecks that could hamper the intended growth. The degree of effectiveness of each of the three scenarios was assessed for each of the region's 18 corridors.

A simplified method of evaluating the effectiveness of corridor development with regard to the realization of the three growth scenarios was established taking into account the effectiveness of the scenarios as mentioned above and other factors such as economic structure, current traffic demand, level of benefit brought by the improvement, and the level of cost of improvement. The model provided a ranking of the corridors in the region in terms of return on investment, which was taken to provide a first-order prioritization of corridor improvement, excluding the effect of factors such as political situation and resulting implementation difficulties. The use of this simplified method was necessitated by the lack of time for collection of detailed data. Combining the results of the various analyses, recommended policy directions for corridor transport development in Southern Africa were formulated as the end product of the exercises presented in this chapter.

Detailed analysis of the top-ranked corridors was then undertaken leading to formulation of development programs for each.

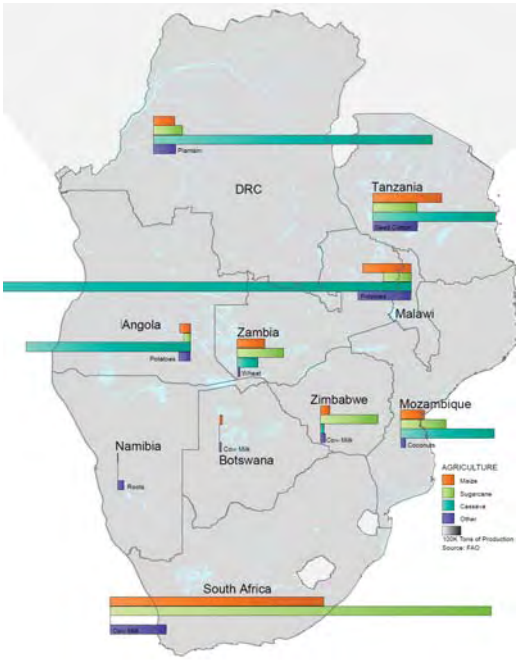
4.2.2 Evaluation of the Network of Corridors

As explained in Chapter 3, the location of natural resources in the region is a key factor for growth and development in the region. Figures 4.2.2 and 4.2.3 plot the distribution of natural resources in the region.



Source: Prepared by the Study Team, from UNEP/GRID

Figure 4.2.2
Existing Mineral and Energy Resources



Source: Prepared by the Study Team, from FAO UN

Figure 4.2.3
Existing Agricultural Potential

Figure 4.2.2 indicates the natural resources distributed on a blank map of the subject region suggesting the validity of Scenario a). Energy and mineral resources such as coal, uranium, and copper conglomerate are found along a vertical central axis, which runs north to south, from the DRC, Zambia, Zimbabwe, to South Africa, and is called the Copperbelt.

Figure 4.2.3 shows top agricultural products by country (expressed by tonnage based on 2007 data) and suggests the validity of Scenario b). Maize, sugar cane, and cassava are staple

agricultural products in a majority of the subject countries. In addition, agricultural products such as cow milk (South Africa and Zimbabwe), potatoes (Angola and Malawi), plantain (the DRC), and seed cotton (Tanzania) are produced in high quantity. This map summarizes the observations in Chapters 2 and 3 regarding the correlation between GDP by sector and agricultural production output. Countries with strong service sectors such as South Africa, Malawi, and Mozambique remain strong in agricultural production.

Figure 4.2.4 shows how the 18 existing corridors are laid out in a manner connecting and servicing the inland natural resources with access ports. This is also indicated in the SDI model. The corridors serve as links between landlocked countries and global markets via the major ports.

Specifically, Figure 4.2.4 shows how the 18 corridors are linked with the 10 major ports of Southern Africa and to natural resources. For example, the North–South Corridor is aligned with the Copperbelt. In addition, the Trans-Caprivi Corridor links the Port of Walvis Bay with the Namibian copper resources, while the Malange Corridor links the Port of Luanda and the oil and natural gas resources in Angola with inland diamond reserves.

Source: Prepared by the Study Team, from UNEP/GRID

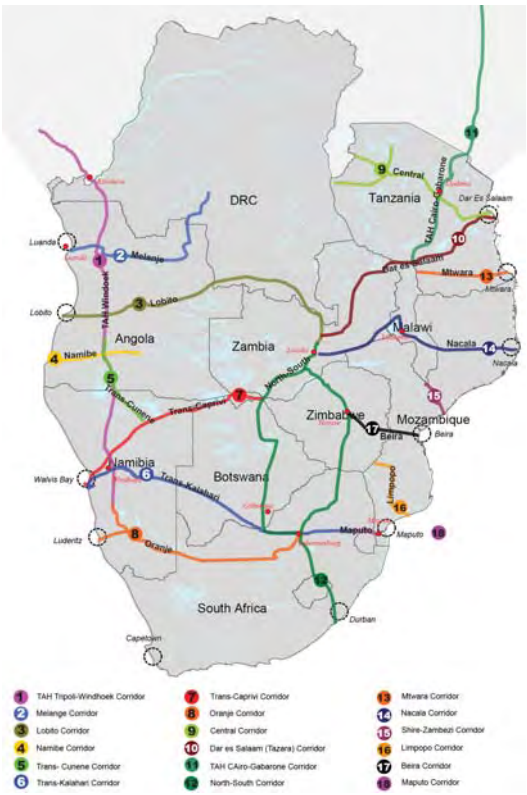
Figure 4.2.4
Existing Resources and Corridors

Taking into account the above-mentioned regional characteristics, a further transport analysis was conducted using the TransCAD transport planning software.[32] An OD analysis was conducted to show the efficacy of the current 18 corridors. Also, this modeling exercise enabled visualization of the current bottlenecks of the regional infrastructure system and future transport trends. Figure 4.2.5 shows the 18 subject corridors assessed in the TransCAD analysis, while Figure 4.2.6 shows the 41 zones used in the TransCAD analysis. The 10 subject countries were

[32] See http://www.caliper.com/tcovu.htm.

divided into 41 zones consisting of 12 port zones and 29 economic zones. Each zone consists of centroids (either ports or major cities), which serve as an economic generator/attractor of traffic.

Heavy (freight) traffic collected from road agencies from the subject countries as well as inland border crossing traffic were input and are visualized in Figure 4.2.7. The traffic flow data along with local OD survey results were used to run an OD estimation for 2008. The OD survey results are taken from a survey conducted from October 2009 to February 2010 at ten major border crossings in the region, indicated in Table 4.2.1. Detailed results of the OD Survey are included in Appendix E. Table 4.2.2 shows the parameters used to run the analysis. A single-mode OD estimation model with a network capacity of 30,000 vehicles per day (equivalent to a Level A road in the EU) was used.



Source: Prepared by the Study Team

Figure 4.2.5
Corridors in Subject Countries

Source: Prepared by the Study Team

Figure 4.2.6
OD Zones within Subject Countries

Note: Tanzania data from 2004 was updated to 2008 using 1.7 x GDP growth%
Source: Prepared by the Study Team. Traffic Data compiled from FESARTA, Zambia Roads Authority, TANROADS, MCLI, RTFP, etc.

Figure 4.2.7 2008 Traffic Flow (Per Day)

Table 4.2.1 OD Survery Border Crossings

Border	Country	Corridor
Nakonde/Tunduma	Tanzania/Zambia	TAZARA
Kasumbalesa	DRC/Zambia	Lobito North–South
Chipata/Mchinji	Zambia/Malawi	Nacala
Kazungula	Botswana/Zambia/Zimbabwe	North–South
Katima Mulilo	Namibia/Zambia	Caprivi
Trans Kalahari/Mamuno	Namibia/Botswana	Kalahari
Oshikango/Santa Clara	Namibia/Angola	Cunene
Mwanza/Zobue	Malawi/Mozambique	Zambezi Valley SDI
Beitbridge	South Africa/Zimbabwe	North–South
Manica/Mutare	Mozambique/Zimbabwe	Beira

Table 4.2.2 Input Parameters for Traffic Assignment Simulation

Field	
Method for Traffic Assignment	User Equilibrium
OD Matrix Estimation Setting	Multiple Paths Method
Number of Iterations of Assignment	20

The resulting OD estimation results for 2009 were then multiplied by various zonal growth factors in order to prepare an OD estimation for 2019. Table 4.2.3 shows the growth factors used for the various ports and economic zones. Economic zone growth was determined by

multiplying the annual GDP growth rate forecasts of the IMF by a factor of 1.5.[33] Port zone growth indicated in Table 4.2.4 was determined by running a regression along a plot of port volume over the past five years.

Table 4.2.3 Economic Zone Growth

Country	2019/2009 growth
Angola	**2.64**
Botswana	**2.42**
DRC	**2.56**
Malawi	**3.23**
Mozambique	**2.7**
Namibia	**1.76**
South Africa	**1.76**
Tanzania	**2.82**
Zambia	**2.47**
Zimbabwe	**2.41**

Source: JICA Study Team based on IMF Projections

Table 4.2.4 Port Zone Growth

Ports	2019/2009 growth
Angola Ports	**4.25**
Nacala	**2.22**
Beira	**2.43**
Maputo	**5.99**
Walvis Bay	**2.38**
Luderitz	**4.48**
Durban	**4.58**
Port Elizabeth	**1.69**
Cape Town	**1.81**
Dar Es Salaam	**2.42**
Mtwara	**1**

Source: JICA Study Team based on CIY, CFM, NAMPORT, and MCLI

The maps in Figures 4.2.8 and 4.2.9 show the desire lines of the results of the OD estimation for 2009 and 2019. The color and thickness of the lines suggest the differences in volume. The red and thick lines indicate higher volumes, showing a higher concentration of traffic. On the contrary, the yellow lines are links that have lower traffic flows.

Source: Prepared by the Study Team

Figure 4.2.8
2009 OD Estimated Desire Lines[34]

Source: Prepared by the Study Team

Figure 4.2.9
2019 OD Estimated Desire Lines

[33] The factor 1.5 was derived from the elasticity of cargo volume growth rate to GDP growth rate found by a regression analysis of data over the past 5 years, which was 1.7, less 0.2 in consideration of long-term decline.

[34] Desire Lines usually represent the shortest or most easily navigated route between an origin and destination. The width of the line represents the amount of demand. In this case the high demands are indicated in red, medium in orange, and low in yellow. Lines with insignificant demands are omitted for ease of visualization.

The desire lines of the 2009 OD estimation analysis show a strong dependency on the North–South Corridor, mainly through the route traversing Botswana and Zambia. Traffic is concentrated along the Copperbelt, primarily in the eastern half of the region. The 2019 desire lines suggest an opening up of other corridors, which were underutilized in 2009. The higher desire lines on the Western Coast suggest the potential growth of the ports of Walvis Bay, Luderitz, Lobito, and Luanda. As freight traffic and flows are further diversified among the corridors and ports (in comparison to the concentration in 2009 on Dar es Salaam, Cape Town, and Durban), traffic congestion along the North–South Corridor in 2009 can be expected to become dispersed to the other corridors by 2019.

4.2.3 Corridor Network Adequacy

The maps in Figure 4.2.10 and 4.2.11 show the OD desire lines overlaid on the 18 existing corridors. Although the map for 2019 shows many lines connecting points that are not shown in the map for 2009, the actual volumes associated with these pairs[35] of points that are not connected by direct links are small. For example, between Luanda (Angola) and Lubumbashi (DRC) the link flow[36] is 0.26, therefore not shown as a direct link. The map in Figure 4.2.11 shows the results of a computer simulation that assigned the desire line for 2019 onto the existing network. As these figures show, the existing network can accommodate traffic demand for 2019 and the volume of traffic that would have to take detours is not high and the detours are short. Consequently, there is no need for an entirely new corridor to be established, at least until 2019.

Source: Prepared by the Study Team

Figure 4.2.10
2009 OD Estimated Desire Lines with Existing Corridors

Source: Prepared by the Study Team

Figure 4.2.11
2019 OD Estimated Desire Lines with Existing Corridors

[35] Pair refers to each pair of origin and destination connected by a desire line.
[36] Flow refers to the traffic demand on the route connecting each origin and destination

4.2.4 Corridor Development Priorities

The follow up to the Fourth Tokyo International Conference on African Development (TICAD IV) held in May 2008 includes recommendations on regional transport infrastructure development and trade facilitation measures required for the "acceleration of growth". While the 18 corridors are all important for regional economic development, with budgetary constraints it is necessary to optimize resource allocation and prioritize corridor development programs in order to maximize the effect on regional economic growth. The methodology for this prioritization is illustrated in detail below.

A three-step prioritization method is proposed:

(i) Corridor-based "contribution" to each of the three growth scenarios: Referring to the condition of each corridor and the geographic distribution of resources, evaluate each corridor based on its contribution to realizing the growth scenarios; and
(ii) Efficiency of corridor development: Referring to the degree of "contribution" to the growth scenarios and other indicators such as traffic volumes and the cost of implementation, evaluate the growth induced and efficiency of corridor development based on a benefit-cost analysis. Although this evaluation is relative, after the standardization of the outcomes, corridors with higher efficiency than average should be selected as prioritized corridors.
(iii) Ease of corridor development implementation: Referring to socio-economic status of the countries traversed by the corridors, evaluate the ease of implementing development programs. Finally, referring to result (ii) above, evaluate the result of prioritization, which is necessary to realize the "accelerate the growth."

(1) Corridor-based "Contribution" to the Growth Scenarios

The conditions and potentials of the identified corridors were analyzed in the preceding subsection. Bottlenecks associated with each of the corridors that would hinder the realization of the development scenarios proposed have also been identified.

An evaluation exercise was undertaken for each of the corridors on the basis of the foregoing analysis. Each corridor was evaluated in terms of effect of corridor development on the realization of the three scenarios on a scale of 1 to 5. If the development of a corridor was assessed as having little impact on the realization of a scenario in the area directly associated with the corridor given existing conditions and likely potentials of the corridor, the corridor received only 1 point in the scoring. On the other hand, if the potential impact of the corridor on the realization of a scenario was judged to be high, a score of 5 was given for the corridor for the scenario.

The scoring method adopted is basically comparative. Setting approximate criteria at score points of 1, 3, and 5 for each scenario, corridors that match the criteria were given appropriate scores (i.e., scores 1, 3, or 5). Other corridors were compared with the above corridors, which already had scores, in terms of "less" or "more" compatible with the criteria, and then were assigned intermediate scores of 2 or 4. The criteria for each scenario are shown in Table 4.2.5.

Table 4.2.6 presents the results.

Table 4.2.5 Scoring Criteria

Scores	1	2	3	4	5
Scenario a)	Little or no mineral deposits along the corridor	・・・	One prominent mineral deposit and other mineral deposits of small size, a few potential industries in agriculture or other sectors	・・・	Corridor contains huge and/or various mineral deposits and extensive potential industries and anchor projects in mining, agriculture, and other sectors
Scenario b)	Little or no contribution to intra-regional trade (as the corridor is used only for transit)	・・・	Corridor connects a few neighboring countries and enhances border trade	・・・	Corridor connects a large number of countries with “complementary” trade relations in the region
Scenario c)	Little or no contribution to diversification and advancement of industrial structure	・・・	Corridor contains ports (including inland ports) with a development plan with potential to diversify and advance industry and the market	・・・	Corridor contains attractive EPZ/FTZ development plan for both investors and local industries, with potential to promote trade with China, India, and/or Brazil

Table 4.2.6 Evaluation of Development Corridors on Contribution to Growth Scenarios

Corridor	Scenario a) Growth utilizing mineral resources development as the core	Scenario b) Growth through intra-regional trade	Scenario c) Growth through diversification and advancement of industrial structure	Comments on the Evaluation
Nacala Corridor	4	3	4	Natural resource development in the Copperbelt, Malawi, and northwest Mozambique industrial diversification and advancement utilizing Nacala SEZ as the core; contribution to development of agricultural potential in Malawi and Mozambique also expected
Beira Corridor	5	2	4	Natural resource development in the northwestern Mozambique; development of agriculture and horticulture farming utilizing fertilizer terminal and Jatropha project as the core
Maputo Corridor	1	4	5	Trade expansion between South Africa and Mozambique; industrial diversification and advancement utilizing industrial zones along the corridor
North–South Corridor	4	5	2	Linking South Africa, Zambia, Botswana, Zimbabwe, Malawi, and Mozambique to promote intra-regional trade; contribution to mineral resource development in Zambia and Botswana also expected
Trans-Kalahari Corridor	4	3	4	Mineral resource development in western Namibia and southern Botswana; industrial diversification through utilizing EPZ, mineral resource processing, and agricultural development
Dar es Salaam Corridor	5	3	3	Mineral resource development in the Copperbelt, Malawi, and Tanzania; agricultural development utilizing fertilizer terminal project
Mtwara Corridor	3	2	1	Mineral resource development in Tanzania; development of trade between/among Tanzania, Malawi, and Zambia
Lobito Corridor	4	2	2	Mineral resource development in the Copperbelt; some agricultural development in inland Angola

Corridor	Scenario a) Growth utilizing mineral resources development as the core	Scenario b) Growth through intra-regional trade	Scenario c) Growth through diversification and advancement of industrial structure	Comments on the Evaluation
Trans-Caprivi Corridor	4	1	4	Expected to improve mineral resource transport from the Copperbelt when it is connected to North–South Corridor; contribution to copper and agricultural development with processing industries in northern Namibia also expected
Oranje Corridor	3	3	1	Mineral resource development in southwestern Namibia; trade expansion between Namibia and South Africa
Sire-Zambezi Waterway	2	2	3	Trade development between Malawi and Mozambique; industrial diversification and advancement in Malawi utilizing Nsanje inland port
Malange Corridor	3	3	1	Mineral resource development in the DRC and inland Angola; development of trade between these countries
Namibe Corridor	2	3	1	Mineral resource development in Angola; trade development between Angola and Namibia
Central Corridor	2	3	1	Mineral resource development in Tanzania; trade development among Tanzania, Rwanda, Burundi, and Uganda
TAH/Cairo-Gaborone	1	4	1	Contribution to intra-regional trade as the second longest route along the Trans Africa Highway (TAH)
TAH/Tripoli-Windhoek	1	4	1	Contribution to intra-regional trade as the longest route in TAH
Limpopo Corridor	2	2	1	Mineral resource development in southern Mozambique; agricultural development in Zimbabwe
Trans-Cunene Corridor	2	4	1	Development of trade between Angola and Namibia

(2) Efficiency of Corridor Development

Referring to the contribution to growth scenarios as assessed in the previous section, the scale and effect of the development of each corridor is evaluated based on a benefit-cost analysis.[37] Since the corridor traverse multiple countries, the analysis first evaluates the magnitude of expected growth by country, and then according to the subject corridors. Second, referring to traffic volumes and transport costs, the expected growth induced in each corridor is evaluated. Finally, referring to the expected cost for the development of each corridor, the efficiency (cost-benefit efficiency) is derived. The steps of the analysis are set out below.

Step I: Evaluation of Expected Growth by Country

(i) First, refer to the evaluation results on contribution to growth scenarios presented in Table 4.2.6.

(ii) For Scenario a) based on mineral resource development for a country, the degree of development potential was assumed proportional to the GDP share of the manufacturing sector of each country. Available statistics on GDP share by sector necessitated this simplification although the industry sector in the statistics includes the non-mining sector although ideally it should be proportional to the combined share of the mining sector and the share of industries related to the mining sector, i.e., [contribution score for scenario a]*[manufacturing sector's GDP share of the country].

(iii) The degree of development potential for the Scenario b) based on intra-regional trade, can be considered to be related to the agriculture sector because bulk of the goods transported between countries in the region would be agricultural produce and products and a part of the service sector commodities. Therefore, it was assumed proportional to the combined GDP shares of one-half[38] of the service sector and the agriculture sector of the country, i.e., [contribution score for scenario b]*[agriculture sector's GDP share of the country]*[0.5)]*[service sector's GDP share of the country*0.5]. Again, this is a simplification due to data availability constraints.

(iv) The degree of development potential for Scenario c), based on the diversification of industrial structure, was assumed to be proportional to the combined GDP share of one-half of the largest sector and the industry sector, i.e., [contribution score for scenario c]*[largest sector's share in GDP of the country*0.5]*[manufacturing sector's GDP share of the country*0.5]. It was assumed that the more concentrated an economy is, the more effective the diversification impact would be, and the larger the impact on the manufacturing sector.

(v) An overall estimate of expected growth potential was obtained by combining the above three factors for each country involved

Step II: Evaluation of Expected Growth by Corridor

(vi) Referring to the potential for expected growth, an average was taken for the multiple countries traversed by a corridor [development potential].

(vii) Existing cargo traffic volume at each border crossing was taken as representative of existing economic exchanges derived from activities in the influence area of the countries along the corridor. Existing traffic volume reflects current economic conditions and current origins and destinations, the starting point of any development plan. Traffic carried by road and rail were assessed in combination and given a score of 1–5 at each border crossing with an average of multiple crossings taken. [Traffic]

[37] It was assumed that while the development of a corridor may be relevant to all three development scenarios, its impact in the entire region may be too small to prioritize over others.

[38] This is for adjustment because the largest sector's share was too high to keep standardization for some countries.

(viii) Another factor is the degree of immediate benefit in terms of reduced unit transport cost for each vehicle or train resulting from the improvement of the corridor. Improvement of the physical infrastructure of a corridor brings more benefit when it is long and existing conditions are poor. When existing nonphysical impediments to transport such as border crossings and internal police checkpoints are many and time consuming, improvements will result in greater benefits than the case with fewer such impediments. Considering this factor, a benefit score was assigned to each corridor on a scale of 1 to 5 [Benefit].

(ix) Assume the multiple of the three factors above represents expected growth in a corridor.

Step III: Evaluation of Efficiency by Corridor

(x) For each corridor a rough measure of development cost was assigned considering existing conditions, necessary improvements, and total length, on a scale of 1 to 5 [Cost].

(xi) The final evaluation score was calculated from (combined, weighted development potential scores by scenario) times (the score for average border crossing cargo traffic volume score) times (transport benefit score considering cost reduction) divided by (development cost score).

(xii) Standardize the score.

The final score is somewhat akin to a benefit-cost ratio, i.e., a measure of efficiency. It is a ratio of benefits including development potential in terms of the three scenarios to improvement costs. Investing in corridors based on the evaluation scores would give the highest return for Southern Africa as a whole.

An example shown below is provided to facilitate understanding of the above procedure.

BOX An Example of Composite Growth Potential Score Calculation (Nacala Corridor)

(i) Potential by Scenario

	A	B	C
Evaluation Score	4	3	4

(ii) Countries Involved and Sectoral GDP Share

	Manufacturing	Agriculture	Service
Mozambique	0.26	0.28	0.46
Malawi	0.34	0.21	0.45

(iii) Weighted Potential Score

For A : (4 x 0.26 + 4 x 0.34) / 2 = 1.20
For B : (3 x (0.46 / 2 + 0.28) + 3 x (0.45 / 2 + 0.21)) / 2 = 1.42
For C : (4 x (0.46 / 2 + 0.26) + 4 x (0.45 / 2 + 0.34)) / 2 = 2.11
Combined potential score = 1.20 + 1.42 + 2.11 = 4.73

(iv) Composite Score

(Development Potential 4.73) x (Traffic 3) x (Benefit 4) / (Cost 4) = 14.19
(The score 14.19 was standardized and then the value 0.252 was obtained.)

Source: Prepared by the Study Team

Table 4.2.7 shows the resulting composite scores and ranking.[39]

[39] This method is a very much a simplified one; while the absolute values of resulting composite scores may mean little, the ranking order is significant. It should be noted that the method does not take into account institutional and other difficult questions. A broader evaluation including such matters is necessary for final decision making. The ranking nevertheless gives a broad indication as to which corridors should be developed first.

Table 4.2.7 Ranking of Corridor Development Returns

Corridor		Country A	Country B	Country C	Scenario	Eval. Score	Potential	Traffic Heavy	Traffic Score	Benefit Score	Cost Score	Stand. Score
A. Nacala	Country	Mozambique	Malawi									
	Manu. Share	0.26	0.34		A	4	1.20					
	Agri. Share	0.28	0.21		B	3	1.42					
	Serv. Share	0.46	0.45		C	4	2.11					
Ov. Eval.							4.73	50	3	4	4	0.252
B Beira	Country	Mozambique	Zimbabwe	Zambia								
	Manu. Share	0.26	0.24	0.46	A	5	1.60					
	Agri. Share	0.28	0.19	0.21	B	2	0.91					
	Serv. Share	0.46	0.57	0.33	C	4	2.27					
Ov. Eval.							4.78	130	3	3	2	0.920
C Maputo	Country	Mozambique	South A.									
	Manu. Share	0.26	0.31		A	1	0.29					
	Agri. Share	0.28	0.03		B	4	1.74					
	Serv. Share	0.46	0.66		C	5	2.83					
Ov. Eval.							4.85	200	4	2	1	2.497
D North-South	Country	South A.	Zimb./Bots	Zambia								
	Manu. Share	0.31	0.34	0.46	A	4	1.48					
	Agri. Share	0.03	0.12	0.21	B	5	1.88					
	Serv. Share	0.66	0.54	0.33	C	2	1.29					
Ov. Eval.							4.65	250	5	4	3	1.785
E Trans-Kalahari	Country	Nambia	Botswana	South A.								
	Manu. Share	0.22	0.47	0.31	A	4	1.33					
	Agri. Share	0.08	0.02	0.03	B	3	1.07					
	Serv. Share	0.7	0.51	0.66	C	4	2.58					
Ov. Eval.							4.98	50	2	3	2	0.321
F Dar es Salaam	Country	Tanzania	Zambia	Malawi								
	Manu. Share	0.17	0.46	0.21	A	5	1.40					
	Agri. Share	0.46	0.21	0.34	B	3	1.59					
	Serv. Share	0.37	0.33	0.45	C	3	1.53					
Ov. Eval.							4.51	170	4	4	3	1.152
G Mtwara	Country	Tanzania	Malawi	Zambia								
	Manu. Share	0.17	0.21	0.46	A	3	0.84					
	Agri. Share	0.46	0.34	0.21	B	2	1.06					
	Serv. Share	0.37	0.45	0.33	C	1	0.51					
Ov. Eval.							2.41	110	2	3	4	-0.713
H Lobito	Country	Angola	DRC	Zambia								
	Manu. Share	0.86	0.27	0.46	A	4	2.12					
	Agri. Share	0.1	0.41	0.21	B	2	0.71					
	Serv. Share	0.04	0.31	0.33	C	2	1.64					
Ov. Eval.							4.46	350	5	3	5	0.180
I Trans-Caprivi	Country	Namibia	Zimbabwe	Zambia								
	Manu. Share	0.22	0.24	0.46	A	4	1.23					
	Agri. Share	0.08	0.19	0.21	B	1	0.53					
	Serv. Share	0.7	0.57	0.33	C	4	2.38					
Ov. Eval.							4.14	140	3	4	3	0.469
J Orange	Country	Namibia	South A.									
	Manu. Share	0.22	0.31		A	3	0.80					
	Agri. Share	0.08	0.03		B	3	1.19					
	Serv. Share	0.7	0.66		C	1	0.40					
Ov. Eval.							2.38	120	3	2	2	-0.389
K Sire-Zambezi		Mozambique	Malawi									
	Manu. Share	0.26	0.21		A	2	0.47					
	Agri. Share	0.28	0.34		B	2	1.08					
	Serv. Share	0.46	0.45		C	3	0.93					
Ov. Eval.							2.47	60	2	4	5	-0.681
L Malange	Country	Angola	DRC									
	Manu. Share	0.86	0.27		A	3	1.70					
	Agri. Share	0.1	0.41		B	3	1.03					
	Serv. Share	0.04	0.31		C	1	0.59					
Ov. Eval.							3.31	na	1	4	4	-0.740
M Namibe	Country	Angola										
	Manu. Share	0.86			A	2	0.86					
	Agri. Share	0.1			B	3	0.06					
	Serv. Share	0.04			C	1	0.43					
Ov. Eval.							1.35	na	1	3	4	-0.949
N Central	Country	Tanzania	Rwanda									
	Manu. Share	0.17			A	2	0.17					
	Agri. Share	0.46			B	3	0.97					
	Serv. Share	0.37			C	1	0.13					
Ov. Eval.							1.27	na	1	3	3	-0.926
O THA/Cairo-Gabaron	Country	Tanzania	Zambia									
	Manu. Share	0.17	0.46		A	1	0.32					
	Agri. Share	0.46	0.21		B	4	2.04					
	Serv. Share	0.37	0.33		C	1	0.36					
Ov. Eval.							2.72	na	1	5	5	-0.794
P THA/Tripoli-Windhoe	Country	DRC	Angola	Namibia								
	Manu. Share	0.27	0.86	0.22	A	1	0.45					
	Agri. Share	0.41	0.1	0.08	B	4	1.49					
	Serv. Share	0.31	0.04	0.7	C	1	0.78					
Ov. Eval.							2.72	50	1	5	5	-0.794
Q Limpopo	Country	Mozambique	Zimbabwe									
	Manu. Share	0.26	0.24		A	2	0.50					
	Agri. Share	0.28	0.19		B	2	0.99					
	Serv. Share	0.46	0.57		C	1	0.34					
Ov. Eval.							1.82	10	1	2	3	-0.931
R Trans-Cuene	Country	Namibia	Angola									
	Manu. Share	0.22	0.86		A	2	1.08					
	Agri. Share	0.08	0.1		B	4	1.10					
	Serv. Share	0.7	0.04		C	1	0.62					
Ov. Eval.							2.80	50	1	3	2	-0.659

(3) Potential for the Implementation of Projects for Corridor Development

Referring to the economic and social indicators of areas traversed by each corridor, as presented in Chapter 2, the potential for the implementation of projects for corridor development has been examined. It can be defined that the potential for project implementation in a corridor is a composite indicator of (i) demographic potential, (ii) scale of economy, (iii) business environment, and (iv) governance of the subject countries. The potential for project implementation by corridor can be defined as an average of these indicators of the traversed countries by the corridor.

The analytical methodology is as follows:

Step I: Evaluation by Country

(i) To quantitatively evaluate the (a) demographic potential, (b) scale of economy, (c) business environment, and (d) governance of subject countries, the data presented in Tables 2.1.1, 2.1.3, 2.1.4, and 2.1.7 of Chapter 2 were utilized. To make a relative comparison between values with different dimensions, all the data were converted into a "standardized value", derived from the following formula;

$$z = \frac{(X - x)}{s}$$

Where X: original data value, x: sample mean, s: sample standard deviation and z: standardized value.

(ii) The degree of demographic potential was assumed proportional to the (a) population in 2020 (which is the target year of the Study), (b) population density in 2020, and (c) the average population growth rate in 2020, respectively.

(iii) The scale of economy was assumed proportional to the (a) GDP, (b) GDP growth rate, and (b) GDP per capita.

(iv) The business environment was assumed to be represented by the ranking of the Doing Business Survey published by the World Bank. All 11 indicators shown in Table 2.1.7 were taken into account.

(v) The degree of governance was assumed proportional to the Ibrahim Index 2007 and CPI Index 2009.

Step II: Evaluation by Corridor

(vi) An overall potential figure for project implementation was obtained by combining the above four figures for each country traversed by a corridor and an average was taken for the multiple countries, as in the preceding analysis.

Tables 4.2.8 to 4.2.12 show the resulting composite scores and ranking from this evaluation.

Table 4.2.8 Demographic Potential of Subject Countries

Unit: Standardized Value

Subject Countries	Population (2020)	Population Density (2020)	Population Growth (2020)	Overall Score (Average)
Angola	−0.22	−0.50	0.77	**0.016**
Botswana	−1.11	−0.85	−1.19	**−1.050**
DRC	2.30	−0.13	0.83	**1.001**
Malawi	−0.38	2.82	1.07	**1.170**
Mozambique	−0.06	−0.15	−0.03	**−0.081**
Namibia	−1.10	−0.87	−0.46	**−0.810**
South Africa	0.90	0.00	−2.29	**−0.462**
Tanzania	0.78	0.22	0.27	**0.423**
Zambia	−0.53	−0.46	0.76	**−0.076**
Zimbabwe	−0.58	−0.07	0.25	**−0.131**

Table 4.2.9 Scale of the Economy of Subject Countries

Unit: Standardized Value

Subject Countries	GDP (2010)	GDP Growth (2010)	GDP/Capita (2010)	Overall Score (Average)
Angola	0.458	1.717	0.599	**0.925**
Botswana	−0.547	−0.718	2.013	**0.249**
DRC	0.682	0.820	−0.857	**0.215**
Malawi	−0.665	0.436	−0.794	**−0.341**
Mozambique	−0.584	0.884	−0.723	**−0.141**
Namibia	−0.572	−0.718	0.523	**−0.255**
South Africa	2.683	−0.974	1.368	**1.026**
Tanzania	−0.404	0.564	−0.628	**−0.156**
Zambia	−0.536	−0.269	−0.608	**−0.471**
Zimbabwe	−0.517	−1.743	−0.891	**−1.050**

Table 4.2.10 Governance of Subject Countries

Unit: Standardized Value

Subject Countries	Ibrahim Index (2007)	CPI Index (2009)	Overall Score (Average)
Angola	−0.902	−1.079	**−0.990**
Botswana	1.408	1.945	**1.676**
DRC	−1.453	−1.079	**−1.266**
Malawi	−0.050	0.065	**0.008**
Mozambique	−0.096	−0.588	**−0.342**
Namibia	1.069	1.046	**1.058**
South Africa	1.114	1.209	**1.162**
Tanzania	0.390	−0.507	**−0.058**
Zambia	0.111	−0.180	**−0.034**
Zimbabwe	−1.592	−0.833	**−1.213**

Table 4.2.11 Business Environment of Subject Countries

Unit: Standardized Value

Subject Countries	Ease of Doing Business Rank	Starting a Business	Dealing with Const. Permits	Employ-ing Workers	Register-ing Property	Getting Credit	Protecting Investors	Paying Taxes	Trading Across Borders	Enforcing Contracts	Closing a Business	Overall Score (Average)
South Africa	1.614	1.661	1.689	0.441	0.707	1.476	1.618	1.198	0.244	0.358	0.739	**1.068**
Botswana	1.392	1.135	0.192	1.179	1.899	0.656	0.827	1.295	0.136	0.481	1.899	**1.008**
Namibia	0.971	−0.181	1.988	1.846	−0.433	1.216	0.010	−0.248	0.081	1.259	1.236	**0.704**
Zambia	0.488	0.773	−0.428	0.107	0.604	0.916	0.010	0.944	−0.244	0.317	0.573	**0.369**
Tanzania	−0.336	−0.082	−1.005	−0.250	−0.718	−0.224	−0.500	−0.697	2.417	1.464	−0.137	**-0.006**
Malawi	−0.356	−0.345	−0.684	0.679	0.422	−0.224	0.010	1.178	−1.059	−0.809	−0.540	**-0.157**
Mozambique	−0.416	0.707	−0.599	−0.845	−0.873	−1.024	0.827	−0.268	0.896	−0.543	−0.682	**-0.256**
Zimbabwe	−0.898	−0.904	−1.005	−0.512	0.863	−0.744	−1.164	−0.912	−0.787	0.502	−1.155	**-0.611**
Angola	−1.099	−1.562	0.171	−1.369	−1.443	−0.224	0.419	−1.069	−1.005	−1.607	−0.871	**-0.878**
DRC	−1.360	−1.200	−0.321	−1.274	−1.029	−1.823	−2.057	−1.420	−0.679	−1.423	−1.061	**-1.241**

Table 4.2.12 Evaluation of Potential for Project Implementation

Unit: Standardized Value

Corridor		Country A	Country B	Country C	Country D	Overall Score	Ranking
A. Nacala	Country	Mozambique	Malawi				
	a.Demographic Potential	-0.0815	1.1703				
	b.Scale of Economy	-0.1410	-0.3411				
	c.Business Environment	-0.2562	-0.1570				
	d.Governance	-0.3422	0.0077				
Overall Evaluation						-0.0176	7
B Beira	Country	Mozambique	Zimbabwe	Zambia	Malawi		
	a.Demographic Potential	-0.0815	-0.1315	-0.0755	1.1703		
	b.Scale of Economy	-0.1410	-1.0503	-0.4711	-0.3411		
	c.Business Environment	-0.2562	-0.6107	0.3691	-0.1570		
	d.Governance	-0.3422	-1.2126	-0.0344	0.0077		
Overall Evaluation						-0.2099	15
C Maputo	Country	Mozambique	South A.				
	a.Demographic Potential	-0.0815	-0.4616				
	b.Scale of Economy	-0.1410	1.0255				
	c.Business Environment	-0.2562	1.0676				
	d.Governance	-0.3422	1.1616				
Overall Evaluation						0.2465	3
D North-South	Country	South A.	Zimbabwe	Botswana	Zambia		
	a.Demographic Potential	-0.4616	-0.1315	-1.0504	-0.0755		
	b.Scale of Economy	1.0255	-1.0503	0.2495	-0.4711		
	c.Business Environment	1.0676	-0.6107	1.0083	0.3691		
	d.Governance	1.1616	-1.2126	1.6765	-0.0344		
Overall Evaluation						0.0912	10
E Trans-Kalahari	Country	Nambia	Botswana	South A.			
	a.Demographic Potential	-0.8099	-1.0504	-0.4616			
	b.Scale of Economy	-0.2555	0.2495	1.0255			
	c.Business Environment	0.7041	1.0083	1.0676			
	d.Governance	1.0575	1.6765	1.1616			
Overall Evaluation						0.4478	2
F Dar es Salaam	Country	Tanzania	Zambia	Malawi			
	a.Demographic Potential	0.4228	-0.0755	1.1703			
	b.Scale of Economy	-0.1559	-0.4711	-0.3411			
	c.Business Environment	-0.0062	0.3691	-0.1570			
	d.Governance	-0.0581	-0.0344	0.0077			
Overall Evaluation						0.0559	5
G Mtwara	Country	Tanzania	Malawi	Zambia			
	a.Demographic Potential	0.4228	1.1703	-0.0755			
	b.Scale of Economy	-0.1559	-0.3411	-0.4711			
	c.Business Environment	-0.0062	-0.1570	0.3691			
	d.Governance	-0.0581	0.0077	-0.0344			
Overall Evaluation						0.0559	5
H Lobito	Country	Angola	DRC	Zambia			
	a.Demographic Potential	0.01619	1.0011	-0.0755			
	b.Scale of Economy	0.92471	0.2151	-0.4711			
	c.Business Environment	-0.87818	-1.2407	0.3691			
	d.Governance	-0.99018	-1.2657	-0.0344			
Overall Evaluation						-0.2025	14
I Trans-Caprivi	Country	Namibia	Zambia				
	a.Demographic Potential	-0.8099	-0.0755				
	b.Scale of Economy	-0.2555	-0.4711				
	c.Business Environment	0.7041	0.3691				
	d.Governance	1.0575	-0.0344				
Overall Evaluation						0.0605	11
J Oranje	Country	Namibia	South A.				
	a.Demographic Potential	-0.8099	-0.4616				
	b.Scale of Economy	-0.2555	1.0255				
	c.Business Environment	0.7041	1.0676				
	d.Governance	1.0575	1.1616				
Overall Evaluation						0.4362	1
K Sire-Zambezi		Mozambique	Malawi				
	a.Demographic Potential	-0.0815	1.1703				
	b.Scale of Economy	-0.1410	-0.3411				
	c.Business Environment	-0.2562	-0.1570				
	d.Governance	-0.3422	0.0077				
Overall Evaluation						-0.0176	7
L Malange	Country	Angola	DRC				
	a.Demographic Potential	0.01619	1.0011				
	b.Scale of Economy	0.92471	0.2151				
	c.Business Environment	-0.87818	-1.2407				
	d.Governance	-0.99018	-1.2657				
Overall Evaluation						-0.2772	16
M Namibe	Country	Angola					
	a.Demographic Potential	0.01619					
	b.Scale of Economy	0.92471					
	c.Business Environment	-0.87818					
	d.Governance	-0.99018					
Overall Evaluation						-0.2319	17
N Central	Country	Tanzania					
	a.Demographic Potential	0.4228					
	b.Scale of Economy	-0.1559					
	c.Business Environment	-0.0062					
	d.Governance	-0.0581					
Overall Evaluation						0.0506	4
O THA/Cairo-Gabaror	Country	Tanzania	Zambia				
	a.Demographic Potential	0.4228	-0.0755				
	b.Scale of Economy	-0.1559	-0.4711				
	c.Business Environment	-0.0062	0.3691				
	d.Governance	-0.0581	-0.0344				
Overall Evaluation						-0.0012	9
P THA/Tripoli-Windho	Country	DRC	Angola	Namibia			
	a.Demographic Potential	1.0011	0.01619	-0.8099			
	b.Scale of Economy	0.2151	0.92471	-0.2555			
	c.Business Environment	-1.2407	-0.87818	0.7041			
	d.Governance	-1.2657	-0.99018	1.0575			
Overall Evaluation						-0.1268	13
Q Limpopo	Country	Mozambique	Zimbabwe				
	a.Demographic Potential	-0.0815	-0.1315				
	b.Scale of Economy	-0.1410	-1.0503				
	c.Business Environment	-0.2562	-0.6107				
	d.Governance	-0.3422	-1.2126				
Overall Evaluation						-0.4782	18
R Trans-Cuene	Country	Namibia	Angola				
	a.Demographic Potential	-0.8099	0.01619				
	b.Scale of Economy	-0.2555	0.92471				
	c.Business Environment	0.7041	-0.87818				
	d.Governance	1.0575	-0.99018				
Overall Evaluation						-0.0289	12

(4) Result of Prioritization and Consideration

As set out in (2) of this section, the following eight corridors were prioritized, mainly since the cost-benefit indicators for each were higher than the average for the 18 corridors:

(i) Maputo Corridor,
(ii) North–South Corridor,
(iii) Dar es Salaam Corridor,
(iv) Beira Corridor,
(v) Nacala Corridor,
(vi) Trans-Caprivi Corridor,
(vii) Trans-Kalahari Corridor, and
(viii) Lobito Corridor.

Figure 4.2.12, shows the results of the assessment of (2) Efficiency of Corridor Development and (3) Potential for the Implementation of Projects for Corridor Development in this section on a positioning map. Specifically, the figure plots the standardized score for the efficiency of corridor development on the Y-axis, and the standardized score indicating the potential for project implementation on X-axis. It can be considered that the efficiency value, including expected growth and cost, represents internal elements of corridor development, while the potential for project implementation represents external or peripheral elements of corridor development. For example, the results for the Beira and Dar es Salaam Corridors were similar in terms of efficiency, but the figure suggests that the Dar es Salaam Corridor has an advantage in terms of project implementation. The Oranje Corridor, ranked high in terms of the potential for project implementation, was not selected since its efficiency score was relatively low. Generally, the corridors that scored high on efficiency have higher scores for project implementation potential. In summary, it is necessary to consider both internal and external elements in order to realize the impact of a corridor development program in terms of accelerating the growth of the region, as called for by TICAD IV.

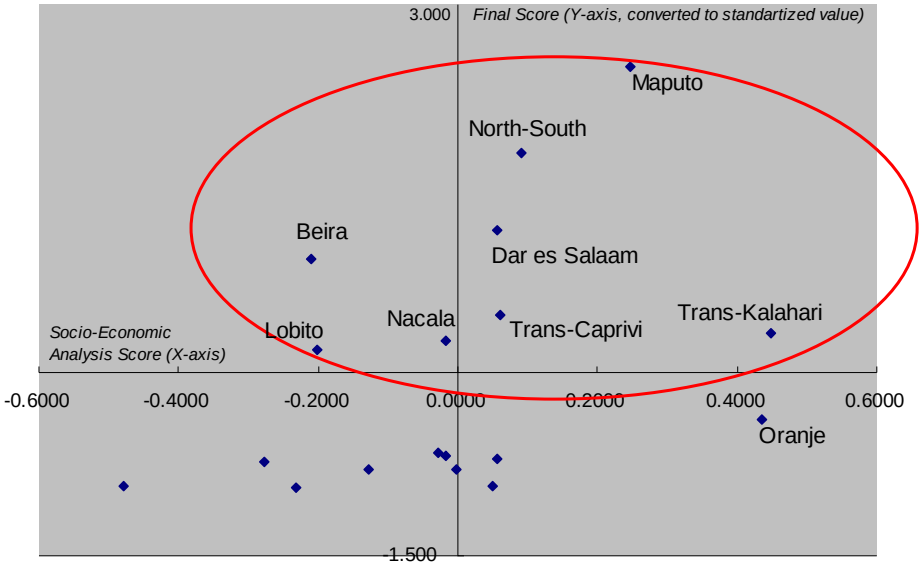


Figure 4.2.12 Analysis of the Selected Corridors

4.2.5 Development Directions to Overcome Infrastructure Bottlenecks

Given the identified bottlenecks through the analysis presented in Section 4.1, possible development directions will be considered for each growth scenario. For more in-depth consideration, an examination of bottlenecks was undertaken along seven corridors selected based on the quantitative analysis presented in the previous section.

Identified bottlenecks in Section 4.1.3 can be summarized as follows:

Bottlenecks under Scenario a): The transport of mineral resources mined and/or smelted in the region heavily depends on road transport, leading to costly and repeated maintenance requirements.

Bottlenecks under Scenario b): The smooth flow of goods and services is hindered by a lack of adequate "soft" infrastructure (e.g., institutions, policies, regulations). Furthermore, the smooth flow of goods and services is hindered by a lack of adequate "soft" infrastructure (e.g., institutions, policies, regulations).

Bottlenecks under Scenario c): The current situation of physical infrastructure is leads to high distribution costs and does not provide efficient access to trading ports. Along east-west corridors, many road and railway sections have not been rehabilitated or upgraded. Moreover, the ports have insufficient capacity to cope with larger trading volumes.

(1) Development Directions Associated with Scenario a)

To overcome the identified bottlenecks regarding Scenario a), it is of great importance to accelerate the modal shift from road to railway in order to reduce the deterioration of road pavements, with associated high maintenance costs and the requirement for frequent maintenance. A move to a more optimal split of traffic between modes is urgently required, especially shifting heavy minerals traffic from road to rail. Along the North–South Corridor, which was identified as one of the prioritized routes in the previous section, roads tend to be damaged easily due to the heavy cargoes (e.g., copper and cobalt from the DRC and Zambia) that have been transported mainly by road due to limitation in railway transport capacity along the corridor.

The following box shows the detailed development directions for each transport mode under Scenario a).

Scenario a) Growth utilizing mineral resources development as the core

Target Industries: Mining (e.g., Copper, Cobalt, Coal, Gold, Zinc)

Overall Strategy: Promoting modal shift from road transport to railway
In the region the cost of transporting heavy metal resources is high as many of them are carried by road due to railway capacity limitation. The cost of railway transport cost is high compared to that in other regions in the world because of monopolization and ineffective operation[40]. In addition, the roads on the routes of heavy minerals transport tend to be damaged easily. Under this condition, the modal shift from road to railway transport of the mineral resources should be focused on as a top priority in the long term. However, development of railway capacity usually takes time. In order to ensure the continuous export of mineral resources, the rehabilitation of the existing trunk roads connecting major production areas to the sea is unavoidable; however, road deterioration should be minimized through institutional and systematic approaches including implementation of axle load

[40] For example, see USAID/Southern Africa Global Competitiveness Hub (2009), T*echnical Report: Review of the Effectiveness of Rail Concessions in the SADC Region.*

controls. In addition, port operations should be improved to reduce the dwell time for dry bulk and break bulk cargoes and thereby increase the international competitiveness of mineral resources in the region.

Priority Sectors: Railways, Port

Other Related Sectors: Roads, Inland Deports, and Border Posts

Railway Sector Strategy: Infrastructure development following operational improvement
In Southern Africa, generally, railway transport capacity has been limited relative to the high demand mainly because of ineffective operation, critically low transport speed caused by track degradation, and a shortage of rolling stock. Considering the current inefficient operation of the various regional railways, in the short term organization reforms and technical improvements should be a priority to establish an environment suitable for investment in the railway infrastructure. Over the long term, track rehabilitation to improve operating speeds and an increase in rolling stock should be pursued to enhance railway transport capacity.

Port Sector Strategy: Simplification of the port procedure aiming at a Single Window Approach
Although the region has a shortage of container terminal capacity due to global containerization and rapid economic growth, the volume of bulk cargoes handled has remained relatively stable in recent years. On the other hand, port dwell time for these cargoes is much longer compared to other international ports as a result of complex documentation procedures with various stakeholders, the high physical inspection rate, and other factors. In addition, the condition of the bulk terminals of some ports developed during the colonial era in the region is deteriorated. In the port sector development under this growth scenario, simplification of port procedures should be a priority issue to be addressed by the strategy. Also, rehabilitation of deteriorated bulk terminals should be explored.

Road Sector Strategy: formulation of systems to prevent road deterioration
In the short term, axle load control approaches including the installation of digital weighbridges and their maintenance at the country and regional levels should be a focus to minimize road damage from the transport of heavy mineral resources. Regarding road development, rehabilitation and maintenance of the existing trunk road networks should be prioritized rather than the development of new roads or the widening of existing roads in the short term. Over the long term, intra-regional roads linking production areas and railway routes should be strengthened, promoting private sector investment as much as possible.

Strategy for Inland Depots: Development of inland depots under public-private partnership
Currently, the region has an insufficient number of inland depots with both physical and customs aspects. Considering that the transshipment demand of land transport freight is rather high at the points connecting trunk roads and major mining regions, such facilities should be developed for transport facilitation, especially for the mining sector. In the short term, depots with bonded warehouses, equipment such as forklifts and cranes, and ring roads should be progressed. Over the long term, railway access should be developed. In addition, similar efforts should be made for existing railway depots. Although most of these existing facilities have only physical aspects (e.g., land, warehouses, equipment), application of the customs aspect is critically important in order to reduce total transport time before exporting products from the port. For the development of such an inland depot, private sector investment should be promoted as much as possible. For example, land acquisition and customs facilitation may be undertaken by the local government, while several private companies may invest in the facility development. Ring road access and the organization of the entire project could be assisted by a development partner.

Strategy for Border Posts: Development of legal framework and procedures for railway OSBPs
Since development of One-Stop Border Posts (OSBPs) for railway (freight) traffic does not require new border facilities/infrastructure but only a legal framework and procedures, they could be developed relatively cost effectively, thereby contributing to both a reduction in transport time and an increase in transport capacity. In the case of the OSBP at Malaba between Uganda and Kenya in East Africa, the railway OSBP opened before the road OSBP, and it reduced border crossing time from 1-2 days to one hour.

(2) Development Directions Associated with Scenario b)

To surmount the bottlenecks of Scenario b), accelerating intra-regional trade through harmonization and unification of trade transport related standards will be an important part of the solution. Rehabilitation and development of the intra-regional road network will contribute to realization of this scenario. For example, in the Tete Corridor (considered to be part of the Beira Corridor in this study), a long bridge over the Zambezi River became a serious transport bottleneck on the main route between Zimbabwe and Malawi, which connects with the North–South Corridor. It is urgently necessary to finish rehabilitation of this bridge or to build a new one over the Zambezi River, so as to facilitate more efficient distribution of goods and services along the corridor.

The following box shows the detailed development directions for each transport mode.

Scenario b) Growth through intra-regional trade

Target Industries: Consumable Agricultural Products (e.g,. Wheat, Rice, Maize, Vegetable, Sugar), Processed Foods, Light Industry Products, Heavy Industry Products)

Overall Strategy: Accelerating intra-regional trade through harmonization and unification of the trade transport related standards
Even in cases where neighboring countries are not separated by physical barriers, differences in regulations and standards, related for example to customs bonds, customs software, motor insurance standards, and vehicle standards, currently hinder smooth trade between and among countries. In order to promote intra-regional trade, harmonization of these regulations and standards is essential. In addition, the time spent at border posts should be minimized, considering the situation that some congested border posts take 2–3 days or longer on average to pass.

Priority Sectors: Transport Facilitation, Border Posts, Roads

Strategy on Transport Facilitation: Addressing nonphysical barriers to cross-border transport
Nonphysical barriers to cross-border transport to be addressed include: (i) differences in axle load limits and vehicle dimensions standards; (ii) differences in road user charges for foreign vehicles; (iii) differences in third-party motor liability insurance systems; (iv) differences in customs laws and regulations; (v) limited sharing of information and data exchange between authorities within countries and between countries; and (vi) the requirement for national customs bond guarantees. Although several international development partners have been begun to address some of these barriers through a variety of approaches, in many cases it will take time to address the barriers because various stakeholders with sometimes conflicting interests are involved. In order to harmonize the different standards and systems, comprehensive efforts under the RECs are essential. Also, development partners need to assist studies and capacity building to achieve this objective in a mutually complementary manner. Although fully addressing these barriers will take time, incremental improvements can be achieved in the near term through the efforts of the various concerned stakeholders.

Strategy for Border Posts: Infrastructure and system improvements through OSBP implementation
Since factors causing long border crossing times for road transport are complex, a comprehensive and multiple approach is required to address this issue. Factors to be addressed may include: (i) insufficient facility capacity to accommodate smooth traffic flows; (ii) high rates of physical inspection; (iii) insufficient inspection equipment (e.g., such as scanner and forklifts); (iv) limited application of ICT, including limited internet access; (v) difficulties with pre-clearance; (vi) separate border clearance at each border post of the two countries; and (vii) the lack the information sharing between/among border officers from different agencies. Although some of these factors can be addressed through regional transport facilitation measures, most of the obstacles are to be addressed at each border crossing. The one-stop border stop is an approach originally targeted at unifying clearance procedures at one border crossing with simultaneous or nearly simultaneous inspection by the border control authorities of the

two countries. However, the concept may be understood more broadly to encompass multiple measures for improving the efficiency of cross-border movement, involving not only the unification of the clearance procedures, but also facility/infrastructure improvements, equipment installation, training and human resource development, and ICT improvements, with a single or multiple international development partners. Development of such OSBPs will commence in the short term generally focusing on the border crossings with the highest traffic volumes, the highest delay times, and the greatest institutional readiness, focusing on the most cost-effective measures. Over the longer term it is envisaged that such OSBPs will be developed at all major border crossings in the region.

Road Sector Strategy: Improvement of the regional access network
Particularly in the northeastern part of the region, even trunk roads have long sections without pavement or with significantly deteriorate pavements. During the rainy season, it is almost impossible for trucks to drive on such routes. In addition, although there are various wide rivers the region, especially in border areas, no bridge is available at many such points along the trunk routes. As a result, trucks are forced to avoid such routes by taking alternative routes, even driving doubling their trip distances. Under this situation, road development/rehabilitation and bridge construction along the trunk routes should be accelerated in the short term to facilitate intra-regional trade. Over the long term, feeder road development shall be a focus.

(3) Development Directions Associated with Scenario c)

To address the bottlenecks of Scenario c), reducing transport costs will vital to enhance international competitiveness. At the same time, it is urgently needed to strengthen transport links between ports and inland countries. Regarding the railway connection on the Trans-Caprivi Corridor (which was one of the selected priority corridors), there is a missing link between Grootfontein and the Zambian border. A Trans-Caprivi Railway Project currently under study by the governments of Namibia and Zambia; accelerated implementation of this project to improve accessibility to the Port of Walvis Bay would help address this issue.

The following box shows the detailed development directions for each transport mode.

Scenario c) Growth through diversification and advancement of industrial structure

Target Industries: Traditional Agricultural Products (e.g. Tobacco, Tea, Coffee, Cotton, Sugar), Fisheries, Processed Foods, Heavy Industry Products (e.g. Metal Refinery, Vehicles), Tourism

Overall Strategy: Reducing transport cost from production areas to outside of the region to increase international competitiveness
The basic idea of this strategy is that ports and the major production areas should be connected efficiently in terms of both transport price and time. Also, the port should be operated efficiently for export production and the import of various materials for diversified industries in a short time. However, in contrast to the strategies underlying the other two growth scenarios, the priority sectors and development approaches for land transport to achieve this growth scenario depend on the location of the production areas and categories of the potential industries. If the potential of traditional agricultural products or industrial products in an inland country under this growth scenario is high, railway transport capacity development should be focused to reduce transport cost and to increase international competitiveness. On the other hand, in the case of an ETZ or FTZ near a port, access to road developments from/to and inside of such zones should be prioritized. Depending on the location of the production areas, inland depots and border posts are also to be developed.

Priority Sectors: Port, Road, Railway
Other Related Sectors: Inland Deports, Border Posts, and Transport Facilitation

Port Sector Strategy: Development of the capacity of container terminals
Since most of the potential products under this scenario can be containerized and also advancement

of industrial structure following economic growth generally promotes the import of the container cargoes, container terminal development should be a focus in the port sector. Considering the recent rapid increase in container handling volume with long dwell times reported at the major ports in the region, development of further container terminal is necessary. Such capacity development will include: (i) development of new container terminals; (ii) rehabilitation of existing container terminals; (iii) rearrangement of the layout of existing terminals; (iv) installation of equipment such as gantry cranes; and (v) simplification of clearance and documentation procedures. The port sector strategy here mainly focuses on development of the physical aspects of container terminals. In addition, a single window approach through transport facilitation and capacity building is part of the strategy. Also, clarification of the different roles of major ports through a port master plan is necessary to determine at which ports container terminals should be developed and in which ways. In the short term, formulation of such a master plan and feasibility studies of new container terminals at ports at which capacity is obviously limited in relation to demand should be undertaken, along with studies to identify problems at other congested ports. Over the long term, construction for physical improvement and capacity building should be a focus.

Railway Sector Strategy: Strengthening of international competitiveness of products through reduction of transport costs

In order to strengthen the international competitiveness of inland products, reduction in transport cost through railway improvement is extremely important. The approaches to be pursued under this strategy involve not only railway capacity development through rehabilitation or construction projects but also improving operation efficiency to reduce transport cost and improve transport reliability and certainty. However, considering current operational issues in the railway sector, the improvement of operations and other "soft" components should be a focus in the short term as in Growth Scenario a. The development of "hard" infrastructure will follow in the long term.

Road Sector Strategy: Development of access roads from/ to production areas

In the road sector, improving accessibility from the production areas to basing points should be prioritized. Especially in the case of ETZs and FTZs near ports, access roads to/from the ports as well as internal roads in the zones should be developed. For inland production areas, roads between those locations and railway stations should be developed. In the short term, a feasibility study of access roads from/to production areas should be a focus, with detailed design to follow. Construction should take place over the long term.

Strategy for Inland Depots: Upgrading freight terminals at the railway stations to Inland Deports with customs' aspects

For reduction of the transport time through railway to the sea, clearance at the connecting point between road and railway without requesting that at the port assumes a key role. However, most of the terminals at railway stations in the region has only land and equipments as written in the strategy of Growth Scenario a. Under this growth scenario, application of customs' aspects to such freight terminals should be focused.

Strategy for Border Posts: Development of legal framework and procedures for railway OSBPs

The aim and approach here is same as for Growth Scenario a, i.e., the cost-effective implementation of OSBPs for railway (freight) traffic, through development of a legal framework and procedures..

Strategy for Transport Facilitation: Acceleration of clearance procedures at the region's ports

Single windows should be developed in the main ports of the region to rationalize and accelerate clearance procedures, which would thereby reduce transport time costs.

4.3 Soft Infrastructure: Cross-Border Transport Facilitation

4.3.1 The Importance of Soft Infrastructure

The importance of "soft" infrastructure (e.g., institutional reforms, laws/regulations,) as well as "hard" infrastructure (e.g., roads, railways, ports) for transport and trade efficiency is well-established.[41] It is considered that 25% of delays along transport corridors worldwide are a result of poor infrastructure, while 75% are related to poor facilitation.[42] The Global Transport Knowledge Partnership has noted that while improvements in infrastructure reduce travel time and vehicle operating costs, cutting down on documentation and time spent at the border can (i) increase vehicle utilization and (ii) reduce capital tied up during the transport operation including the need for increased inventory to protect against unreliable delivery times.[43] Accordingly, this section focuses on the "soft" infrastructure of cross-border transport in Southern Africa.

Table 4.3.1 shows rankings according to the World Bank's Logistics Performance Index, a benchmarking tool ranking 150 countries.[44] South Africa has a relatively high ranking, while the others have relatively low rankings.

Table 4.3.1 Logistics Performance Index (LPI) Rankings of the Subject Countries

Country	LPI Ranking	Customs	Infrastructure	International Shipments	Logistics Competence	Tracking and Tracing	Domestic Logistics Costs	Timeliness
Malawi	91	90	105	81	76	126	39	79
Mozambique	110	95	109	118	99	129	95	101
Namibia	126	114	118	125	142	142	125	83
South Africa	24	27	26	22	25	18	124	31
Tanzania	137	123	122	132	138	120	15	140
Zambia	100	120	120	102	87	64	43	130
Zimbabwe	114	138	136	114	113	70	134	97

Notes:
(1) The LPI ranking is a composite ranking based on a simple average of the country scores on the seven key dimensions shown in the table.
(2) Angola, Botswana, and DRC were unranked.
Source: Jean-François Arvis (World Bank), Monica Alina Mustra (World Bank), John Panzer (World Bank), Lauri Ojala (Turku School of Economics), and Tapio Naula (Turku School of Economics), *Connecting to Compete: Trade Logistics in the Global Economy, The Logistics Performance Index and Its Indicators, 2007* [the most recent available as of the current writing], pp. 26–33

Considering Japan's commitment to assist 14 one-stop border post (OSBP) projects in Africa in the coming years, and considering that the implementation of OSBPs may lead to various transport/logistics improvements, the following subsection reviews candidate OSBP projects.[45] The last subsection chapter reviews facilitation aspects with respect to transport and customs on a regional or corridor as opposed to border-specific basis.[46]

[41] Alberto Portugal-Perez and John S. Wilson, *Trade Costs in Africa: Barriers and Opportunities for Reform*, World Bank Policy Research Working Paper 4619, September 2008, pp. 21–27; and Joseph Francois and Miriam Manchin, *Institutions, Infrastructure, and Trade*, World Bank Policy Research Working Paper 4152, March 2007.
[42] See, e.g., Creck Buyonge and Irina Kireeva, "Trade Facilitation in Africa: Challenges and Possible Solutions", in *World Customs Journal*, Volume 2, Number 1, 2008, p. 43 (citing World Bank, *Doing Business in 2006: Creating Jobs*, 2005); and L.M. Harmon, B. Simataa, and A. Van der Merwe, *Implementing Facilitation on Trade and Transport Corridors*, 28th Annual Southern African Transport Conference, Pretoria, 6 July 2009.
[43] *Global Transport Knowledge Partnership Newsletter*, May 2008 [L.M. Harmon, lynn.harmon@gtkp.com].
[44] Singapore was ranked first, Afghanistan was ranked last, and Japan was ranked sixth.
[45] While it is recognized that implementation of a customs union or customs unions will eventually reduce or eliminate the needs for OSBPs, it is considered that such implementation will only take place well after envisaged target years in view of the difficulty of the undertaking. Further, even after establishment of a customs union (as in the case of the Southern African Customs Union, SACU), border posts may be maintained in order to collect data required for the apportionment of revenue among member states.
[46] In addition, broader beyond-the-border trade facilitation measures should be considered to complement the measures proposed.

4.3.2 One-Stop Border Post Projects

One-stop border post (OSBP) projects involve the implementation of border control procedures of two neighboring countries in a single joint facility as opposed to separate processing by the two countries in their respective national territories. The term may also be understood in a broader sense, to encompass the harmonization of procedures and documents, ICT-based automation, and facility development. Implementation requires strong political support as well as bilateral and/or multialteral agreements and national enabling laws. Benefits include reduced transport costs, resulting in reduced costs for imports and exports, and increased competiveness.[47]

This study assessed 16 candidate one-stop border post projects in the region:

(1) Chirundu (Zimbabwe/Zambia, North–South Corridor);
(2) Kazungula (Botswana/Zambia(/Zimbabwe), North–South Corridor);
(3) Beitbridge (South Africa/Zimbabwe, North–South Corridor);
(4) Kasumabalesa (DRC/Zambia, North–South Corridor);
(5) Lebombo/Ressano Garcia (South Africa/Mozambique, Maputo Corridor);
(6) Wenela/Katima Mulilo (Sesheke) (Zambia/Namibia, Trans Caprivi Corridor);
(7) Oshikango/Santa Clara (Namibia/Angola, Trans Cunene Corridor);
(8) Trans Kalahari/Mamuno (Namibia/Botswana, Trans Kalahari Corridor);
(9) Mwami/Mchinji (Zambia/Malawi, Nacala Corridor);
(10) Mandimba/Chiponde (Mozambique/Malawi, Nacala Corridor);
(11) Dedza/Calomue (Malawi/Mozambique, Nacala Corridor);
(12) Mwanza/Zobue (Malawi/Mozambique, Tete/Beira Corridor);
(13) Forbes/Machipanda (Zimbabwe/Mozambique, Beira Corridor);
(14) Nakonde/Tunduma (Zambia/Tanzania, Dar es Salaam Corridor/North–South Corridor);
(15) Songwe/Kasumulo (Tanzania/Malawi, Dar es Salaam Corridor/North–South Corridor); and
(16) Negomano/Mtambaswala (Unity Bridge, Tanzania/Mozambique, Mtwara Corridor).

The details are set out in Appendix F. OSBP projects may be prioritized based on a number of factors including traffic (present and future), delay time, and institutional readiness. OSBP projects to be assisted by a particular international development partner (in the case specifically addressed by this report, Japan) may also reflect to a degree the extent that other development partners are or have been involved in providing assistance at particular border crossing points. Also, the comparative advantages of respective development partners may be considered.

Table 4.3.2 sets out a preliminary prioritization of OSBP projects based on the factors outlined above; the assessment should be considered together with the corridor prioritization presented earlier in this chapter. In some cases no priority is given because of missing data. This assessment will be revised at later stages based on ongoing surveys, study findings regarding corridor prioritization, and any suggested refinements in methodology. The table also lists other possible donors.

[47] Africa Department, JICA, *Study Report on One Stop Border Post Assistance for Chirundu on Zambian–Zimbabwean Border*, August 2008, p. 9; and COMESA, SADC, and EAC, *North–South Corridor: Progress Report and Way Forward, Paper Prepared for the North–South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, pp. 10–11.

Table 4.3.2 Preliminary Assessment of Border Crossings

Border Crossing	Traffic (trucks per day)	Delay Time	Institutio-nal Readiness	Overall Priority	Possible Project Elements	Other Potential Donors (including Japan)
Chirundu	High (270)	High (various)	High	High (9)	Risk management, integrated border management, further training, ICT, monitoring, community development	DFID, World Bank, JICA
Kazungula	Medium (115)	High (1.0–2.5 days)	High	High (8)	Potentially all aspects, with co-financing from AfDB	AfDB, DFID, JICA
Beitbridge	High (287)	High (1–2 days)	Medium	High (8)	Infrastructure/facilitie s, legal aspects, and training	DFID
Kasumabalesa	350 (High)	High (1–3 days)	Medium	High (8)	ICT, legal aspects, document harmonization, procedure simplification, implementation of OSBP procedures	France, DFID, DBSA
Lebombo/ Ressano Garcia	High (200–455)	Medium (6-7 hours)	Medium	Medium (7)	Immediate need is for proper master planning and feasibility studies	DFID, DBSA
Wenela/ Katima Mulilo	Low (20–25)	High (1–3 days)	High	Medium (7)	All aspects, except for possibly legal aspects	DFID, SIDA, UNCTAD
Oshikango/ Santa Clara	Low (50)	High (3–5 days)	Low	Medium (5)	All aspects	USAID
Trans Kalahari/ Mamuno	Low (60)	Low (1 hour)	High	Medium (5)	Facilities, ICT, and specification/ implementation of OSBP operational procedures	USAID, JICA
Mwami/ Mchinji	Low (25)	Low (1 hour)	Medium	Low (4)	All aspects	AfDB, EU, JICA
Mandimba (Milange)/ Chiponde (Muloza)	Low (6–7)	Low (30 minutes)	Medium	Low (4)	All aspects	AfDB, JICA
Dedza/ Calomue	Medium (80–160)	2–8 hours (Low)	Low	Low (4)	All aspects	AfDB
Mwanza/Zobue	Medium (100)	4–8 hours (Low to Medium)	Low	Low (4.5)	All aspects	-
Forbes/ Machipanda	Medium (70)	No data	Medium	-	-	DFID, EU
Nakonde/ Tunduma	Medium (148)	High (4–5 days)	Medium	Medium (7)	Legal aspects	DFID, JICA
Songwe/ Kasumulo	No data	No data	No data	-	All aspects	-
Negomano/ Mtambaswala	No data	No data	No data	-	All aspects	AfDB

Notes:
(1) Traffic: below 50 = low, 51–199 = medium, and 200+ = high
(2) Delay time: less than 6 hours = low, 6–12 hours = medium, more than 12 hours = high

(3) Institutional readiness based on subjective judgment of efforts at OSBP implementation to date and their success: low, medium, and high
(4) Overall priority at this stage notionally assessed by (i) assigning 3 points for high traffic, 2 points for medium traffic, and 1 point for low traffic; (ii) assigning 3 points for high (long) delay time, 2 points for medium low time, and 1 point for low delay time; (iii) assigning 3 points for high institutional readiness, 2 points for medium institutional readiness, and 1 point for low institutional reference; and (iv) ranking as high (8–9 points), medium (5–8 points), and low (4 points or less).
(5) As indicated in the text, a range of traffic estimates are available for Beitbridge and Lebombo/Ressano Garcia, as well as for others.

Source: JICA Study Team

Based on this preliminary assessment, the following projects (which are along the heavily trafficked North–South Corridor) may be considered the highest priority:

(i) Chirundu (ongoing, but requiring further assistance with risk management, integrated border management, further training, ICT, monitoring, and community redevelopment);
(ii) Kazungula (potentially all aspects, with cofinancing from AfDB);
(iii) Beitbridge (all aspects); and
(iv) Kasumabalesa (ICT, legal aspects, document harmonization, procedure simplification, and implementation of OSBP procedures).

The next section considers facilitation aspects on a regional or corridor basis, which will contribute to transport system optimization beyond border posts.

4.3.3 Facilitation Aspects on a Regional (or Corridor) Basis

(1) Transport Aspects

Harmonization and Enforcement of Axle Load Limits[48]

Axle load limits are established and enforced to assure that vehicles operate within the pavement design parameters of the road network and therefore they reduce road deterioration and contribute to road traffic safety. The harmonization of axle load limits promotes the efficiency of cross-border road transport operations since if there are differences in axle load limits, road haulers must transship cargo at borders or risk fines, which will decrease the profitability of their operations. With harmonized axle load limits, a truck that meets the axle load standard in one country would meet the axle load standard in the other countries traversed. At the same time, properly specified axle load limits help preserve the road and bridge infrastructure.

Accordingly, the three RECs in Eastern and Southern Africa (SADC and COMESA as well as the EAC)[49] have generally agreed on the following axle load limits for freight vehicles, which are based on the distribution of loads on axles, which in turn depends on the number of axles and the number of tires:

(i) single steering axle (two tires): 8 t;
(ii) single axle (dual tires): 10 t;

[48] This section draws from: (i) Gael Raballand, Charles Kunanka, and Bo Giersing, *The Impact of Regional Liberalization and Harmonization in Road Transport Services: A Focus on Zambia and Lessons from Landlocked Countries*, The World Bank, 2008, pp. 21–22; (ii) Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, pp. 9–10; (iii) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, pp. 12–13; (iv) *Meeting of the Ministers Responsible for Transport and Meteorology, Draft Annotated Record*, Swakopmund, Namibia, 15 May 2009, pp. 13–19; and (v) COMESA, SADC, and EAC, *North-South Corridor: Progress Report and Way Forward, Paper Prepared for the North-South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, pp. 26–27, 45.

[49] The Association of Southern African National Road Agencies has also been actively engaged with this issue.

(iii) tandem axle (four tires): 16 t;
(iv) tandem axle (dual tires): 18 t;
(v) triple axle (six tires): 24 t;
(vi) triple axle (twelve tires): 24 t; and
(vii) combination rig (gross vehicle mass): 56 t.[50]

However, some countries do not apply these axle load limits (e.g., the load limit for a tandem axle in Zambia and Tanzania is only 12 t) to protect the local road transport industry.

The enforcement of axle load limits remains an issue. Since road transport in the region is very competitive, transporters have a strong financial incentive to operate trucks that exceed axle load limits. FESARTA has estimated that 10%–50% of the vehicles operated in the region are overloaded. In some cases the concerned authorities are seeking to link axle load controls to Customs clearance, e.g., at Beitbridge on the Zimbabwe side across from South Africa and at Kazungula on the Botswana side across from Zambia. The region is moving toward mutual recognition of axle load control certificates, which will become achievable with well-managed weighbridge stations, uniform axle load limits, and more robust national enforcement systems.[51] Accordingly, regarding weighbridge infrastructure and equipment, enforcement and weighbridge operations, institutional arrangements, human resources, and public awareness, the three RECs concerned have agreed to:

(i) develop a strategic regional network of overload control stations along the major transport corridors[52];
(ii) select appropriate weighbridge types based on traffic volumes;
(iii) involve the private sector in the operations and maintenance of weighbridges;
(iv) introduce a cross-border overload control system linked to Customs at all border posts along the regional corridors;
(v) introduce harmonized regional weighbridge clearance certificates;
(vi) through the respective governments, establish dedicated overload control enforcement units with accredited personnel;
(vii) establish a regional training center for overload control using existing training facilities to the extent possible, with a common syllabus to be adopted for overload control training; and
(viii) promote awareness of the importance of overload control by publishing brochures/ leaflets, and installing information signs, and disseminating information on community and national radio stations and websites.[53]

There is scope for Japanese assistance in relation to a number of these elements, through the relevant RECs and focus countries of this study.

[50] The RECs have also agreed on the introduction of a common bridge formula (P = 2 100 x L + 18 000, where P = Permissible mass (kg) and L = distance (m) between the centers of the outer axles of any group of consecutive axles; and mass tolerance of 5% on axle, axle unit, vehicle, and vehicle combination mass.
[51] An infrastructure issue is that the poor quality of roads along some corridors in effect is equivalent to a restriction on axle loads, e.g., the effective limit along the North-South Corridor via Kazungula is 45 t due to pontoon (ferry) capacity, the effective limit between South Africa and Malawi is 48 t because of broken hangers on the Tete suspension bridge.
[52] A recent paper recommended a detailed study of the feasibility of linking weighbridges along the North–South Corridor. COMESA, SADC, and EAC, *North-South Corridor: Progress Report and Way Forward, Paper Prepared for the North–South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, p. 45.
[53] *Meeting of the Ministers Responsible for Transport and Meteorology, Draft Annotated Record*, Swakopmund, pp. 15–17.

Harmonization of Vehicle Dimensions Standards[54]

Harmonization of vehicle dimensions standards is important because if such standards differ across countries, road transport operators must use different configurations for different markets, with consequent adverse impact on efficiency and costs. With assistance from the USAID Southern Africa Global Competiveness Hub, the three RECs have generally agreed on the following maximum vehicle dimensions (height, width, and length):

(i) 12.5 m for rigid chassis single vehicles or trailers;
(ii) 18.5 m for articulated vehicles (although some countries have a standard of 17.0 m);
(iii) 22 m for trucks and draw-bar trailers;
(iv) 2.65 m maximum width; and
(v) 4.30–4.60 m maximum height.

While the RECs have agreed on these maximum vehicles dimensions, laws have generally not been enacted to provide the legal basis for enforcement of these standards, In some cases these agreed standards may be unrealistic for certain countries (e.g., the vehicle length of 22 m may not be reasonable on mountainous roads, suggesting the need for some revision of the current standards). Also, an issue relates to interlinks, which are prohibited in Mozambique (and Tanzania).

The RECs are in the process of developing an implementation plan that ensures implementation by the countries. Scope for foreign (Japanese) assistance may include assistance to countries in formulating the legal basis for enforcement of vehicle dimensions standards.

Harmonization of Road User Charges for Foreign Vehicles[55]

Differences in the road user charges levied on vehicles registered in foreign countries across the region constitute a barrier to the creation of a unified transport market. At present, road user charges in the region vary by country. There are different road financing arrangements in the region including: (i) road or bridge tolls (Mozambique, South Africa, Zimbabwe), (ii) fuel levies (all countries), (iii) fixed charges per unit of weight and distance (e.g., Zambia), and (iv) other fees.

These differences in road user charges have had an adverse impact on certain countries, with Mozambique cited as an example. If foreign trucks entering a country are assessed high road user charges, trucking companies may avoid the countries, even if the high road user charges amount to only about 5%–10% of costs. The World Bank has noted that the Beira Corridor is often avoided for this reason (as well as because Mozambique does not allow seven-axle

[54] This section draws from: (i) Gael Raballand, Charles Kunanka, and Bo Giersing, *The Impact of Regional Liberalization and Harmonization in Road Transport Services: A Focus on Zambia and Lessons from Landlocked Countries*, The World Bank, 2008, p. 22; (ii) Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, p 10; (iii) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, p. 13; (iv) *Meeting of the Ministers Responsible for Transport and Meteorology, Draft Annotated Record*, Swakopmund, Namibia, 15 May 2009, pp. 13–17; and (v) an interview with Mr. Amos Marawa, Director, Common Market for Eastern and Southern Africa (COMESA), Infrastructure Department, 29 September 2010.

[55] This section draws from: (i) Gael Raballand, Charles Kunanka, and Bo Giersing, *The Impact of Regional Liberalization and Harmonization in Road Transport Services: A Focus on Zambia and Lessons from Landlocked Countries*, The World Bank, 2008, pp. 19–21; (ii) Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, p. 10; (iii) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, p. 14; and (iv) *Meeting of the Ministers Responsible for Transport and Meteorology, Draft Annotated Record*, Swakopmund, Namibia, 15 May 2009, pp. 4–6; and (v) Africon, *Implementation of Harmonised Road User Charges System in the SADC Region*, prepared for the SADC Secretariat, June 2007.

interlinks and it is not a member of the COMESA Yellow Card system for third-party motor liability insurance).

Accordingly, the COMESA countries have agreed to road user charges of USD 10 equivalent per 100 km. SADC and the EAC had also agreed to these charges within the Tripartite framework (although Botswana, Namibia, and Mozambique have higher charges, which may be justified by the relatively lower traffic volumes in these countries), with SADC taking the lead in developing the system. More recently, SADC and COMESA were undertaking a review of these charges based on road deterioration modeling.[56] The target year for harmonization of road user charges was set as 2010.

However, the World Bank has pointed to the difficulty of harmonizing road user charges throughout the region; they have concluded that in the immediate term, road user charges may remain a matter of negotiation/reciprocal action between/among countries. To date at least, most countries have either continued with their existing arrangements or introduced new charges that have not been fully consistent with regionally agreed charges.[57] That said, there may still be some scope for Japanese assistance regarding the harmonization of road user charges considering the continuing efforts of the Tripartite group in this field.

Third-Party Motor Vehicle Liability Insurance[58]

Transporters and drivers engaged in cross-border transport are generally required to obtain third-party motor liability insurance to cover the costs of accidents that may occur in foreign countries. If there are different third-party motor liability insurance regimes between/among countries in a region, transporters and motorists will not need to buy separate insurance coverage for each country they traverse. Additional costs relate to the time required to purchase the duplicate cover, increased paperwork, and the need for drivers to carry additional cash with associated risks.

COMESA, SADC, and the EAC currently have three different systems of third-party motor liability insurance for cross-border transport:

(i) cash payments at the border, which are country-based and follow the laws of the country of entry (e.g., in Mozambique payments are required of foreign vehicles only and cover third-party vehicle and property damage);
(ii) a fuel levy, which entails indirect payments for third-party motor insurance assessed on purchases of fuel (applied in the SACU countries, i.e., Botswana, Lesotho, Namibia, South Africa, and Swaziland); and
(iii) the (COMESA) Yellow Card system, which allows for pre-purchase of motor insurance in local currency at the origin with the insurance honored by all participating countries, and

[56] Interview with Mr. Amos Marawa, Director, Common Market for Eastern and Southern Africa (COMESA), Infrastructure Department, 29 September 2010.
[57] A Workshop was held on 26–27 April 2009 in Gaborone to re-run the SADC Road User Charges model on the basis of the updated data that was provided by Member States. However, only four of the SADC states provided reliable data for the model.
[58] This section draws from: (i) Gael Raballand, Charles Kunanka, and Bo Giersing, *The Impact of Regional Liberalization and Harmonization in Road Transport Services: A Focus on Zambia and Lessons from Landlocked Countries*, The World Bank, 2008, p. 23; (ii) Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, p. 10; and (iii) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, pp. 14–15; and (iv) *Meeting of the Ministers Responsible for Transport and Meteorology, Draft Annotated Record*, Swakopmund, Namibia, 15 May 2009, pp.17–18.

which covers third-party property liabilities and medical expenses of the driver and passengers.[59]

Efforts to harmonize third-party motor liability insurance in Southern (and Eastern) Africa date back to 1999 when efforts were made to apply the COMESA Yellow Card system throughout the region. More recently, in 2008, a Study on Harmonization of Third Party Motor Vehicle Insurance for the SADC Region was proposed to address this issue, to benefit particularly Angola, Botswana, DRC, Lesotho, Mozambique, Namibia, South Africa, and Swaziland. While funding was available under the Regional Integration Capacity Building (RICB) facility of the EU, since only one bid was received, EU procurement regulations did not allow for the process to proceed. Also, SADC approached the Lusaka office of the UN Economic Commission for Africa for possible funding, but without success. Even without funding from development partners, a small-scale study of third-party motor liability insurance is being undertaken by the SADC task force in charge of transport; one modality being considered is allowing SADC transporters to purchase a Yellow Card on entry to the COMESA region.

Japan could conceivably assist further study and/or implementation with respect to this issue, although Europe with its Green Card system may be seen as having a comparative advantage for such technical assistance.

(2) Customs Aspects

Customs Simplification and Harmonization[60]

SADC, COMESA, and the EAC have been working to: (i) harmonize customs laws, regulations, procedures, and documentation to comply with relevant international conventions and best practices; (ii) systematically remove trade facilitation bottlenecks; (iii) strengthen trade facilitation within Customs authorities, including the adoption of a "pro-customer culture"; and (iv) share modernization experiences among regional Customs authorities. Specific measures have included implementation of: (i) simplified, harmonized temporary admission, re-exportation and transit procedures; (ii) the same version of the Harmonized System (HS) of Customs Classification[61]; (iii) the valuation system of the General Agreement on Tariffs and Trade (GATT); and (iv) harmonization of exemption and duty relief measures.

The EU has been the major development partner assisting these ambitious efforts at Customs simplification and harmonization in Southern Africa, particularly through the SADC Customs Modernization and Trade Facilitation Project, funded with EUR 18 million in the 9th European Development Fund (EDF) Regional Indicative Programme (RIP). In addition, the USAID Southern Africa Global Competiveness Hub has assisted: (i) the review and updating of

[59] The concept is that when a visiting driver is legally liable for an accident, the local bureau in the host country (handling bureau) deals with the claim and seeks reimbursement from the bureau in the home country of the driver (paying bureau). While the COMESA Yellow Card facilitates cross-border transport since transporters and motorists do not need to buy separate insurance coverage for each country they traverse, there have been a number of problems with implementation of the scheme: (i) the insurance coverage varies between/among countries; (ii) there have been problems with counterfeit cards; (iii) some companies authorized to issue Yellow Cards have been de-registered; (iv) at some borders there are no insurance companies to issue the cards; and (v) the cost of the Yellow Card varies by country, although to some extent this reflects the different coverage.

[60] This section draws from: (i) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, pp. 11–12; (ii) an interview with Mr. Willie Shumba (Senior Programme Officer, Customs), Mr. Happias Kuzvinzwa (Advisor, Customs and Trade Facilitation), Mr. David Walker (Customs Technical Expert), and Mr. Tom Farrington (Programme Management Advisor), Trade, Industry, Finance and Investment (TIFI) Directorate, Southern Africa Development Community (SADC), 15 October 2009; and (iii) Southern Africa Global Competiveness Hub, *Fourth Quarter and Year End Report, Financial Year 2009*, submitted by AECOM and Carana Corporation to U.S. Agency for International Development/Southern Africa, October 2009, pp. 17–18.

[61] The most recent version of the HS was released in February 2007.

Customs laws, regulations, manuals, procedures, and processes using international best practices based on the World Customs Organization's Revised Kyoto Convention on Simplification and Harmonization of Customs Procedures; and (ii) training for both Customs officials and the business community to ensure uniform interpretation of laws and regulations.

Single Administrative Document[62]

The three RECs in Eastern and Southern Africa have agreed on a single administrative document (SAD) for Customs in the region to reduce the cost of moving goods across borders through a single customs declaration made in the originating country. With the assistance of USAID Southern Africa Global Competiveness Hub, the SAD 500 piloted by SADC along the Trans-Kalahari Corridor was later adopted along the Dar es Salaam and Maputo Corridors, and is being used by South Africa, Zimbabwe, Zambia, and Malawi along the North–South Corridor as part of the Regional Customs Bond Guarantee System pilot project described in a following subsection. However, although several of countries have agreed to use the SAD, its actual adoption has not yet been widespread.

Electronic Data Interchange between Customs Administrations

As has been noted, different computerized customs management systems are used by the different countries in the region. While most countries in Southern Africa use the Automated SYstem for CUstoms Data (ASYCUDA) developed by the United Nations Conference on Trade and Development (UNCTAD), exceptions include Angola and Mozambique (Trade Information Management System or TIMS, developed by Crown Agents) and South Africa (the Customs Automated Processing of Entries System or CAPE). The RTFP has noted that even when countries use the same Customs management software, they usually fail to share Customs data and information, due to both legal and technological reasons. Accordingly, the same information has to be entered on both sides of the border. Significant time savings could be achieved if this information would need to be entered only once, especially if it is entered during a preclearance procedure before arrival of the goods at the border. [63]

In view of the foregoing, there would be significant value added in a study for improving regional Customs information sharing and interconnectivity, possibly funded by Japan. The aim of such a study would be to identify areas where well-designed and targeted investments could be made to improve the Customs IT infrastructure and data sharing between Customs administrations of the region.[64]

Establishment of Single Windows in the Region

While cross-border data interchange is important, especially between Customs administrations, the establishment of single windows[65] within each country can greatly facilitate trade and transport. At present in Southern Africa, there is little data sharing among the many agencies present at the border within each country, and other than Customs, most agencies are not

[62] This section draws from *North–South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, p 8.

[63] The first paragraph of this section draws from *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, p. 9.

[64] The World Bank Japan Fund funded a similar study along the Abidjan-Lagos Corridor, executed by the World Bank and the Economic Community of West African States (ECOWAS). See PADECO Co., Ltd., *A Regional Study on Customs Data Sharing and Interconnectivity along the Abidjan-Lagos Corridor*, prepared for ECOWAS, June 2009.

[65] Single-window inspection may be defined as the simultaneous (or nearly simultaneous) inspection and control of people, goods, and vehicles of a country's respective authorities.

computerized. To implement a national single window requires strong political will, as evidenced by the recent failure of an attempt to do so by the United States Millennium Challenge Corporation in Zambia.

Accordingly, there would be significant value added in a project, possibly funded by Japan, to develop national single windows that are customer-focused, based on a contemporary foundation well expressed in the Revised Kyoto Convention, and that operate in a fully automated environment, whether on the ASYCUDA platform or another of equal capacity.

Such a project could proceed in three stages, as proposed in the following box.

Proposed Three-Stage Project to Develop National Single Windows

Stage I would be a preparatory phase involving short-term, highly focused assessments of national customs administrations, relevant regulatory agencies, and private-sector stakeholders. Each assessment would culminate in terms of reference and recruitment documents for implementing the recommendations proposed. A Monitoring Plan would be written to track progress of project implementation, and a Change Management Plan would present strategies for overcoming foreseeable resistances. The principal goal of Stage I would be to prepare for the integration of all direct stakeholders into the single window system.

Stage II would involve training, technical assistance, reform actions, and a choice of implementation options. The training, technical assistance, and reforms would all be direct follow-on measures to the assessments conducted in Stage I. They would be expected to meet targets established in the Monitoring Plan and to begin use of the tactics described in the Change Management Plan. Stage II would also comprise measures necessary to enact legal reforms necessary for electronic transactions and for data management and protection. The design of an ICT system sufficiently robust to handle the known requirements of a trade facilitation single window would be another important technical assistance component of this phase. The training and reforms of this phase should achieve measurable preparedness of the trade community for receiving an integrated single window.

A second aspect to be covered in Stage II would be the choice of lead agency and of the most suitable implementation option. Arguably, in most cases Customs should not be the lead agency. A service provider, with no decisional authority, could lead the implementation of the single window and manage its operations. Countries should give consideration to the Ghana Community Network Services Limited (GCNet) model as an attractive alternative. A service provider would likely be a mixed company, or a public-private partnership, and would choose the recognized "automated information transaction system" as the working model. This system would allow the trader to submit a one-time application which the service provider would forward to all concerned entities, with Customs playing a central role in authorizing clearance and calculating revenue.

Stage III would involve the establishment of the service provider and automation of the national single windows. No country should advance to Stage III until it has met the intermediate objectives established in the Monitoring Plan through successful reforms in Stage II. All the design and implementation recommendations of this project are premised on the proven fact that premature automation will lead to failure and dissipation of resources.

In Stage III, the Project Management Team—possibly represented by the service provider—would proceed with procurement of all ICT equipment, technical assistance for installation, and training in the system. This phase will culminate in the full-scale operations of single windows for the trade communities of the ports of the Corridor.

Source: After PADECO Co., Ltd., *A Comparative Feasibility Study on Development of Single Windows in the Main Ports of the Abidjan-Lagos Corridor*, prepared for ECOWAS, June 2009.

Regional Customs Bond Guarantee[66]

A regional customs bond guarantee would provide significant benefits by reducing or eliminating administrative/financial costs associated with nationally executed customs bond guarantees for transit traffic. The countries in the region require customs bonds to cover the potential loss of duty revenue if the goods carried are diverted and consumed in a transit country. Within a nationally executed bond system, transporters transiting one country en route to another need to take out a customs bond at least equal to the duty that would be payable on their cargo; when they prove that the cargo has left the customs territory, the bond is released. However, the processing of releasing takes time (sometimes as long as 60 days), and the issuance of the bond comes at a cost, estimated at about 4% of the cost of an import or export commodity. In the COMESA region an estimated US$500 million equivalent in business capital is used to bond goods, which ties up working capital of mainly small firms already short of cash. The problem is compounded by delays in bond cancellation, due to manual rather than electronic processing.

Both SADC and COMESA with private sector stakeholders have been piloting the development of a regional customs bond to address this problem, the former with assistance from DFID and the latter with assistance from USAID. Benefits may ultimately include: (i) faster clearance of vehicles; (ii) a resulting increase in tons/kilometers with a positive impact on freight rates; (iii) release of a large sum of money for clearing and forwarding agents, which is tied up as a guarantee and/or collateral in commercial banks and insurance companies; (iv) providing customs authorities with reliable security and an improved system for collection of duties and taxes; (v) providing a simple and economical administrative system for carriers/transporters; and (vi) providing a simple and economical mechanism for sureties (financial institutions) to issue and manage customs bond and creating an opportunity to extend their cooperation. Challenges include convincing smaller transporters and freight forwarders in the smaller countries that a regional bond system will benefit them, and to harmonize the SADC and COMESA systems to form a single regional customs bond guarantee system. If one country along a corridor applies a different customs transit regime from the others, the benefits of a regional system along that corridor will be significantly reduced.[67]

One area of possible Japanese assistance for this activity may be related to the geo-location of goods in transit through the use of Radio Frequency Identification (RFID) devices. A private sector consortium has proposed implementation of a trade corridor cargo tracking system on a pilot basis for management of one of the Walvis Bay Corridors.

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[66] This section draws from: (i) Regional Trade Facilitation Programme, *North South Corridor Pilot Aid for Trade Programme*, Status Report, October 2008, pp. 10–11; (ii) COMESA, SADC, and EAC, *North-South Corridor: Progress Report and Way Forward, Paper Prepared for the North-South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, p. 28; (iii) *North-South Corridor Pilot Aid for Trade Programme, Surface Transport*, downloaded from http://www.northsouthcorridor.org/media/090330_full_final_report_-_formatted_2_english.pdf, p. 12; (iv) Japan International Cooperation Agency, PADECO Co., Ltd., and Mitsubishi UFG Research and Consulting Co., Ltd., *The Research on Cross-Border Transport Infrastructure: Phase 3, Final Report*, March 2009, pp. 4–10; and (v) Fernando Anselmo, SADC Transit Management System Legal Provisions, MCLI Operational Working Group Meeting, Nelspruit, South Africa, 4–5 February 2010.

[67] In the longer run, a more comprehensive solution could involve the countries acceding to the Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention) (Geneva, 14 November 1975), which permits the international carriage of goods by road from one customs office of departure to a customs office of arrival, through as many countries as necessary, without any intermediate frontier check of the goods carried. It might even be argued that no guarantee system is required for a large percentage of cargo because most goods traveling under bonds are carried by established clearing and forwarding companies, which have substantial fixed assets that could be seized.

5 Regional Infrastructure Development in Southern Africa

5.1 Overall Development Strategy

As described in Section 4.1, various barriers to cross-border transport, related to both "hard" and "soft" transport infrastructure, hinder the growth of countries in Southern Africa, particularly related potential development of trade and industry, in line with the growth scenarios set out in Chapter 3. The development of transport infrastructure to address the barriers to achieving the growth scenarios will be important for achieving regional economic development. Considering that these barriers are generally complex and interacting, comprehensive regional transport infrastructure development programs consisting of various mutually enhancing projects consistent with well-conceived strategies, are essential achieve the objective. In formulating these programs it is important not to consider only ongoing and future projects to be assisted by a single development partner, but all ongoing and planned projects of the governments, RECs, all development partners, and the private sector aimed at achieving the same or similar objectives.

In this chapter the strategies formulated in the previous chapter are further elaborated for each of the eight corridors selected in the previous chapter. Target industries, bottlenecks, and projects are shown for each corridor. In addition, development programs/projects for each of corridors are set out. Of these projects, specific projects targeted for Japanese official development assistance are presented in the last section of this chapter taking into account strategic considerations related to Japanese assistance.

An overall view of the regional infrastructure development strategies prepared in this report is shown in Figure 5.1.1. The structure of this chapter is illustrated in Figure 5.1.2.

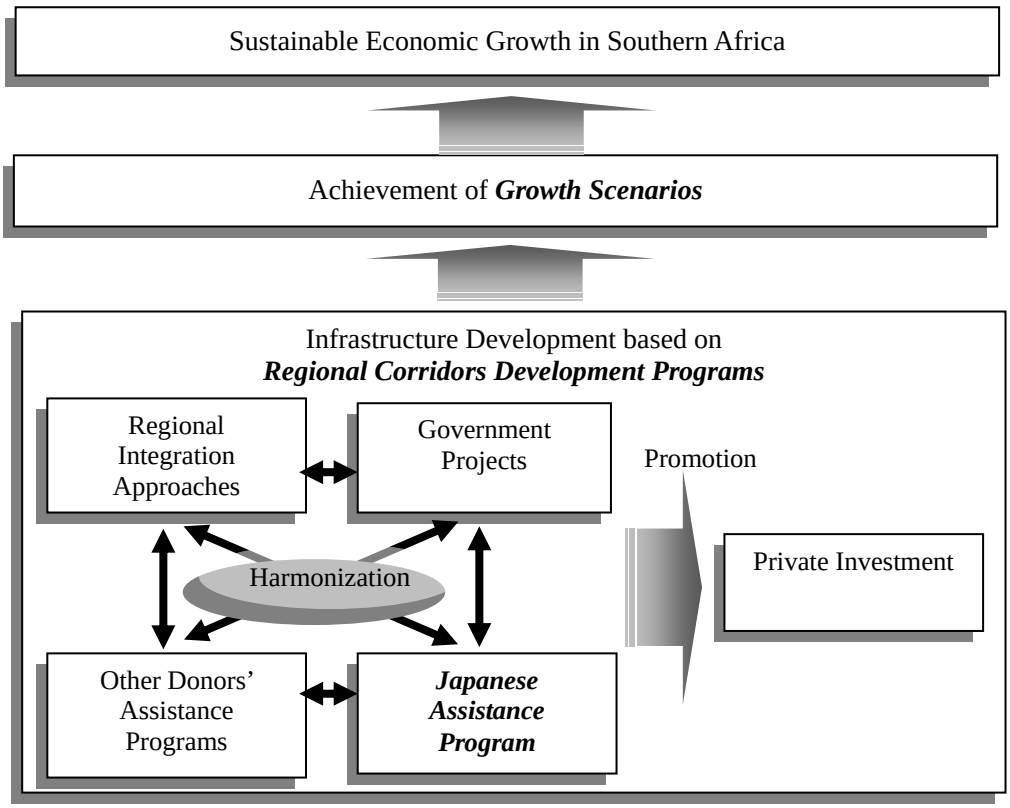


Figure 5.1.1 An Overall View of the Regional Infrastructure Development Strategies

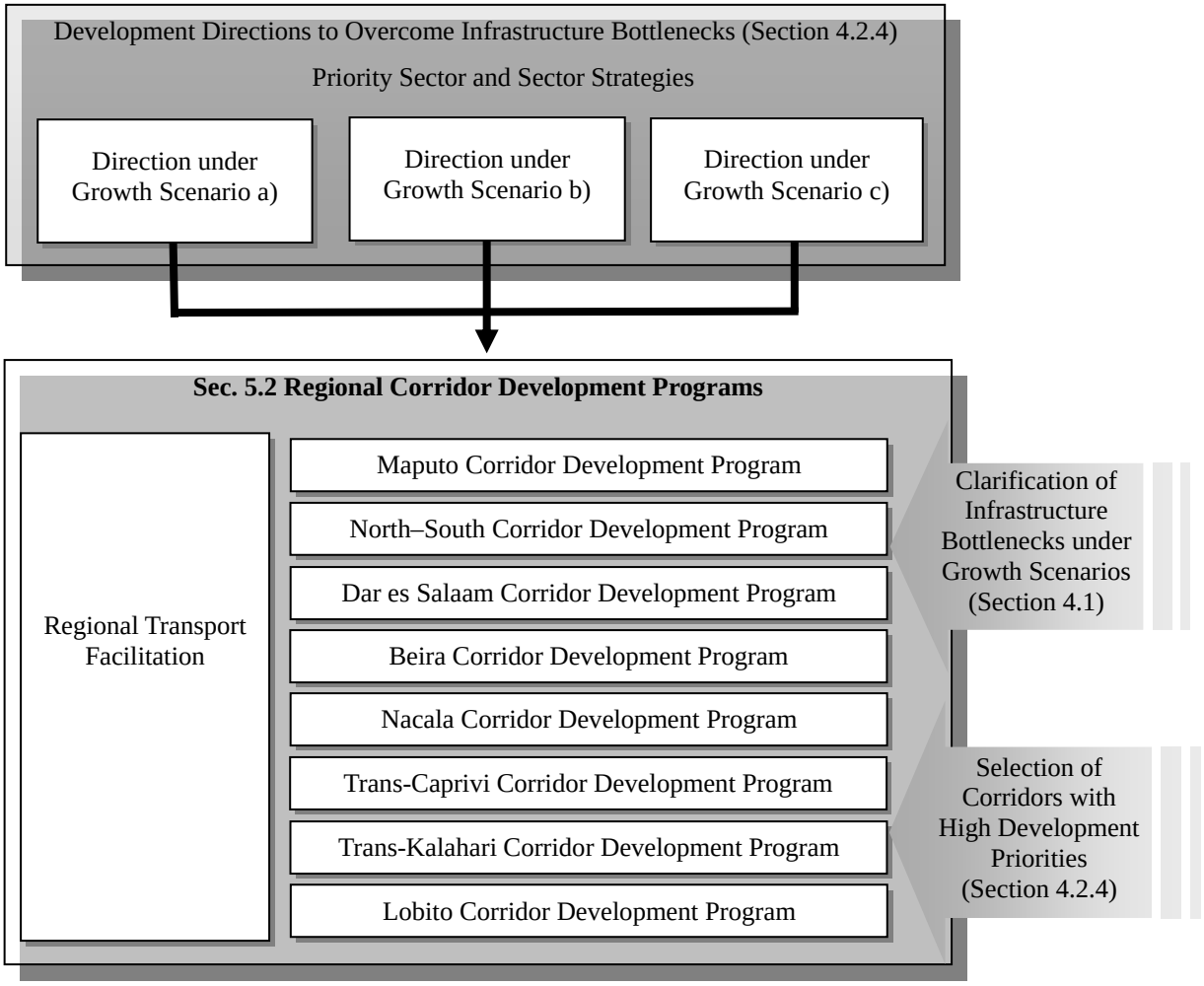


Figure 5.1.2 Structure of Chapter 5

5.2 Proposed Corridor Development Program

Based on the development directions described in the foregoing chapter, development directions for each of eight prioritized corridors were prepared.[1] The corridor programs target priority sectors and industries including the main commodities to be transported along the corridors in line with the applicable growth scenarios, with the focus on growth scenarios that scored 3 or higher for the corridor. In addition to the program for each corridor, a regional transport facilitation program to address issues that go beyond individual corridors (e.g., harmonization and enforcement of axle load standards).

[1] Although not mentioned regarding each corridor, to improve corridor performance it will be important to strengthen existing corridor management institutions (e.g., the Maputo Corridor Logistics Initiative, the Walvis Bay Corridor, the Trans Kalahari Corridor Secretariat) or establish new ones in cases where there is no existing institution. A legal instrument must be agreed, and a sustainable corridor funding mechanism prepared (e.g., a tonnage levy on imports, as assessed in the Northern Corridor in East Africa; memberships fees as applied in the Maputo and Walvis Bay Corridors; and development bank grants as in the case of the Central Corridor in East Africa and the Abidjan–Lagos Corridor in West Africa). See Yao Adzigbey, Charles Kunaka, and Tesfamichael Nahusenay Mitiku, *Institutional Arrangements for Transport Corridor Management in Sub-Saharan Africa*, Sub-Saharan Transport Policy Program (SSATP), SSATP Working Paper No. 86, October 2007.

5.2.1 Maputo Corridor

Major Target Industries for Scenario b) (4 points):
Heavy and light Industries in South Africa and Mozambique
Major Target Industries for Scenario c) (5 points):
Heavy industries near the Port of Maputo, automobile industries in South Africa, and agricultural products in South Africa, Zimbabwe, and Swaziland

Major Bottlenecks under Growth Scenarios:
As the railway and road conditions along this corridor are relatively better than along others, the major bottleneck on this route is the border crossing between South Africa and Mozambique at Lebombo and Ressano Garcia. Even though the distance between Maputo and Johannesburg is only about 600 km, shorter than that from Johannesburg to the major ports in South Africa, the long border crossing time at Lebombo/Ressano Garcia reduces the competitiveness of the Port of Maputo. Other major issues include delays in port clearance and insufficient communication infrastructure at the port.

Priority Sectors: Border Post and Port

Development Direction:
In the short term, approaches to reducing the border crossing time at Lebombo/Ressano Garcia should be prioritized. Over the long term, the physical development of the Port of Maputo and/or an alternative port in the vicinity of Maputo as well as an improvement in port operation systems should be targeted.

(1) Port

New Port Development (Mozambique, Long Term). As Southern African companies around Johannesburg are shifting or aiming to shift their cargoes to the Port of Maputo instead of the Port of Durban, the development of a new terminal in Maputo or a new port in the vicinity of Maputo is desired not only for Southern Africa but also for other inland countries using the North–South Corridor and the heavily congested Port of Durban. There are plans to develop a new petroleum port at Techobanine, a site with a deep harbor located 70 km south of Maputo; once developed, it would be the deepest port in Mozambique.

(2) Railway

Rolling Stock Procurement of Ressano Garcia Railway Line (Mozambique, Short Term). To improve rail service along the Maputo Corridor, the rolling stock and locomotives for the railway sections in Mozambique should be enhanced to accommodate the increasing demand. For rehabilitation of the railway track, CFM spent USD 40 million rehabilitating the line and finished in 2009.

(3) Border Post

Preparation of a Master Plan and Feasibility Studies for the Lebombo/Ressano Garcia OSBP (South Africa/Mozambique, Short Term). While some studies have been undertaken (e.g., by the South African Department of Public Works), it is necessary to find a more cost-effective model to achieve OSBP objectives at this border crossing, focusing on policies, processes, and procedures, in addition to infrastructure. In addition, detailed plans and feasibility studies for each phase must be properly prepared, with full financial and economic justification (including presentation of the "business case"), along with a comprehensive social and environmental impact assessment. One constraint for the respective governments may be the time required for such a study; while it is important to recognize that long-lasting achievable results (beyond certain attainable "quick wins") will come after 2010 (i.e., after the World Cup,

a deadline which has been driving decision making in South Africa), conducting the required studies may be considered a short-term priority.

Development of Lebombo/Ressano Garcia OSBP (South Africa/Mozambique, Long-Term). Based on the outcome of the proposed master plan and feasibility studies, a OSBP project at Lebombo/Ressano Garcia may be developed, over the longer term, to facilitate freight flows along the Maputo Corridor.

(4) Inland Depot

KM 4 Dry Port (Planned) (Railway ⇔ Road)(South Africa/Mozambique, Ongoing/Short Term): A dry port is planned at Km 4, near the Lebombo/Ressano Garcia border crossing. A feasibility study including an overall railway rehabilitation plan for Mpumalanga Province in South Africa is ongoing and scheduled for completion in June 2010.

5.2.2 North–South Corridor

Major Target Industries for Scenario a) (4 points):
Copper in Zambia and the DRC, and coal in Botswana
Major Target Industries for Scenario b) (5 points):
Industries in multi facility economic zones (MFEZs) in Zambia and the DRC along the route (Lusaka South, Kasumbalesa, Ndola, Chambishi, and Lumwana)

Major Bottlenecks under Growth Scenarios:
This corridor connecting mining areas to the sea is significantly longer than other major corridors in the region, but currently the railway network in the corridor is not working efficiently due to issues related to "hard" infrastructure and operations. Since the road in this corridor has been improved with support of various development partners, the only missing road (bridge) link is currently that at the Kazungula border crossing between Zambia and Botswana on the Zambezi River. The long border crossing times, of the order of 1–2 days at Chirundu between Zambia and Zimbabwe, and at Beitbridge between South Africa, are to some extent being addressed by ongoing projects, but these efforts must continue. Also, similarly long border crossing times ate Kasumbalesa, between Zambia and the DRC, must be addressed. Considering the number of countries traversed by the North-South Corridor, various approaches for transport facilitation are critically important to achieve growth Scenario b), which has high potential for this corridor.

Priority Sectors: Bridge (Roads), Border Posts, and Railway

Development Direction:
In the short term, bridge construction and OSBP development along the road corridor should be a focused. Also, some attempts to improve railway operations could be done. In the long term, railway capacity development approaches from both hard and soft infrastructure sides should be achieved.

(1) Roads (Bridges)

Although most road sections along the North–South Corridor are in good or fair condition, in order to complete the corridor there is a need to build a bridge over the Zambezi River at Kazungula, located at the border crossing point between Zambia and Botswana. The background and current status of the bridge construction is as follows.

Kazungula Bridge Construction (Zambia and Botswana, Short Term). At present, cross-border traffic at Kazungula relies on two pontoons (ferries). Although current traffic volume at Kazungula is estimated at about 115 trucks per day (total in both directions), it is expected that a considerable percentage of traffic currently crossing at Chirundu (about 270

trucks per day, total in both directions) would move to Kazungula if a bridge is constructed. In 2001, JICA conducted a feasibility study for a Kazungula Bridge; at the time, the bridge was designed to cross Zambia, Botswana, and Zimbabwe. However, difficulties in crossing Zimbabwe territory emerged, and redesign of the bridge as a curved structure traversing only Zambia and Botswana territories was requested. In response, AfDB/SADC is currently conducting a feasibility and detailed design study of the bridge including OSBP components. Mid-2009 construction cost estimates were about USD 80 million for the bridge and USD 32 million for the OSBP components, although it is understand that SADC has requested the consultant to scale down the cost of the OSBP component, without sacrificing efficiency. JICA is considering financing of this bridge as well as the OSBP buildings as requested by the governments of the two countries.

Beitbridge-Harare-Chirundu Road Improvement (Zimbabwe, Short Term). DBSA has identified this project along with the Ministry of Transport of Zimbabwe in consultation with the South African National Roads Agency Limited (SANRAL). It would serve traffic between Johannesburg–Pretoria (Gauteng) and (i) Zambia/DRC via Chirundu as well as (ii) Malawi via the Tete Bridge. The road from Gauteng to Harare has been identified as the busiest in SADC with about 4,000 vehicles per day including 30% heavy vehicles. DBSA has been approached by the Infrastructure Development Bank of Zimbabwe to assist with development of the project, which is to include a financially sustainable toll road. The Beitbridge–Harare segment has been estimated to cost USD 500 million.

(2) Railway

Upgrading of Victoria Falls to Bulawayo Railway (Zambia and Zimbabwe, Long Term). This project will rehabilitate this critical section of the North–South Corridor railway, to accommodate increased traffic through track replacement and ballast supplement. Funding of the project could be linked to the removal of operating constraints on the alternative and competing railway route through Botswana. The total cost of this project, proposed by the North South Corridor Pilot Aid for Trade Programme – Surface Transport, is estimated to be USD 200 million. The project should take into account the rights of the existing railway concessionaire BBR and the current political/economic situation in Zimbabwe.

Upgrading of Kapiri Mposhi to Chingola Railway (Zambia, Long Term). This project will upgrade the 220 km section of the mainline from Kapiri Mposhi to Chingola to 20 ton axle loads, similar to the TAZARA specifications since the TAZARA mainline locomotives are now unable to access the Zambian rail system because of the differing permissible axle loads. The total project cost is estimated at USD 200 million.

Northwest Railway Extension (from Chingola to Solwezi) (Zambia, Long Term). This project will extend the railway line to Solwezi, together with upgrading of the Kapiri Mposhi to Chingola line. It will provide a railway line from the copper mines around Solwezi with bulk rail transport to and from the port of Dar es Salaam. Several feasibility studies have been carried out over the past few years by various private sector interests. Total project cost is estimated to be USD 250 million.

(3) Border Posts

Follow-on Assistance for Implementation of the Chirundu OSBP Project (Zambia/ Zimbabwe, Ongoing/Short Term). Additional assistance is required to address a number of challenges that remain at Chirundu, e.g., the need for further implementation of risk management, the need for integrated border management reducing the number of agencies at the border, further ICT development, development of a structured way of sharing equipment (e.g., scanners, forklifts). Also, a number of community development issues may be addressed by a

Border Community Integrated Development Program identified by JICA to improve living and working conditions of the community; indeed, combining infrastructure provision with social development programs may be an approach applicable to all OSBP projects.

Assistance for the Implementation of the Beitbridge Border Efficiency/OSBP Project (South Africa/Zimbabwe, Ongoing/Short Term). Considering that Beitbridge is already arguably the most significant bottleneck in the region, it is necessary to implement measures to improve the efficiency of this border crossing as soon as possible. One constraint is that South Africa may intend to pilot a OSBP at Lebombo/Ressano Garcia before rolling out the concept out at other border crossings. Nevertheless, there is considerable scope for improving efficiency at Beitbridge even maintaining it as a two-stop border post.

Construction of a New Four-Lane Bridge at Beitbridge (South Africa/Zimbabwe, Long Term). The capacity of the existing (two-lane) bridge is limited, since several lanes of traffic (including commercial freight vehicles, private vehicles, and buses) converge into a single lane to cross the bridge in each direction. Accordingly, construction of a new four-lane bridge, along with required access roads and building and parking facilities.

Development of Kazungula OSBP Project (Botswana/Zambia, Long Term). A OSBP component has already been designed as part of the Kazungula bridge feasibility study. SADC asked the consultant to scale down the OSBP cost component from USD 32 million without compromising its efficiency. There are three alternative border crossing points (Chirundu, Kazungula, and Katima Mulilo, the last-named near a bridge completed in 2004 with German assistance). An issue is that if traffic is diverted to Chirundu, there may not be a need for Kazungula for some years, although Kazungula may be preferred eventually.

Development of Kasumbalesa OSBP Project (Zambia/DRC, Long Term). Significant gains in efficiency could be realized with implementation of a OSBP at Kasumabalesa, which is already a busy border crossing, with traffic at present estimated to include about 350 trucks per day. Transshipment at the border is the norm. Data from the private sector and other sources indicate average dwell time at the border to be 1.5–3 days. While a number of infrastructure/facility issues are being addressed at Kasumabalesa, various legal and operational issues that could be addressed through implementing a OSBP remain.

(4) Inland Depot

Dry Port at Lusaka, Kitwe and Ndola as PPP candidates (Zambia, Long Term). A master plan targets development of dry ports at Lusaka, Kitwe, and Ndola, which are major nodes for freight transport in Zambia. Kitwe and Ndola are important as nodes where freight from the Copperbelt is brought in and moved to trunk roads. Each dry port is to be about 40,000 m^2 and include customs as an ICD, an industrial park, and ring road access. In the future, railway access should also be developed. Bonded warehouses and handling equipment including cranes and forklifts should be installed for use by forwarders in return for payment of user fees. The construction works (USD 30–40 million) should be undertaken as PPP projects with about 10 major private forwarders (e.g., Maersk, MAC and Global Logistics) as shareholders. If it is implemented on a PPP basis with only one private forwarder, the other forwarders would not use the facility; therefore, the concept to involve many forwarders as shareholders is important. A dry port development as a PPP project was tendered by the Ministry of Works two years ago.

5.2.3 Dar es Salaam Corridor

Major Target Industries for Scenario a) (5 points):
Coal and gold in Tanzania, copper and cobalt in Zambia, and rare metals in Malawi
Major Target Industries for Scenario b) (3 points):
Petrochemical industries in Tanzania; and agricultural products in Tanzania, Zambia, and Malawi
Major Target Industries for Scenario c) (3 points):
Tourism in Tanzania, Zambia, and the DRC

Major Bottlenecks under Growth Scenarios:
The TAZARA Railway, opened in 1976, is carrying 70% of the copper produced by Zambia. However, rolling stock availability has been decreasing with consequent adverse effect on line capacity in recent years. Although the Port of Dar es Salaam has an issue of critical congestion at the container terminal, the general cargo terminal most of the export traffic from Zambia, Tanzania, and the DRC move through has sufficient capacity relative to traffic. The long clearance time involving various stakeholders at the port is more critical for this dry bulk cargo. The Nakonde/Tunduma border crossing between Zambia and Tanzania on the Dar es Salaam road corridor is moderately busy (a total of about 150 trucks per day in both directions) and has relatively long border crossing times (4-5 days on average). Since some heavy minerals are transported by road due to a shortage of railway capacity, road conditions have deteriorated rapidly along this corridor.

Priority Sectors: Port, Railway, and Border Post

Development Direction:
In the short term, rolling stock to improve railway service, streamlined port procedures, and rehabilitation of deteriorated road sections should the focus. Over the longer term, increasing railway capacity should be prioritized to facilitate a shift of heavy minerals from road to rail.

(1) Roads

Although the road along the Dar es Salaam Corridor was once well developed, it has become deteriorated due to heavy traffic and poor maintenance. The section requiring most immediate improvement is discussed below.

Serange–Mpika–Chinsali Road Spot Rehabilitation (Zambia, Short-term). This section is important for Zambia's access to the sea. The road condition of some parts of this section has been worsening, with spot rehabilitation required. Traffic volume along this section is 933 vehicles/day including 516 trucks/trailers.[2] Although Zambia's Road Agency had planned implementation of this project with its own resources and the project was tendered, it was not conducted finally due to a shortage of financial sources. A feasibility study, basic design, and detailed design, to be followed by implementation, is required at an early stage to assure continued use of this important route by both intra-regional and inter-regional traffic.

(2) Port

The congestion at the container terminal at the Port of Dar es Salaam is a critical issue to be addressed. At the same time, improvement of port operations at not only the container terminal but also at the general cargo terminal should be a focus for development of the Dar es Salaam Corridor under the growth scenarios.

Improvement of Operations at the Port of Dar es Salaam (Tanzania, Short to Long Term). "Soft" issues at the Port of Dar es Salaam include: (i) a high rate of physical inspection, (ii) governance issues (corruption), and (iii) the complex port procedures involving various

[2] Zambian traffic volume survey by RDA in April–May 2009.

stakeholders. In addition, inefficient access between the port and the railway, and the layout of the port reduce the port's productivity. At first, a study to improve port operations should be undertaken, taking both soft and hard components into account. This study should be followed by small-scale infrastructure development projects to improve the port layout and access within the terminals. Capacity building for related government officials such as the Port Authority and Customs is also necessary. Although new, large-scale development at this port is difficult due to limited land availability in the existing port, improvement of port operations can reduce dwell time and increase cargo handling capacity.

(3) Railway

Construction of Kasama–Mpulungu (172 km) (Zambia, Long Term). This project, which will connect Kasama on the TAZARA Railway and the inland port at the southern end of Lake Tanganyika. A prefeasibility study has been completed.

Upgrading and Restructuring of TAZARA Railway (Tanzania and Zambia, Long Term). A SADC study concluded that a suitable operating structure must be found for TAZARA that will allow for improved and sustainable operations in the future, and that complete concessioning seems to be unattractive at this stage. This study called for technical assistance to the Governments of Tanzania and Zambia to formulate an appropriate restructuring plan for TAZARA.

(4) Border Posts

Development of Nakonde/Tunduma OSBP Project (Zambia/Tanzania, Short Term). This moderately busy border crossing (with a total of about 150 trucks per day in both directions) and relatively long border crossing times (4–5 days on average) is a candidate for development in the short to long term. DFID has recently planned assistance at Nakonde/Tunduma, with the implementation of an Integrated Border Management System including ICT elements. A risk with the development of an OSBP at Nakonde/Tunduma is that Zambia is constructing a ZMK 30 billion/JPY 600 million/USD 6.5 million inland clearance depot 9 km from the border; when completed, this development will reduce the need for vehicles to wait for clearance at the border point, and hence the need for space at the border facility will decrease. Also, there may be land acquisition/resettlement issues if the Tanzania border facility is to be expanded.

Development of Songwe/Kasumulo OSBP Project (Tanzania/Malawi, Long Term). Since Malawi uses the Port of Dar es Salaam, the Malawi Revenue Authority has been seeking interconnectivity with the Tanzania Revenue Authority using Revenue Authorities Digital Data Exchange (RADDEx), a system that has been used in East Africa; the Malawi and Tanzania Revenue Authorities have already signed an MOU on this subject. This border crossing may be a candidate for OSBP development over the long term.

5.2.4 Beira Corridor (including the Sena and Tete Corridors)

Major Target Industries for Scenario a) (5 points):
Coal in Tete in Mozambique, bauxite and heavy mineral sands in Malawi, and nickel and other minerals in Zimbabwe
Major Target Industries for Scenario c) (4 points):
Agricultural products and processing (e.g., cotton, sugar processing, timber processing, fruit and fruit processing, horticulture) and fertilizer production in Mozambique

Major Bottlenecks under Growth Scenarios:
Although this corridor is the shortest route to the sea for not only central Mozambique but also the

southern region of Malawi (with high industrial potential) and some parts of Zambia and Zimbabwe, only small feeder vessels have been able to enter the Port of Beira due to the critical sedimentation of the port's approach channel. There are two railway routes to inland countries, one of which, the Sena Line, terminated more than 20 years but is now under rehabilitation/reconstruction supported by the World Bank and the European Investment Bank. On the other hand, no financing source has been identified for the Sena Corridor road, which has a long unpaved section that trucks avoid by taking a roundabout route. Currently, border crossing times between Mozambique and Malawi along this road corridor is reported as several hours.

Priority Sectors: Railway and Port
Other Related Sectors: Road

Development Direction:
In the short term, insufficient dredging at the Port of Beira and rehabilitation/reconstruction of the Sena Railway Line should be targeted as priority issues. In addition, a feasibility study of unpaved sections of the Sena Road Corridor running through major production areas should be undertaken, followed by basic and detailed design studies. Over the long term, attempts to reduce railway and road transport time and costs including implementation of OSBPs should be a focused.

(1) Roads

Proposed road development projects along this corridor target the improvement of connectivity from major production areas for inter-regional export industries to the railway link and the sea. The main targets here are underdeveloped road sections of the Sena route. In addition, the long road bridge over the Zambezi River at Tete, has become old and requires rehabilitation. Details follow.

Marka–Nsanje–Bangula–Chikuwawa (159 km) Road Upgrade (Malawi, Short Term). This road section is part of the Sena Corridor in Malawi directly connecting the Port of Beira with Blantyre, the major industrial hub in the country. However, most parts of this road are unpaved and currently not functional. Among the various segments, upgrading of Nsanje–Bangula and Bangula–Chikuwawa is planned with financing by the Government of Mozambique and the European Union. Also, the rehabilitation of Marka (border to Mozambique)–Nsanje section is currently undergoing.

Chikuwawa–Blantyre (M1, 20km) Rehabilitation (Malawi, Short Term). This is a paved but deteriorated road section of the Sena Corridor. The cost for works was estimated as USD 2.2 million by the Road Authority. Although detailed design was planned as a part of the FY2008/2009 program of the Road Authority and implementation was expected in FY 2010/2011, no funding has been available.

Rehabilitation of the Tete Bridge (Mozambique, Ongoing/Short Term). The Tete Bridge, built as a road bridge over the Zambezi River in the 1960s, is a five-span suspension bridge with a total length of 720 m. Due to its age and the heavy traffic, the bridge is in bad condition and currently being rehabilitated.

(2) Port

Although the Port of Beira is the closest gateway to the sea for not only its hinterland in Mozambique but also for parts of the neighboring countries, critical sedimentation in the port approach channel has been a serious problem for a long time. Another issue to be addressed is uncertainty in port procedures and poor communications infrastructure. Proposed projects to address these issues follow.

Capital Dredging and Maintenance Dredging at the Port of Beira (Mozambique, Short to Long Term). The Port of Beira has been suffering from serious sedimentation due to its geographic features. Japan provided one dredger (grant aid) for maintenance dredging in 2000 and another was added in 2007. However, the sedimentation problem has been critical and capital dredging to restore the access channel to its original design characteristics has become necessary. CFM, EIB, and ORET will initiate such capital dredging starting in 2010 with a total project budget of EUR 43 million. In addition, a new maintenance dredger with a capacity of 2.5 million m^3 will be provided by DANIDA in 2011 in order to maintain the access channel as restored by the 2010 project. If these projects are carried out successfully, the remaining issue would be the budget required by CFM for maintenance dredging.

Development of a New Coal Terminal (Mozambique, Long Term). Despite the high potential for coal exports from the Tete area, there is no exclusive berth or terminal currently active. Development of such a terminal for coal with effective connectivity to the Sena Railway would dramatically improve the efficiency of transporting coal from the production area to the sea. Currently, there is one old coal terminal with one berth that is now closed and planned to be rehabilitated. In addition, a new coal terminal is planned to be built using sandy materials dredged from the access channel in the projects mentioned projects.

Improvement of Port Operation Efficiency (Mozambique, Short to Long Term). Forwarders in inland countries have indicated a number of port operation issues: (i) frequent delays in port procedures (e.g., clearance); (ii) weak communication infrastructure with frequent outages; (iii) insufficient provision of information on procedures; and (iv) limited English-language capability of port staff. All of these issues have caused the port to lose international competitiveness. Overall improvement attempts, especially the provision of terminal equipment (such as cranes), the simplification of documentation procedures, and capacity building for government officials involved in the procedures, could help reduce port dwell time as well as the risk of delay.

(3) Railway

Rehabilitation of Dona Ana–Vila Nova (Sena Railway, Branch Line in Mozambique, Ongoing/Short Term). This project will connect the Sena Railway in Mozambique and with the CEAR railway system in Malawi. The section is the last missing link of the Sena Railway line that was operated between the Port of Beira to inland Malawi. Basic design was completed by the Indian private operator CCFB, the concessionaire of the Sena and Beira Railway system. Except for some sections, no civil works have been started yet for this 44 km section. CCFB has indicated that it may be relatively easy to reconstruct this section.

Rolling Stock Procurement for Sena Railway (Mozambique, Short Term). The rolling stock for this railway should be enhanced to accommodate the increasing demand for the transport of coal from the Moatize coal mine to the Port of Beira. The total project cost is estimated to be USD 300 million; there seems to be no financial gap to implement this project.

Rehabilitation of Vila Nova (Marka)–Makanga (Sena Railway Branch Line in Malawi, Long Term). This project will connect the Mozambican border and the CEAR railway system in Malawi. CCFB seems to be interested in operating and managing the Sena Railway Line on the Malawi side on a concession basis. Total cost was estimated as USD 110 million, including the cost of reconstruction of the Chiromo Bridge over the Shire River. A prefeasibility study was conducted by CCFB in 2005, after CCFB submitted a proposal to the Government of Malawi in 2007, responding to a request of the government, which has continuously requested JICA to support this project, especially the reconstruction of the Chiromo Bridge.

Rehabilitation of Lilongwe–Salima (Malawi, Long Term). The section between Salima and Lilongwe has been damaged, and now some of the bridges are in critical condition due to vandalism. There is a need to rebuild the bridges and/or replace them with box culverts. CEAR does not have any financial sources for the project.

New Construction of Kafue–Lions Den (Zambia and Zimbabwe, Long Term). This section will connect Kafue in Zambia with Lions Den in Zimbabwe. Since there is already a railway line between from Zimbabwe in Lions Den and Beira, this section will become one of the shortest routes between Zambia and a seaport.

(4) Border Posts

Development of the Mwanza/Zobue OSBP (Malawi/Mozambique, Long Term). Traffic volumes are currently about 100 trucks per days and delays 4–8 hours at this border crossing. Considering issues related to the distance (3–6 km) between the two border posts at present, development of a OSBP at this border crossing is considered a long-term priority.

Development of the Forbes/Machipanda OSBP (Zimbabwe/Mozambique, Long-Term). A total of about 70 trucks per day cross this border in both directions. There has already been some move toward implementation of a OSBP at this border crossing, and DFID's RTFP has examined the crossing on a preliminary basis. More recently, the EU has been undertaking a feasibility of improvement of the Beira-Machipanda link, including assessment of a OSBP at Forbes/Machipanda, which could be developed over the medium to long term.

Development of Railway OSBPs (Various, Long Term). Following the example of the Malaba railway OSBP between Kenya and Uganda in East Africa, it would be beneficial to develop railway OSBPs along the railway line(s) in this corridor.

(5) Inland Depots

Dona Ana Dry Port (Planned) (Road ⇔ Railway)(Mozambique, Ongoing/Short Term). A dry port construction project is planned at Dona Ana, which is located at the junction of Sena Railway Line with the main line to Tete and with a branch line to Malawi. The Mozambican logistics company MoCargo invested in this project to serve import and export cargo to/from Malawi, especially to/from Blantyre and Limbe, via the Sena Corridor.[3] Construction is to be started soon. When the road improvement works between Chikwawa and Marka on the Malawi side are completed in few years, it is highly expected that the cargo volume will increase.

Tete Inland Container Terminal (Planned) (Road ⇔ Railway)(Mozambique, Ongoing/ Short Term). A container terminal is planned at Tete in Mozambique, in line with the rehabilitation of the the Sena Railway. The project has been initiated and will be managed by CFM. Tete has the potential to become a strategic transport hub for Malawi (and eastern Zambia in the long run) when the rehabilitation of Sena Railway is completed in 2010. For Malawi, it is far more efficient to transfer cargo from rail to road (or vice versa) at Tete than to transport it along the corridor by road when exporting and importing goods from the Beira Port.

[3] Interview with CCFB.

5.2.5 Nacala Corridor

Major Target Industries for Scenario a) (4 points):
Copper in Zambia and coal in Tete in Mozambique
Major Target Industries for Scenario b) (3 points):
Consumable agricultural products (soybeans, sugar, and vegetables)
Major Target Industries for Scenario c) (4 points):
Heavy industries in the Nacala SEZ, traditional agricultural products in Malawi and Mozambique (tobacco, tea, cotton, sugar)

Major Bottlenecks under Growth Scenarios:
Although the Port of Nacala is the deepest port in the region, located in a natural harbor where maintenance dredging is not required, the trunk route from neighboring countries to the port currently serves low traffic volumes since inland transport is not well developed. Due to track deterioration, railway operating speeds and capacity are low. In addition, most road sections along the corridor are unpaved and/or have high roughness levels, which makes road transport over long distances difficult. Under this condition, various development partners have assisted projects to develop roads and railways along this corridor. Considering potential industrial development and the improvement of inland transport in the near future, traffic at the port is expected to increase rapidly beyond its current capacity.

Priority Sectors: Railway, Port, and Road
Other Related Sectors: Border Post(s)

Development Direction:
In the short term, rehabilitating roads and undertaking feasibility studies for railway track rehabilitation should be accorded the first priority. Over the longer term, the corridor railway should be rehabilitated and the port should be improved. Border post improvements should complement road improvements and the development of higher traffic levels.

(1) Roads

In contrast to other corridors prioritized in Chapter 4, most of the road sections along the Nacala Corridor are in such poor condition they are essentially nonfunctional. Following the development direction indicated above, the following specific improvements are required to achieve the growth scenarios. While governments and development partners are considering the development of specific sections, in most cases official approval is not yet in place and funding required for feasibility studies and detailed design.

Nampula–Cuamba (350 km) Upgrade (Mozambique, Ongoing/Short Term). This road section is paved section and in fair condition from the Port of Nacala to Nampula, but the (unpaved) segments from Nampula to Cuamba are in bad condition and not functional as a regional transport corridor. JICA completed a feasibility study of this project in 2009, and the detailed design was recently completed by the Government of Mozambique. Construction is planned with assistance from JICA, AfDB, and the Korean Export-Import Bank. (Note that the Yen Loan Agreement between the Government of Japan and Mozambique has just been concluded in March 2010.)

Cuamba–Mandimba Road (160 km) upgrade (Mozambique, Short Term). This road section connects western Mozambique to the Malawi border at Mandimba (Muloza)/Chiponde (Milange). As with the easterly part of the previous road section this road section is bad condition and not functional as a regional transport corridor. JICA is now assisting a feasibility study of paving this road. ANE has estimated the construction cost to be USD 96 million. AfDB

allocated UA[4]40 million from JICA and the same amount from AfDB for the implementation of this project, where the board approval is planned for 2011[5]. However, currently there is no financing source available for the detailed design of this project.

Chiponde–Mangochi Road (58 km) Widening (Malawi, Short Term). Chiponde (Milange)-Mangochi is a Malawi section of Nacala Road Corridor to/from Mozambique border. Although the section is paved and in relatively good condition, it is difficult for large trailers to travel the winding mountainous segment from Chiponde (Milange, i.e., the Mozambique border) to Mangochi. While there is not yet any specific government plan for improvement of this road section and there is no donor commitment, it is essential to widen this section in order to open the Nacala Road Corridor as a regional freight transport route.

Rehabilitation of Mangochi–Liwonde Road (90 km) and Liwonde–Nsipe Road (82 km) (Malawi, Short Term). The road pavement linking Mangochi–Liwonde–Ngipe is deteriorated and requires rehabilitation. AfDB committed to this work as a part of Phases II and III of the Nacala Road Corridor Project.

Periodic Maintenance of Nsipe–Lilongwe Road (160 km) and Lilongwe–Mchinji Road (M12, 120 km) (Malawi, Short Term). These sections are parts of Nacala Road Corridor in Malawi toward the Zambia border (Mchinji Border). Although both sections require periodic maintenance, financing for this work is available only for Nsipe–Lilongwe, committed by the EU. The Road Authority estimated the cost of of periodic maintenance of Lilongwe–Mchinji to be as USD 4.8 million; it had been planned as part of its FY2010/2011 program but was canceled due to a shortage of financial resources.

Rehabilitation of Luangwa–Chipata–Mwami Road (360 km) (Zambia, Short Term).
The traffic along this road section is expected to increase rapidly after the opening of the other sections of the Nacala Road Corridor to/from the sea. Currently, the EU is assisting a feasibility study and detailed design for this project. AfDB has committed to development of this road section as a part of Phase II of the Nacala Road Corridor Project Phase II. According to its Nacala Road Corridor Project Brief, AfDB is planning rehabilitation of this road section with financing from itself along with financing from the Government of Japan and the EU.

(2) Port

Currently, the Port of Nacala, with two container berths and four berths for general cargo, mainly serves domestic demand without much transit traffic due to underdeveloped inland transport along the corridor. The port is not congested at all. However, after opening of the road corridor, port traffic (particularly containerized traffic) is expected to increase rapidly, considering the growing container import demand of Mozambique and its neighboring countries. Also, the rehabilitation of the Nacala railway with development partner assistance will increase general cargo/bulk traffic over the longer term. Considering that the container terminal and the general cargo/ bulk terminal are both aging and both been deteriorating due to insufficient maintenance, these terminals should be rehabilitated.

Expansion of the Port of Nacala Container Terminal (Mozambique, Short Term). The capacity of the Port of Nacala Container Terminal should be increased, including through rehabilitation of the current facility, ahead of the opening of the Nacala Road Corridor. Since rehabilitation of the existing terminal without an new alternative may interfere with or require closure of container terminal operations during the construction, the new terminal should be developed first. JICA is currently conducting a preparatory study for a container terminal

[4] UA 1 = USD 1.549 on average in February 2010.
[5] AfDB, Nacala Corridor Project Brief.

rehabilitation project at the Port of Nacala. In addition to construction of new berths and storage areas, required equipment (including additional gantry cranes to handle high capacity traffic efficiently) should be installed to increase capacity.

Rehabilitation/Improvement of the General Cargo Terminal (Mozambique, Long Term). Although general cargo at the port is low even compared to containerized traffic, rehabilitation of the Nacala Railway rehabilitation will alter the situation dramatically. Particularly, achieving the potential of Zambian copper exports from the Port of Nacala will be important. Over the long term, rehabilitation of the general cargo terminal should be carried out following increases in the traffic capacity of the railway.

Improvement of Port Operation Efficiency (Mozambique, Short to Long Term). While the Port of Nacala benefits from excellent natural features, port operations are not especially efficient compared to other international ports in the region (or outside of the region). In order to attract calls of international major deep-sea carriers and increasing its transit cargo handling volume, the Port of Nacala should improve its operations, including documentation procedures, communication infrastructure, and information services. In addition, connectivity between the railway and the port, which are operated by the same concessionaire, would substantially increase operational efficiency between inland points and the sea.

(3) Railway

Upgrading of the Cuamba-Entre Lagos Railway Line (78 km) (Mozambique, Ongoing/ Short Term). Upgrading of this railway line (segment) is required to enhance the overall transport capacity of the Nacala Railway. CDN has undertaken some minor rehabilitation, and timber sleepers have already been replaced over 12 km.

Construction of New Line from Tete to Malawi (Mozambique and Malawi, Long Term). This project would provide a dedicated new railway line connecting the coal mines in Tete to the Port of Nacala. It would transport the volume of coal that cannot be transported along the Beira Corridor. Vale of Brazil and Riversdale Mining of Australia have shown interest in the project. The total project cost is unknown.

Rehabilitation of Malawi Railway Network (including investment in the rolling stock rehabilitation between Lilongwe and Salima) (Malawi, Short Term). MCC Malawi has developed a concept note for funding of this project, and CDN (CEAR) is already invested in six locomotives. The total project cost was estimated to be USD 60 million, including USD 10 million for rolling stock procurement. The section between Salima and Lilongwe has been damaged, and especially some of the bridges are in critical condition due to vandalism. There is a need to rebuild bridges and/or replace them with box culverts. CEAR lacks financial resources for the project.

Construction of Chipata–Kalonje (250 km) (Zambia, Long Term). This project would connect the TAZARA and Nacala Railways crossing South Luangwa National Park. In the long run, it would become an alternative trading route for Malawi, eastern Zambia, and even Zimbabwe. However, careful environmental impact analysis is required to assess and mitigate any negative impacts of traversing the national park. A South African consultant has already undertaken a prefeasibility study for the project, and China has expressed unofficial interest.

(4) Border Posts

Development of Mwami/Mchinji OSBP (Zambia/Malawi, Long Term). Considering the low current traffic volume (a total of about 25 trucks per day in both directions) and short delay time

at present at this border (about one hour), development of a OSBP at this border crossing is considered a long-term priority.

Development of Mandimba (Muloza)/Chiponde (Milange) OSBP (Mozambique/Malawi, Long Term). Similarly, with low traffic (6–7 trucks per day) and a short delay time (30 minutes) at present, development of a OSBP at this border crossing is considered a long-term priority. The 2009–10 JICA-assisted road feasibility study concluded that while there is no urgency for an OSBP at Mandimba/Chiponde in view of the low present cross-border traffic volumes, two-phased development of juxtaposed OBSP facilities at Mandimba/Chiponde was justifiable, with the first phase in 2014 and the second phase in 2024.

Development of Dedza/Calomue OSBP (Malawi/Mozambique, Long Term). Traffic is somewhat heavier at Dedza/Calomue (a total of 80-160 trucks per day in both directions), and delay times higher (2–8 hours), although development of a OSBP at this border crossing is still considered a long-term priority, although perhaps of higher priority than the preceding two OSBP projects.

Development of Railway OSBPs (Various, Long Term). Following the example of Malaba between Kenya and Uganda, it would be beneficial to develop railway OSBPs along the railway lines in this corridor.

(5) Inland Depots

Transshipment Facilities at Nacala Port (Port ⇔ Railway) (Mozambique, Short Term). For import cargo transported to Malawi along the Nacala Railway, it takes about 25 days on average from arrival at the port to arrival at Malawi, due to the inefficiency of transshipment from sea transport to railway transport, mainly a consequence of the lack of locomotives and railway (freight) wagons rather than customs clearance constraints.

Limbe Railway Terminal (Road ⇔ Railway) (Malawi, Short Term). A railway cargo terminal in Limbe, where the headquarters of CEAR is located, plays a key role in the transshipment of imported goods from rail to road, for delivery mainly to Blantyre, Malawi's largest commercial center. According to Malawian private forwarders and truckers, the facilities at the terminal are insufficient to handle the current volume of cargo from the Port of Nacala. CEAR expressed an urgent need to rehabilitate the terminal in order to cope with future cargo handling volumes.

Chipata Cargo Center (Under Construction) (Road ⇔ Railway)(Zambia, Ongoing/Short Term). A cargo terminal is currently under construction at Chipata in Zambia, along with the new construction of Mchinji–Chipata railway line. The line will be opened at the end of December 2009.

5.2.6 Trans-Caprivi Corridor

Major Target Industries for Scenario a) (4 points):
Copper in Namibia, coal in Zimbabwe
Major Target Industries for Scenario c) (4 points):
Tourism in Namibia and Botswana, traditional agricultural products (tobacco and tea) in Zambia, and Malawi

Major Bottlenecks under Growth Scenarios:
Even though this route has high potential for bulk cargo transport from inland areas in Namibia and

neighboring countries, the railway link is available only for 600 km from the port to Grootfontein. Also, congestion at the container terminal at the Port of Walvis Bay is expected to become an issue in the near future.

Priority Sectors: Railways and Port

Development Direction:
Similar to the case of the Trans-Kalahari Corridor, in the short term a feasibility study of railway extension and container terminal development at the Port of Walvis Bay should be prioritized. Over the long term, construction of the railway could be initiated.

(1) Port

As is the case with the Trans-Kalahari Corridor, development of a new container terminal development at the Port of Walvis Bay is necessary for the development of the Trans-Caprivi Corridor under the growth scenarios (see Section 5.1.5).

(2) Railway

Trans-Caprivi Railway Project (Cape Fria/Angra Fria–Katima Mulilo, Grootfontein–Katima Mulilo) (Namibia, Short to Long Term). This project will connect Walvis Bay and western Zambia via Tsumeb, Grootfontein, and Katima Mulilo. After the civil war in Angola and the destruction of the Benguela Railway, the SADC region had no direct railway link to the west coast. In particular, the Zambian Copperbelt seeks a rail-based import/export route via Walvis Bay to optimize its supply chain and global competitiveness. The branch section to Cape Fria/Angra Fria is also included in the study scope. The project cost is estimated to be USD 0.53 billion (for the section from Tsumeb to Katima Mulilo) A feasibility study was ongoing with the final report due in December 2009. A stakeholder consultation process was undertaken concurrently.

Rehabilitation of Walvis Bay–Tsumeb (400 km) (Namibia). The terms of reference of the project has already been announced and TransNamib has received Expression of Interest (EOI) from major donor countries.

(3) Border Post

Development of Wenela/Katima Mulilo (Sesheke) OSBP Project (Namibia/Zambia, Long-Term). Wenela/Katima Mulilo (Sesheke) is one of the most lightly trafficked borders examined, with traffic of 20–25 trucks per day (2008–09). Time spent at the border is currently estimated at about 1–3 days. While DFID, SIDA, and UNCTAD have extended assistance for Wenela/Katima Mulilo, the major effort to date has been a 2007 JICA-assisted OSBP feasibility study. The project may be more suitable for development over the longer term, in view of the light traffic.

5.2.7 Trans-Kalahari Corridor

Major Target Industries for Scenario a) (4 points):
Coal and copper in Botswana, and copper in Namibia
Major Target Industries for Scenario c) (4 points):
Automobile industry in South Africa, tourism in Namibia and Botswana, and seafood processing in Namibia

Major Bottlenecks under Growth Scenarios:
Although this corridor traverses a route with high mining potential, currently railway service is available only between the Port of Walvis Bay and Gobabis in Namibia. Since the Port of Walvis Bay provides a high level of service and its containerized traffic has been increasingly rapidly, container traffic there is expected to exceed the current terminal capacity in the short term. The road condition along this corridor is relatively good although road traffic volumes are especially high.

Priority Sectors: Port and Railway

Development Direction:
Considering the availability of high-quality coal in Botswana, which has attracted the attention of Europe, a feasibility study of the railway extension should be carried out in the short term, followed by construction in the long term. After the ongoing Walvis Bay container terminal feasibility study is completed, the first phase of the construction should also be undertaken in the short term. In addition, a new coal terminal development at the port should be developed in the long term for the export of coal from Botswana.

(1) Port

As the growth rate of container traffic in the Port of Walvis Bay over the last few years has been extremely high, development of a new container terminal is to be achieved in the short term. Another necessary development under the growth scenarios is opening of a new coal terminal.

Development of New Container Terminal at the Port of Walvis Bay (Namibia, Short to Long Term). In response to rapidly increasing demand, currently, JICA has been conducting a feasibility study of development of a new container terminal at the port. This study calls for expansion of the terminal in three phases. The construction cost for Phase I was estimated as NAD 1,594 million and that for yard expansion in Phase II as NAD 50 million (excluding equipment procurement). Phase I construction is planned to start in mid-2010.

Development of a New Coal Terminal around the Port of Walvis Bay (Namibia, Long Term). Although currently there is no coal terminal or coal handled at the Port of Walvis Bay, development of such a terminal will be essential after the opening of the railway link from Botswana through this corridor. Currently, the company that owns the coal mine in Botswana is planning to open a new coal port south of the Port of Walvis Bay.

(2) Railway

Trans-Kalahari Railway Project (Namibia). This project will connect Walvis Bay Port and Lobatse in Botswana over a distance of about 700 km. The project aims to enhance connectivity between Namibia and Botswana as well as Gauteng Province in South Africa. The total project cost is estimated as about USD 1.4 billion. A PPP arrangement will be introduced; a prefeasibility study to be completed in 2011 is being undertaken through the World Bank's Public-Private Infrastructure Advisory Facility (PPIAF). China, the Russia, and Germany have expressed interest in this project (although no commitments have been made).

(3) Border Posts

Assistance for Implementation of the Trans Kalahari/Mamuno OSBP Project (e.g., ICT, Legal, Procedures, Training, Border Community Integrated Development) (Namibia/Botswana, Short Term). While traffic is relatively light (a total of about 50 trucks per day) and delay times short (about one hour) at this border crossing, a August 2008 USAID-assisted feasibility study found that it can be converted to OSBP operation with

relatively minor adjustments compared to other border crossings although some infrastructure/ facilities improvements will be required.

5.2.8 Lobito Corridor

Major Target Industries for Scenario a) (4 points):
Copper and cobalt in DRC and Zambia, Manganese in DRC

Major Bottlenecks under Growth Scenarios:
Although the Copperbelt in southern DRC and Zambia was connected with the Port of Lobito by railway before, the railway service has been terminated since the Angolan civil war. Rehabilitation of the railway section between Munhango and Luau was commenced in February 2009.

Priority Sectors: Railways and Port

Development Direction:
Similar to the case of the Trans-Kalahari Corridor, in the short term a feasibility study of railway rehabilitation and container terminal development at the Port of Lobito should be prioritized. Over the long term, construction of the railway could be initiated.

(1) Port

Rehabilitation/ Expansion of the Container Terminal (Short Term): The port of Lobito is suffering from serious congestion with vessel waiting times of 4–6 weeks. Expansion of the capacity of the container terminal as well as rehabilitation of the existing terminal is a priority. It is reported that the Government of China committed a loan for rehabilitation of the Port of Lobito.

(2) Railway

Rehabilitation of Benguela Railway (DRC and Angola, Short to Long Term). The Project is to revitalize the Lobito rail line linking the Port of Lobito with the DRC/Zambian Copperbelt. Companhia do Caminhos de Ferro de Benguela, the Benguela Railway Company, in 2009 launched a project to rehabilitate the railway section between Munhango and Luau. The Chinese construction enterprise China Railway 20 Bureau Group Corporation (CR-20) will finish the replacement of rails in May 2010, and passenger train service between Lobito to Luau is expected to commence in 2011.

5.2.9 Facilitation Aspects on a Regional Basis

Target Industries for Scenario b):
All products for intra-regional trade
Target Industries for Scenario a) and c):
Export products to the sea for inter-regional trade

Major Bottlenecks under Growth Scenarios: There are a number of issues related to transport and customs facilitation that impede cross-border transport on a regional basis. These relate to axle load and vehicle dimensions standards, road user charges for foreign vehicles, third-party motor liability insurance, customs information sharing and interconnectivity, and the need for national single windows.

Development Direction: Significant progress has been made in addressing a number of these issues under the auspices of the RECs, although more needs to be done, especially with respect to customs facilitation issues in order to address bottlenecks hindering achievement of the growth scenarios.

Harmonization and Enforcement of Axle Load Standards (All Countries, Short-Term): Accordingly, the three RECs in Eastern and Southern Africa (SADC and COMESA as well as the EAC) have generally agreed on axle load limits for freight vehicles, although some countries do not apply these axle load limits to protect the local road transport industry. The three RECs have agreed on a number of measures related to weighbridge infrastructure and equipment, enforcement and weighbridge operations, institutional arrangements, human resources, and public awareness**.**

Harmonization of Vehicle Dimensions Standards (All Countries, Short-Term): Harmonization of vehicle dimensions standards is important because if such standards differ across countries, road transport operators must use different configurations for different markets, with consequent adverse impact on efficiency and costs. With assistance from the USAID Southern Africa Global Competiveness Hub, the three RECs have generally agreed on a set of maximum vehicle dimensions, but laws have generally not been enacted to provide the legal basis for enforcement of these standards.

Harmonization of Road User Charges for Foreign Vehicles (All Countries, Short Term): Differences in the road user charges levied on vehicles registered in foreign countries across the region constitute a barrier to the creation of a unified transport market. The three RECs have set 2010 as target date for harmonization of road user charges, but the task is challenging.

Harmonization of Third-Party Motor Liability Insurance (All Countries, Short Term): A small-scale study of third-party motor liability insurance has been undertaken by the SADC task force in charge of transport.

Customs Facilitation, including Improving Customs Information Sharing and Connectivity, Development of National Single Windows (All Countries, Short- and Long-Term): A number of customs facilitation initiatives are ongoing or proposed, including customs simplification and harmonization, implementation of a single administrative document, electronic data interchange between customs administrations, establishment of single windows in the region, and implementation of a regional customs bond guarantee.

In the short term, there would be significant value added in a study for improving regional Customs information sharing and interconnectivity, to identify areas where well-designed and targeted investments could be made to improve the Customs IT infrastructure and data sharing between Customs administrations of the region. Also, in the short- to long-term, there would be significant value added in a project to develop national single windows that are customer-focused, based on a contemporary foundation well expressed in the Revised Kyoto Convention, and that operate in a fully automated environment, whether on the ASYCUDA platform or another of equal capacity.

Appendices

Appendix A Summary of Proceedings from Stakeholder Seminar in Lusaka, Zambia, 18 February 2010

I. Introduction

1. The Southern Africa Integrated Regional Formulation Study Seminar (hereinafter "the Seminar") was held in Lusaka, Zambia, on 18 February 2010. Senior officials representing Botswana, Malawi, Mozambique, Namibia, South Africa, and Zambia, as well as officials of regional economic communities (RECs), corridor organizations, international development partners, and the private sector attended the Seminar. The seminar program is provided as **Figure A.1** and the list of participants as **Figure A.2**.

Figure A.1 Seminar Program

Southern Africa Integrated Regional Program Formulation Study Seminar

Schedule and Venue:

Date: February 18, 2010 (Thursday)
Time: 9:00–16:15
Venue: Taj Pamodzi Hotel

Agenda:

8:45–9:00	**Registration**
9:00–9:30	**Agenda 1: Opening and Welcoming Remarks**
9:00–9:15	Welcome Remarks from JICA (Mr. Yoshiro Kurashina, JICA)
9:15–9:30	Introduction of Southern Africa Integrated Regional Program (Ms. Minako Mochida, JICA)
9:30–10:00	**Coffee Break**
10:00–12:30	**Agenda 2: Growth Scenarios of Southern Africa**
10:00–10:30	Presentation: Summary of Socio-Economic Conditions (Mr. Bruce Winston, JICA Study Team)
10:30–11:30	Presentation: Proposed Structure of Growth Scenarios (Mr. Kensuke Shimura, JICA Study Team)
11:30–12:30	Discussion on Growth Scenarios of Southern Africa (Chaired by Mr. Yuichiro Motomura, JICA Study Team)
12:30–13:30	**Lunch Break**
13:30–16:15	**Agenda 3: Corridor Development Programs for Southern Africa**
13:30–14:30	Presentation: Proposed Corridor Development Program (Mr. Yuichiro Motomuara, JICA Study Team)
14:30–16:00	Discussion on Corridor Development Program (Chaired by Mr. Bruce Winston, JICA Study Team)
16:00–16:15	**Closing Remarks** (Mr. Shiro Nabeya, JICA)

Figure A.2 List of Participants

Delegate Name	Organization		Country
Darwin Musanshi	Ministry of Works and Supply	Senior Economist Planning and Monitoring Department	Zambia
Diep Nguyen-van Houtte	World Bank	Senior Operations Officer Regional Integration Department Africa Region (AFCRI)	Zambia
Ashie Mukungu	AfDB	Country Economist	Zambia
Jürgen Kettner	EU	Head of Infrastructure	Zambia
Mehdi Mahjoub	EU	Engineering Adviser	Zambia
Brian B. Shone	FEDHAUL	Managing Director	Zambia
Prisca M. Chikwashi	ZACCI	Chief Executive Officer	Zambia
Roseta Mwape	Zambia Association of Manufacturers	Chief Executive Officer	Zambia
Charles David Phiri	Railway Systems of Zambia	General Manager	Zambia
Owen Nalivaka	Ministry of Transport and Public Infrastructure	Economist Monitoring and Evaluation	Malawi
Flossie Manyunya	ASANRA	Officer	Malawi
Lovemore Bingandadi	SADC	Corridor Coordination Advisor Infrastructure & Services Directorate	Botswana
Godwin Punungwe	USAID-Southern Africa Global Competitiveness Hub	Transport Advisor	Botswana
Ana MM Dimande	Ministry of Transport and Communications	National Director Directorate of Infrastructure	Mozambique
Alberto Chicava Manhusse	Ministry of Planning and Development		Mozambique
Oscar Simasiku Muyatwa	Ministry of Works and Transport	Deputy Director Transportation Policy	Namibia
Ned Sibeya	National Planning Commission Secretariat	Deputy Director Bilateral Programs Directorate Development Cooperation	Namibia
Samuel Sandi	Walvis Bay Corridor Group	Program Coordinator Trans-Caprivi Corridor	Namibia
Magdelene Mabua	Southern African Customs Union	Transport Specialist	Namibia
Bevan Simataa	Trans Kalahari Corridor Secretariat	Executive Director	Namibia
Dave Perkins	NEPAD	Spatial Development Programme	South Africa
Phillip Palmer	USAID	Deputy Program Economist	South Africa
Samson Muradzikwa	DBSA	Chief Economist International Division	South Africa
Barney M W Curtis	FESARTA	Executive Director	South Africa
Brenda Horne	Maputo Corridor Logistics Initiative	Chief Executive Officer	South Africa
Yoshiro Kurashina	JICA	Director Regional Strategy Unit for Africa (RSA)	Kenya
Minako Mochida	JICA	Regional Project Formulation Advisor (Regional Infrastructure (Energy))	Kenya
Shiro Nabeya	JICA	Chief Representative	Zambia
Wataru Sato	JICA	Assistant Resident Representative	Zambia
Kabila Ilubala	JICA	Infrastructure Development Advisor	Zambia
Yuichiro Motomura	JICA Study Team	PADECO	Japan
Bruce Winston	JICA Study Team	PADECO	Japan
Kensuke Shimura	JICA Study Team	Mitsubishi UFJ Research & Consulting	Japan
Natsuko Kikutake	JICA Study Team	PADECO	Japan
Brian Zulu	World Bank		Tanzania
Mohamedain E. Seif Elnasr	COMESA	Energy Economist	Zambia
David Zulu	Ministry of Finance and National Pla	Program Implementation Officer	Zambia
Martin Musonda	COMESA	Infrastructure Development	Zambia

2. The aim of the Seminar was to present the findings of the Southern Africa Regional Program Formulation Study (hereinafter "the Study") undertaken by the Japan International Cooperation Agency (JICA). Specific aspects presented include: (i) existing conditions and growth scenarios for Southern Africa, and (ii) a corridor development program for Southern Africa.

3. The Seminar was directed by JICA staff members, including: (i) Mr. Yoshiro Kurashina, Director, Regional Strategy Unit for Africa, JICA; and (ii) Ms. Minako Mochida, Regional Project Formulation Advisor, Regional Infrastructure (Energy). Four study team members from

PADECO Co., Ltd. and Mitsubishi UFJ Research and Consulting Co., Ltd. presented the study findings.

II. Session 1: Opening

4. Mr. Kurashina, JICA, opened the Seminar by warmly welcoming all the participants. He noted that the Seminar provided a good opportunity to maintain and nurture relationships for the mutual benefit of stakeholders in the region and in Japan. He highlighted the opening of a one-stop border post (OSBP) at Chirundu between Zambia and Zimbabwe on 5 December 2009, an initiative for which JICA provided assistance for bridge construction, drafting of a bilateral agreement, and staff training for OSBP operation. In order to further promote transport and trade facilitation in the region, he stated that it is necessary to formulate and implement appropriate programs and projects to contribute to the development of the countries, with their ownership and partnership. He observed that on 18–19 February 2010 (i.e., the same day as and the day following the Seminar), in Victoria Falls, the Common Market for Eastern and Southern Africa (COMESA) was holding a seminar on its Transport and Communications Policy and Strategy Priority Investment Plan (TCPS/PIP); JICA and COMESA agreed to share output(s) from the respective studies and harmonize and harmonize study results.

5. Ms. Mochida, JICA, then presented an overview of the Seminar and Study. She stated that the objectives of the Study were to identify: (i) how Southern Africa as an integrated region can achieve economic growth through identification of bottlenecks; (ii) how infrastructure (especially transport) can contribute to this growth; and (iii) what actions the Seminar participants and JICA need to undertake to address these issues and materialize the growth. She then introduced the background of the Study, dating back to the first Tokyo International Conference on African Development (TICAD I) in 1993 and, more recently, TICAD IV in May 2008 in Yokohama, which included boosting economic growth through regional infrastructure as a focus area. She then set out JICA's approach to African infrastructure, including a major focus on regional transport and energy. Specifically, this approach entails: (i) JICA's utilizing its long experience in assisting economic infrastructure in Asia and Africa through bilateral assistance; (ii) a flexible combination of aid modalities, with JICA's own project formulation facilities, including technical assistance/technical cooperation, grant/loan financing, and research; (iii) a recent emphasis on cross-border transport infrastructure in Africa to promote regional integration and support landlocked countries (including the development of OSBPs); and (iv) a multimodal corridor development approach. She raised a number of critical questions for Southern Africa: How can the region achieve economic growth with some degree of certainty? What infrastructure is required to materialize regional growth scenarios? Is it necessary to develop new corridors to materialize the growth scenarios? She stated that the seminar would present: (i) existing ("as-is") conditions; (ii) three possible paths for the region's economic growth (regional growth scenarios or strategies) supported by data and information; and (iii) priorities for transport infrastructure to achieve the growth scenarios, based on "best-effort analysis" and quantification. Finally, she called for the active participation of the Seminar attendees.

III. Session 2: Growth Scenarios (Strategies) for Southern Africa

6. Mr. Bruce Winston, JICA Study Team Member, presented the existing conditions of the region covered by the Study, which served as input to the growth scenarios, as well as the analysis of development directions for regional infrastructure and the corridor development programs discussed in the following session. Specifically, he addressed: (i) population; (ii) governance; (iii) economic indicators and economic sector composition; (iv) investment environment; (v) resource allocation; and (vi) freight traffic flows.

7. Mr. Kensuke Shimura, JICA Study Team Member, then made the main presentation on growth scenarios (strategies) for the region. He first addressed development potentials under current economic conditions, including (i) characteristics of the Strategic Development Initiative (SDI)/Development Corridor Model, (ii) the global economic crisis and its impact on Southern Africa, and (iii) the validity of the SDI/Development Corridor Model after the financial crisis. Next, he presented three regional growth scenarios: (i) growth centered upon mineral resources development; (ii) growth based on intra-regional trade; and (iii) growth through diversification and advancement of the industrial structure through global trade, with diversification of the export market to Asia the key. He noted that the three growth scenarios are not mutually exclusive but rather are consistent with each other.

8. Mr. Yuichiro Motomura, JICA Study Team Member, chaired the discussion on growth scenarios in Southern Africa. He indicated the team's willingness to receive comments from the participants so that the team's Draft Final Report can be improved when it is finalized within one month.

9. It was asked to see the data on cross-border investment in support of South Africa, which had led the development scenario. It was also noted that a need to reflect the COMESA infrastructure master plan as well as the parallel regional development infrastructure master plan under development by SADC. For the latter a workshop is planned in April 2010, after which through the Tripartite cooperation arrangement, the two regional master plans will need to be harmonized. Mr. Shimura noted that the team had presented all relevant, available data on cross-border investment. Mr. Motomura stated that the team would incorporate the mentioned master plans, to the extent that they can be completed and made available before the completion date for the current JICA study.

10. It was asked for the JICA Study Team to clarify the precise topic of the Study/Seminar. In addition, it was stressed that the need to harmonize the JICA master plan with that of COMESA and SADC. Also, it was asked about the time frame for the JICA plan. For example, it was asked whether over the time frame could we expect Angola and the DRC to continue to import food from Malawi and South Africa. Mr. Motomura clarified that the Study/Seminar focused on transport, specifically cross-border transport, with the aim of stimulating regional economic growth; for that purpose, the Study formulated growth scenarios, from which a desirable network of corridors was identified. He added that since this a Japan-assisted program, one purpose of the Study was to advise the Government of Japan on desired directions for its future assistance to the region, but at same time, hopefully the Study will be useful to others as a planning framework. Mr. Shimura clarified that the planning time frame for the Study was a period of 10 years (i.e., to 2019). Also, he concurred that Angola and the DRC have the potential to become large producers of agricultural products, but he noted that the Study sought to focus on the complementary structure of trade, which means that exporters of agricultural products can be importers. Ms. Mochida noted that the Seminar would later present short- and long-term programs, but also reminded the participants that the Government of Japan has resource limitations (as do all development partners), so coordination with RECs and other development partners will be important. The point, which was noted before, was reiterated that SADC and COMESA were currently working on regional infrastructure master plans. Ms. Mochida observed that the European Union was also funding a similar study, and that JICA would share information on its proposed program to facilitate the harmonization and integration of the respective regional infrastructure plans.

11. It was stated that a organization had completed two reports on the South African private sector and state enterprises doing business in the region and that these reports would be shared with the JICA Study Team. It was noted that the Draft Final Report was well written, although

in a few cases facts needed to be updated/corrected (e.g., Seychelles is now a member of SADC as is Mauritius but not Mauritania, developments in Zimbabwe over the last 18 months should be noted including implementation of their medium-term program). Regarding the discussion of the impact of the financial crisis on South Africa, it was noted that the rest of the region was very different from South Africa and it was not possible to extrapolate the impact of the crisis in South Africa to elsewhere in the region; in the other countries the impact has been on trade rather than on weakening of the currency.

12. It was pointed to the need for some more time at the national level to review the Draft Final Report. It was noted that the Nacala Corridor included Zambia as well as Mozambique and Malawi.

13. It was stated that the study was very useful, especially the analysis of the growth strategies (scenarios). AFCRI will be reading the report with the government(s) in some detail. It was noted that an ambitious program, focusing on transport, along a number of corridors had been presented; It is observed that there are a number of administrative and regulatory constraints and suggested the possibility of coordinating with other development partners to address these constraints. Mr. Motomura noted that the "soft" side will be a major part of the discussion during the following session.

14. It was noted that Namibia might be able to provide additional information to be reflected in the report.

15. It was observed that the World Bank Africa Infrastructure Country Diagnostics (AICD) study recommended the need to adopt a greater spatial focus in regional transport infrastructure planning. It is necessary to make hard choices to maximize returns on investments in infrastructure. The utilization of the SDI model was agreed, but a view was stated that the mining sector was probably the only one that could generate the level of demand necessary for large-scale investments in infrastructure. It was noted that once (primary) trunk infrastructure had been developed, the secondary infrastructure did not necessarily flow naturally, e.g., as seen in the Maputo Corridor. It was observed that some of the minerals development options presented had been there for 20–30 years but had not come to fruition, not because of a lack of transport infrastructure but because of a lack of energy. For example, the exploitation of bauxite opportunities in Malawi and nickel in Tanzania are constrained principally because of energy and not transport. In this respect, Ms. Mochida noted that JICA recently initiated a regional energy program study, and that she herself, a power sector specialist, has been undertaking consultations with the power sector specialists of the RECs.

16. It was noted that the report was very interesting and included a lot of information that they had not seen before. The Seminar was informed that USAID was in the middle of redesigning its regional trade facilitation program[1] and that the figures on traffic on at various border crossings could inform this process. Regarding the scenario on increased intra-regional trade, it was stated that in the research for USAID's trade facilitation program they had a hard time finding convincing evidence that intra-regional trade would drive growth in Southern Africa in the short to medium term, while over the long term it was difficult to project. They had not seen the data from the United Nations Economic Commission for Africa (UNECA); intra-regional trade is generally low and some of the increases in recent years may be due to increased commodity prices; it would be interesting to see 2009 and 2010 data. The strategies most likely to be successful involve targeting larger markets. Even growth in Botswana has come not from regional exports but exports to larger markets. Also, there have been a number of

[1] See https://www.fbo.gov/index?s=opportunity&mode=form&id=ddf9674bc1d3c979e0998666b0d1f349&tab=core&_cview=0.

developments limiting the potential for a regional growth strategy based on intra-regional trade. The South Africa Department of Trade and Industry has announced a new strategy to increase incentives for government contract procurement from South Africa, which is likely to decrease procurement from neighboring countries. Also, it was observed that the SADC Free Trade Area was stalling as it moved into the final stages and SADC countries were reluctant to decrease tariffs on sensitive goods; while 85% of the tariff lines have been cut out, these have been mainly on goods that are not traded.

17. It was noted that FESARTA had provided quite a lot of information on the corridors and was still collecting it because of difficulty in collecting information from the countries. It was stated that in the future the countries should be more effective in providing quality information, e.g., by being more committed to making sure that their focal points have the right information that is useful for the region.

18. Mr. Shimura stated that although it is important to recognize secondary investments in sectors related to the mining industry, this growth strategy is difficult. In any case, the growth scenarios are not mutually exclusive but rather are complementary. For example, if scenarios a and c are complementary, investment in processing industries or the manufacturing sector would be induced. He agreed on the weakness of intra-regional trade, but argued that it is unrealistic to abandon regional integration in Southern Africa. To diversify risk, it is important to diversify the trade structure of countries in the region and expand regional as well as external trade.

19. It was suggested that the corridor maps were to be checked carefully.

20. It was observed that the growth "scenarios" were drivers of growth. This was agreed with a participant and it was stated that all three scenarios would be necessary for this region to grow. It was added that the use of the term "scenarios" might be confusing because they were not options; they were all necessary strategies for regional growth. Mr. Motomura noted that this point was well taken.

21. Regarding scenario c, it was observed that the world wanted the region's minerals but not its metals (i.e., processed minerals). The need to break that cycle, which was the colonial paradigm, was noted. Moving up the value chain is the only way to develop. However, it was observed that there were constraints on a massive increase in manufacturing exports – it is a difficult scenario to realize.

22. Mr. Motomura observed that there are different time frames for the three scenarios or strategies. They will follow parallel paths but at different speeds.

23. The importance of resolving land issues in certain countries (e.g., Mozambique) to develop commercial agriculture was noted.

IV. Session III: Corridor Development Program(s) for Southern Africa

24. Mr. Motomura presented the proposed corridor development program(s) for the region. He began by presenting development directions for regional infrastructure, including: (i) infrastructure bottlenecks under the growth scenarios; (ii) derivation of development directions; and (iii) "soft" infrastructure (cross-border transport facilitation). Based on an assessment of a long list of 18 corridors against the growth scenarios in terms of benefit/cost and socio-economic indicators, the highest priority was assigned to the Maputo, North-South, Dar es Salaam, Beira, Trans-Caprivi, Nacala, and Trans-Kalahari Corridors. He then presented details on development programs for each of the priority corridors, including a discussion of major

bottlenecks for each corridor under the respective growth scenarios, priority sectors, and development directions.

25. Mr. Bruce Winston, JICA Study Team Member, chaired the discussion on growth scenarios in Southern Africa. Recognizing the participants' expertise and experience in the region, he noted that the team was carefully recording the comments made and plans to reflect them in its Final Report.

26. The presenter was commended for his effectively visualizing presentation with maps. It was observed that the JICA study was focusing more on corridor priorities while the ongoing European Union study was examining project priorities within corridors. Although priority projects may not be part of corridor priorities, the two studies are very complementary. Also, it was noted that they the European Union was financing Nacala Corridor road improvements under its national portfolio in Zambia with EUR 38 million; however, since EUR 240 million will be required, they are hoping that China will co-finance the project (also along with the European Investment Bank). Regarding development of the Port of Nacala, a "chicken and egg" situation was observed. In addition, it was noted that Zambia had a plan for a dry port at Chipata. It was suggested that JICA might wish take a closer look at this corridor and provided a copy of a January 2010 feasibility study.

27. It was stated that at a "high level" the recommended corridor prioritization was agreed. In addition, an understanding was stated that Vale of Brazil had taken over or would soon take over a port and coal mining concession along the Nacala Corridor, while railway feasibility studies still need to be undertaken. Development partner assessments should be revised accordingly. Also, with respect to the role of mining in stimulating economic growth, the Seminar was informed that AFCRI was undertaking a study of spatial development and export processing zones along the Nacala Corridor.

28. It was observed that the team's analysis was very thorough, but it was not necessarily agreed with all the results, e.g., with respect to the Shire–Zambezi Corridor. Also, it was noted that the rehabilitation of the Sena railway line had been completed and the issue now pertained to freight tariff (rate) negotiations. Regarding the information provided in "27", it was stated that Vale's Nacala port and rail concession were not awared.

29. It was also clarified that CDM was still in control of the Nacala port and railway. It was further stated that an alternative to the Port of Maputo might be considered, but it would be necessary to construct a railway link to the new port. In addition, it was noted that there was talk about a road along the Sena Corridor but the Government of Mozambique has not identified it as a priority and the road has not yet been funded. Regarding Beira, it was noted that the Government planned to dredge the channel by mid-2010, although contributions from development partners would be welcome. It may be difficult to consider Nacala as an alternative as long as there are with the Tete bridge; it may be better to consider an alternative linking with the railway system. It was noted that the Government was negotiating with JICA for a feasibility study of upgrading the terminal at the Port of Nacala and they were thinking of linking the port to the Tete mine.

30. The JICA Study Team was commended for its methodology but it was stated that it could not be agreed with all the Study recommendations. It was noted that the Maputo Corridor had many mines, e.g., a magnetite mine in Middelburg. This is why it is urgent to resolve bottlenecks along the Corridor. Regarding the development of a new port in Maputo in the long term, it was stated that currently the port had a throughput of 8 million tons and a capacity of 16 million tons, which would be increased to 48 million tons in 20 years; to recommend a new port, it is necessary to project reaching a traffic volume of more than 48 million tons over the next 20

years. The infrastructure capacity of the port is planned in line with such traffic growth. Generally, it was argued for focusing more on urgent priorities by focusing on current plans rather than looking long term. A view was stated that rehabilitation of the railway line was inappropriate since CFM spent USD 40 million rehabilitating the line and finished in 2009. To improve rail service it is necessary for Transnet of South Africa to make rolling stock available for use in Mozambique and to address railway pricing issues. Assistance for locomotives and rolling stock may be required. A shunting yard at the border is unnecessary since the railway improvements already undertaken should be sufficient to serve port demand of up to 48 million tons. Regarding the Lebombo/Ressano Garcia border crossing, it was noted that it was necessary to see why the OSBP recently proposed by DFID was not delivered; what is needed is to "pick up the project and manage it properly and implement it". It is necessary to create a "platform" where the private sector can work with the governments, which is the most critical element of a OSBP. It was stated that the project teams under DFID project "did not know the way forward". Any assistance for the border crossing should include an independent project management component. A "central project" is required to coordinate between the two governments to address the soft issues (e.g., border post operating hours), which can add significantly to efficiency; however, they will need a partner. Regarding railway passenger service, as stated in the Draft Final Report, immigration officers should be on the trains so that passengers do not have to get off for immigration clearance. It was concluded by again stressing the need to focus on short-term projects rather than looking at long-term "dream lists".

31. It was noted that a organization was developing a regional infrastructure master plan with a transport component, in which it had formulated high, low, and central growth scenarios. It has been assumed that each landlocked country should have a minimum of two outlets to the sea. A concern about reducing the long list of 18 corridors to 7 priority corridors was expressed, asking for example how to persuade Angola and Namibia that a corridor linking the two countries is not a priority. Clearly, the region has suppressed demand due to infrastructure constraints. The organization's vision is that it will promote efficiency if the corridors compete for traffic as the region moves toward a single market; however, if the number of corridors is scaled down from 18 to 7, it will be difficult to achieve efficiency.

32. It was stated that there was no problem with the corridors, but rather with some of the projects within the corridors. The previous comments in "30" regarding the Maputo Corridor were concurred. It was noted that the Beitbridge-Chirundu link was important within the North-South Corridor as well as the rail link to Kafue connecting to the TAZARA line. These projects should be prioritized. DBSA and other development partners have secured a mandate for dualization of the Beitbridge–Chirundu toll road and rail link and a feasibility study has been undertaken. Also, the progress at Kasumabelsa was mentioned. It was further stated that the Forbes/Machipanda border crossing on the Beira corridor was important, noting that the collapse of Zimbabwe had hurt Beira considerably. It was stated that energy was a key issue; because of hydroelectric power in Zambia and Mozambique, the development of electric trains was thought to be an ideal project; carbon credits could be gained. It was stated that these were key concepts that should be in the document. It was keen to understand how the Shire-Zambezi Corridor could have a priority as high as corridors with known resource deposits. Lastly, it was observed that the railway network was incomplete not only because of civil war but because of poor maintenance (there has been no civil war in Zambia and Malawi).

33. It was stated that "E" could find nothing to disagree with concerning the corridor prioritization, although perhaps the Shire–Zambezi Corridor needs some revaluation, including a feasibility assessment from several perspectives, including economic, environmental, and financial. It was concurred that maintenance had been a serious issue apart from civil wars. It was stated that while an independent project manager was needed for the Maputo Corridor and Lebombo/Ressano Garcia, there had been insufficient cooperation from South Africa; It was

added that if South Africa did not cooperate well, it would be difficult to make much progress. Finally, in response to previous statement, it was stated that reducing the number of priority corridors to seven was practical and necessary; it was observed that SADC might have political constraints, but a development partner could not have 40 priorities; from a partner's point of view, focusing on perhaps even three corridors may be appropriate.

34. It was stated that the map presented for the Dar es Salaam Corridor only showed the portion within Tanzania. Particularly with railways, on the management side, the need to bring in the private sector was recognized, but it was stated there was a need to "go beyond that" since the region had had experience with concessions not producing the intended results. It was stated that the projects for each corridor were at "much too high a level". Lastly, concerning OSBPs, it was observed that JICA had been working hard, but there had been too much emphasis on infrastructure and too little on procedures. It is best to look first at procedures and then decide what infrastructure is needed. Mr. Winston observed that in theory at least, infrastructure requirements should be less with OSBPs, although some physical works would still be required (e.g., repartitioning of offices, traffic channelization).

35. It was pointed out that the railway prefeasibility study undertaken by the Walvis Bay Corridor Secretariat was still ongoing, but it was not guaranteed that the proposed railway would link with the existing rail line; it may take another alignment altogether. It was stated that the existing rail line required rehabilitation and improvement; at the same time, the development of dry ports should be pursued. An MOU signed by Botswana, Zambia, and Zimbabwe will have a huge influence on corridor development. It was noted that the Trans-Kalahari Corridor included not only the Trans Kalahari/Mamuno border crossing between Namibia and Botswana but also a border crossing between Botswana and South Africa. A number of interventions are required to assure the efficiency of the corridor.

36. On the relative efficiency of road versus rail, it was recognized that bulky goods could be efficiently hauled by rail, but argued that the choice of mode should be left to market forces in the end.

37. It was noted that the Government of Namibia supported study of a missing railway link between Groenfontein, Namibia, and Sesheke, Zambia. Also, it has been supported by a Government of Zambia application for grant funding of a rail link between Sesheke and Livingstone.

38. Consideration of corridor institutional frameworks was urged to assure that every corridor has a well-functioning corridor secretariat. This was concurred. The need for the Government of South Africa to prioritize funding for the Lebombo/Ressano Garcia border crossing was recognized. In this context, it was stated that support from Japan would be important, while noting that only the Government of South Africa and not the private sector could apply. It was stated that once an application was accepted, there would be requirements from the Government of Japan to assure performance, but without a development partner involved there is no oversight, which has been a problem.

V. Closing Session

39. Mr. Kurashina, JICA, clarified that because certain corridors were selected according to the analysis undertaken in the Study, this does not necessarily mean that JICA will provide assistance for them. Rather, this is a conceptual study. Requests for assistance will be taken up by JICA headquarters and country offices in due course. Nevertheless, JICA would like to add value by sharing its strategy with other stakeholders.

40. It was stated that the due date for comments on the Draft Final Report is 25 February 2010.

41. Mr. Shiro Nabeya, Chief Representative, JICA Zambia Office, made the closing remarks. He expressed gratitude to the collective efforts of all who attended the Seminar. JICA is proud to support and promote regional economic development through various means. Infrastructure development has been identified as a key catalyst, and the draft Study presented in this Seminar assessed a number of transport corridors to help identify realistic solutions. He stressed the need to improve logistics between ports and inland countries and the need for improved regional economic cooperation, as well as the need for improved institutional capacities. He closed by again thanking the participants in the Seminar for their useful comments and expressed his hope that the Study would be beneficial.

Appendix B.1 National Development Strategies of Subject Countries

Country	National Development Strategy
Angola	**National Development Plan/Strategy:** Estrategia de Combate a Pobreza or ECP (Poverty Reduction Strategy Paper), Angola 2025 **Overall Goal/Objective of the Plan/Strategy: The** Angola 2025 vision document, prepared in 2006, presents long-term aspirations for consolidation of peace and national reconciliation, sustainable development, macroeconomic and social stability, establishment of an integrated national economy, and reduction in inequalities. **Priority Areas/Policies:** The ECP covering 2006–08 proposes to implement a public expenditure program focusing on ten priority areas: (i) social reinsertion, (ii) de-mining, (iii) food security and rural development, (iv) HIV/AIDS, (v) education, (vi) health, (vii) basic infrastructure, (viii) employment and vocational training, (ix) governance, and (x) macroeconomic management. **Priority in Infrastructure Development:** The government of Angola has prepared a Medium-Term Development Plan (2009–2013), and but the plan for infrastructure development has not been made publicly available.
Botswana	**National Development Plan/Strategy:** A Long Term Vision for Botswana – Vision 2016; National Development Plan 10 (2009–15) **Overall Goal/Objective of the Plan/Strategy:** The broader contexts for the objectives of national development (Vision 2016) are: (i) sustained development, (ii) rapid economic growth, (iii) economic independence, and (iv) social justice. It aims to increase its per capita income to a level equivalent to USD 8,500 in real terms (after correcting for inflation) by 2016, maintaining an average annual growth rate of 6% in real per capita incomes. This level of growth is to be sustained by a very high level of investment, at 41 per cent of GDP, which will be met from government savings, domestic private savings, and an inflow of foreign capital. **Priority Areas/Policies:** NDP10 emphasizes the importance of removing every possible constraint on private sector growth, and the need for continued support of the private sector through productive investment in relevant infrastructure, and further education and training. The largest share (36.5%) of projected government expenditure up to 2015 is for "economic service". **Priority in Infrastructure Development:** Vision 2016 calls for improving the quality of construction and maintenance of roads throughout the country, particularly with regard to road signs and markings, which improve road traffic safety. The implementation of plans to improve roads and communications in small and remote settlements is to be accelerated. Recognizing that the country is strategically located along the Trans-Kalahari Highway, the Maputo Corridor, and much of the rest of the Southern African road network, and is able to provide transport services to its neighbors, Vision 2016 calls for improvement of the internal road and rail network and local transport services, which will facilitate the development of a number of sectors, particularly tourism.
DRC	**National Development Plan/Strategy:** The Poverty Reduction and Growth Strategy Paper (PRGSP) of the Democratic Republic of the Congo, Vision 26/25 **Overall Goal/Objective of the Plan/Strategy:** The objective of the DRC's long-term development vision (Vision 26/25) is to increase the country's human development ranking to the level of the intermediate countries and move toward meeting the Millennium Development Goals. In the near term, the PRGSP seeks sustainable and effective improvement in living conditions by targeting the main causes of poverty. **Priority Areas/Policies:** The PRGSP is based on the following five major pillars:

Country	National Development Strategy
	(i) promote good governance and consolidate peace (through strengthened institutions); (ii) consolidate macroeconomic stability and growth; (iii) improve access to social services and reduce vulnerability; (iv) combat HIV/AIDS; and (v) promote local initiatives (*dynamique communautaire*). The Medium-Term Expenditure Framework (MTEF) includes the following actions: (i) improvement of road infrastructure; (ii) improved access to basic education; (iii) improved access to primary health care; (iv) improved supply of safe drinking water and access to sanitation; and (v) the fight against HIV/AIDS. **Priority in Infrastructure Development:** The PRGSP states that the qualitative and quantitative insufficiency of transport services, accentuated by the poor condition of country's transport infrastructure, is one of the DRC's main problems. The lack of modern handling equipment at the main seaport in Matadi, and the poor functioning of the Matadi/Kinshasa railway (CFMK, Chemin de Fer Matadi Kinshasa) are also pointed as factors contributing to the high cost of imported goods.
Malawi	**National Development Plan/Strategy:** The Malawi Growth and Development Strategy (MGDS, revised edition) **Overall Goal/Objective of the Plan/Strategy:** The overriding philosophy of the MGDS is poverty reduction through sustainable economic growth and infrastructure development. **Priority Areas/Policies:** The MGDS identifies nine priority areas to address in its overall objective of economic growth and wealth creation that are critical for immediate improvement in economic well-being: (i) agriculture and food security; (ii) greenbelt irrigation and water development; (iii) education, science, and technology; (iv) transport infrastructure and Nsanje world inland port; (v) climate change, natural resources, and environmental management; (vi) integrated rural development; (vii) public health, sanitation, and HIV/AIDS management; (viii) youth development and empowerment; and (ix) energy, mining, and industrial development. In order to address the nine priority areas, the MGDS development framework is addresses five broad thematic areas: (i) economic growth; (ii) social protection; (iii) social development; (iv) infrastructure development; and (v) improved governance. Regarding economic growth, the Government will in the short- to medium-term prioritize agricultural productivity of key crops (i.e., maize, tobacco, tea, sugar, and cotton), to improve food security and agro-processing for export. **Priority in Infrastructure Development:** The MGDS is focused on infrastructure in transport, energy, water and sanitation, information and communication technology, and science and technology. While all of these are seen as prerequisites for economic growth and development, the Government has prioritized transport infrastructure and the Nsanje World Inland Port. Particular emphasis is being placed on reducing transport costs by connecting production areas to both domestic and export markets. Energy generation and supply, greenbelt irrigation, and water development have also been prioritized.
Mozambique	**National Development Plan/Strategy:** The Government of Mozambique's Action Plan for the Reduction of Absolute Poverty for 2006–09 (PARPA II) **Overall Goal/Objective of the Plan/Strategy:** The Objective of PARPA II was to construct a prosperous Mozambique; the plan guides and motivates the state in promoting an increase in productivity. It was intended to reduce the incidence of poverty from 54% in 2003 to 45% in 2009, with an approach that benefits the poorest and least favored population groups, while relying on citizens' own efforts together with national investment. PARPA II set out the additional objectives of improving the monitoring of economic development, playing a more active role in regulating private sector activity and the mechanisms of competition, and continuing to allow room for public-private partnerships in the creation of a

Country	National Development Strategy
	favorable business environment. **Priority Areas/Policies:** The general priorities of PARPA II were to: (i) carry out policies and use instruments to promote an average annual real growth in national per capita income; (ii) maintain close coordination with the international community in order to permit continuation of the flows of aid, particularly to the State Budget; (iii) ensure redistribution of income to the population, particularly the poorest strata, by providing social services and performing other relevant and classical state functions; (iv) continue to monitor trends in poverty levels; and (v) improve the monitoring of trends in the economy, including productivity, using better and more appropriate statistical indicators, and employing them at the opportune time. In the structure of sectoral expenditures during the period 2006–10, "health and AIDS" was given the biggest share (over 18%), and "roads and highways" the second biggest share (13%–14%). **Priority in Infrastructure Development:** Under the economic development pillar, making the North–South corridor a focal point for national development was considered a priority, through multisectoral and territorial links, in order to meet overall objectives and the objectives of the pillars of governance, human capital, and economic development. The following actions were identified: (i) continuing the rehabilitation of the principal routes, including N1 Maputo–Pemba, N14 Lichinga–Pemba, N13 Lichinga–Cuamba, and N103 Cuamba–Nampevo; (ii) continuing the programs for rehabilitating tertiary roads; (iii) building bridges over the Zambezi, Rovuma, Meluli, Lugela, Guijá, and Moamba rivers; (iv) completing the rehabilitation of the Ilha de Moçambique bridge; and (v) maintaining the highway network in reasonably good condition. Contribution to the development of economic and social activities along the Beira Corridor was prioritized, by: (i) rehabilitating the Sena line; (ii) maximizing the use of the port of Beira; and (iii) establishing regulatory authority for ports and railroads. In addition, PARPA II stressed revitalization and improvement of maritime, river, and lake transportation by taking actions to: (i) liberalize the entry and operation of private parties in cabotage and crossings; (ii) dredge the ports of Beira and Quelimane; (iii) purchase vessels for the crossings at Maputo/Catembe, Inhambane/Maxixe, Beira/Buzi/ Machanga, and Quelimane/Ricamba; (iv) rehabilitate the bridges at Catembe, Maputo, and Inhambane; (v) build a shipyard at Inhambane; and (vi) assure that the management of all principal and secondary ports in this country is efficient and effective.
Namibia	**National Development Plan/Strategy:** The Third National Development Plan (NDP3) 2007/08–2011/12; Vision 2030 **Overall Goal/Objective of the Plan/Strategy:** Vision 2030 describes a future Namibia where "prosperity, harmony, peace and political stability" are achieved through progress in education, science and technology, health including the fight against HIV, sustainable agriculture, peace and social justice, and gender equality. NDP3, which is the first systematic attempt to translate the Vision into actionable policies and programs, has "accelerated economic growth and deepening rural development" as its main theme. The Vision has three indicative targets: (i) a baseline GDP growth target averaging 5% per annum with no new policy interventions and a higher GDP growth target averaging 6.5% predicated on a number of new policy interventions and actions; (ii) achievement of other socioeconomic indicators as well as a qualitative assessment of the progress towards achieving the MDGs by 2015; and (iii) average annual employment growth of 2.6% under the baseline average annual GDP growth rate of 5.0%, and at 3.2% under the higher GDP growth rate of 6.5%. **Priority Areas/Policies:** NDP3 has following the Key Result Areas (KRAs): (i) competitive economy (macro economy and infrastructure); (ii) productive utilization of natural resources and environmental sustainability; (iii) productive and competitive human resources and institutions; (iv) knowledge-based economy and

Country	National Development Strategy
	technology-driven nation; (v) quality of life; (vi) equality and social welfare; (vii) peace, security, and political stability; (viii) regional and international stability and integration. In the MTEF for 2009/09 to 2010/11, the Government has decided to embark upon a major expenditure program designed to protect the vulnerable and stimulate growth; for this purpose, it developed a four-pronged strategy: (i) within the overall fiscal targets, focusing resources on the poorest and most vulnerable in the face of economic shocks; (ii) improving the social safety net to relieve poverty (particularly in rural areas) and reduce inequality; (iii) investing for competitiveness, to promote growth and prosperity as the source of continuing development; and (iv) assisting ministries to properly maintain public assets and the required levels of public service. Regarding investment in the productive sector, the MTEF prioritizes minerals, agriculture (livestock sector), aviation, tourism, and financial services. **Priority in Infrastructure Development:** The NDP3 Goal under the Infrastructure sub-KRA (which belongs to the Competitive Economy KRA) is to establish and sustain a highly developed and reliable infrastructure, which is a prerequisite for improved productivity, reduced production costs, and enhanced competitiveness. This infrastructure includes: (i) road, railway, air and maritime transport; (ii) telephone, Internet, broadcast, and postal communications; (iii) meteorology; and (iv) housing and works and management of public property. The transport subsector strategies include enhancing SADC inter-regional transport connectivity and links to other important destinations outside southern Africa. Priorities for the MTEF period were put on the programs for "roads and streets", and "aviation and meteorological facilities".
South Africa	**National Development Plan/Strategy:** Accelerated and Shared Growth Initiative – South Africa (ASGISA) **Overall Goal/Objective of the Plan/Strategy:** The ASGISA aims to halve poverty and unemployment by 2014, by reducing unemployment to below 15% and halving the poverty rate to less than one-sixth of total households. To achieve this objective, which requires about 5% of GDP growth rate on average between 2004 and 2014, the South African government set a two-phase target, with annual average growth of at least 4.5% between 2005 and 2009, and at least 6% between 2010 and 2014. In addition, ASGISA initiative calls for sharing "the fruits of growth" so that poverty comes "as close as possible" to elimination, and severe inequalities further reduced. **Priority Areas/Policies:** The main elements of ASGISA include: (i) an acceleration of public investment in infrastructure (ZAR 416 billion over three years); (ii) a set of targeted sector investments (in business process outsourcing, tourism, chemicals, bio-fuels, metals and metallurgy, wood, pulp and paper, agriculture, the creative industries, and clothing and textiles); (iii) selected economic reforms to reduce the cost of telecommunications, and steel and chemicals; (iv) stepped-up education and skills development programs, second economy interventions in micro-finance and small- and medium-sized businesses, bringing informal businesses and settlements into the formal legal framework, and the creation of a more conducive regulatory environment for development. The Medium Term Budget Policy Statement 2009, announced on 27 October 2009, set out the latest medium-term priorities, including creating jobs, enhancing the quality of education, improving health outcomes, developing rural areas, and fighting crime and corruption. **Priority in Infrastructure Development:** Key areas of government expenditure in infrastructure investment include: (i) provincial and local roads; (ii) bulk water infrastructure and water supply networks; (iii) energy distribution; (iv) housing; (v) schools and clinics; (vi) business centers; (vii) sports facilities; and (viii) multi-purpose government service centers, including police stations, courts, and correctional facilities. Electronic communications is regarded as key commercial and social infrastructure. Another key challenge identified in the infrastructure sector was preparation for 2010 World Cup, including the building or improving of

Country	National Development Strategy
	10 sports stadiums, and investment in the environs and access to the stadiums. In addition to the general infrastructure programs, provinces were asked to propose special projects that would have a major impact in accelerating and sharing growth. In the latest Medium Term Expenditure Framework, rural infrastructure investment and spending on housing and municipal infrastructure is prioritized, including completion of the Gautrain mass rapid transit project, major improvements in the Gauteng road network, and initiation of public transport improvement programs in 12 cities and metropolitan areas.
Tanzania	**National Development Plan/Strategy:** The National Strategy for Growth and Reduction of Poverty (NSGRP); Tanzania Development Vision 2025 **Overall Goal/Objective of the Plan/Strategy:** NSGRP is a national organizing framework focusing on poverty reduction. It also calls for wider, longer-term sectoral or national outcomes as specified in national policies such as Tanzania Development Vision 2025. The target annual GDP growth rate was specified as 6%–8% from 2005 to 2010. However, policies will be required to ensure that the pattern of growth is pro-poor and benefits at the macro level are translated into micro-level welfare outcomes. **Priority Areas/Policies** NSGRP pays greater attention to further stimulating domestic saving and private investment response, infrastructure development, human resource development, increased investments in quality education, science and technology, use of information and communication technology (ICTs), a competitive knowledge-based economy, and an efficient government. In the medium-term budget (2007/8–2009/10), resources were allocated to prioritized special projects in the areas of infrastructure development, agriculture, water, energy, education, livestock, and health and higher education. **Priority in Infrastructure Development:** The NSGRP's cluster strategies focus on infrastructure development including modernization and expansion of railways through favorable policies, as well as modernization and expansion of trunk roads, ports, and airports, and transport services. Specific strategy elements include: (i) progressing Development Corridors through enhanced public–private partnerships; (ii) providing an adequate level of physical infrastructure to cope with the requirements of poverty reduction targets (through rehabilitation of 15,000 km of rural roads annually by 2010, up from 4,500 km in 2003); (iii) ensuring that the basic infrastructure exists, including a network of passable roads, to enable the delivery of basic social services; (iv) increasing the proportion of passable (good/fair condition) rural roads from 50% in 2003 to at least 75% in 2010; (v) addressing geographic disparities by identifying the economic potentials of the disadvantaged districts and supporting exploitation of these potentials by increasing productivity in these districts. Spatial development and development corridor planning approaches are to be employed, e.g., through the now ongoing Mtwara Development Corridor and Central Development Corridor initiatives under PPP arrangements.
Zambia	**National Development Plan/Strategy:** The Fifth National Development Plan 2006–2010 (FNDP); Vision 2030 **Overall Goal/Objective of the Plan/Strategy:** The long-term development objective in the National Vision 2030 is for Zambia "to become a prosperous middle income country by the year 2030". The FNDP, as an important step towards realization of the 2030 Vision, has the theme: "Broad Based Wealth and Job Creation through Citizenry Participation and Technological Advancement", while the strategic focus is "Economic Infrastructure and Human Resources Development". The main growth aims of the Plan are to: (i) increase the overall growth rate to an annual average of at least 7%; and (ii) ensure that growth is broad-based and rapid in the sectors where the poor are mostly engaged. **Priority Areas/Policies:** The FNDP identifies six policy intervention areas: (i)

Country	National Development Strategy
	macroeconomic policies; (ii) social policies; (iii) rural sector policies; (iv) urban sector policies; (v) structural policies; and (vi) cross-cutting issues. From the expenditure point of view, the Plan identifies two critical areas on which public spending should be focused: (i) strengthening the relevant economic and social infrastructure, especially roads, schools, and hospitals; and (ii) enhancing agriculture and rural development. These will be complemented by the implementation of specific structural reforms across various sectors in order to improve the business and investment climate. In many respects, these priorities also match the eight MDGs. In summary, the expenditure focus of the FNDP is on infrastructure (particularly road infrastructure), agricultural development, education, health, water and sanitation, and public order and safety. **Priority in Infrastructure Development:** Strengthening economic infrastructure is one of the critical vehicles for the realization of the Plan's objectives. Poor physical infrastructure such as roads, electricity, irrigation, and dams, has been one of the major bottlenecks holding back private sector development and Zambia's economic progress in general. During the FNDP period, it has been planned that roads in "maintainable condition" should improve from 51% in 2005 to 90% by 2010. Spending on rural feeder roads, in particular, is to be enhanced to widen market access. The Government also has targeted increasing spending on road infrastructure from both the Government and development partners to at least 2.8% of GDP by 2010 from 2.5% in 2006. Government spending is programmed to increase to 1.8% of GDP by 2010 from 1.1% in 2006, to allow for road infrastructure development and maintenance. As a proportion of the Government budget, spending on roads was to increase to 5.3% by 2009 and maintained at that level. In addition to roads, the development of railway infrastructure has also been accorded priority, although railway projects will be funded mainly through private financing. Other key infrastructure programs include the enhancement of energy supply and the development of water resources for economic purposes such as irrigation. There are also projects of a large commercial nature, e.g., the development of hydropower stations, which will be developed mainly through PPPs or private arrangements. These large projects are of vital importance because the Southern African region began facing a power shortfall by 2008 and Zambia is one of the few countries where new power generation projects can be quickly developed. A proposed power rehabilitation program is essential to guarantee power supply and significantly reduce power outages frequently experienced by business enterprises and households. Also, the country's rural electrification program was to be increased during the Plan period.
Zimbabwe	**National Development Plan/Strategy:** It has been announced that the Government of Zimbabwe (Ministry of Economic Development) is formulating/has formulated a Zimbabwe Economic Development Strategy (ZEDS) 2008–12, although it is not yet available. **Overall Goal/Objective of the Plan/Strategy, Priority Areas/Policies:** According to the World Bank's *Interim Strategy Note, FY08–09*, medium-term prospects for Zimbabwe depend on implementation of a comprehensive reform program focusing on fiscal adjustments, including the termination of quasi-fiscal activities by the Reserve Bank of Zimbabwe, monetary tightening, and exchange rate adjustments. The program would need to be supported by fundamental structural reforms, such as price liberalization, public enterprise and civil service reforms, strengthened property rights, and improvements in governance.

Source: Development strategy and poverty reduction strategy papers of each country's government; World Bank, *Country Assistance Strategies*, *Country Partnership Strategy*; International Development Association (IDA), *Interim Strategy Note*.

Appendix B.2 Agricultural and Related Production in Southern African Countries (1,000 tons)

Maize

	2000	2005	2006	2007	2008
Angola	395	720	566 *	570 F	570 F
Botswana	9	2	11	12 F	12 F
DRC	1,184	1,155	1,155	1,156	1,156
Malawi	2,501	1,225	2,611	3,226	2,635
Mozambique	1,180	1,403 *	1,418	1,152	1,285
Namibia	32	41	61	40 F	40 F
South Africa	11,431	11,716	6,935	7,125	11,597
Tanzania	1,965	3,132	3,423	3,659	3,659 F
Zambia	1,040	866	1,424	1,366	1,446
Zimbabwe	2,108	915	1,485	953	496

Sugar Cane

	2000	2005	2006	2007	2008
Angola	350 F	345 F	360 F	360 F	360 F
DRC	1,669	1,522	1,495	1,550 F	1,550 F
Malawi	2,100 F	2,400 F	2,450 F	2,500 F	2,500 F
Mozambique	397	2,247	2,060	2,061	2,451
South Africa	23,876	21,265	20,275	20,300 F	20,500 F
Tanzania	1,355	2,300 F	2,450 F	2,370 F	2,370 F
Zambia	1,600	2,500 F	2,500 F	2,500 F	2,500 F
Zimbabwe	4,228	3,290 *	3,100 F	3,000 F	3,100 F

Coffee (Green)

	2000	2005	2006	2007	2008
Angola	4 *	2 *	2 *	2 *	2 F
DRC	47	32	32	32	32
Malawi	4 *	1	2	1	1
Mozambique	1 F	1 F	1 F	1 F	1 F
Tanzania	48	54	34	55	43
Zambia	5 *	5 *	5 F	5 F	5 F
Zimbabwe	9	4 *	5 *	5 F	5 F

Tea

	2000	2005	2006	2007	2008
DRC	2	2	2	2	2
Malawi	42	38	45	46 F	46 F
Mozambique	10	16	16	16	17
South Africa	13	22	3	4 F	4 F
Tanzania	24	31	30	31	35
Zambia	1 F	1 F	1 F	1 F	1 F
Zimbabwe	22 *	22 F	22 F	22 F	22 F

Tobacco (Unmanufactured)

	2000	2005	2006	2007	2008
Angola	3 *	3 F	3 F	3 F	3 F
DRC	4	4 F	4 F	4 F	4 F
Malawi	99	94	122	118 F	160
Mozambique	9	65	95	34	64
South Africa	30	20	18	20 F	20 F
Tanzania	26	47	52	51	51
Zambia	10	58	48 F	48 F	48 F
Zimbabwe	228	83	44	79	79 F

Rice (Paddy)

	2000	2005	2006	2007	2008
Angola	6	9	9 *	9 F	9 F
DRC	338	315	316	316	317
Malawi	72	41	91	113	115
Mozambique	181	174 *	99	105	102
South Africa	3 F	3 F	3 F	3 F	3 F
Tanzania	782	1,168	1,206	1,342	1,342 F
Zambia	14	13 F	14	18	18 F
Zimbabwe	1 F	1 F	1 F	1 F	1 F

Seed Cotton

	2000	2005	2006	2007	2008
Angola	10 F	3 F	3 F	3 F	3 F
Botswana	3 F	3 F	3 F	3 F	3 F
DRC	27 F	25 F	25 F	25 F	25 F
Malawi	37	50	59	63	77
Mozambique	38 F	111 F	165 F	210 F	240 F
Namibia	5 F	6 F	6 F	6 F	6 F
South Africa	70	54	39	29	26
Tanzania	123	357	230 F	320 F	320 F
Zambia	62 *	142	118	140 F	140 F
Zimbabwe	327	196	208	235	240 F

Bananas

	2000	2005	2006	2007	2008
Angola	300 F	300 F	300 F	300 F	300 F
DRC	312	314	314	315	315
Malawi	310 F	370 F	380 F	390 F	390 F
Mozambique	90 F	90 F	90 F	90 F	90 F
South Africa	373	352	344	348	338
Tanzania	701	2,007	3,507	3,500 F	3,500 F
Zambia	1 F	1 F	1 F	1 F	1 F
Zimbabwe	85 F	95 F	85 F	85 F	85 F

Beef and Buffalo Meat

	2000	2005	2006	2007	2008
Angola	85	85	85	85	85
Botswana	29	35	35	35	35
DRC	14	12	12	12	12
Malawi	17	21	24	27	29
Mozambique	12	17	16	29	20
Namibia	64	39	36	39	39
South Africa	625	705	804	805	805
Tanzania	230	270	270	247	247
Zambia	53	59	58	58	58
Zimbabwe	101	95	97	97	97

Chicken Meat

	2000	2005	2006	2007	2008
Angola	8 Fc	9 Fc	8 Fc	8 Fc	8 Fc
Botswana	9 Fc	5 Fc	5 Fc	6 Fc	6 Fc
DRC	12	11	11	11	11
Malawi	15 Fc	16 Fc	15 F	15 F	15 Fc
Mozambique	31 Fc	34 Fc	40 F	40 F	36 Fc
Namibia	9 Fc	10 Fc	5 Fc	5 Fc	10 Fc
South Africa	817	949	971	974 F	974 F
Tanzania	42 F	52 F	53 F	46 F	46 F
Zambia	35 Fc	39 Fc	37 Fc	37 Fc	37 Fc
Zimbabwe	25 Fc	53 Fc	40 F	40 F	36 Fc

Milk

	2000	2005	2006	2007	2008
Angola	195	195	198	200	196
Botswana	122	108	105	105	105
DRC	5	5	5	5	5
Malawi	35	43	25	30	35
Mozambique	69	78	77	75	75
Namibia	89	150	110	110	110
South Africa	2,540	2,871	2,971	3,000	3,060
Tanzania	806	944	944	955	955
Zambia	75	84	81	84	84
Zimbabwe	310	242	250	250	250

Beer

	2000	2005	2006	2007	2008
Angola	100 F	293 *	375 *	396 *	396 F
Botswana	39 F	51 *	47 *	45 *	45 F
DRC	98 Fc	163 F	158 F	180 F	180 F
Malawi	12 Fc	29 Fc	22 Fc	27 Fc	27 Fc
Mozambique	46 F	69 F	48 F	48 F	48 F
Namibia	33 Fc	117 F	117 F	98 Fc	98 Fc
South Africa	2,000 F	2,590 *	2,700 *	2,653 *	2,653 F
Tanzania	183	217	274	311	311 F
Zambia	60 F	53 *	54 *	56 *	56 F
Zimbabwe	103 Fc	121 *	116 *	112 *	194 Fc

Note: * = Unofficial figure, F = FAO estimate, Fc = Calculated data
Data on Beef and Buffalo meat and milk may include official, semi-official, or estimated data
Source: FAOSTAT

Although South Africa's economic structure is highly industrialized, it has large production capacity for some agricultural and related products (maize, sugar cane, beef and buffalo meat, milk and beer). Some other countries, i.e., Tanzania and Malawi, also have sizable production capacities for particular products, including maize, tobacco, rice, and bananas.

Appendix C Detailed Analysis of the Current Industrial Situation of the Corridors

A detailed analysis of development potential was conducted for each target corridor and is reported in this Appendix. It also serves as input information for Section 4.1.3. The corridor No. of Figure 4.1.1 is added for reference.

C.1 North–South Corridor (No.④)

The North–South Corridor links the DRC, Zambia, and Botswana/Zimbabwe (alternative routings), with the Port of Durban in South Africa, by road and rail. As this route, through the Botswana route, is currently the busiest corridor in the region, with traffic volumes exceeding capacity at least along certain segments of the corridor.

The main mineral projects and potential industries for the corridor (other than in South Africa) are concentrated in Zambia and the DRC, as shown in Table C.1. Except for these, there seems to be no indication of any major mineral deposits or exploration areas under consideration in this corridor.

Table C.1 Potential Industries and Investments to Date – North–South Corridor

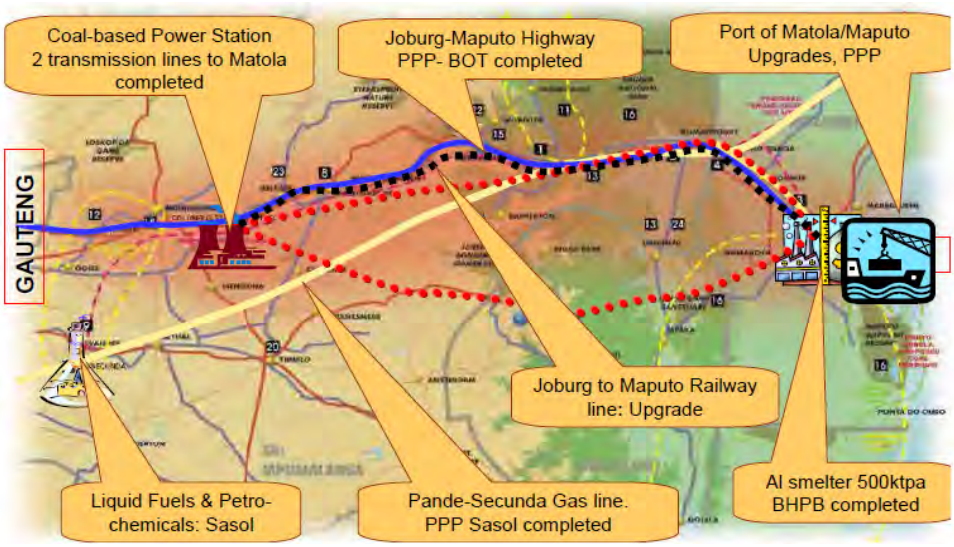
Potential Industries	**Description**
Mining	• Zambia: Copper, Cobalt (Copperbelt), Coal (Maamba) • DRC: Copper (Katanga Province) • Botswana: Coal (Mmamabula) • Zimbabwe: Platinum (Mimosa), Coal (Wankie)
Tourism	• Zambia and Zimbabwe: Victoria Falls (World Heritage) • Zimbabwe: Great Zimbabwe (World Heritage) • Safari
Multi-Facility Economic Zone (MFEZ, Zambia)	• Lusaka South MFEZ, Kasumbalesa MFEZ, Ndola MFEZ, Chambishi MFEZ, Lumwana (Solwezi) MFEZ • Objective of MFEZ: Catalyzing industrial and economic development in the manufacturing sector to stimulate both domestic and export-oriented business
Anchor Projects	**Description**
Lumwana Copper Mines (Lumwana, Zambia)	• Largest copper mine in Africa • Invested in by a Canadian mining company (Equinox Minerals Limited) • Start operation in 2009. • Expected to produce an average of 172,000 tons of copper per year contained in concentrates over the initial 6 years of its 37-year mine life • Total investment amount: USD 1 billion
Konkola North Copper Mines (Zambia)	• USD 50 million to be invested by the Brazilian mining company Vale in 2010 • Expected to begin production in 2013
Chambishi Multi-Facility Economic Zone (Ndola, Zambia)	• Invested in and established by the China Nonferrous Metal Mining Group • Investment commitments: About USD 900 million by 2010 • A copper Smelter was constructed and started to operate in October 2009, receiving copper from Lumwana Mine

Source: Prepared by the JICA Study Team

C.2 Maputo Corridor (No.③)

The Maputo Corridor may be considered the eastern segment of the Trans-Kalahari Corridor. The area served by the corridor is well explored and there is little potential for new mineral developments. However, exploitation of eastern chrome deposits in South Africa as well as a variety of mineral and coal deposits close to the Kruger National Park and the Mozambique border could be facilitated by further development of the corridor.

The development status of various corridor initiatives is set out in Figure C.1 and Table C.2. As shown in Figure C.1, there are currently some initiatives to reroute some of South Africa's coal exports through Maputo.



Source: Maputo Corridor Logistics Initiative (MCLI)

Figure C.1 Maputo Corridor Development Status

Table C.2 Potential Industries and Investments to Date – Maputo Corridor

Potential Industries	**Description**
Agriculture	• South Africa: Citrus farms in Limpopo Province have started to export their products via the Port of Maputo. • Zimbabwe and Swaziland: Sugar and fruit industries are expected to use the Corridor
Automobile Industry	• South Africa: BMW South Africa is considering the export of cars through the Port of Maputo. Nissan Motor Company South Africa conducted a trial run to use the Port of Maputo Port for export.
Industrial Park	• Mozambique: Mozal (see below) and its group companies have already been in the Beluluane Industrial Park, near the Port of Maputo. Textile industry companies targeting the US market (relating to AGOA) are now considering building factories in the Park.
Anchor Project(s)	**Description**
"Mozal" Aluminium Smelter	• One of the biggest aluminum foundries in Africa • Partnership among BHP Billiton, Japan's Mitsubishi Co., and South Africa's Industrial Development Corporation and the Mozambican government • Reported a loss of USD 115 million for 2008 and cut staff due to the global financial crisis

Source: Prepared by the JICA Study Team

C.3 Beira Corridor (including the Sena and Tete Corridors) (No.②)

The Beira Corridor historically was the main route into Zimbabwe, while also serving some Zambian traffic. Potential mineral deposits that could be advanced with the rehabilitation of the Beira Corridor included development of priority resources associated with the alkaline complexes, i.e., fluorite deposits and dimension stone at Montamonde, south of Tete. The fluorite has good grades and huge reserves. Potential also exists for the exploitation of industrial minerals, e.g. phosphates in alkaline complexes and limestone.

Along the Sena and Tete Corridors, the Moatize coal fields in the Zambezi Valley are currently being developed by Vale of Brazil and Riversdale Mining of Australia, which have plans to export coal via the Port of Beira, although there are serious investigations into developing the Nacala Corridor as well to act as the main export route.

Figure C.2 shows the Beira, Sena, and Tete Corridors. Table C.3 presents information on potential industries and investments along the corridors.

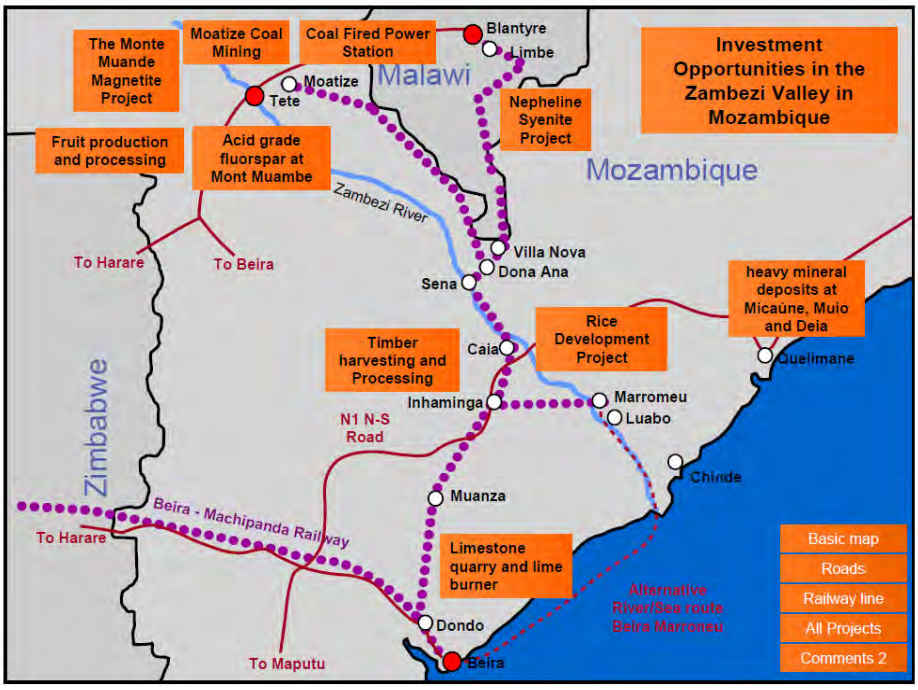


Figure C.2 Beira, Sena, and Tete Corriors

Table C.3 Potential Industries and Investments to Date – Beira, Sena, and Tete Corridors

Potential Industries	**Description**
Mining	• Mozambique: Coal (at Tete, high export potential, see below), niobium-tantalum, gold, fluorite (at Montamonde and Tete), tin, heavy mineral sands, pegmatite minerals • Malawi: Bauxite (at Mulanje), heavy mineral sands (at Tengani, near Nsanje • Zimbabwe: Platinum (at Hartley and Unki), nickel (at Unki)
Agriculture (The Beira Agricultural Growth Corridor (BAGC) Initiative)	• Mozambique: Cotton production (along the Zambezi River), sugar processing (investment by Sena Sugar, Mozambique), rice production (downstream Mopeia region), timber processing (Sofala region), fruit production and processing (Tsangano and Moatize region), horticulture (Buzi region)
Tourism	• Mozambique: Investment and rehabilitation of Gorongosa National Park
Anchor Projects	**Descriptions**
Beira Port Fertilizer Terminal Project (through Beira Agricultural Growth Corridor (BAGC) Initiative), (Beira, Mozambique)	• One of the world's largest fertilizer terminals at port • To be invested in by a private sector Norwegian private company (Yara International) • Total investment amount: USD 35 million • To be transported to Zambia, Malawi, and the DRC
Moatize Coal Mine Project (Tete, Mozambique)	• Mozatize I Project: USD 595 million to be invested in by the Brazilian mining company Vale in 2010 • Another investment planned by the Australian mining company Riversdale and a UK mining "junior" • Moatize II Project: Huge potential similar to that of Moatize I. An MOU between Government of Mozambique and Vale has already been signed for the development of railway transport in Northern Mozambique.
Dombe Jatropha BioDiesel Project (Dombe, Mozambique)	• 19,000 ha biodiesel production; 10% for domestic consumption • Total investment amount: USD 53 million • The biofuel is expected to flow out of Mozambique through the Port of Beira.

Source: Prepared by the JICA Study Team

C.4 Nacala Corridor (No.①)

Nacala is regarded as the best location for a deepwater port on the East African coast. The Nacala Corridor has consequently been at the forefront of ongoing initiatives to rehabilitate the rail link to Malawi, thereby creating a number of "anchor" tenants and promoting development along the corridor. Together with Beira and other corridors (Sena and Tete), these developments have been linked to the possible export of coal from the Moatize and Benga coal fields as well as from the Muchana Vuzi coal fields north of the Cahorra Bassa Dam in Tete Province, Mozambique. The corridor is ultimately seen as linking Lusaka in Zambia with the Port of Nacala. There are an increasing number of exploration programs in southern Zambia, focusing on base metals – mainly copper and nickel as well as uranium prospects. All of these would benefit from development of the corridor.

Mozambique has some poorly explored base metal (nickel and copper) potential along the Nacala railway line, as well as some iron ore north of the line. These iron ore deposits are generally small but of good grade and could be exported as ore. (It is reported that exports will

soon be started.). There is also niobium and rare earth potential in the carbonatites on the east flank of the Rift Valley.

The Brazilian mining company Vale is exploring a potash deposit southwest of the port of Pemba, north of Nacala. There are now abandoned graphite mines close to Pemba, which may also raise the potential of the Mtwara Corridor.

For Malawi, together with the bauxite deposits in Mulange, one of the largest and richest ilmenite deposits in Africa is found at Chipoka, near Salima. It is contained in mineral sands in the form of mineable dune sands located around the shores of Lake Malawi, with an estimated reserve of about 1 billion tons. Plans include a smelter with a capacity to smelt 26 million tons over a 25-year project life.

Figure C.3 shows the Nacala Corridor, while Table C.4 presents information on potential industries and investments along the corridor.

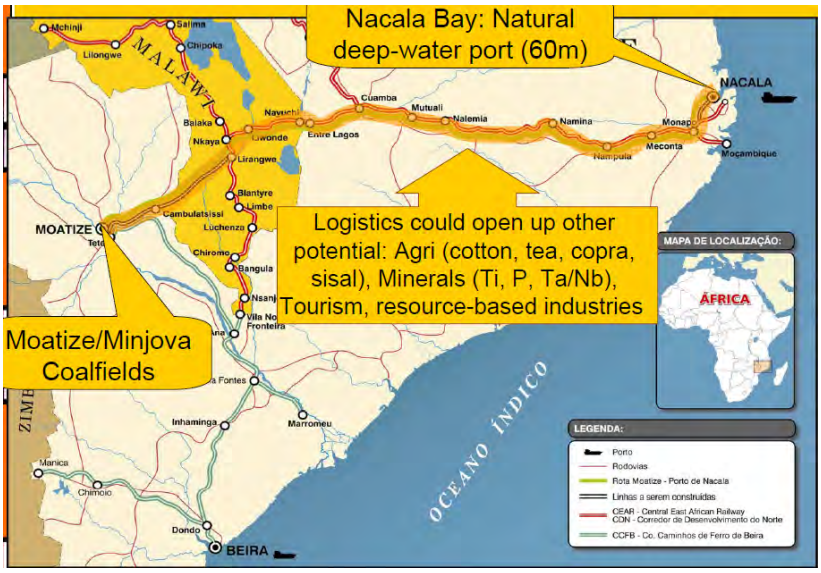


Figure C.3 Nacala Corridor

Table C.4 Potential Industries and Investments to Date – Nacala Corridor

Potential Industries	Description
Mining	• Mozambique: Coal (at Tete, high export potential, see below), iron ore (along the north of the corridor), potash (at Pemba) • Malawi: Ilmenite (at Chipoka, the largest deposit in Africa), limestone (central Malawi), heavy mineral sands (at Mangochi and Chipoka), gemstones (central Malawi), zircon, sorontianite.
Agriculture	• Mozambique: Traditional crops such as sugar, tobacco, cotton. Soybean oil mill, canning fruits and vegetables, aqua-farming (Malawi), coffee, leather processing, cotton, oil processing (for consumption) from sunflowers and peanuts (Zambia) • Malawi: Tobacco (whole Malawi), sugar (at Dwangwa), tea (southern Malawi), cotton (at Balaka), aqua-farming (Domasi and Cape Maclear) • Zambia: Cotton (at Chipata)

Potential Industries	**Description**
SEZ/Indusrial Park	• Mozambique: Nacala Special Economic Zone (ZEEN) is currently under consideration
Tourism	• Mozambique: Pemba • Malawi: Cape Maclear (World Heritage), Liwonde National Park, Mulanje Forest Reserve • Zambia: South Luangwa National Park
Anchor Projects	**Description**
Moatize Coal Mine Project (Tete, Mozambique)	• Mozatize I Project: USD 595 million to be invested by the Brazilian mining company Vale in 2010 • Another investment planned by the Australian mining company Riversdale and a UK mining "junior" • Moatize II Project: Huge potential as with Moatize I. An MOU between the Government of Mozambique and Vale has already been signed to develop railway transport in Northern Mozambique.
Chipoka Ilmenite Mine (Chipoka, Malawi)	• One of the largest and richest ilmenite deposits in Africa
Mangochi Heavy Mineral Sands (Mangochi, Malawi)	• To be developed by a private Chinese company

Source: Prepared by the JICA Study Team

C.5 Mtwara Corridor (No.⑦)

Mtwara Port is a small functioning port, but the rail line linking the port to the main agricultural areas was taken out of service at the time of construction of the TAZARA rail link between Tanzania and Zambia. Considerable research has been completed on the corridors of Tanzania, supported by the Industrial Development Corporation (IDC) of South Africa and other international development partners.

The main mineral projects and potential industries for the Mtwara Corridor are the following:

(i) Mining of vanadium, titanium, and iron ore at Liganga;
(ii) Mining of coal around the Nyasa Lake including the Mchuchuma–Katewaki area;
(iii) Petrochemical industries based on the Songo Songo and Mnazi Bay gas fields;
(iv) A petroleum refinery and pipeline linking Mtwara–Mbamba Bay;
(v) Mining and processing of gypsum to manufacture cement and other products from deposits in the Lindi region; and
(vi) Mining and processing of rock salt to produce edible salt and chemicals from deposits in the Lindi region.

Figure C.4 shows the Mtwara Corridor, Figure C.5 shows the location of the Mchuchuma-Katewaka Coal Field, and Table C.5 presents information on potential industries and investments along the corridor.

Source: National Development Corporation of Tanzania (NDC) Website (http://www.ndctz.com/MtDC.htm)

Figure C.4 Mtwara Corridor

Source: Same as for Figure C.4.

Figure C.5 Location of Mchuchuma–Katewaka Coal Field

Table C.5 Potential Industries and Investments to Date - Mtwara Corridor

Potential Industries	**Description**
Mining	• Tanzania: Coal (see below), Iron Ore, Vanadium, Titanium (at Liganga), Gold (at Lupa), Niobium (at Mbeya), Platinum Group Elements (at Luwumbu) • Malawi: Uranium (at Kayelekera deposit and Mzimba), Niobium, Tantalum, Zircon (at Mzimba)
Petro-Chemical Industries	• Songo Songo (Tanzania) • Mnazi Bay Gas fields (Tanzania)
Tourism	• "Bush'n Beach" Tourism (Tanzania) • Selous-Niassa Transfontier Conservation Area (Tanzania)
Anchor Projects	**Description**
Mchuchuma–Katewaka Coal Mine Project (Tanzania)	• Detailed Feasibilty Study completed including EIA • Among the major 10 coalfields of Tanzania, Mchuchuma–Katewaka Coalfield has been explored to the greatest extent. • Coalfield: Total reserve of 536 million tons (of which 159 million tons is in the proven category.)
Mchuchuna Thermal Power Station (Tanzania)	• Detailed feasibility study completed including EIA
Mtwara–Mamba Bay Oil Pipeline Project (Tanzania)	• Still early stage of development

Source: Prepared by the JICA Study Team

C.6 Dar es Salaam Corridor (No.⑥)

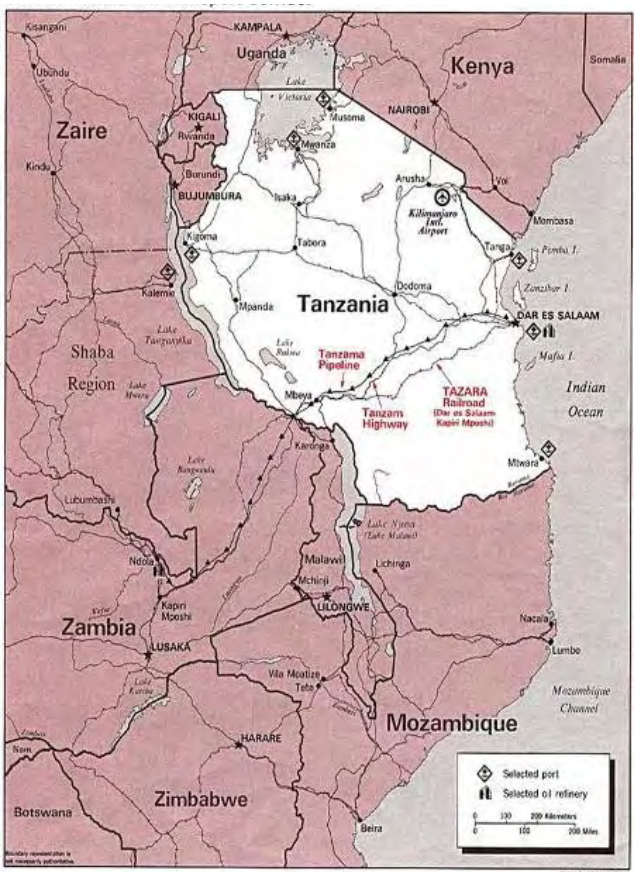
The Dar es Salaam Corridor is based on a rail link between Tanzania and Zambia, which was built with Chinese assistance a number of years ago (with a track gauge different from that of other rail lines in the region) and has not been able to reach and sustain its design capacity. It is also served by an oil pipeline between the two countries and the main road connection from Tanzania to South Africa through Zambia and Botswana. The port of Dar es Salaam is also at capacity with long delays in loading and off loading.

Mineral development served by the corridor in Tanzania is restricted to smaller gold deposits and the coal areas proposed to be linked to the Mtwara Corridor. The Government of Tanzania has focused on developing the Central Development Corridor (CDC, or Central Corridor), which is planned to cover the geographical area between Dar es Salaam Port in Tanzania and Lake Kivu in Rwanda. The objective is to create an economic growth region, which will stimulate increased cross-border and international trade and investment especially in physical infrastructure, tourism, mining, agriculture, and manufacturing or industries.

Key potential mining and mineral beneficiation[1] projects involve nickel and related minerals, and are already being developed by, among others, Barrick Gold Corporation and Falcon Bridge Ltd. Recent announcements from African Eagle regarding a lateritic nickel project will add to the pressure for development of this corridor.

Figure C.6 shows the Dar es Salaam Corridor, while Table C.6 presents information on potential industries and investments along the corridor.

[1] Beneficiation is a process whereby extracted ore from mining is reduced to particles that can be separated into mineral and waste, the former suitable for further processing or direct use.



Source: Base map from the University of Texas at Austin: http://lib.utexas.edu/maps/tanzania.html

Figure C.6 Dar es Salaam Corridor

Table C.6 Potential Industries and Investments to Date – Dar es Salaam Corridor

Potential Industries	**Description**
Mining	• Tanzania: Coal (see below), iron ore, vanadium, titanium (at Liganga), gold (at Lupa), niobium (at Mbeya), platinum group elements (at Luwumbu) • Malawi: Uranium (at Kayelekera deposit and Mzimba), niobium, tantalum, zircon (at Mzimba)
Petro-Chemical Industries	• Songo Songo (Tanzania)
Tourism	• Selous–Niassa Transfontier Conservation Area (Selous Game Reserve, Tanzania) • Lake Tanganyika (Tanzania, Zambia, DRC) • South Luangwa National Park (Zambia)
Anchor Projects	**Description**
Mchuchuma–Katewaka Coal Mine Project (Tanzania)	• Detailed Feasibility Study completed including EIA • Among the major 10 coalfields of Tanzania, Mchuchuma-Katewaka Coalfield has been explored to the greatest extent. • Coalfield: Total reserve of 536 million tons (of which 159 million tons is in the proven category.)
Mchuchuna Thermal Power Station (Tanzania)	• Detailed feasibility study completed including EIA

Source: Prepared by the JICA Study Team

C.7 Trans Kalahari Corridor (No.⑤)

Already a well-established and good-quality road route linking Maputo to Walvis Bay, the Trans-Kalahari Corridor is seen as having great potential for Botswana in terms of possible coal exports to Namibia as well as for export through Walvis Bay. Botswana also has a number of base metal (copper and nickel) projects nearing the development stage, most of which would benefit from a rail link to Namibia. With an uranium industry already present in Namibia, Walvis Bay is well equipped for the shipping of radioactive products, with such materials being brought by road from as far away as northern Mozambique (e.g. from the Marropino Tantalum Mine). There is increasing exploration for uranium in Zambia, as well as base metal projects in the south of Zambia, the developers of which must consider the long port delays at East African ports, which have led to most traffic being routed through South Africa, with much of this by road freight. Also, there is expected to be a surge in mineral development in Namibia as huge areas of the country are covered by exploration licenses.

Figure C.7 shows the Trans Kalahari Corridor, while Table C.7 presents information on potential industries and investments along the corridor.

Source: Walvis Bay Corridor Group

Figure C.7 Trans-Kalahari Corridor

Table C.7 Potential Industries and Investments to Date – Trans Kalahari Corridor

Potential Industries	Descriptions
Mining	• Namibia: Copper (at Otjihase, near Windhoek), uranium (along the central coast side), diamonds (coast side) • Botswana: Coal
Automobile Industry	• South Africa: Automobile manufacturers and automobile parts companies seek a new export channel in addition to the Port of Durban in South Africa. For example, Volvo Company has expressed interest in the corridor development plan.
Tourism	• Namibia and Botswana: Kalahari Desert

Source: Prepared by the JICA Study Team

C.8 Trans Caprivi Corridor (No.⑨)

The Trans-Caprivi Corridor would open up much of northern Namibia, but the main mineral potential lies in the copper mines of the Tsumeb area. With plants currently treating ore imported into Namibia, the development of this corridor would benefit the industry as well as provide a focus for ongoing exploration efforts to establish new mines in the area. The corridor would also open a potential regional market for the Zimbabwean coal mines at Hwange, but this be in competition with the current investigations into exporting coal from the Mamabula coal fields of Botswana via the Trans Kalahari route.

Figure C.8 shows the Trans Caprivi Corridor, while Table C.8 presents information on potential industries and investments along the corridor.

Source: Walvis Bay Corridor Group

Figure C.8 Trans Caprivi Corridor

Table C.8 Potential Industries and Investments to Date – Trans Caprivi Corridor

Potential Industries	**Description**
Mining	• Namibia: Copper (at Tsumeb and Kombat)
Tourism	• Namibia: Namib Desert National Park, Swakopmund • Botswana: Okavango Delta National Park
Anchor Project(s)	**Description**
Kombat Copper Mines and Tsumeb Copper Smelter (Tsumeb, Namibia)	• An estimated NAD 600,000 was spent on a renovation program for the 35,000 t/year Tsumeb concentrator, completed in October 2002 • The development work was carried out at the Kombat mine near Tsumeb. which along with the Otjihase mine near Windhoek, will remain the main source of domestic concentrate feed for the Tsumeb smelter • At the Tschudi deposit 20 km west of Tsumeb, full-scale mining started during 2004 • Commercial production started in May 2004, with a target full-rate output of 150,000 t/year of special high grade zinc • Ownership: Ongopolo Limited (Shareholder: East China Mineral Exploration and Development Bureau)

Source: Prepared by the JICA Study Team

C.9 Namibe Corridor (No.⑬)

The Port of Namibe was developed in Portuguese colonial times for the export of iron ore from the Cassinga mines in Angola. There have been numerous more recent initiatives times to reopen the mines and repair the rail connection. There are no other known major mineral deposits that would be served by this corridor.

C.10 Lobito Corridor (No.⑧)

The Lobito Corridor is designed around the rehabilitation of the Lobito rail line linking the Port of Lobito with the DRC/Zambian Copperbelt. While this is one of the largest potential copper-producing zones in the world, the development and repair of many of the mines following the extended conflict in the DRC has been hampered by a lack of reliable transport to port facilities. In addition to the known copper potential associated with this corridor, there are also abandoned manganese mines at Kisenge in the DRC, close to the Angolan border, which were previously served by the Lobito rail line.

Copper deposits in the Menongue area were investigated in the 1950s, with some trial mining reported. Individual samples are reported to have 3%–8% copper and up to 25 grams per ton of silver with reported gold traces. The area is covered by Kalahari sands and is unlikely to have been adequately explored. Also, the area has likely been seriously affected by the civil war in the DRC. Some “mine” symbols are also recorded on maps of the Alto Zambese area, where rocks of the Katanga Supergroup extend into Angola from Zambia. These areas would probably be more fully investigated with the greater prospect of realizing benefits after reestablishment of the Lobito corridor.

Figure C.9 shows the Lobito Corridor, while Table C.9 presents information on potential industries and investments along the corridor.

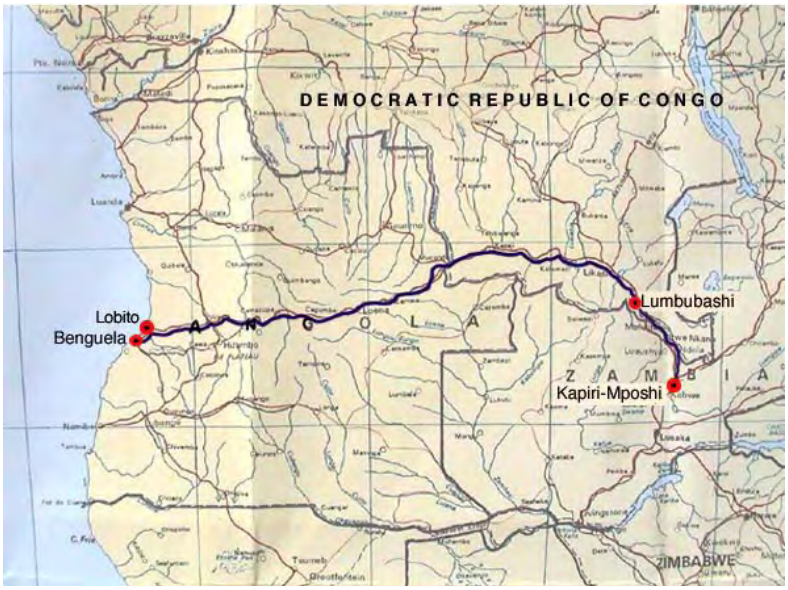


Figure C.9 Lobito Corridor

Table C.9 Potential Industries and Investments to Date – Lobito Corridor

Potential Industries	**Description**
Mining	• DRC and Zambia: Promotion of copper and cobalt industries of DRC's Katanga and Zambia's Copperbelt industry
Others	• 40% of Angola's population lives along the Lobito Corridor, and industrial development is envisaged in various sectors including oil, natural gas, forestry, agriculture, and fisheries
Anchor Projects	**Description**
Tenke-Fungurume Copper and Cobalt Mines	• Tenke Fungurume Project is a large copper and cobalt mine with significant potential • It is reported that the production will start soon
Kombat Copper Mines and Tsumeb Copper Smelter (Tsumeb, Namibia)	• An estimated NAD 600,000 was spent on a renovation program for the 35,000 t/year Tsumeb concentrator, completed in October 2002 • Development work was carried out at the Kombat mine near Tsumeb, which along with the Otjihase mine near Windhoek, will remain the main source of domestic concentrate feed for the Tsumeb smelter • At the Tschudi deposit some 20 km west of Tsumeb, full-scale mining started during 2004 • Commercial production started in May 2004, with a target full-rate output of 150,000t/year of special high grade zinc • Ownership: Ongopolo Limited

Source: Prepared by the JICA Study Team

C.11 Malange Corridor (No.⑫)

The Malange Corridor is seen as vital for expanding diamond interests in the Angolan Lucapa area and across the border into the DRC. There are also iron ore and manganese deposits at Cassala–Kitungo (Cuanza Norte), about 200 km from Luand, where reserves are reported at 300–500 metric tons with 23%–33% iron, with 194 metric tons as proven reserves, of which only 84 metric tons can be recovered through open pit mining. Manganese deposits have been reported from the Lucala Manganese Rectangle, in Cuanza North and Malange provinces, in close proximity to the Cassala–Kitungo iron deposits. A number of small deposits of manganese ore ranging from 10,000 to 250,000 tons are concentrated in alluvial deposits. A total resource of 5 million tons of high-grade ore (55% manganese) has been reported.

C.12 Oranje Corridor (Gariep SDI) (No.⑩)

Southern Namibia has a high level of exploration based on the successful Rosh Pinah Skorpion lead zinc mines. Other mineral deposits are likely to be smaller and involve pegmatite. The potential for cross-border benefits is unclear since the large iron ore mines of Sishen are served by the dedicated Sishen–Saldanah rail line.

Table C.10 presents information on potential industries and investments along the Oranje Corridor.

Table C.10 Potential Industries and Investments to Date – Oranje Corridor

Potential Industries	**Description**
Agriculture	• South Africa: Production of table grapes, raisins, wine, dates, vegetables, and nuts in the Kalahari region
Fisheries	• Hake (Colin) trolling and fish culturing, etc. in the offshore of the Corridor • Namaqualand Mariculture Industrial Park (NAMIP) development plan
Mining	• Namibia: Zinc (in the southwest region), copper (at Haib) • South Africa: Iron Ore (at Sishen)
Tourism	• South Africa: Ai Ais–Richtersveld National Park, Kgalagadi transfrontier conservation areas, Oranje River mouth nature reserve, Augrabies National Park, Namaqua National Park
Anchor Projects	**Description**
Skorpion Zinc Mines (near Rosh Pinah, in the southwest of Namibia)	• Commercial production started in May 2004, with a target of full-rate output of 150,000 t/yr of special high grade zinc • Ownership: Anglo American Base Metals 100% via local subsidiaries • One of the world's lowest production costs for zinc mining • **At full rate the operation should account for about 4% of Namibia's GDP** • Anglo American expects to export about 90% of the zinc produced through Lüderitz Port to the Asian, European, and North American markets in about equal proportions
Oranje River Farmer Settlement Program (South Africa)	• Objectives: Creation of commercial farmers in the Northern Cape Province of South Africa, promotion of agricultural product processing (agrotechnical industry) , and production of high-value-added agricultural products

Source: Prepared by the JICA Study Team

C.13 Shire–Zambezi Waterway

Refer to the description of the Beira, Sena, and Tete Corridors in C.3 above.

C.14 Lebombo SDI

Refer to the description of the Maputo Corridor in section C.2 above.

C.15 Limpopo Corridor (No.⑰)

The Limpopo Corridor is served by the rail line from Zimbabwe to Mozambique. The Corridor Mineral Sands project in Mozambique could benefit from development of this corridor. Historically, the Port of Maputo has served much of Zimbabwe's and northern Botswana's mineral exports. However, there is little potential for this corridor outside of the corridor sands in Mozambique.

Figure C.10 shows the Limpopo Corridor, while Table C.11 presents information on the Corridor Sands Mineral Project.

Figure C.10 Limpopo Valley SDI

Table C.11 Corridor Mineral Sands Project

Project Site	The deposit is near the town of Chibuto, Gaza Province, located 190 km north of Maputo, and 50 km inland from the Indian Ocean.
Minerals	A deposit of titanium dioxide (TiO_2)
Investors	Australian mining company WMC (currently BHP Billiton)
Infrastructure	The road, jetty, and related infrastructure to be built to the coast, costs USD 80 million, and power infrastructure will cost USD 80 million.
Total Investment Cost	USD 800 million with USD 500 million as initial investment
Feasibility Study	The bankable feasibility study was completed in 2002, at a cost of USD 10 million.

Source: *Mining Review Africa*, Issue 5, 2003

Appendix D Detailed Analysis of the Current Infrastructure Situation of the Corridors

In this subsection, the current situation of the infrastructure in each of the 18 focus corridors is comprehensively presented. This subsection sets out the current status of "hard" infrastructure development on (i) roads, (ii) ports, (iii) waterways, (iv) railways, and (v) inland container terminals. Cross-border transport facilitation ("soft" infrastructure) issues are separately elaborated in Section 4.3 and the corresponding appendix. The corridor No. of Figure 4.1.1 is added for reference.

D.1 North–South Corridor (No.④)

D.1.1 Roads

There are two major routes of the North–South Corridor: (i) the Durban–Johannesburg–Beitbridge–Harare–Chirundu–Lusaka Route and the Durban–Johannesburg–Lobatse–Gaborone –Kazungula/Victoria Falls–Livingstone–Lusaka Route. The road corridor serves more than a half of the road transport to/from Botswana, Zimbabwe, Zambia, and Malawi. Basically, export cargos from these inland countries are transported through this road corridor to the Port of Durban and trucks with import cargoes from overseas and also South Africa return to those countries. Road conditions except those on some sections in Zambia that are currently under construction or planned to be developed are good or fair. However, the roads along this route tend to be damaged easily due to the heavy cargoes hauled, typified by copper from Zambia, which is transported by road due to limitations in railway transport capacity. The border crossing points between Zimbabwe/Botswana and Zimbabwe/Zambia are separated by the Zambezi River and have also been major bottlenecks. Although in 2002 a new Chirundu Bridge was constructed with the assistance of JICA, the Kazungula border crossing currently lacks a bridge and therefore relies on two pontoons for ferry service. In response, AfDB has been conducting the Feasibility Study on Kazungula Bridge Construction, with the study to be completed during first quarter of 2010, under the SADC North–South Transport Corridor Improvement Study. The new bridge is expected to dramatically reduce traffic congestion at the Kazungula border crossing; in addition to serving road transport, it will include provision for railway transport

D.1.2 Ports

The Port of Durban has had the largest share of containerized cargo in Africa handling about 65% of the total containers through South African ports. Almost all major shipping lines including Maersk, MSC, OOCL, COSCO, EMC, PIL, NYK, Mitsui OSK, and K Line, make calls at this port, many of which use transshipment via feeder services from the Port of Cape Town. Durban is a hub of the North–South Corridor, serving as a gateway to international trade not only to/from South Africa, but also to/from Botswana, Zimbabwe, Zambia, and Malawi. The volume of container cargo handled at the Port of Durban, which reached 2.64 million TEUs in 2008, has been increasing rapidly as have throughputs at other major ports in Africa, following containerization and economic growth in the region. With the recent rapid increase in cargo handling volume, the port has been heavily congested, which has led to delays in container handling operations.

Various efforts have been undertaken to reduce this congestion. Recently, rail-mounted gantry cranes to smooth the railway terminal operation were installed. Three additional berths at the container terminal are under construction. The container handling volume of this port is expected to increase to 3.5 million TEUs in 2010. A breakdown of container traffic handled at the Port of Durban in 2008, the last full year for which data was available.

Table D.1 Container Handling at the Port of Durban (2008)

(Unit: TEUs)

Landed	Full	Empty	Total Landed
Deep sea	839,755	140,686	980,441
Coastwise	5,998	6,443	12,441
Transshipped	223,533	70,135	293,668
TOTAL LANDED	1,069,286	217,264	1,286,550

Shipped	Full	Empty	Total Shipped
Deep sea	668,669	358,524	1,027,213
Coastwise	13,345	18,074	31,419
Transshipped	225,600	71,383	296,983
TOTAL SHIPPED	907,634	447,981	1,355,615

GRAND TOTAL 2008:	**1,976,920**	**665,246**	**2,642,165**

Source: TPT, Ports Authority of the Republic of South Africa

D.1.3 Railways

(1) Zambia

Current Status and Issues: The railway system along the corridor in Zambia is comprised of two main lines: (i) a line from Livingstone (Victoria Falls) to the northern border to the DRC via Lusaka, Kapiri Mposhi, and Copperbelt cities (along the North-South Corridor); and (ii) a line from Kapiri Mposhi to the northeast border to Tanzania, which is called the TAZARA railway (along the Dar es Salaam Corridor). The government of Zambia determined to privatize its railways in March 2000 and Railway Systems of Zambia (RSZ) was awarded the concession for Zambia's railway system except for the TAZARA line in 2003. Figure D.1 presents a map of the Zambian railway network in the North–South and Dar es Salaam Corridors.

Source: http://pages.intnet.mu/servas/Zambia/zambia2.jpg

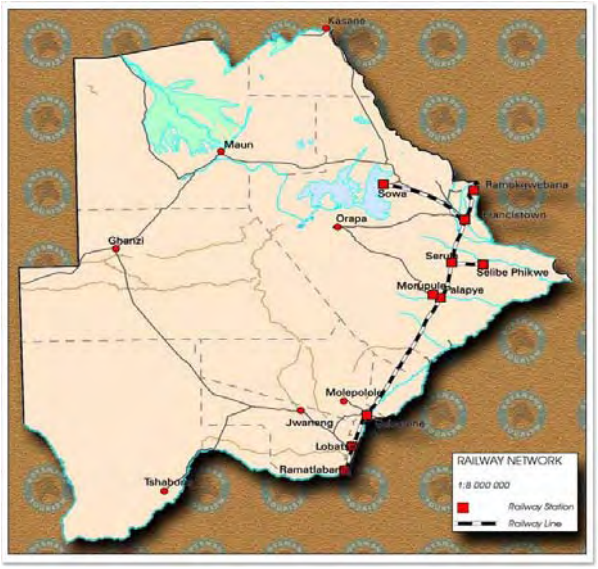
Figure D.1 Railway Network in Zambia
(North–South Corridor and Dar es Salaam Corridor)

Privatization: With privatization in 2003, Railway Systems of Zambia (RSZ) was awarded the concession for the railway system in Zambia, except for the TAZARA line. RSZ operates the line from the Zambian Copperbelt to Livingstone, where the railway system joins the Beitbridge Bulawayo Railway (BBR) system, with the same company operating the RSZ and BBR concessions. For USD 250 million, RSZ was awarded a 20-year freight rail operation concession and a 7-year passenger train operation between Livingstone and Kitwe.[1] The main shareholders of RSZ are Transnet (Spoornet, 20%), New Limpopo Projects Investments (Pvt) Ltd[2] (NLPI, headquartered in Mauritius), and Zambia Railways. Edlow Resources, which was a shareholder of Malawi Central East African Railways (CEAR), also participated in the bidding. It is said that Edlow Resources planned to export the mineral resources in Zambia from the port of Nacala through Malawi.

It is reported that the RSZ concession has been successful in avoiding the deterioration of the railway infrastructure and equipment. Especially freight service over the long-haul corridor has significantly improved.[3]

(2) Botswana

Current Status and Issues: In Botswana, Botswana Railways (BR) operates a railway network consisting of a main line of 640 km (from Ramatlabama to Bakaranga via the capital city Gaborone) and two branch lines from Francistown to Sua Pan (175 km) and from Palapye to Morupule Colliery (16 km). Figure D.2 presents a map of the Botswana railway network in the corridor.



Source: http://www.botswanatourism.co.bw/maps/img/railway_big.jpg

Figure D.2 Railway Network in Botswana (North-South Corridor)

[1] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.

[2] NLPI is an investment-holding company, registered in Mauritius, the main investment focus of which is infrastructure-related projects on the continent of Africa. The Nedbank, Old Mutual, and Sanlam Groups are all major South African financial institutions, partnered by the shareholders of NLPI, together with NLPI. Seki, *Infrastructure Development and South African Companies* [in Japanese], Japan External Trade Organization (JETRO), 2006.

[3] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.

Privatization: In 1987, the Government of Botswana took over the operation of the 641 km railway line that runs through Botswana from the National Railways of Zimbabwe (NRZ). Following the Botswana Railways Act, which was enacted in 2004, the flexibility of business management increased significantly. Corporate restructuring to reduce deficits has been ongoing, including the discontinuation of passenger train services in April 2009.[4]

(3) Zimbabwe

Current Status and Issues: National Railways of Zimbabwe (NRZ), a parastatal company, has managed the operation of railway services. The Zimbabwe railway system was principally constructed during the British colonial era, and some of the routes form a section of the "Cape-Cairo Railway". In 2005 the ownership of the physical infrastructure assets was transferred to the government, with the result that NRZ is now only in charge of railway operation. The Minister of Transport replaced the top management of NRZ in the same year, noting that the achievement of managerial goals was far below that targeted. Also, freight wagons leased from South Africa were not returned after the termination of contract and a delinquent charge has been request.

Privatization (Beitbridge Bulawayo Railway): A concession contract of USD 85 million was concluded in 1997 between Beitbridge Bulawayo Railway (Pvt) Ltd (BBR) and NRZ. Construction then commenced on a new 317-km section between Beitbridge and Bulawayo through a 30-year build, operate, and transfer (BOT) scheme, with completion in May 1999. With this new line, the time required from Durban in South Africa to the Copperbelt in Zambia and the DRC was substantially shortened by about one week.[5] In spite of recent turmoil in Zimbabwe, it appears that traffic volume on the line has been maintained at a high level. Moreover, BBR acquired from the Government of Zimbabwe the access marketing rights to utilize the 470 km section between Bulawayo and Victoria Falls in 2004. The main shareholders of BBR are New Limpopo Bridge Projects Limited (NLB, headquartered in Zimbabwe), Nedcor Investment Bank, Sanlam, Old Mutual and Gensec Asset Management, which are all major South African financial institutions and own 85% of the shares, while NRZ holds only 15%. The operation of the railway line is under the supervision of the South African railway operator Transnet (Spoornet).

The concession has been successful in terms of improving service along the corridor, reducing transit times, and reducing concession fee payments made to the government.[6] Such a successful railway concession is a very exceptional case in Southern Africa.

(4) Ongoing and Proposed Projects along the Corridor

Table D.2 presents ongoing and future railway projects/studies along the North-South Corridor, in Zambia, Botswana, and Zimbabwe

D.1.4 Inland Container Terminals (Depots)

The team understands that there are inland container terminals in Lusaka, the capital, and Kitwe.[7] Also, the team understands that there are inland container terminal facilities in Lusaka, but these are not in operation.

[4] See http://www.botswanarailways.co.bw.
[5] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID Southern Africa Global Competitiveness Hub, 2009.
[6] See previous footnote.
[7] NEA Transport Research and Training, *Zambia – Trade and Transport Facilitation Audit*, 2004.

Table D.2 Ongoing and Proposed Railway Projects along the North–South Corridor (in Zambia, Botswana, and Zimbabwe)

Projects	In Charge	Estimated Cost (USD)	Remarks
Upgrading of Kapiri Mposhi to Chingola Railway (Zambia)	RSZ/GOZ	200 million	• To upgrade the 220 km section of mainline from Kapiri Mposhi to Chingola to 20 t axle loads, similar to TAZARA specifications • The TAZARA mainline locomotives are now unable to access the Zambian rail system in respect of permissible axle loads.
Northwest Railway Extension (from Chingola to Solwezi) (Zambia)	RSZ/GOZ	250 million	• To construct the extension of the railway line to Solwezi, together with the upgrading of the Kapiri Mposhi to Chingola line • It will provide a railway line from the copper mines around Solwezi with bulk rail transport to and from the port of Dar es Salaam. • Several feasibility studies have been carried out over the past few years by various private sector interests.
Upgrading of Victoria Falls to Bulawayo Railway (Zimbabwe)	BBR	200 million	• To rehabilitate the entire route, which is one of the most critical sections of the North-South Corridor railway, to accommodate increased traffic with track replacement and ballast supplement • Funding of the project could be linked to the removal of operating constraints on the alternative and competing railway route through Botswana.
Establishment of a Regional Locomotive and Wagon Leasing Pool	All SADC countries	150 million	• To establish a regional railway locomotive and wagon leasing pool, utilizing the existing workshops and equipment to solve the current equipment shortages • The project may start with consultations with all the regional railway operators, through the Southern African Railway Association (SARA), and investigate the desirability and feasibility of having a regional railway equipment leasing company.

Source: Prepared by the JICA Study Team, based on interviews and SADC/COMMESA/EAC (2009); and *North South Corridor Pilot Aid for Trade Programme - Surface Transport*

D.2 Maputo Corridor (No.③)

D.2.1 Roads

The Maputo road corridor, with a distance of 500 km, connects the Port of Maputo in Mozambique and Johannesburg via the Lebombo/Ressano Garcia border crossing. Except for the part of the road about 50 km from the port to the border, the road is located within South Africa and is in relatively good condition.

D.2.2 Ports

The port is operated by the Maputo Port Development Company (MPDC) under concession to CFM (Empresa Portos e Caminhos de Ferro de Mozambique). Due to significant congestion at the Port of Durban, the Port of Maputo serves as a major feeder hub of the Port of Durban. Most cargo handled at the Port of Maputo is transported from/to Johannesburg with the advantage that it is the closest port to Johannesburg. However, the facilities at Maputo including cranes and warehouses are somewhat deteriorated. In addition, dredging has been insufficient, making it difficult to sustain waterway channels. Also, it is expected that the cargo demand will reach the port's capacity within a few years. In order to address the capacity limitations of the Port of Maputo, South Africa is currently planning to develop a new port at Techobanine, which is located south of Maputo. The new port will be the deepest port in Mozambique.

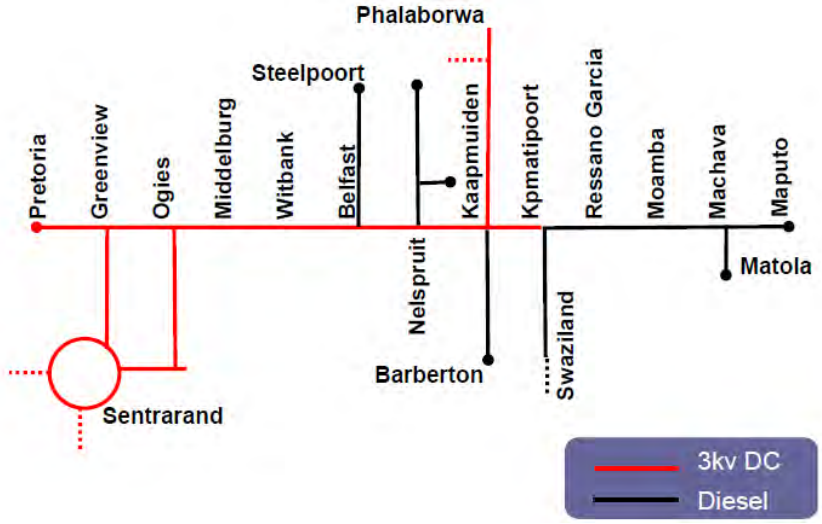
D.2.3 Railways (Ressano Garcia Railway)

Current Status and Issues: The line extends from Maputo to Pretoria via Ressano Garcia, the border crossing between Mozambique and South Africa, with a total length of 580 km. The line on the Mozambique side is called the "Ressano Garcia Railway Line". The route follows the shortest path from Johannesburg to a port in the Indian Ocean (the Ports of Maputo and Matola) and the potential of rail transport along the corridor has been well recognized. On the other hand, the line has not been rehabilitated mainly due to the challenges and difficulties of establishing efficient management of railway operations between the two governments.

Currently, the rail freight transport along the Maputo Corridor consists of mainly bulk cargo, including South African coal exports en route to the Matola Coal Terminal in Mozambique. Considering that the congestion at the Port of Durban will reach critical levels, importers and exporters are increasingly looking towards the port of Maputo as an alternative. In addition, railway service along the Maputo Corridor is now being refocused, following the revival of development cooperation between the South African rail operator Transnet (Spoornet) and the Mozambican state-owned company CFM.[8] It is forecast that the freight traffic volume of the line will reach 9 million tons per year by 2009. Most of this traffic is expected from smaller mines and coal for specialized markets that may lead the Port of Maputo to compete with Richards Bay, a bulk port in South Africa.[9]

Figure D.3 presents a schematic of the Maputo Corridor railway line.

[8] Interview with Maputo Corridor Logistics Initiative (MCLI).
[9] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.



Source: Maputo Corridor Logistics Initiative (MCLI)

Figure D.3 Schematic of Maputo Corridor Railway Line

Privatization: While CFM still holds management responsibility for port and railway operations in Mozambique, the government decided to introduce privatization to the railway operation in 1991 and terminated subsidies to the port and railway operations in 1995. The government of Mozambique first decided to negotiate a concession for the Ressano Garcia Railway with a South African consortium led by New Limpopo Projects Investments (Pvt) Ltd. (NLPI) and Spoornet (Transnet). After five years spent in selecting a concessionaire,[10] a concession was finally awarded to the above-mentioned consortium plus CFM in December 2002. The duration of the concession agreement is 15 years, aiming at the privatization of the railway from the South African border through to the Ports of Maputo and Matola. However, in November 2005, the Government of Mozambique cancelled the rail concession, on the ground that the concessionaire did not substantially start to operate the line and invest in its rehabilitation. Finally, in 2006, the Government of Mozambique decided to continue operation under CFM[11] and the operation of the line was again handed over to CFM, which had operated the line 11 years earlier. The early attempt to concession the Ressano Garcia Railway can be concluded as a failure. At present, the line is undergoing major rehabilitation and it is expected that it will be capable of handling the projected increases in traffic.[12]

Ongoing and Future Projects: Table D.3 presents ongoing and proposed railway projects/studies for the Maputo Corridor.

[10] Although this consortium won the concession in December 1997, an agreement was not reached due to internal difficulties within the consortium and the deal was terminated in February 1999.
[11] CFM and Transnet (Spoornet) signed an agreement of cooperation on the railway line in October 2006.
[12] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.

Table D.3 Ongoing and Proposed Railway Projects along the Maputo Corridor (in Mozambique and South Africa)

Projects	In Charge	Estimated Cost (USD)	Remarks
Rehabilitation of Rail Track	CFM/Transnet	20 million (already invested)	• The 88 km line rehabilitation was completed, including replacing sleepers and weld joints, and the upgrading of some bridges. • Tons per axle was increased to 20.
Feasibility study of the improvement of border facilities and rehabilitation of the railway line across the border	Mpumalanga Province (South Africa)	N.A.	The study includes the following TOR: • Improvement of border facilities for passenger trains • Construction of a shunting yard at the border • Construction of a new railway line from the border to Mpumalanga Airport

Source: Prepared by the JICA Study Team, based on interviews and other sources

D.2.4 Inland Container Terminals (Depots)

Km 4 Dry Port (Planned) (Railway and Road): A dry port is planned at Km 4, near the Lebombo/Ressano Garcia border crossing. A feasibility study including an overall railway rehabilitation plan for Mpumalanga Province in South Africa was said to be underway and completed by June 2010.

D.3 Beira Corridor (including Sena and Tete Corridors) (No.②)

D.3.1 Roads

The Beira Corridor serves road transport along the Beira–Mutare–Harare–Chirundu–Lusaka Route, which overlaps with the Harare–Chirundu–Lusaka section of the North–South Corridor, and the Beira–Tete–Blantyre Route, the so-called Tete Route, and the Beira–Nhamilabue–Nsanje–Blantyre Route, the so-called Sena Route, as the shortest route to the sea for inland countries including Malawi, Zambia, and Zimbabwe. However, the current condition of many road sections of the Tete Route and the Sena Route is not good including some sections (e.g., the Dondo–Caia Section) where road transport is impossible during the rainy season. In addition, there is no financing source for the development of many of these sections. Table D.4 presents road conditions and planned improvement projects by section along the Sena Route.

Table D.4 Road Condition and Financing Source for Improvement of Sena Route

Country	Section	Length (km)	Condition	Financing Source	Start	Com-pletion
Mozambique	Beira–Dondo	20	fair/paved	–	–	–
Mozambique	Dondo–Inhaminga	188	poor/unpaved	No	2013	2016
Mozambique	Inhaminga–Nhamilabue	112	good/paved	–	–	–
Mozambique	Nhamila–Marka	53	fair/paved	–	–	–
Malawi	Marka–Nsanje	29	poor/unpaved	No	2010	2011
Malawi	Nsanje–Bangula	50	poor/unpaved	Malawi	2008	2010
Malawi	Bangula–Nchalo–Chikwawa	80	poor/paved	EU	2008	2010
Malawi	Chikwawa–Blantyre	20	poor/paved	No	2010	2011

Country	Section	Length (km)	Condition	Financing Source	Start	Com-pletion
Malawi	Blantyre–Zomba	65	poor/paved	AfDB	2010	2012
Malawi	Zomba–Liwonde	81	fair/paved	–	–	–
Malawi	Liwonde–Nsipe	82	poor/paved	AfDB	2010	–
Malawi	Nsipe–Lilongwe	160	poor/paved	EU	2008	2010

Notes: (1) Planned start dates are estimated for projects that have not yet been implemented. (2) Scheduled completion dates are estimated for projects that are already ongoing.
Source: JICA Study Team

D.3.2 Ports

The Port of Beira is the hub of the Beira Corridor and serves as the world's gateway to Mozambique, Malawi, Zimbabwe, and Zambia. As with other major ports in the region, the container handling volume at this port has been increasing rapidly in recent years; data for 2008 are presented in Table D.5. However, because of limited channel depth, currently only feeder services mainly from Durban are available at this port (except for one small vessel from Europe) without any transshipment.

Table D.5 Container Cargo Handling Volume of Port of Beira by Transit Countries in 2008

(Unit: TEUs)

	Mozambique	Zimbabwe	Malawi	Zambia	DRC	Cabotage	Total
Export	18,445	2,113	7,712	696	0	–	28,966
Import	15,344	2,268	10,548	4,866	93	–	33,119
Total	33,789	4,381	18,260	5,562	93	2,886	64,971

Source: Cornelder

The container terminal is operated by Cornelder, which is also the container terminal operator of Pemba Port with a large share held by a Dutch company under a 25-year concession; the other terminals are operated by CFM, which is also responsible for future development of the port as well as dredging. The significant bottleneck at this port has been the lack of channel depth due to insufficient dredging. Although one dredger for maintenance dredging was provided by Japan in 2000 and another was added in 2007, the capacity of these dredgers has been insufficient for restoration of the Port of Beira. In order to address this problem, a project for restoration of the Port of Beira access channel to its original design characteristics with a depth of 8 m was planned to commence in January 2010 with a total project budget of EUR 43 million, funded by CFM, EIB, and ORET. The sandy materials dredged from the channel will be used as reclamation materials for the new coal terminal planned to be developed north of the oil terminal. In addition, a new dredger with a capacity of 2.5 million cubic meters will be provided by DANIDA in 2011.

Features of the Port of Beira are presented in Table D.6.

Table D.6 Features of Berths of the Port of Beira

Berth #	Terminal	Operator/ Condition	Depth (m)	Length (m)
1	Fishing Quay	Currently not used	N/A	
2	Container Terminal	Operated by Cornelder	11.0	641
3	Container Terminal	Operated by Cornelder	11.0	
4	Container Terminal	Operated by Cornelder	11.0	
5	Container Terminal	Operated by Cornelder	9.0	
6	General Cargo Terminal	Operated by CFM	6.8	857
7	General Cargo Terminal	Operated by CFM	7.8	
8	Old Coal Terminal	Currently closed. Planned to be rehabilitated.	7.2	
9	General Cargo Terminal	Operated by CFM	9.2	
10	General Cargo Terminal	Operated by CFM	9.2	
11	Old Oil Terminal	Operated by CFM	9.0	228
12	New Oil Terminal	Under development	12.0	264
13	New Coal Terminal	Planned to be development	N/A	N/A

Source: JICA Study Team

D.3.3 Railways

Current Status: Companhia Dos Caminhos De Ferro Da Biera (CCFB, the Beira Railway Company) was established with a 25-year concession. The Beira rail system comprises two rail lines: (i) a 317-km Machipanda line (Beira Railway) linking Beira Port to the railway network in Zimbabwe (along the Beira Corridor); and (ii) a 600-km Sena line linking Beira Port to the Moatize coal mines via Inhamitanga, Caia, and Vila de Sena (along the Sena Corridor). The Beira Railway extends westward up to the border station of Machipanda, where it links to the Zimbabwe rail network at Mutare station. This line is heavily graded, which consequently limits the train load. The Sena line takes off from the Machipanda line at Dondo (a station about 28 km from Beira) and goes northward, crossing the Zambezi River between Vila de Sena and Dona Ana (298 km from Dondo). The line again diverges at Dona Ana; a 254 km line runs along the north bank of the Zambezi River.

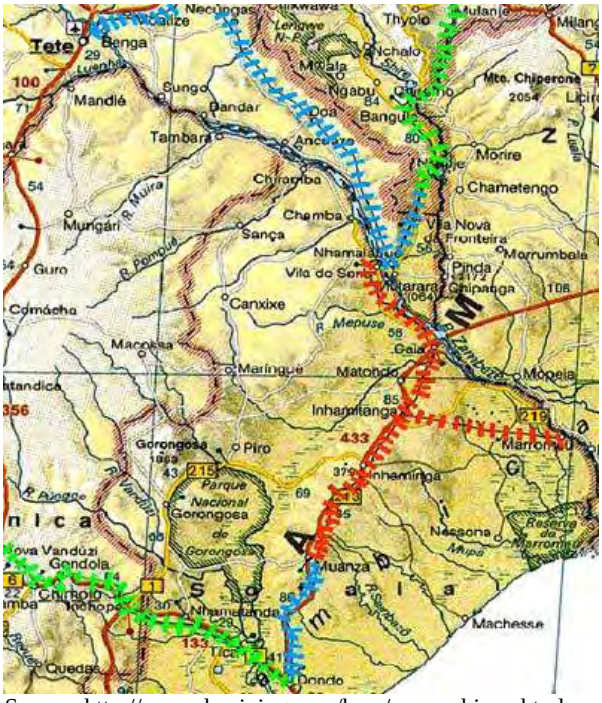
While the operation of the Sena line or Sena Railway was terminated for more than 20 years due to civil war, the rail transport capacity was refocused to utilize the mining potential around Moatize and to enhance the connectivity from Beira Port to southern Malawi. CFM first started to revitalize the Sena Railway and CCFB is currently implementing a rehabilitation and reconstruction project along the entire line with the financial support from the World Bank and EIB. The project is to be completed in 2010.

Figure D.4 presents a map of the railway network operated by the CCFB concession.

Issues and Bottlenecks: The Beira Railway (the Machipanda line) now carries a certain amount of traffic (mainly import/export goods from/to Zimbabwe and Zambia) and requires relatively little investment to continue operating profitably.[13] On the other hand, the Sena Railway requires extensive rehabilitation, and although the estimated economic benefits are substantial, due to a relatively slow growth of traffic the line is not commercially viable without a high share of public sector financial support. This issue may become less important after realization of several ongoing development plans for large-scale coal mining at Moatize; even now it is necessary to consider alternative routes to transport coal because of restrictions on the transport capacity of the rail track, even after rehabilitation.

Table D.7 presents the current conditions of the Beira and Sena Railways.

[13] Interview with CCFB.



Source: http://www.demining.com/hmc/mozambique.html

Figure D.4 Railway Network Operated by the CCFB Concession (Beira and Sena Corridors)

Table D.7 Current Conditions of Beira and Sena Railways (in Mozambique and Malawi)

Section	Length	Railway System	Current Condition
Beira–Dondo–Machipanda	317 km	Beira Railway	• Good conditions after rehabilitation assisted by the World Bank and EIB project
Dondo–Dona Ana	298 km	Sena Railway (Main Line)	• Rehabilitation/reconstruction assisted by the World Bank and EIB project has been finished. • A passenger train is currently in operation.
Dona Ana–Moatize	254 km	Sena Railway (Main Line)	• Rehabilitation/reconstruction is ongoing. • Will be completed in December 2009.
Dona Ana–Vila Nova (Marka)	44 km	Sena Railway (Branch Line in Mozambique)	• Very bad condition due to the 16-year civil war occurring in this area. • CCFB is ready to rehabilitate this section once CEAR or the government of Malawi finishes reconstruction of the branch line in Malawi.
Marka (border to Mozambique)–Nsanje–Makanga	N.A.	Sena Railway (Branch Line in Malawi)	• Impossible to operate due to the destruction of Chiromo Bridge over the Shire River (near Bangula) • Before the outbreak of civil war in Mozambique in 1970s, the railway was operated up to the Port of Beira.

Source: CCFB and CEAR

Privatization[14]: The main shareholders of CCFB are the Indian governmental companies of RITES (26%) and IRCON International (25%)[15], while the remaining shares are owned by CFM (49%). RITES has an track record of technical assistance and consulting in Mozambique over more than 20 years. The concession contract includes upgrading and operation of the Beira Railway (Machipanda line) and rehabilitation and reconstruction of the Sena Railway. The concessionaire took over operations and maintenance of the Beira Railway in December 2004 and has completed several improvements on this line. The concession is reportedly successful.[16]

Ongoing and Future Projects: Ongoing and proposed railway projects/studies are set out in Table D.8.

Table D.8 Ongoing and Proposed Railway Projects along the Beira and Sena Corridors (in Mozambique and Malawi)

Projects	In Charge	Estimated Cost (USD)	Remarks
Rehabilitation of Dona Ana–Moatize (Sena Railway, Main Line)	CCFB/EIB /WB	147 million	• Rehabilitation and reconstruction of 520 km has been completed. • The remaining 70 km is still under construction. • Was to be completed by December 2009 and to be operated in 2010.
Rehabilitation of Dona Ana–Vila Nova (Marka) (Sena Railway, Branch Line in Mozambique)	CCFB	N.A.	• No civil works have yet been undertaken for this 44 km section. • CCFB implied that it is relatively easy to reconstruct this branch.
Rehabilitation of Vila Nova (Marka)–Makanga (Sena Railway, Branch Line in Malawi)	CEAR? CCFB?	110 million	• A prefeasibility study was conducted by CCFB in 2005 and the total cost was estimated as USD 110 million. • CCFB submitted a proposal to the government of Malawi in 2007, responding to a request by the government of Malawi. • CCFB seems to be interested in operating and managing Malawi's side of the Sena Railway Line on a concession basis. • The cost estimate includes the reconstruction of Chiromo Bridge over the Shire River.
Rolling Stock Procurement	CCFB	300 million	• For transporting coal from Moatize Coal Mine to the Beira Port • Locomotives and wagons will be procured.

[14] Seki, *Infrastructure Development and South African Companies* [in Japanese], Japan External Trade Organization (JETRO), 2006.
[15] RITES and IRCON are wholly owned by the Ministry of Railways of India.
[16] L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.

Projects	In Charge	Estimated Cost (USD)	Remarks
Rail Track Reinforcement of Sena Railway Main Line	CCFB? Vale?	N.A.	• In order to transport coal from Moatize (a maximum of 20 million tons/year), it is necessary to reinforce the rail track.

Source: Prepared by the JICA Study Team, based on interviews, the SADC Corridor Activity Plan 2008, and other sources
Note: The costs for rehabilitation of Rehabilitation of Dona Ana – Moatize includes those between Dondo and Dona Ana only.

D.3.4 Inland Container Terminals (Depots)

Dona Ana Dry Port (planned; Road ⇔ Railway): A dry port construction project is planned at Dona Ana, which is located at the junction of the Sena Railway Line, linking with the main line to Tete and with a branch line to Malawi. A Mozambique logistics company, MoCargo, invested in this project, aiming at handling import and export cargo from/to Malawi, especially from/to Blantyre and Limbe, via the Sena Corridor.[17] It is reported that the construction will soon commence. It is expected that cargo volumes will increase after improvement of the road between Chikwawa and Marka in Malawi is completed in a few years.

Tete Inland Container Terminal (planned; Road ⇔ Railway): A container terminal is planned at Tete in Mozambique, in line with the rehabilitation of the Sena Railway. The project has been initiated and managed by CFM. Tete has the potential to become a strategic transport hub for Malawi (and eastern Zambia) some time after rehabilitation of the Sena Railway is completed in 2010. For Malawi, it is far more efficient to transfer cargo from rail to road (or vice versa) at Tete than to transport it along the corridor by road when exporting and importing goods from the Port of Beira.

D.4 Nacala Corridor (No.①)

D.4.1 Roads

The Nacala Road Corridor connects the Port of Nacala with Malawi and Mozambique through the Nacala–Nampula–Cuanba–Mandimba/Chiponde–Mongochi–Liwonde–Dedza–Lilongwe–Mchinji/Chipata–Chipata–Luangwa–Lusaka. However, the route is not currently functional since most of the road sections from Nampula to inland countries are currently in poor condition. A number of feasibility studies, detailed designs, and construction for development of this route are ongoing with the assistance of JICA, AfDB, EU, and KXIM. Among these projects, the Nacala Road Corridor Project led by AfDB and involving the other development partners over three phases covers most of the expected road development work. However, there are still some road sections in poor condition for which no financing source is currently available. Road conditions and planned construction works by section are presented in Table D.9.

[17] Interview with CCFB.

Table D.9 Road Condition and Financing Sources for Improvement of the Nacala Road Corridor

Country	Section	Length (km)	Condition	Financing Source	Start	Finish
Mozambique	Nacala–Nampula	190	fair/paved	–	–	–
Mozambique	Nampula–Cuamba	350	poor/unpaved	JICA, AfDB & KXIM (Phase I)	2009	–
Mozambique	Cuamba–Mandimba/ Chiponde	160	poor/unpaved	JICA, AfDB (Phase III)	2011	–
Malawi	Chiponde–Mangochi	58	fair/paved but winding mountainous route	No	–	–
Malawi	Mangochi–Liwonde	90	poor/paved	AfDB (Phase II)	2010	–
Malawi	Liwonde–Nsipe	82	poor/paved	AfDB (Phase III)	2011	–
Malawi	Nsipe–Lilongwe	160	poor/paved	EU	2008	2010
Malawi	Lilongwe–Mchinji/Chipata	120	poor/paved	None	2010	2011
Zambia	Mwami–Chipata–Luangwa	360	poor/paved	JICA, AfDB, and EU (Phase II)	2010	–
Zambia	Luangwa–Lusaka	320	good/paved	–	–	–

Notes: (1) Regarding road sections committed by Nacala Road Corridor Project, the donors allocated to each section on Nacala Road Corridor Project Brief prepared by AfDB are written as financing sources here though those for Phase II and III have not been officially approved yet. (2) Planned start dates are estimated for projects that have not yet been implemented. (3) Scheduled completion dates are estimated for projects that are already ongoing.
Source: JICA Study Team

D.4.2 Ports

The Port of Nacala has a depth of 15 meters and is endowed with natural topographic features that do not require regular dredging. However, the port is currently used mostly for international trade from/to Mozambique with a relatively low volume of transit cargoes due to the undeveloped road corridor and inefficient railway. The container terminal and general cargo terminal are operated by CDN[18] under a concession. Operation of only a fuel terminal is directly under CFM.[19] Rehabilitation of the existing container terminal and development of a new container terminal are under consideration with JICA assistance. There is a new project to develop a coal terminal at the other side of the current terminals in the bay to handle coal from the Zambezi area. Development of a refinery is also being considered.

Tables D.10 and D.11 summarize container traffic and general cargo traffic (respectively) at the Port of Nacala in 2008, the most recent year for which full data was available.

[18] CDN stands for Corredor de Desenvolvimento do Norte, S.A.R.L., "the North Development Corridor". A total of 49% of CDN's shares are owned by CFM while the remaining 51% are held by private consortia. In 2009 the former main shareholder, the US-based Railroad Development Corporation (RDC), sold all of its shares to a Mozambican investment group called INSITEC, which is a subsidiary of the Commercial and Investment Bank (BCI).
[19] CFM stands for Caminhos de Ferro de Moçambique.

Table D.10 Container Cargo Handling Volume at the Port of Nacala in 2008

(Unit: TEUs)

	National Transport	International Transport		Transshipment	Total
		From/to Mozambique	Transit		
Export	1,374	18,225	3,282	–	–
Import	2,153	17,394	2,681	–	–
Total	3,527	35,619	5,963	2,734	47,843

Source: CDN

Table D.11 General Cargo Handling Volume at the Port of Nacala in 2008

(Unit: 1,000 tons)

	National Transport	International Transport		Transshipment	Total
		From/to Mozambique	Transit		
Export	9.5	199.3	73.4		
Import	27.3	384.3	149.		
Total	36.8	583.6	222.8	33.8	876.9

Source: CDN

D.4.3 Railways

(1) Mozambique

Current Status: Currently, the private consortium CDN is in charge of operation of the Nacala Railway together with the port operation, through a concession contract. With financial assistance from the Government of France, rehabilitation of the track between Nacala and Cuamba (533 km) has already been completed. CDN currently plans to rehabilitate/upgrade the section between Cuamba and Entre Lagos (Nayuchi on the Malawi side, 78 km)[20] and the branch line between Cuamba and Lichinga (in Niassa Province, 262 km).

The wagons move the entire distance between Nacala and the origin/destination within Malawi. The exchange of locomotives normally takes place at Cuamba, rather than the border, where it is reported that the exchange can be accomplished more efficiently. Looking at the current demand for rail cargo, there is more transport of imported and processed goods from the Port of Nacala to the inland, while transport of goods for export from the inland (domestic resource of inland countries) is relatively less, with a proportional comparison of roughly 75% to 25%.[21] In the future, there is the possibility of coal transport from Tete Province, which would require a rail line extension between Moatize and the rail network in Malawi.[22] While the service level along this railway has deteriorated due to a shortage of locomotives and wagons,[23] there have been recent improvements.

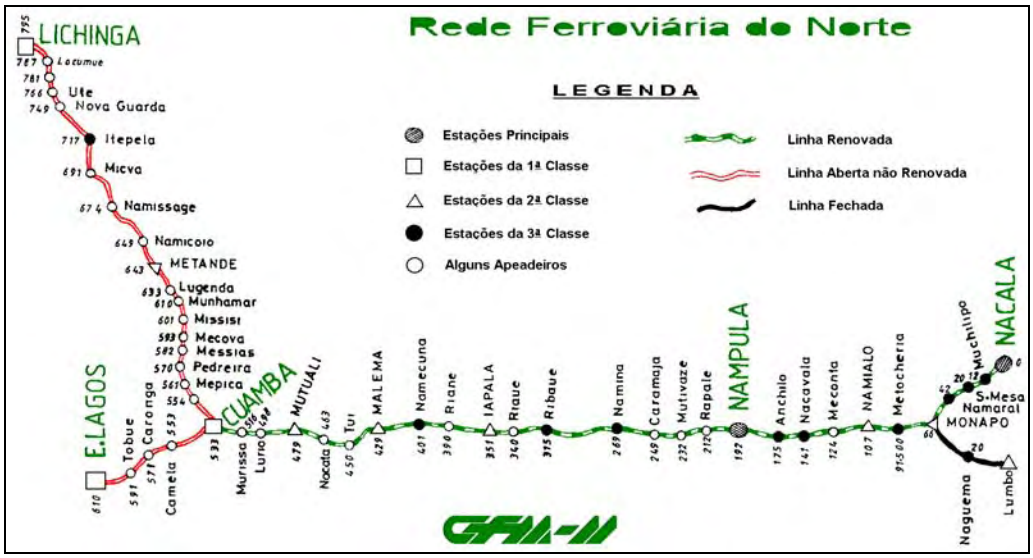
[20] According to a feasibility study conducted by CDN, the upgrading costs between Cuamba and Entre Lagos (78 km) is estimated as USD 11 million.(Source: USAID/Southern Africa Global Competitiveness Hub (2009) Technical Report: Review of the Effectiveness of Rail Concessions in the SADC Region)

[21] JBIC/Mitsubishi UFJ Research & Consulting (2008), *The Preliminary Study for Master Plan Formulation on Nacala Special Economic Zone (ZEEN)*, Final Report.

[22] Vale, a major Brazilian mining company, has already expressed interest in investing in a new railway line connecting Moatize to the Nacala Railway. A feasibility study of construction of a new line will be completed by 2011, after which Vale will decide upon a viable option for transporting Moatize coal to Nacala Port. The Australian mining company "Riversdale" is also planning to transport coal in Moatize to the Indian Ocean, mainly through the Sena Railway Line. (Source: Interview with CCFB).

[23] A report by the USAID/Southern Africa Global Competitiveness Hub concluded that "CDN has not demonstrated success. It is closely tied to the Malawi concession and performance there has been lacking." (Source: USAID/Southern Africa Global Competitiveness Hub (2009), T*echnical Report: Review of the Effectiveness of Rail Concessions in the SADC Region*).

Figure D.5 presents a map of the railway network operated by CDN in Mozambique.



Source: CDN

Figure D.5 Railway Network Operated by the CDN Concession (Mozambique)

Issues and Bottlenecks: While it has been reported that the service level has deteriorated due to a shortage of locomotives and wagons,[24] there have been recent improvements. While the frequency of operation along the section between Cuamba and the Malawi border was reported several years ago as one return per one month, it has now recovered to the level of three returns a day on average.[25] CDN continues to put a priority on the improvement of service levels, first by rail track rehabilitation/upgrading and second by increasing the quantity of rolling stocks.[26] (CDN had five locomotives as of 2008, and an additional six were to procured in line with an expansion in wagon capacity.[27])

Table D.12 summarizes the current condition of the Nacala Railway in Mozambique.

Table D.12 Current Condition of Nacala Railway (Sections in Mozambique)

Section	Length	Rail Track Specification	Current Condition
Nacala–Cuamba	533 km	40 kg/m Rail Concrete Sleepers	• Rehabilitated by the Government of France in the 1990s • In relatively good condition
Cuamba–Entre Lagos (Nayuchi)	78 km	30 kg/m Rail Timber/Steel Sleepers	• Train speed is restricted to a maximum of 25 km/h • It normally takes 3.5–5 hours for this section. • Rail track conditions are slightly improved, but this remains a critical section.

Source: CDN

[24] The USAID/Southern Africa Global Competitiveness Hub report concluded that "CDN has not demonstrated success. It is closely tied to the Malawi concession and performance there has been lacking". L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.

[25] Interview with CDN Nacala Office and CEAR.

[26] CDN pointed out that improving the transport capacity in Malawi is solely dependent on the rehabilitation and upgrading of rail track, not on the quantity of rolling stock.

[27] JBIC/Mitsubishi UFJ Research & Consulting (2008), *The Preliminary Study for Master Plan Formulation on Nacala Special Economic Zone (ZEEN)*, Final Report.

Privatization: The CDN consortium was awarded a 25-year concession for both the rail line and the port on the Nacala corridor in January 2005. Since the same consortium operates the rail services in both Malawi[28] and Mozambique, it has been possible for it to implement through train movements. CDN has made little progress in improving and rehabilitating the rail track.[29] As a result of the poor condition of the track between Cuamba and Malawi and difficulties with service on the Malawi side, there has been a significant diversion of cargo to the Port of Beira Port to road.[30] However, service levels are improving.

Table D.13 summarizes locomotives and wagons owned by CDN and CEAR.

Table D.13 Locomotives and Wagons owned by CDN and CEAR (as of 2008)

Locomotives / Wagons	CDN	CEAR	Total
Locomotives	5	11	16
Wagons			
Container Carrying	30	144	174
Closed Wagons	96	106	202
Tank Cars (for fuel)		59	59
Tank Cars (for palm oil)		14	14
Ballast Wagons	55		55
High-Sided Wagons		56	56
Total	181	379	560

Source: CDN and CEAR

Ongoing and Future Projects: Ongoing and proposed railway projects/studies along the Nacala Corridor in Mozambique are summarized in Table D.14.

Table D.14 Ongoing and Proposed Railway Projects/Studies along the Nacala Corridor (in Mozambique)

Projects	In Charge	Estimated Cost (USD)	Remarks
Upgrading of the Cuamba–Entre Lagos railway line (78 km)	CDN/CFM	11 million	• Replacement of timber sleepers has been done for 12 km
Upgrading of the Cuamba–Lichinga railway line	CDN/CFM	30 million	• Replacement of timber sleepers, rehabilitation of bridges and culverts will be necessary.

Source: Prepared by the JICA Study Team, based on interviews, the SADC Corridor Activity Plan 2008, and other sources

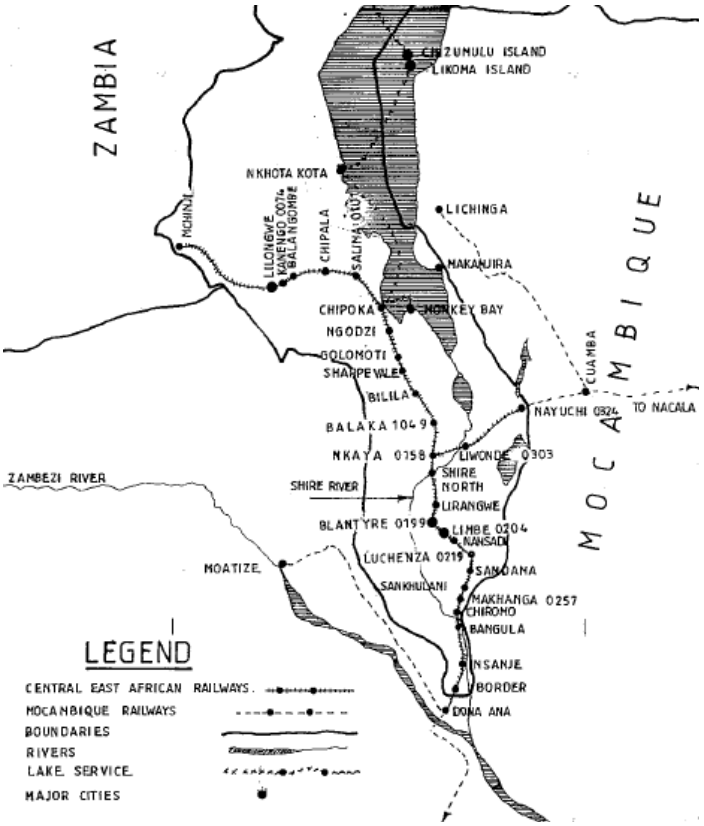
(2) Malawi and Zambia

Current Status: The main line extends from Kanengo Terminal in the capital city Lilongwe to Nkaya, a junction, via Salima, near Lake Malawi. From Nkaya Junction, there are two routes: (i) one stretches eastward, via Liwonde, up to Nayuchi, on the border with Mozambique (along the Nacala Corridor); and (ii) the other extends southward to Blantyre and Limbe, then to Marka (on the border with Mozambique) via Chiromo, Bangula and Nsanje (along the Sena Corridor). Since passenger service is irregular at present, freight service is the main income source for Central East African Railways (CEAR), which is in charge of railway operations in all of Malawi (it has its headquarters in Limbe). Similar to same case of CDN of Mozambique, the

[28] It was also awarded the concession for Malawi's railway in May 1999.
[29] E.g., L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.
[30] The Services Group, *Nacala Free Trade Zone Development Study*, Preliminary Report (Revised), Millennium Challenge Corporation, 2006.

service level has deteriorated due to a shortage of locomotives and wagons and aging rail track, among other reasons. An important issue as now is vandalism to the rail track, which has caused heavy damage on critical structures, especially on bridges.[31] As a consequence, the section between Salima and Lilongwe is reported to be in extreme danger. Regarding the section southward from Blantyre and Limbe, the line has not been operated for more than 10 years as a result of the destruction of Chiromo Bridge, located near Bangula, caused by a severe flood in 1997. To connect Malawi with Beira Port by the shortest path, it is of urgent necessity to rebuild this section; however, there are no financial sources within CEAR for capital investments.[32]

Figure D.6 presents a map of the CEAR concession in Malawi.



Source: CEAR

Figure D.6 Railway Network Operated by the CEAR Concession (Malawi Side)

Issues and Bottlenecks: As was the same case with CDN of Mozambique, the service level has deteriorated due to a shortage of locomotives and wagons, aging rail track, and other reasons. Some of the sections were constructed during the colonial era in early 1930s, while other sections were built in the 1970s. More details are presented in Table D.15. A major issue are present is rail track vandalism, which has caused heavy damage to critical structures, especially bridges.[33] As a consequence, the section between Salima and Lilongwe is reported to be in extreme danger. Regarding the section southward from Blantyre and Limbe, the line has not been operated for more than 10 years as a result of the destruction of Chiromo Bridge, located

[31] Interview with Central East African Railways.
[32] According to CEAR, the annual operating revenue is MWK 390 million (equivalent to USD 2.7 million) on average while the annual maintenance cost exceeds MWK 60 million (equivalent to USD 450,000) on average, which accounts for 15% of the total revenue.
[33] Interview with CEAR

near Bangula, caused by a severe flood in 1997. To connect Malawi with the Port of Beira by the shortest path, it is of urgent necessity to rebuild this section; however, there are no financial sources within CEAR for capital investments.[34]

Table D.15 Current Condition of Nacala Railway (Sections in Malawi)

Section	Length	Rail Track Specifications	Current Condition
Entre Lagos (Nayuchi)–Nkaya	100 km	40 kg/m Rail PS [extruded polystyrene] Concrete Sleepers	• Constructed in the 1970s • The section from Nkaya junction to Molipa is situated on clay sub-soil • The track alignment is of a higher quality than that of the section between Nkaya and Blantyre
Nkaya–Blantyre (Limbe)–Makanga	88 km	40 kg/m and 30 kg/m Rail Steel/PS Concrete Sleepers	• Constructed from the 1930s to the 1950s (during the colonial era) • Rail track conditions are very poor due to vandalism, flood in rainy season, etc.
Nkaya–Mchinji (border to Zambia)	387 km	40 kg/m Rail PS Concrete Sleeper	• Constructed in 1979 • Some of the bridges are critically in danger due to vandalism; there is a need to rebuild bridges and/or replace them with box culverts. • The line extension to Chipata (Zambia) was to be completed at the end of 2009.
Makanga–Nsanj – Marka (border to Mozambique)	*N.A.*	*N.A.*	• *Impossible to operate due to the destruction of Chiromo Bridge over the Shire River (near Bangula)* • *Before the outbreak of civil war in Mozambique in 1970s, the railway was operated up to Beira Port.*

Note: The section between Makanga and Marka is considered as part of the "Sena Railway" but is included here for convenience.
Source: CEAR

Privatization: The government of Malawi prepared a privatization program for railway operations in 1996 and CEAR was awarded a 20-year concession in December 1999 for operation of all railway lines in Malawi. This privatization was one of the first in the SADC region. Also, the concession contract for the operation of Nacala Railway and the Port of Nacala was concluded in January 2005 between the Government of Mozambique and CDN, another subsidiary of CEAR. Although efficient operation through consistent management from inland Malawi to the port in Mozambique was ultimately expected, CEAR still faces a challenge to efficiently manage the operation toward the Port of Nacala, mainly due to domestic issues such as vandalism, rather than the rehabilitation/upgrading of the section between Cuamba and Entre Lagos (as explained above).

[34] CEAR reported an annual operating revenue of MWK 390 million (equivalent to USD 2.7 million) on average while the annual maintenance cost exceeds MWK 60 million (equivalent to USD 450,000) on average, which accounts for 15% of its total revenue.

Some reports have concluded that the concession contract was progressed without a proper regulatory climate.[35, 36]

Ongoing and Future Projects: Ongoing and proposed railway projects/studies along the Nacala Corridor in Malawi are set out in Table D.16.

Table D.16 Ongoing and Proposed Railway Projects along the Nacala Corridor (in Malawi)

Projects	In Charge	Estimated Cost (USD)	Remarks
Rehabilitation of Malawi Railway Network	CEAR/GOM	50 million	• A concept note has been developed for funding by MCC Malawi.
Invest in the Rolling Stock	CEAR/GOM	10 million	• CDN has already procured six locomotives.
Construction of Mchinji–Chipata New Line (27 km)	GOZ	N.A.	• Was to be completed in December 2009

Source: Prepared by the JICA Study Team, based on interviews, the SADC Corridor Activity Plan 2008, and other sources

D.4.4 Inland Container Terminals (Depots)

Transshipment facilities at Nacala Port (Port ⇔ Railway): it is reported that customs clearance and other procedures take 1–2 days for exports and 6–7 days for imports (which is faster than at the Port of Beira).[37] In contrast, for cargo transported to Malawi by the Nacala Railway, it takes about 25 days on average from the arrival at the port to arrival in Malawi,[38] due to the inefficiency of transshipment from sea transport to railway, mainly a result of the lack of locomotives and (freight) wagons rather than customs clearance constraints.

Limbe Railway Terminal (Road ⇔ Railway): There is a railway cargo terminal in Limbe, where the headquarters of CEAR is located. The terminal has a key role in transshipping imported goods from rail to road, for delivery to Blantyre. According to Malawian private forwarders and truckers, the facilities equipped at the terminal are insufficient to handle the current volume of cargo from the Port of Nacala. CEAR indicated an urgent need to rehabilitate the terminal in order to cope with the future cargo handling volumes.[39]

Kanengo Railway Terminal (Road ⇔ Railway): Kanengo Railway Terminal is located north of Lilongwe. The terminal handles tea, sugar, and fertilizer transport.

Liwonde Logistics and Industrial Center (Planned) (Road ⇔ Railway): A logistics and industrial center is planned in Liwonde, Malawi. The World Bank has completed a needs assessment.[40]

[35] See, e.g., L. Phipps, *Review of Railway – Concessions in the SADC Region*, USAID/Southern Africa Global Competitiveness Hub, 2009.
[36] The force majeure clause in the contract was unclear, which led to a serious dispute over the Rivi Rivi Bridge reconstruction after flood damage in 2004.
[37] JICA (2007), *The Project Formulation Study on the Promotion of Industrial Development in Major Corridor Areas in Mozambique.*
[38] See previous footnote.
[39] Interview with CEAR
[40] Consilium Legis (Pty) Ltd., *Transport and Trade Facilitation: East and Southern Africa – Review of Present Problems and Reform Initiatives - Vol. 1,* 2003.

Chipata Cargo Center (Under Construction) (Road ⇔ Railway): A cargo terminal is currently under construction at Chipata in Zambia, along with construction of the Mchinji–Chipata railway line. The line was to be opened at the end of December 2009.

D.5 Mtwara Corridor (No.⑦)

D.5.1 Roads

The Mtwara Corridor connects the Port of Mtwara in Tanzania with Malawi and Zambia through the Mtwara–Massasi–Mangaka–Tunduru–Songea Route. However, currently only the road from Mtwara to Massasi is surfaced. Although improvement of some sections has been committed by AfDB and other development partners, there are still long sections of missing links without any financing source for future development.

D.5.2 Ports

Mtwara is a natural basin port with a depth of 10 m and a total berth length of about 300 m. Because land transport from/to the port has not been well developed, currently traffic through this port is relatively low. There is a plan to develop the port with an industrial park, for which the Government of Tanzania has purchased land around the port. A study on the development of the Port of Mtwara is ongoing funded by the Government of Japan. In addition, the Tanzania Port Authority once requested JICA assistance for development of this port, although no clear plans for the future development of this port have been formulated.

D.5.3 Railways

There are no railway services along this corridor.

D.5.4 Inland Container Terminals (Depots)

There are no major inland container terminals along this corridor.

D.6 Dar es Salaam Corridor (No.⑥)

D.6.1 Roads

The Dar es Salaam Corridor originates from the Port of Dar es Salaam and provides access to/from the landlocked countries of Zambia, Malawi, and the DRC. Currently, most of the freight moving along this corridor is from/to Zambia through the Dar es Salaam–Mlkumi–Iringa–Makambako–Uyole–Tunduma/Nakonde–Isoka–Chinsali–Mpika–Serange–Kapri Mposhi–Lusaka Route. Although the condition of most of the road sections of this route is relatively good, a section from Chinsali to Serange has been damaged and spot rehabilitation is required. The underlying issue is that a number of heavy vehicles hauling copper from Zambia rely on this road corridor due to the capacity limitation of the railway system, which leads to road damage in the short term.

D.6.2 Ports

The Port of Dar es Salaam is the largest cargo handling port among the four international ports in Tanzania. The port is the hub of the Central Corridor, serving as a gateway for international trade, through which export and import goods are hauled not only to/from origins/destinations in Tanzania, but also to/from Zambia, Burundi, and Rwanda. Dar es Salaam Port also handles, although in lesser volumes, 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. The port requires regular dredging. The three berths with deeper water depths are dedicated to containers, 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. The port container terminal has been significantly congested, with average dwell time reported as 26 days in 2008. Because of the rapid economic growth in the region, the container handling volume has been exceeding the planned container terminal capacity in recent years. Complicated port procedures involving various stakeholders and a high inspection rate have also been key factors causing the long dwell time, which in turn reduces cargo handling capacity. Table D.17 presents container cargo handling volumes for transit countries at the Port of Dar es Salaam in a recent year.

Table D.17 Container Cargo Handling Volume of Port of Dar es Salaam for Transit Countries in 2007

(Unit: TEUs)

	Tanzania	Zambia	Burundi	Rwanda	DRC	Malawi	Uganda	Others	Empties	Total
Export	95,754	17,930	14,191	5,977	16,791	2,513	2,543	479	3,922	160,100
Import	41,731	10,639	3,840	1,135	2,822	497	80	8	84,313	145,065
Transshipment	–	–	–	–	–	–	–	–	–	28,815
Total	137,485	28,569	18,031	7,112	19,613	3,010	2,623	487	88,235	333,980

Source: Tanzania Port Authority

D.6.3 Railways

Current Status, Issues and Bottlenecks: China donated about USD 500 million for construction of the Tanzania–Zambia Railway Authority (TAZARA) line in the 1970s. The railway operation has been jointly managed by the governments of Tanzania and Zambia through the establishment of a state-owned company (TAZARA). Although the track gauge of the TAZARA line differs from that of the Tanzania Railway Corporation (TRC) network, it is the same as the railway network in Zambia and Central African countries. Compared with other African rail operators, the condition of rolling stock and rail track of the TAZARA line is relatively good.

The line was heavily utilized at the time of apartheid in South Africa since its neighboring countries used the Port of Dar es Salaam for foreign trade. Currently, the transport volume has been increasing with the growing imports of products from China and exports of mining products from inland countries. A privatization program was considered but SADC urged that a suitable and appropriate operating structure be found for TAZARA, which would allow for improved and sustainable operations in the future, considering that a complete concession seems to be unattractive at the moment. For upgrading of the railway system as a whole, the Government of China provided a USD 10 million loan without interest in 2004, to procure facilities and equipment (e.g., spare parts, rail track, locomotives, communication equipment, cranes) as well as staff training.

Ongoing and Future Projects: Table D.18 presents ongoing and proposed railway projects/studies in Tanzania along the Dar es Salaam Corridor.

Table D.18 Ongoing and Proposed Railway Projects along the Dar es Salaam Corridor (in Tanzania)

Projects	In Charge	Estimated Cost (USD)	Remarks
Construction of Chipata–Kalonje (250 km, Zambia)	RSZ/GOZ	N.A.	• To connect TAZARA and Nacala Railway crossing South Luangwa National Park • Needs a sound assessment of the environmental impacts on the national park, which may render the project infeasible • A prefeasibility study has been completed by a private South African consultant. • China has expressed unofficial interest for the project.
Construction of Kasama–Mpulunga (172 km, Zambia)	RSZ/GOZ	N.A.	• To connect Kasama of the TAZARA Railway and the inland port at the southern Lake Tanganyika • May form an important route to the lake Tanganyika and the TAZARA Railway • A prefeasibility study has been completed.
TAZARA Upgrading and Restructuring Study	TAZARA	0.4 million	• SADC reported that a suitable and appropriate operating structure must be found for TAZARA that will allow for improved and sustainable operations in future and that a complete concession seems unattractive at this stage. • The study includes provision of technical assistance to the Governments of Zambia and Tanzania for formulating an appropriate restructuring plan for TAZARA.

Source: Prepared by the JICA Study Team, based on interviews and SADC/COMMESA/EAC (2009) North South Corridor Pilot Aid for Trade Programme – Surface Transport

D.6.4 Inland Container Terminals (Depots)

Kapiri Mposhi Railway Terminal (Road ⇔ Railway): There is a railway terminal in Kapiri Mposhi, which is the terminal point of the TAZARA railway in Zambia.

D.7 Trans-Kalahari Corridor (No.⑤)

D.7.1 Roads

The Trans-Kalahari Highway was completed and commissioned in 1998 with linking the Port of Walvis Bay to Johannesburg through Windhoek and Gaborone over 1,900 km. The roads have been maintained in relatively good condition since then. Although the corridor has high economic potential with connecting major cities of the high income countries in the region, the cross border traffic volume is not so high due to the long distance between economic hubs on the corridor. Most of the current cross border traffic on this corridor is import goods from South Africa to Namibia and Botswana.

D.7.2 Ports

The Port of Walvis Bay possesses eight berths handling containers, bulk cargo, and other cargo. The port is equipped with reach stackers, forklifts, tractors, haulers, trailers, harbor tower cranes, and additional equipment including mobile cranes. Haulage transport is available from Namport. The port has no delays in ship schedule and cargo handling unlike other ports in Southern and Western Africa due to smooth berthing when loading and unloading cargo from the vessels. There was a large increase in container cargo handling volume in 2008, when 200,719 TEUs were handled compared to 83,263 TEUs in 2005/6. JICA has been assisting a feasibility study of a new container terminal at this port. Construction is planned to commence in 2010.

D.7.3 Railways

Current Status and Issues: TransNamib, a parastatal enterprise, is in charge of operation of the railway network in Namibia. Its network consists of 2,883 km including sections: (i) from Walvis Bay to Tsumeb via Usakos (along the Trans-Caprivi Corridor), (ii) from Walvis Bay to Gobbabis via Windhoek (along the Trans-Kalahari Corridor), (iii) from Windhoek to Keetmanshoop (along the Oranje Corridor), and (iv) from Keetmanshoop to Lüderitz via Aus (also along the Oranje Corridor). A new section is being added through northward extension to Angola.

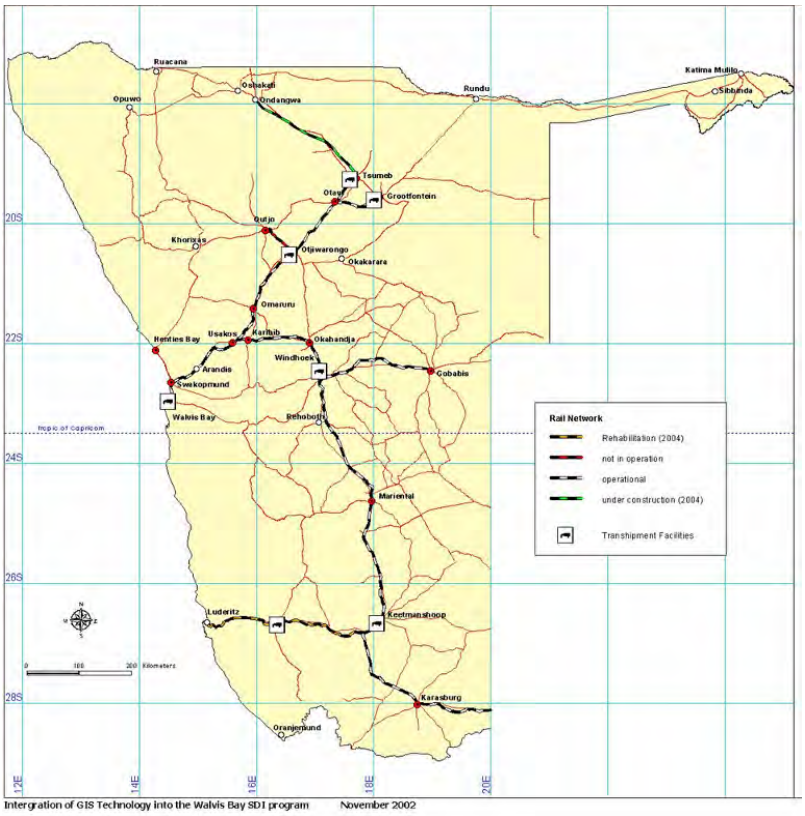
TransNamib was established in 1998 as a railway subsidiary of TransNamib Holdings (Pvt) Ltd by the organizational reform of the transport public corporation in Namibia. Freight services are its main income source, transporting liquid fuel, mineral products, building materials, and agricultural products as well as container traffic. Although passenger services are currently an important business domain (with the operation of the tourist train “Desert Express”, which links Windhoek and Swakopmund), profitability is very low level as elsewhere in Africa.

Figure D.7 presents a map of the railway network in Namibia.

As stated, rail track has been added to the network mainly by the extension to the Angola border. The new line from Tsumeb to Ondangwa (246 km) was constructed in June 2006 with the financial support from Arab Bank for Economic Development in Africa and the Kuwait Fund for Arab Economic Development. The remaining section to connect Namibia and Angola is now under construction. In addition, China provided a loan of USD 30 million in November 2005 for the procurement of 17 locomotives and wagons.[41]

Ongoing and Future Projects: A Trans-Kalahari Railway Project is at the prefeasibility stage. The project would connects the Port of Walvis Bay Port and Lobatse in Botswana with a distance of about 700 km. The project aims at enhancing connectivity between Namibia and Botswana as well as Gauteng Province in South Africa. The total project cost has been estimated at about USD 1.4 billion. Table D. 19 presents details of this project as well as of a Trans-Kalahari Coal Railway Project.

[41] Interview with Ministry of Transport of Namibia.



Source: TransNamib Holdings

Figure D.7 Railway Network in Namibia (Trans-Caprivi, Trans-Kalahari, Trans-Cunene and Oranje Corridor)

Table D.19 Ongoing and Proposed Railway Projects along the Trans-Kalahari Corridor (in Namibia and Botswana)

Projects	In Charge	Estimated Cost (USD)	Notes
Trans-Kalahari Railway Project (led by the Governments of Namibia and Botswana)	Government of Namibia/ Government of Botswana/ World Bank	1.4 billion	• A prefeasibility study is ongoing through the World Bank's Public-Private Infrastructure Advisory Facility (PPIAF). • The study inception report was submitted by the appointed consultant in November 2009. • The study is to last 18–22 months. • A Public-Private Partnership will be introduced. • China, Russia, and Germany have expressed interest in this project (although there have been no commitments yet).
Trans-Kalahari Coal Railway Project (dedicated line, led by private investors)	Private Investors	N.A.	• A private South African company, CIC Energy Corp., and the state-owned financial institution Industrial Development Corporation (IDC), have completed a prefeasibility study.

Source: Prepared by the JICA Study Team, based on interviews and other sources

D.8 Trans-Caprivi Corridor (No.⑨)

D.8.1 Roads

The Trans-Caprivi Highway links the Port of Walvis Bay with the inland areas of Zambia through Livingstone and Lusaka, and southeastern DRC. This road corridor of 2,500 km was completed in 2008 after the opening of Katima Mulilo Bridge in 2004. Although the current road condition is relatively good, the major issue along this corridor is that roads are easily damaged by heavy traffic. Specifically, the Livingstone–Sesheke Section will require attention although it is now in fair condition.

D.8.2 Ports

See the section above on the Trans-Kalahari Corridor.

D.8.3 Railways

Current Status, Issues, and Bottlenecks: See the section above on the Trans-Kalahari Corridor.

Ongoing and Future Projects: The Trans-Caprivi Railway Project is currently ongoing by the Governments of Namibia and Zambia. After the civil war in Angola and the destruction of Benguela Railway, the SADC region had no direct railway link to the west coast. Especially for Zambia, the mining sector in the Copperbelt seeks a rail-based import/export route via the Port of Walvis Bay to optimize its supply chain and enhance its global competitiveness. A preliminary Environmental and Social Assessment (PESA) was completed in 2006 as a part of a preliminary investigation funded by the Government of Namibia. Details of railway projects in this corridor are presented in Table D.20.

Table D.20 Ongoing and Proposed Railway Projects along the Trans-Caprivi Corridor (in Namibia)

Projects	In Charge	Estimated Cost (USD)	Remarks
Trans-Caprivi Railway Project (Cape Fria/Angra Fria–Katima Mulilo, Grootfontein–Katima Mulilo)	Ministry of Transport of Namibia	0.53 billion (from Tsumeb to Katima Mulilo)	• A feasibility study was ongoing with the final report due in December 2009. • The branch section to Cape Fria/Angra Fria was included in the study scope. • A stakeholder consultation process was undertaken.
Rehabilitation of Walvis Bay–Tsumeb (400 km)	Ministry of Transport of Namibia	N.A.	• The terms of reference for the project has already been publicly announced. • TransNamib has received expressions of interest (EOIs) from major donor countries.

Source: Prepared by the JICA Study Team, based on interviews and other sources

D.8.4 Inland Container Terminals (Depots)

Grootfontein Railway Terminal (Road ⇔ Railway): There are road-railway transshipment facilities in Grootfontein, which is located along the Trans-Caprivi Corridor in Namibia.

D.9 Trans-Cunene Corridor (No.⑱)

D.9.1 Roads

The Trans-Cunene road corridor links the Port of Walvis Bay with Lubango in southern Angola, over a distance of 1,600 km. Currently, the Government of Angola is planning road rehabilitation including rehabilitation of the Lubango–Santa Clara road segment, which will extend the corridor. This corridor carries the largest volumes of transit cargo imported through the Port of Walvis Bay, mainly serving southern Angola. In addition, the corridor traverses the most densely populated parts of Namibia in the north. Oshikango, which is the Namibian border crossing with Angola along this road corridor, is a major wholesaling and retail center for trade with Angola. Although the road traffic volume along this corridor is not high compared to the trade volume, the border is busy with many retailers carrying goods across on foot.

D.9.2 Ports

See the section above on the Trans-Kalahari Corridor.

D.9.3 Railways

Current Status, Issues, and Bottlenecks: See the section above on the Trans-Kalahari Corridor.

Ongoing and Future Projects: The Governments of Angola and Namibia formally agreed to develop a new railway line along the Trans-Cunene Corridor in May 1997.[42] The new railway line between Tsumeb and Oshikango would be an extension of the existing railway network in Namibia, which would enable inter-regional rail connectivity between/among Namibia, Angola, and South Africa. The details of the project are shown in Table D.21.

Table D.21 Ongoing and Proposed Railway Projects along the Trans-Cunene Corridor (in Namibia)

Projects	In Charge	Estimated Cost (USD)	Notes
New line construction linking Ondangwa–Oshikango (60 km)	Ministry of Transport of Namibia	N.A.	• This new line will be linked to the Angolan railway system at a point near Cassinga/Chamutete in Angola • The route is the final missing link between connects Namibia and Angola. • Currently under construction
New line construction linking Odangwa–Oshakati (38 km)	Ministry of Transport of Namibia	N.A.	• Not yet started.

Source: Prepared by the JICA Study Team, based on interviews and other sources

D.10 Oranje Corridor (Gariep SDI) (No.⑩)

D.10.1 Roads

The Oranje Road Corridor links the Port of Lüderitz, the second largest port in Namibia, and the Port of Walvis Bay, to Johannesburg through Windhoek. The total length from the Port of Lüderitz to Johannesburg is 1,678 km. The road condition is relatively good without any specific issues.

[42] Interview with Ministry of Transport of Namibia.

D.10.2 Ports

See the section above on the Trans-Kalahari Corridor.

D.10.3 Railways

Current Status, Issues, and Bottlenecks: See the section above on the Trans-Kalahari Corridor.

Ongoing and Future Projects: The railway line between Lüderitz and Aus along the Oranje Corridor was constructed during the colonial era. Along with the completion of the rehabilitation work at the Port of Lüderitz in 1998, upgrading of rail track was planned in order to accommodate future traffic, mainly mining products, to be exported through the new port facilities. Table D.22 presents details of the project.

Table D.22 Ongoing and Proposed Railway Projects along the Oranje Corridor (in Namibia)

Projects	In Charge	Estimated Cost (USD)	Notes
Upgrading and rehabilitation of Aus–Lüderitz (140 km)	Ministry of Transport of Namibia	N.A.	Phase I: • Upgrading of the 74 km section between Aus and the east of Haalenberg • Construction completed. Phase II: • Upgrading of the 65 km section between the east of Haalenberg to Lüderitz • Addressing steep sections and sharp radius bends along the sections approaching Lüderitz station; the construction of a flyover bridge is planned. • Rehabilitation of Lüderitz station will be included.

Source: Prepared by the JICA Study Team, based on interviews and other sources

D.11 Lobito Corridor (No.⑧)

D.11.1 Roads

The Lobito Road Corridor connects the Port of Lobito in Angola with major mining regions in the DRC and Zambia, providing the shortest route to the sea. The total length of the corridor is about 1,800 km. However, the existing road network needs rehabilitation in order for it to be effective route.

D.11.2 Ports

The port handled roughly 600,000 tons per year including 68,446 TEU[43] of building materials, flour, sugar, rice, grain, and general cargo in 2007. There are seven berths of 1,122 m in total with depth of 10.3–10.6 m including container and dry bulk berths. It is reported that rehabilitation and renewal works have been taking place with greater urgency around the premises of the Port of Lobito and beyond, with financial assistance provided by Chinese firms. The project includes dredging and reclamation of one fourth of the existing port, development of existing oil terminal, container terminal and fishing port.

[43] Port of Lobito, 2007

As well as the Port of Luanda and Port of Namib in Angola, currently the usage of the Port of Lobito is strictly for Angolan domestic consumption only and the Port Authority has been aiming for no transshipment/transit cargo across any of the nation's borders.

D.11.3 Railway

This Lobito Railway Corridor is designed around the rehabilitation of the Lobito rail line linking the Port of Lobito with the DRC/Zambian Copperbelt. Construction of the Benguela railway began in 1903 and was finished in 1929. In 1931 the newly opened Angolan port of Lobito received the first copper load from Katanga, DRC. Companhia do Caminhos de Ferro de Benguela (the Benguela Railway Company) was established in 2001. Although the Copperbelt in southern DRC and Zambia was connected with the Port of Lobito by railway before, the railway service has been terminated since the Angolan civil war. Rehabilitation of the railway section between Munhango and Luau was commenced in February 2009. The Chinese construction enterprise China Railway 20 Bureau Group Corporation (CR-20) will finish the replacement of trails in May 2010 and the inauguration of passenger train service between Lobito to Luau is expected in 2011.[44]

D.12 Shire–Zambezi Corridor

D.12.1 Waterways

The purpose of this project is to reopen the Shire–Zambezi Waterway from an inland port Nsanje (to be constructed in 2010) in Malawi to the Port of Chinde in Mozambique, a distance of about 238 km. This would enable barges and medium seagoing vessels to ply between Chinde and Nsanje, thereby providing direct waterway access to the Indian Ocean.[45]

D.13 Malange Corridor (No.⑫)

The Malange Corridor development initiative is led by the Government of Angola and follows the Luanda–Ndalatando–Malange axis. The corridor is also being planned to link the mineral-rich areas in Angola with the Port of Luanda (Malange Corridor) and Namibe Port (Namibe Corridor). The Malange initiative will include development of the intermodal infrastructure connections at the Port of Luanda, reorganization of the maritime terminal, modernization of the technical nautical services units, modernization of navigational aids, and development of a dry port in Viana, on the western outskirts of Luanda.

D.13.1 Roads

The road is the main vehicle link to the diamond-rich eastern provinces of Lunda Norte and Lunda Sul, major earners of foreign income for Angola.

D.13.2 Ports

As written in D.11.2, the major ports in Angola, including the following two ports on the Malange Corridor, are mainly for domestic consumption without much transit of transshipment.

Port of Luanda:
The Port of Luanda is directly managed by the Empresa Portuaria de Luanda (Port Authority of Luanda) and is the nation's primary gateway for regional cargo. The port handles containers,

[44] CFB Benguela Railway website http://www.cripes.com/.
[45] AllAfrica.Com http://allafrica.com/stories/200908110912.html.

general cargo, and dry-bulk cargo, as well as acting as a base for the energy industry. Both container traffic and general cargo have recorded very strong growth in the recent years. There is congestion in most cargo-handling sectors and the scope for volume development is constrained. Currently, vessel waiting time is reported to be 4 to 6 weeks and the terminal operator is imposing a congestion surcharge of USD 300 per TEU, however this is vain as the traffic is still extremely slow.

Among the total number of eleven berths at the port, 488 m are for containers, 825 m for general cargo, and 350 m for dry bulk cargo. The depth of the container and general cargo berths is about 10.5 m.

The following table shows the container handling at the Port of Luanda in 2008.

Table D.23 Container Handling Volume at the Port of Luanda (2008)

	(Unit: TEU)
Landed	267,956
Shipped	296,497
TOTAL	566,463

Source: Angola Ports Authority

Port of Namibe:
Currently, the Port of Namibe handles about 6% of the total cargo handling volume of the four major ports in Angola. The majority of cargo handled at this port are bulk cargo including mineral for export, consumption and construction materials. This is the most deteriorated port among the four major ports under rehabilitation request, hence its rehabilitation is an urgent issue. JICA is conducting the rehabilitation of this Port as a grant aid project.

D.13.3 Railway

The railway line to Malange, capital of the province of Malange, has been extensively rehabilitated by Chinese firms, while the road also has been rehabilitated. Reconstruction of the railway line is scheduled to be completed by the end of 2009.

D.14 Namibe Corridor (No.⑬)

The Namibe Corridor is also being planned to link the mineral-rich areas in Angola with the Port of Namibe, together with the development initiative of the Malange Corridor. The Namibe Corridor will incorporate the development of a dry port at Lubango, development of multimodal facilities at the Port of Namibe port, and reconstruction and modernization of the Port of Namibe.

D.14.1 Roads

Many parts of the road sections need improvement including construction and upgrading. The roads between Lubango and Namibe are under construction with EU development assistance.

D.14.2 Ports

See the section above on the Malange Corridor

D.15 Central Corridor (No.⑭)

D.15.1 Roads

The road corridor connects the Port of Dar es Salaam with Uganda via Mulukala, Rwanda via Rusumo, and Burundi via Kobero. Although many of the road sections of this corridor were in poor condition several years ago, the conditions in the Tanzanian section have relatively recovered with the contribution of various donors as well as the government of Tanzania (see Table D.24). While the road corridor serves inland-bound imported freight from Tanzanian ports, it also serves seaport-bound export freight (largely coffee and tea) originating from Rwanda and Burundi, as well as export of cotton produced in western Tanzania.

Table D.24 Recent Projects along the Central Corridor Supported by the Government of Tanzania (GOT) and Development Partners (Road Sections in Tanzania)

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

Source: JICA 2009. The Research on Cross-Border Transport Infrastructure Phase 3.

D.15.2 Ports

See the section above on the Dar es Salaam Corridor.

D.15.3 Railway

The Central Railway Corridor includes the Dar es Salaam–Kigoma railway line network (1,254 km), connecting Bujumbura by boats on Lake Tanganyika, and to Rwanda by road. The road route is from Dar es Salaam via Dodoma, Singida, Nzega to Lusahunga into Rwanda and Burundi. Neither the road nor the rail networks is in good condition, especially from Dodoma up to Lake Tanganyika. Although various development partners and the Government of Tanzania have been conducting road rehabilitation/upgrading projects along this route, there has been no major improvement of the railway system, although AfDB has undertaken a feasibility study of a railway extension.

D.16 TAH Cairo–Gabarone Corridor (No.⑮)

D.16.1 Roads

The standard of the Cairo–Gaborone section of the TAH is high in Egypt and along the southern sections of this corridor. The major capitals along this corridor generate average daily traffic of

4,000–5,000 vehicles per day or above.[46] Most of this traffic is local but there is also a fair level of long-distance, international movements of passengers and freight along the corridor, particularly along the central and southern sections. (Note that only the sections in Tanzania were considered in this Study.)

D.17 TAH Tripoli–Windhoek Corridor (No.⑯)

D.17.1 Roads

War and civil turmoil, in combination with difficult terrain and climatic conditions, have discouraged the development of the TAH Tripoli–Windhoek Corridor. In particular, along the central and southern road sections of this corridor, which include those in and Angola and the DRC, are severely damaged. (Note that only the sections in Angola, the DRC, and Namibia were considered in this Study.)

D.18 Limpopo Corridor (No.⑰)

D.18.1 Roads

Many sections of the Limpopo Road corridor are currently in bad condition and their improvement is essential to stimulate economic development along this corridor. Both the rail line and road along the Limpopo Corridor are currently being rehabilitated. Also, the road link between the Maputo Corridor and the Xai Xai Pafuri route is under consideration, together with the building of a bridge across the Limpopo River near Crooks Corner. The Limpopo Railway line was concessioned to Consortia 2000, a Portuguese-led consortium.

[46] African Development Bank and United Nations Economic Commission for Africa, *Review of the Implementation Status of the Trans African Highways and the Missing Links, Vol. 1, Main Report, 2003.*

Appendix E Results from OD Survey

OD Results for the 10 Border posts are provided in a soft copy excel spreadsheet.

Tabs include:

- Outward Bound OD Data
- Inward Bound OD Data
- OD Zones Map
- OD Zones Description
- Exception Reports
- Project Statistics
- Commodities

Appendix F One-Stop Border Posts

Introduction

This appendix considers one-stop border posts at:

(1) Chirundu (Zimbabwe/Zambia, North–South Corridor);
(2) Kazungula (Botswana/Zambia(/Zimbabwe), North–South Corridor);
(3) Beitbridge (South Africa/Zimbabwe, North–South Corridor);
(4) Kasumbalesa (DRC/Zambia, North–South Corridor);
(5) Lebombo/Ressano Garcia (South Africa/Mozambique, Maputo Corridor);
(6) Wenela/Katima Mulilo (Sesheke) (Zambia/Namibia, Trans Caprivi Corridor);
(7) Oshikango/Santa Clara (Namibia/Angola, Trans Cunene Corridor);
(8) Trans Kalahari/Mamuno (Namibia/Botswana, Trans Kalahari Corridor);
(9) Mwami/Mchinji (Zambia/Malawi, Nacala Corridor);
(10) Mandimba/Chiponde (Mozambique/Malawi, Nacala Corridor;
(11) Dedza/Calomue (Malawi/Mozambique, Nacala Corridor);
(12) Mwanza/Zobue (Malawi/Mozambique, Tete/Beira Corridor);
(13) Forbes/Machipanda (Zimbabwe/Mozambique, Beira Corridor);
(14) Nakonde/Tunduma (Zambia/Tanzania, Dar es Salaam Corridor/North–South Corridor);
(15) Songwe/Kasumulo (Tanzania/Malawi, Dar es Salaam Corridor/North–South Corridor); and
(16) Negomano/Mtambaswala (Unity Bridge, Tanzania/Mozambique, Mtwara Corridor).

Subject to availability, information is generally presented on traffic[1] and waiting time at the border, infrastructure/facilities, operations, legal aspects, recent developments, measures to be implemented, development partner assistance, and the scope for assistance by the Government of Japan.

1. Chirundu[2] (Zimbabwe/Zambia, North–South Corridor and also the Beira Corridor)

Traffic data (2009) indicates about 330 vehicles (including 270 trucks) per day in both directions crossing the border. A 2007 traffic monitoring survey undertaken by FESARTA found average northbound border crossing times ranging from 20–50 hours and average southbound border crossing times ranging from 2 to 20 hours.[3] Northbound traffic on average takes three times longer than southbound traffic to cross the border because (i) of the type of

[1] If there is a range of data on traffic for a particular border post, the range is presented although outliers are not included in the range.

[2] This section draws from: (i) a site visit undertaken on 5 October 2009, including interviews with (a) Mr. Muyunda Sibote, Senior Collector-Customs, Chirundu Border Post, Zambia Revenue Authority, and (b) Mr. Mr. William Gadzikwa, Station Manager, Chirundu One Stop Border Post, Zimbabwe Revenue Authority; (ii) Africa Department, JICA, *Study Report on One Stop Border Post Assistance for Chirundu on Zambian-Zimbabwean Border*, August 2008; (iii) East African Community in collaboration with JICA Support Office for Africa, *Chirundu Border Post Study Tour Report*, April 2009; (iv) Barney Curtis, *The Chirundu Border Post: Detailed Monitoring of Transit Time*, Sub-Saharan Africa Transport Policy Program (SSATP), SSATP Discussion Paper No. 10, September 2009; (v) an interview with Mr. Whytone Ngulube, Director of Buildings, and Mrs. Amatende, Chief Architect, Ministry of Works and Supply, 30 September 2009; (vi) an interview with Mr. Muyangwa Muyangwa, Commissioner, Customs Services, Zambia Revenue Authority, 30 September 2009; (vii) an interview with Mr. Kingsley Chanda, CEO and Chairman, Ciltax Consultants Limited, Chirundu One Stop Border Post Station Manager, 5 October 2009; and (viii) and an interview with Mr. Mark Pearson, Programme Director, DFID, Regional Trade Facilitation Programme (RTFP), 24 November 2009.

[3] Average northbound transit times were (21 hours for tankers, 26 hours for refrigerated cargo, 35 hours for break bulk cargo, 39 hours for consolidated cargo, and 48 hours for containerized cargo); average southbound transit times were 5 hours for refrigerated cargo, 12 hours for tankers, 18 hours for containerized cargo, and 19 hours for break bulk cargo.

goods moving in the respective directions, with transits and empty returns, which have relatively simple processing requirements, common for southbound traffic; (ii) the comparative prevalence of preclearance and other facilitation procedures[4]; and (iii) the relatively poor infrastructure at the time on the Zambia side.

Findings with respect to the infrastructure at Chirundu follow:

(i) There are two bridges at Chirundu, one completed in 1939 and recently rehabilitated with assistance from the United Kingdom Department for International Development (DFID) to serve light passenger vehicle and pedestrian traffic, and another completed in 2002 with assistance of Japanese government.
(ii) The two border posts are about 500 m apart.
(iii) As a condition of the JICA assistance for the new bridge, the two countries agreed to construct new border facilities at their own expense to facilitate cross-border movement. Zimbabwe completed its new facilities in 2007, while Zambia completed its new facilities in August 2008 (with additional JICA assistance).
(iv) The new Zambia border post includes a customs office, cargo inspection facility, passenger terminal, truck parking area, and a bank. The cargo and passenger terminals are about 300 m apart. Entering and exit trucks are processed by the same offices, as are entering and exiting trucks. Other border control agencies are accommodated in a block adjacent to the customs/immigration block. A new examination space has been constructed and is well covered. They have a scanner that is now utilized by the authorities of both Zambia and Zimbabwe. The customs control zone is fenced. The parking area is in poor condition; the design was for 40 t trucks, but now trucks from neighboring countries are hauling 75–80 t, and the parking area is being damaged. ZMK 3.6–4.0 billion (JPY 70–78 million yen equivalent or USD 0.8–0.9 million equivalent at late November 2009 exchange rates) is required for reinforced concrete pavement to carry the heavier loads;
(v) The new Zimbabwe border post includes space for customs and immigration greater than that of Zambia and is currently being modified for OSBP operation. The main freight terminal is in the center and serves all operations for entering and exiting traffic. A shaded scanning bay has been constructed but the scanner has not yet been delivered pending payment to the Chinese supplier; the position of the scanning bay does not take OSBP operations into account. ICT infrastructure is limited, although Zimbabwe Customs does have a very small aperture terminal (VSAT) link to Harare. Zimbabwe has built a generator house but still lacks a generator; during the rainy season there are power outages every day, during which Zimbabwe Customs switch to manual processing. The border post on the Zimbabwean side is located in a national park.
(vi) Traffic flows are not separated.

Findings with respect to operations at Chirundu follow:

(i) At present, Chirundu opens at 6 AM (passenger terminal)–7 AM (freight terminal) and closes at 6 PM. Since the Zimbabwe facility is located within a national park, awareness programs about nocturnal animal behavior are said to be required if 24-hour operation is to be implemented. Also, staff housing requires upgrading in quantity and quality to support round-the-clock operation.

[4] Since Zimbabwe introduced preclearance before Zambia, preclearance was more widely used in Zimbabwe, although the procedure is becoming more common along with Zambia's Customs Accredited Client Program, which now includes 18 clients accounting for 50% of the traffic.

(ii) At least 10 public agencies are located on each side of the border, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.
(iii) About 12 physical inspections of entering trucks per day are undertaken by the Zambia Revenue Authority (Customs), i.e., about 10% of all trucks.
(iv) Parking arrangements are haphazard on the Zambian side with numerous minor accidents in the parking area; further traffic after OSBP implementation may exacerbate the parking congestion problem.
(v) Commercial vehicles (e.g., trucks carrying goods from China such as clothes, agricultural equipment, construction equipment, and construction materials) frequently execute incorrect declarations and cannot pay for their violations. Customs seize the truck and the goods and ask the driver to pay the duties and a fine; they eventually reach a compromise, since otherwise the parking area would be utilized well beyond capacity. Customs blacklist these clients and undertake a more detailed inspection next time.
(vi) Both the Zambia and Zimbabwe Revenue Authorities use ASYCUDA ++ but to date there has been no electronic data interchange. Another bottleneck at Chirundu is the different levels of ICT development among border control authorities. For example, on the Zambia side, the Revenue Authority (Customs) is the most advanced, but some other authorities do not have any computers (e.g., Health, Police, Agriculture, Veterinary Department) and therefore are unable to share information with Customs electronically. Immigration has their own computer system, but Customs cannot access it. While Zimbabwe Customs is computerized, they have only one computer for their eight staff members and most other border control authorities are operating manually.

In order to reduce delays at the Chirundu border crossing, DFID and JICA have been jointly assisting development of a OSBP operation, which commenced on 5 December 2009. In view of the geography of the site, with the Zambezi river separating the two countries, a model involving juxtaposed facilities on both sides was selected, with both countries' authorities each processing traffic in the country of entry (i.e., northbound traffic processed in Zambia and southbound traffic processed in Zimbabwe).

While DFID has assisted actual procedures as well as facilities and ICT, JICA has undertaken the legal and training (other than ICT training) components. Although (as mentioned) in 2002 JICA constructed the new bridge, DFID repaired the old bridge and also has been responsible for partitioning the building on the Zimbabwe side to provide office accommodation for Zambian officials, constructing access roads to the old bridge, providing fencing, and constructing a clearing booth on the Zambia side so that drivers need not come out of their vehicles. Also, DFID has been "delivering" procedures and will upgrade ICT in three phases, starting with a wireless link by which each country's authorities can access its server on the other side of the border, and later laying a fiber optic cable to deal with security and reliability concerns, and finally establishing a "community" system to interrelate all IT systems.[5]

With JICA assistance,[6] the legal framework for the operation of a OSBP at Chirundu was established well in advance of implementation. A Bilateral Agreement between the Government of the Republic of Zimbabwe and the Government of the Republic of Zambia Concerning the Establishment and Implementation of a One-Stop Border Post at Chirundu was signed in August 2008. A Zimbabwean domestic law covering extraterritorial application of relevant legislation

[5] The ICT component provided by DFID has not included computers to the extent desired/required by stakeholders, which may present an opportunity for JICA or other development partners.
[6] DFID notes that it also supported the legal component for Chirundu, e.g., by assisting a multisectoral committee in Zambia in preparing the final drafts of the legal instruments.

and application of criminal law was enacted in 2007, while similar legislation was enacted by Zambia in 2008.[7]

A number of challenges remain at Chirundu, e.g., the need for further implementation of risk management, the need for integrated border management reducing the number of agencies at the border, further ICT development, development of a structured way of sharing equipment (e.g., scanners, forklifts). Offices that become redundant with OSBP implementation may be rented to the private sector. Also, a number of community development issues remain, which may be addressed by a Border Community Integrated Development Program identified by JICA to improve living and working conditions of the community through the empowerment of local residents; indeed, combining infrastructure provision with social development programs may be an approach applicable to OSBP projects.[8]

The major lessons from the Chirundu experience include: (i) the need for a consultative approach, including the private sector; (ii) the importance of having the legal framework in place before discussing other matters; (iii) the need for effective information dissemination to assure people that the OSBP will be beneficial; and (iv) the difficulty of fitting an OSBP into existing rather than newly constructed buildings.

2. Kazungula[9] (Botswana/Zambia(/Zimbabwe), North–South Corridor

Kazungula is located on the Zambezi River about 65 km upstream of Victoria Falls. Three international boundaries converge at Kazungula, with the boundary between Zambia and Namibia and that between Zambia and Zimbabwe demarcated by the center of the Zambezi River, while the boundary line between Botswana and Namibia is demarcated by the center line of the Chobe River, which flows into the Zambezi River upstream of an existing ferry line.

Border crossing traffic at Kazungula is moderate with 115 trucks, 79 private cars, and 9 buses per day (2008). An approximate doubling of the truck traffic is forecast by 2015. Average border crossing delays at Kazungula are reported to be about 1.0–2.5 days with some delays as long as five days, which was reported as the previous average waiting time at this border crossing. Some transporters that have traditionally used this crossing have reportedly switched to Wenela/Katima Mulilo (Sesheke) (Zambia/Namibia, Trans Caprivi Corridor), particularly the refrigerated trucks transiting to DRC with frozen fish, poultry, and other food products.

The width of the ferry (pontoon) crossing ranges from about 450 m (low flow season) to 700 m (flood season). Three ferries owned and operated by the Government of Zambia are operated at this crossing. Ferry charges range from USD 20 to USD 120 depending on the size of the vehicle. The dock area is often under water in the rainy season, which reduces transport capacity; the waiting time for the pontoon service is 3-4 hours.

[7] Zimbabwe could enact OSBP legislation quicker than Zambia because Chirundu is mainly of significance to Zimbabwe for transit traffic, so its risk of lost revenues is not that great, However, since Chirundu is Zambia's largest port in terms of revenue collection, they had to take a more cautious approach; therefore, it took some time to "unlock" concerns regarding revenue as well as control and security issues.

[8] In February 2010, the World Bank informed the JICA Study Team that the World Bank would be "taking over" assistance at Chirundu, including, ICT, change management training, performance assessment monitoring, and a "community platform".

[9] This section draws from: (i) a site visit to Kazungula (Zambia; time did not permit a visit to the Botswana side across the river) on 3 October 2009, including an interview with Mr. Mulenga C. K., Station Manager, Zambia Revenue Authority, Customs and Excise Division, Kazungula Border Station Manager; (ii) an interview with Mr. Bregnel Mhango (Transport Infrastructure Advisor), Southern African Development Community (SADC), 15 October 2009; and (iii) and an interview with Mr. Andries Louw, Team Leader, Consultancy Services for the Proposed Kazungula Bridge Facility, Egis BCEOM, 2 October 2009.

Operational issues at Kazungula currently include the following:

(i) The border is open from 6 AM to 6 PM, which suggests scope for more efficient operations even before construction of a planned bridge.
(ii) At least 10 public agencies are located on the Zambian side of the border (and close to 10 on the Botswana side), which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.
(iii) The Zambian Revenue Authority has begun to implement more sophisticated risk management procedures, with accredited clients and post-clearance audit procedures.
(iv) There is a need for a separation of traffic flows for transport and trade facilitation.
(v) The border post on the Zambian side is almost impassable during the rainy season due the lack of paved surfaces.
(vi) While Zambia has enacted a generic law for OSBP implementation in connection with the Chirundu OSBP project, Botswana lacks such a law. Also, a bilateral agreement for OSBP implementation will need to be negotiated between Botswana and Zambia.
(vii) While both Botswana and Zambia use ASYCUDA ++, there is not currently a systems interface between the two countries.

The Governments of Botswana and Zambia have signed a memorandum of understanding on the development of a Kazungula Bridge, to include new border crossing infrastructure. The MOU expressly stated the desire of the two countries to operate a OSBP at Kazungula. Recent developments at Kazungula include the ongoing feasibility study and preliminary design of a Kazungula bridge, assisted by AfDB, with the project to include: (i) the design and construction of a fixed road and rail bridge to replace the existing ferry, and construction of OSBP facilities on both sides along with associated trade and transport facilitation measures[10]; (ii) an ongoing study on bridge financing options; and (iii) establishment of a Botswana/Zambia Project Steering Committee. The Kazungula Station Manager on the Zambia side expressed concern that the work on infrastructure, buildings, and the laws was proceeding in isolation.[11]

The construction cost for the Kazungula bridge was estimated at USD 80 million including rail, plus USD 16 million for border posts on each side (a total of USD 32 million, excluding the costs of ICT and inspection equipment); the approach road would cost an additional USD 6 million. However, SADC has asked the consultant to scale down the OSBP cost component without compromising its efficiency. There are three alternative border crossing points (Chirundu, Kazungula, and Katima Mulilo, the last-named near a bridge completed in 2004 with German assistance). An issue is that if traffic is diverted to Chirundu, there may not be a need for Kazungula for 10 years, although Kazungula may be preferred eventually.

While AfDB is financing the ongoing feasibility study and preliminary design for the Kazungula bridge project, including OSBP components, there is considerable scope for Japanese assistance for all aspects of the work at Kazungula, under co-financing arrangements with AfDB.[12]

[10] See, e.g., *Conceptual Statement on One-Stop Border Facilities at Kazungula*, August 2009, p. 30 covers operational principles for the OSBP.
[11] E.g., the OSBP is being considered from the structural point of view, but not from the point of view of process; if a truck is rejected at Customs, it must enter the country before returning as there is no space to turn around.
[12] It was suggested that in the short term the Government of Japan could assist the Zambia Revenue Authority with equipment, including computers, and scanners, and with training, not only for Customs, but also for other border control agencies and the private sector (e.g., clearance agents, transporters).

3. Beitbridge[13] (South Africa/Zimbabwe, North–South Corridor)

Beitbridge is one of the heaviest trafficked (according to some sources, the most heavily trafficked) border crossing in the Southern Africa region (and busier than any border crossing in East Africa), with a total of 287 trucks and 72 passenger vehicles per day (2009, although one source cited a figure as high as 600 trucks per day), which is far beyond the current capacity of existing infrastructure/facilities. Delays at Beitbridge are typically 1-2 days but can be up to 3 days due to limitations in border processing capacity. Traffic growth at this border crossing can be expected to be rapid as political and economic conditions normalize in Zimbabwe; FESARTA has forecast a doubling of this traffic by 2012. While about 75% of the northbound traffic through Beitbridge is transit traffic to Zambia, DRC, and Malawi, it is expected that the proportion of transit will decrease as the economy in Zimbabwe improves.

Infrastructure issues at Beitbridge with respect to the bridge itself may be summarized as follows:

(i) the capacity of the existing (two-lane) bridge is limited, since several lanes of traffic (including commercial freight vehicles, private vehicles, and buses) converge into a single lane to cross the bridge in each direction;
(ii) due to congestion at the bridge, traffic is permitted to cross in only one direction at a time, in batches separated by vehicle type;
(iii) when abnormal loads cross, all other traffic must stop; and
(iv) there is a lack of an emergency lane, except on the old bridge, which is of uncertain structural condition.

Issues with the border crossing facilities/infrastructure at Beitbridge include:

(i) the shortage of parking bays on the South African side (only 70 are available), and the lack of space for expansion;
(ii) a poorly designed one-way road system south of the South African border, which is inadequate to cope with current traffic volumes; and
(iii) positioning of the scanner on the Zimbabwe side too close to the border, exacerbating congestion as southbound vehicles queue.

Specific operational issues at the Beitbridge border crossing include:

(i) a large number of "windows" at the border (e.g., customs, immigration, port health, agriculture, veterinary, carbon tax);
(ii) the limited pre-clearing of cargo, particularly in the northbound direction, with preclearance through the South African Revenue Service (SARS) often taking several days;

[13] This report uses one word for "Beitbridge" (except when citing a source that uses it as two words in its title); some suggest that one word ("Beitbridge") should refer to the town/border crossing and two words to the bridge ("Beit Bridge"). This subsection draws from: (i) Transport Logistics Consultants, *Situational Analysis at Beitbridge Border Post between Zimbabwe and South* Africa, Draft Final Report, August 2009; (ii) *Memorandum of Understanding between the Governments of the Republics of South Africa and Zimbabwe on the Border Efficiency Management Programme at the Beitbridge Border Post*, 2009; (iii) Federation of East and Southern African Road Transport Associations (FESARTA), *Problem Issues and Potential Solutions for the Beit Bridge Border Post*, 2009; (iv) an interview with Mr. Barney M. W. Curtis, Director, Federation of East and Southern African Road Transport Associations (FESARTA), 23 November 2009; (v) an interview with Mr. Mark Pearson, Programme Director, Regional Trade Facilitation Programme, U.K. Department for International Development (DFID), 24 November 2009; and (vi) an interview with Mr. Bregnel Mhango (Transport Infrastructure Advisor), Southern African Development Community (SADC), Infrastructure and Services Directorate, 15 October 2009.

(iii) poor driver behavior (e.g., drivers do not park in the proper areas and are not always available when called to receive releases or move their trucks);
(iv) in spite of nominal 24-hour operation, insufficient movement of trucks across the border between 10 PM and 6 AM, with only a few Customs officials working after 5 PM and fewer after 10 PM;
(v) a lack of clear management structure on both sides of the border;
(vi) the lack of an official document setting out border crossing procedures;
(vii) the lack of a fast-track lane for empty vehicles and accredited vehicles/operators that have been pre-cleared and have completed all other payment systems;
(viii) increased use of "bakkies"[14] with trailers and other small vehicles, which block passenger terminals and create confusion;
(ix) congestion in the passenger terminal since most buses (about 60 per day) arrive at night;
(x) inadequate traffic control on the Musina–Beitbridge road and delays at weighbridges in Zimbabwe; and
(xi) inadequate implementation of a customs user accreditation system in South Africa and a lack of such an accreditation system in Zimbabwe.

While there is an existing bilateral agreement between South Africa and Zimbabwe for the Beitbridge border crossing, it does not adequately reflect the transport provisions of the SADC Protocol on Transport Communications and Meteorology. Further, since Zimbabwe is a member of both SADC and COMESA, there may be some confusion as Zimbabwe seeks to the conform to the requirements of two RECs. However, recently (2009) the two countries signed a memorandum of understanding for a border efficiency management program at Beitbridge seeking to address these issues.

Recent specific initiatives by development partners regarding Beitbridge include:
(i) a monitoring study sponsored by the Sub-Saharan Africa Transport Policy Program (SSATP);
(ii) a situational analysis sponsored by DFID's Regional Trade Facilitation Programme;
(iii) development of joint South Africa/Zimbabwe institutional structures (e.g., a Joint Border Operations Committee) to manage a border efficiency management project established at the operational, technical, senior official, and ministerial level; and
(iv) development of an action plan targeting April 2010 for the completion of border efficiency tasks and July 2010 for establishment of a OSBP.

Measures to be implemented at Beitbridge may include the following:

(i) construction of a new four-lane bridge, along with required access roads and building and parking facilities;
(ii) repair of the original bridge for use for emergency traffic;
(iii) an aligned and streamlined customs clearance process flow, along with legal, procedural, and administrative provisions for the implementation of a border efficiency management system between the two countries, to include Customs best practices;
(iv) implementation of a single window at the national level;
(v) implementation of a OSBP, most likely with clearance to be undertaken in the country of entry (i.e., northbound traffic to be cleared in Zimbabwe and southbound traffic to be cleared in South Africa);[15]
(vi) measures to promote the use of pre-clearance procedures;
(vii) measures to improve driver behavior;

[14] A bakkie is a small pickup truck or van.
[15] Considering the sovereignty issues raised by OSBP implementation, some advocate focusing efforts at Beitbridge on the implementation of a border efficiency management program rather than a OSBP.

(viii) adequate staffing for true round-the-clock border operation;
(ix) modernization of the existing bilateral agreement;
(x) improvement of the management structure on each side of the border;
(xi) movement of the Zimbabwe scanner away from the border;
(xii) moving informal transport away from the border to reduce congestion;
(xiii) rescheduling of bus operations to reduce nighttime congestion at the passenger facility; and
(xiv) further development of the authorized economic operator (AEO) scheme in the two countries.

While DFID has actively extended assistance for Beitbridge and expects to continue to do, Japanese assistance could complement DFID assistance, e.g., with respect to infrastructure/ facilities, legal aspects, and training. One constraint is that South Africa may intend to pilot a OSBP at Lebombo/Ressano Garcia before rolling out the concept out at other border crossings. Nevertheless, there is considerable scope for improving efficiency at Beitbridge even maintaining it as a two-stop border post.

4. Kasumbalesa[16] (DRC/Zambia, North–South Corridor)

Traffic at Kasumbalesa likely includes about 350 trucks per day.[17] Most trucks entering or exiting the DRC's Katanga province are transiting Zambia. Transshipment at the border is the norm. Data from the private sector and other sources indicate average dwell time at the border to be 1.5–3 days.

A recent review of the current facilities at Kasumbalesa found that on the Zambia side:

(i) The office buildings at Kasumbalesa were constructed before 1970 according to the layout of most Zambian border posts, with one building providing office space for Customs, Immigration, and the Office of the President, as well as the Ministry of Health (and the Zambia State Insurance Company). Exiting traffic passes through Customs followed by Immigration and Health, while entering traffic passes through Health, Immigration, Insurance, Customs, and the Road Transport and Safety Agency (RTSA). The review found that "[t]his fully utilizes the current offices at Kasumbalesa Zambia therefore making them inadequate for use in an OSBP atmosphere".[18] However, other border control agencies (e.g., Police, RTSA) are located outside of this office.
(ii) Since there is no parking space for trucks or buses, they park along the road, which reduces road capacity and limits access to the border gate. There are 10 parking spaces for passenger cars outside the Customs and Immigration office.
(iii) There is limited water supply at Kasumbalesa.

However, the review also found that:

(i) "[U]ltra modern integrated office infrastructure"[19] is planned for Kasumbalesa integrating all border agencies in one facility, with development to be based on a

[16] This subsection draws from: (i) *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, U.K. Department for International Development, 2009, pp. 34–55; (ii) an interview with Mr. Whytone Ngulube, Director of Buildings, and Mrs. Amatende, Chief Architect, Building Department, Ministry of Works and Supply (30 September 2009); and (iii) an interview with Mr. Muyangwa Muyangwa, Commissioner, Customs Services, Zambia Revenue Authority (1 October 2009).
[17] One estimate of 40 trucks per day may be discarded as a likely outlier.
[18] *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, U.K. Department for International Development, 2009, p. 35.
[19] See source in previous footnote, p. 36.

public-private partnership (PPP) agreement signed between the Government of Zambia and a concessionaire (Baran Trade and Investment) in July 2009 following a memorandum of understanding signed in December 2008. The concession is for 20 years with a possible extension of five years subject to a performance assessment to be undertaken by Government of Zambia. The construction period is expected to be 18 months and the cost has been reported to be USD 20 million in news media accounts.

(ii) The infrastructure to be constructed includes: (a) a freight terminal with space for Customs and Immigration; (b) parking for 15 buses and 150 trucks, as well as space for passenger cars; (c) a passenger control terminal with booths for Customs, Immigration, and other facilities; and (d) offices for the Veterinary Department, Drug Enforcement, RTSA, Police, Health, Agriculture, Office of the President, Zambia Bureau of Standards, and Environmental Council, as well as the private sector (e.g., customs clearing agents, insurance companies, banks).

(iii) Also, the OSBP concept is to be the "focal point" in the design of the new border facilities, which would operate as a juxtaposed facility.

The same review examined facilities on the DRC side at Kasumbalesa and found that:

(i) With assistance from the French Overseas Development Agency, the DRC is developing developed a new office complex to provide space for Customs, Police, Agriculture, Veterinary, Road Agency, and all other border agencies except for Immigration by the end of 2009. An electronic weighbridge, customs warehouses, physical examination areas, and a scanner area are also included in the complex. This "ultra modern integrated office infrastructure" is 7 km from the border and 94 km from Lubumbashi.[20]

(ii) Electronic toll gates are located about 5 km from the border.

(iii) There is an import terminal comprising an electronic weighbridge, offices for Customs, Road Agency, customs warehouses, physical examination areas, and a scanner area.

(iv) There is an export terminal on the other side including an electronic weighbridge and examination areas.

(v) Parking is available for 250 trucks with additional parking for passenger cars.

(vi) While this facility was not designed with the OSBP concept in mind, there will be sufficient space to implement a OSBP at this site if agreed by the two sides.

While infrastructure issues are being addressed at Kasumbalesa[21] a number of legal/operational issues remain:

(i) Border operating hours are only from 6 AM to 6 PM and require extension if the border crossing is to operate as a proper commercial facility.

(ii) At least 10 public agencies are located on the Zambian side of the border and 8 on the DRC side, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.

(iii) While Zambia has enacted a generic law for OSBP implementation in connection with the Chirundu OSBP project, the DRC lacks such a law. Also, a bilateral agreement for OSBP implementation will need to be negotiated between Zambia and the DRC.

(iv) Both the DRC and Zambia Customs use ASYCUDA ++ but to date there has been no electronic data interchange.

(v) There are reportedly serious security issues at Kasumbalesa.

[20] See source in previous footnote, pp. 44-45.

[21] However, to the extent possible, it would be better to modify the buildings under construction to suit OSBP operation rather than wait for construction to be completed. COMESA, SADC, and EAC, *North–South Corridor: Progress Report and Way Forward, Paper Prepared for the North-South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, p. 44.

(vi) Recently, there has been a substantial increase in charges levied on foreign road transport operators in the DRC. Also, Katanga Province (DRC) has introduced a provincial income tax for transporters entering the province, and it is reportedly arbitrary in its application.

While the French government has extended assistance for Kasumbalesa (as noted above), DFID's RTFP recently undertook a situational analysis of this border crossing, and the Development Bank of South Africa (DBSA) has been asked to provide assistance at this border crossing, Japan could assist with the establishment of a cross-border ICT interface to improve the efficiency of border operations, establishment of the bilateral legal framework and the national legal framework in the DRC, document harmonization and procedure simplification, and specification and implementation of OSBP operational procedures.

5. Lebombo/Ressano Garcia[22] (South Africa/Mozambique, Maputo Corridor)

The Lebombo/Ressano Garcia border crossing is one of the busiest border crossings in Southern Africa, with the total number of trucks crossing per day estimated at 180 (FESARTA) to 200–300 (Maputo Corridor Logistics Initiative, MCLI interview)[23], to 455 by the road concessionaire (Trans African Concessions (Pty) Ltd).[24] FESARTA has estimated average border crossing time for freight traffic as ranging from 6–7 hours to one day. This border is also a busy crossing for passengers, with traffic estimated at 1,000 persons per day, but with peaks over 120,000 persons per day (around Christmas and Easter); the movement of passengers was facilitated by the implementation in 2005 of visa-free travel by nationals of the two countries. Passengers typically require 3–4 hours for clearance.

Border control facilities on both sides are inadequate to process the cross-border traffic.[25] The problem is compounded by a lack of space since the border crossing is situated on hilly/mountainous terrain and in the vicinity of a river. Specific problems include severe congestion at the passenger facility on the South African side as well as a shortage of parking, with trucks queued in the 100–200 m no-man's land".[26] The border is open from 6 AM to 10 PM, although clearance activities on the Mozambique side are said to slow down around 8 AM. There are about 10 agencies on each side of the border, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.

[22] This subsection draws from: (i) a site visit to Lebombo/Ressano Garcia, 20 November 2009 (a day on which there was heavy rain); (ii) an interview with Mr. Daniel Tovela, Executive Director of One-Stop Border Posts, Managing Director of Border Posts, and Southern Region Manager of Border Posts, and staff, Mozambique Customs (Autoridade Tributaria de Mozambique), 16 and 20 November 2009; (iii) an interview with Mr. Victor Nunes, Senior Manager, One Stop Border Posts, Border Control Operational Coordination Committee, South African Revenue Service, 24 November 2009, along with a 26 May 2009 PowerPoint presentation provided by Victor Nunes, (iv) an interview with Ms. Brenda Horne, Chief Executive Officer, Maputo Corridor Logistics Initiative, 19 November 2009, and a PowerPoint presentation provided by Ms. Horne; (v) Ms. Yuko Sakashita, NEPAD Infrastructure Policy Advisor, *Ressano-Garcia (South Africa/Mozambique) Border Facility Survey Report*, 9 September 2009 [in Japanese]; (vi) Luc de Wulf and Michel Zarnowiecki, *One Stop Border Post at Lebombo-Ressano Garcia*, 9 July 2009; (vii) an interview with Mr. Barney M. W. Curtis, Director, Federation of East and Southern African Road Transport Associations (FESARTA), 23 November 2009; (viii) Corridor Development Consultants, in consortium with DB Consulting, David Arkwright, and Geocarta Namibia, *Study on the Corridor Spatial Development Initiative*, prepared for the Southern African Development Community Secretariat, 2007; and (ix) *Legal Issues Related to the Operationalization of the Lebombo-Ressano Garcia One-Stop Border Post*, prepared for the Regional Trade Facilitation Programme (RTFP), UK Department for International Development, October 2009.

[23] An estimate citing a Maputo Corridor Logistics Initiative Study was reported as high as 1,500 trucks per day, although this estimate seems to be an outlier.

[24] With a total of 2,882 vehicles per day, including light vehicles. Email from Ms. Brenda Horne, MCLI, 9 March 2010.

[25] All South African border facilities, including those at Lebombo, were constructed prior to 1994, during the apartheid era, and hence their purpose was more to keep people out than to facilitate trade and transport.

[26] "No-man's land" in this report refers to an area in which land use is restricted, as opposed to an area under dispute.

Another current operational issue is the incompatible ICT systems used by the respective Customs authorities (i.e., the Customs Automated Processing of Entries System or CAPE in South Africa, and the Trade Information Management System or TIMS, developed by Crown Agents, in Mozambique).

As far back as 1997, the Ministers of Transport of South Africa and Mozambique agreed that a OSBP should be developed at Lebombo/Ressano Garcia, and a Protocol was signed in 1998. However, there was a delay in implementation as it was difficult to reach consensus on the concept/design/systems of a OSBP, within each country and between the two countries. Then in 2006 the respective heads of state of South Africa and Mozambique expressed their firm political will to open a OSBP in the near future. A 9-page, 22-article Agreement between the Government of South Africa and the Government of the Republic of Mozambique on a Combined Border Post on the South Africa-Mozambique Border was signed on 18 September 2007. This bilateral agreement is not self-executing, but rather is limited to setting out the broad principles for a OSBP. With the assistance of DFID's RTFP, seven draft annexes to provide the detailed legal basis to implement the bilateral agreement were drafted.[27] Also, various working groups (infrastructure, legal, management and finance, operational procedures, ICT, safety and security, human resources) have been established on both sides and bilaterally to work toward OSBP implementation at Lebombo/Ressano Garcia.

Key elements of the OSBP concept envisaged[28] for Lebombo/Ressano Garcia include the following:

(i) separate facilities to be provided for processing freight and commercial traffic;
(ii) passenger traffic to be processed at a new facility straddling the border;
(iii) freight traffic to be processed at a site 4 km from the border in Mozambique territory (so-called Km 4), with concerned authorities of the two governments to be present at the operational stage[29];
(iv) a dedicated, secure road linking Km 4 with the border (now expected to be 8 km long, considering the steep terrain and land mine issues);
(v) a joint pedestrian facility with access from both Mozambique and South Africa outside the current port area, to be in operation before December 2009; and
(vi) rail passenger traffic to be processed at a new rail facility on South African territory.[30]

The South African Department of Public Works (DPW) has recently (2009) estimated a total cost of ZAR 1.9 billion (JPY 22 billion equivalent/USD 260 million equivalent at the November 2009 exchange rate),[31] up from previous estimates of ZAR 600 million, for this "three-location, one-stop border post" project. However, the South African National Treasury advised the Medium-Term Expenditure Framework (MTEF) that only ZAR 133 million was available for 2008/2009, ZAR 133 million for 2009/10, ZAR 166 million for 2009/10, and ZAR 70 million for 2010/11, with an additional ZAR 300 million recommended for 2011/12, leaving a shortfall of ZAR 800 million.

[27] These cover: (i) Definitions, Governance, Funding and General Provisions; (ii) Powers and Duties of Officers and Employees; (iii) Operations; (iv) Facilities Management; (v) ICT; (vi) Safety and Security; and (vii) Infrastructure.
[28] Interestingly, the two countries already practice one-stop inspection during peak (passenger) traffic periods, i.e., during the festive seasons. However, there is no clear legal basis for this practice.
[29] The Government of Mozambique has relocated 51 families from this area at a cost of about USD 2 million equivalent.
[30] However, international best practice would be the process rail passengers on the train, e.g., as done in Europe decades ago and as done currently between Tanzania and Zambia on the TAZARA line.
[31] About 20% of the cost is for land reclamation, a relatively high proportion as a result of the difficult terrain in the area.

The South African DPW plan includes three phases as shown in the following box:

Three-Phase OSBP Plan of the South African Department of Public Works

Phase 1: Upgrading of Lebombo Border Post for 2010
- separation of traffic (light vehicles; freight; buses and pedestrians)
- estimated cost reduction to R309m
- design allows for later incorporation of the OSBP.

Phase 2: Upgrading the Ressano Garcia Border Post for 2010
- subject to negotiations on land agreements between the two countries
- estimated cost reduction to R128m
- design allows for incorporation with Phase 1
- design allows for later incorporation of the OSBP.

Phase 3: Finalization of Designs and Construction for OSBP
- includes freight facility and main border post
- rail facility for later development.

Source: Border Control Operational Coordination Committee, South African Revenue Service

Current outstanding issues include the following:

(i) While the signed bilateral agreement has been ratified and gazetted by Mozambique, it has not (yet) been ratified by South Africa.
(ii) The draft annexes to the bilateral agreement, prepared with DFID/RTFP assistance, have not (yet) been agreed.
(iii) Both countries lack the required capital and operating budget for the project as currently envisaged.
(iv) There have not yet been any formal agreements over land ownership/utilization rights between the two countries.
(v) The lack of committed, skilled human resources in the various working groups is an additional problem.
(vi) There has been a lack of formalized outcomes and deliverables from the working groups relating to operations/management issues that should have informed the design and construction of the OSBP.
(vii) There remains a continuous struggle to have the private sector included in the planning process and to be continuously involved in a stakeholder engagement process.[32]

While DFID/RTFP has provided substantial assistance for the development of the legal framework for Lebombo/Ressano Garcia (although the complete legal framework has not yet been agreed by the parties), and has supported the working groups, with the winding down of the RTFP in October 2009 (to be replaced by the TradeMark Southern Africa program),[33] there may be some scope for Japanese assistance for this OSBP project. However, it will be necessary to find a more cost-effective model to achieve OSBP objectives, focusing on policies, processes, and procedures, in addition to infrastructure. Also, before the Government of Japan could assist this OSBP project, a master plan as well as detailed plans and feasibility studies for each phase

[32] This paragraph draws from: (i) an interview with Mr. Victor Nunes, Senior Manager, One Stop Border Posts, Border Control Operational Coordination Committee, South African Revenue Service, 24 November 2009, along with a 26 May 2009 PowerPoint presentation provided by Victor Nunes; and (ii) an interview with Ms. Brenda Horne, Chief Executive Officer, Maputo Corridor Logistics Initiative, 19 November 2009, and PowerPoint presentation provide by Ms. Horne.

[33] In addition, the World Bank is assisting improvement of the road to Ressano Garcia.

must be properly prepared, with full financial and economic justification (including presentation of the "business case"), along with a comprehensive social and environmental impact assessment.[34] One constraint for the respective governments may be the time required for such a study; however, it is important to recognize that long-lasting achievable results (beyond certain attainable "quick wins") will come after 2010 (i.e., after the World Cup, a deadline which has been driving decision making in South Africa).[35]

6. Wenela/Katima Mulilo (Sesheke)[36, 37] (Zambia/Namibia, Trans Caprivi Corridor)

Wenela/Katima Mulilo is one of the most lightly trafficked borders examined, with traffic of 20–25 trucks per day (2008–09). However, traffic has been increasingly rapidly since opening in 2004 of a German-assisted 877 m bridge on the Zambian side located within 1 km of the border; in the first two years after opening of the bridge, traffic from Namibia to Zambia increased by 79%, traffic from Zambia to Namibia increased by 48%, and northbound transit increased by 81%. Considering rapid growth of the economies of Zambia and eastern DRC, especially with growth in copper, agricultural commodities, and general consumer goods traffic, a demand forecast for this border indicates potential traffic of 90 trucks per day by 2012. Time spent at the border is currently estimated at about 1–3 days.

In the last two years, new building/road/parking infrastructure has been constructed on both sides, largely taking into account the requirements for OSBP operation, especially on the Zambian side. However, when visited in October 2009, on the Zambian side, although the base and sub-base had been prepared, the parking area had not been paved due to a lack of funds from the national government, and with the risk of losing the benefit of work completed during the impending rainy season.

Even with the completion of facilities and Wenela/Katima Mulilo, a number of legal/operational issues remain:

(i) The border is open from 6 AM to 6 PM, although the two countries are considering extending the operating hours to 8 PM.
(ii) At least 10 public agencies are located on the Zambian side of the border and 7 on the Namibian side, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.
(iii) Simplification of the visa process for truck drivers and harmonization of axle load enforcement are required.
(iv) While Zambia has enacted a generic law for OSBP implementation in connection with the Chirundu OSBP project, Namibia lacks such a law. Also, a bilateral agreement for

[34] Change management and business process engineering skills have also been mentioned as requirements.
[35] One concern is the relatively low intensity of South Africa's interest in Lebombo–Ressano Garcia, as it would promote the port of Maputo at the expense of competing South African ports. However, the Government of South Africa has decided that this OSBP project should be implemented first, even before one at Beitbridge.
[36] This subsection draws from: (i) Corridor Development Consultants in collaboration with Burmeister & Partners, *Study for Implementation of One Stop Border Posts: Katima Mulilo/Wenela (Namibia–Zambia) and Oshikango–Santa Clara (Namibia–Angola)*, funded by JICA and commissioned by the Southern Africa Development Community, 30 March 2007; (ii) an interview with Mr. Erick Shimumbwe, Station Manager, Katima Muluilo, Services Division, Zambia Revenue Authority; (iii) an interview with Mr. Whytone Ngulube, Director of Buildings, and Mrs. Amatende, Chief Architect, Building Department, Ministry of Works and Supply (30 September 2009); (iv) an interview with Mr. Muyangwa Muyangwa, Commissioner, Customs Services, Zambia Revenue Authority (1 October 2009); and (v) *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, U.K. Department for International Development, 2009, pp. 18–33.
[37] For clarification, Wenela is the border crossing point on the Namibian side, while Katima Mulilo is a Namibian town with a population of about 25,000 located 6 km from the border (Wenela); Zambia refers to their border post as Katima Mulilo; the border crossing is 10 km from the town of Sesheke.

OSBP implementation will need to be negotiated between Namibia and Zambia. Upon first review, the model bilateral agreement and law prepared by a March 2007 JICA-assisted feasibility study appears well drafted, but there are still some outstanding issues (e.g., regarding principles governing detention or return of people, goods, and vehicles).[38]

(v) While both Namibia and Zambia use ASYCUDA ++, there is not currently a systems interface between the two countries.

Recent developments at Wenela/Katima Mulilo include:

(i) completion of the OSBP feasibility study, funded by JICA, in March 2007;
(ii) undertaking of a situational analysis by DFID's RTFP;
(iii) assistance by the Swedish International Development Authority (SIDA) and the United Nations Conference on Trade and Development (UNCTAD), to identify "clusters" to coordinate trade and transport facilitation initiatives along the corridor;[39]
(iv) a memorandum of understanding expected to be signed by the transport ministers of DRC, Namibia, and Zambia, in Livingstone in February 2010; and
(v) a Walvis Bay–Ndola–Lubumbashi Corridor Management Committee to be fully established on 1 September 2010, with funding to be provided by AfDB from September 2010 to August 2013.

The March 2007 JICA-assisted feasibility study of OSBP implementation at Wenela/Katima Mulilo recommended a model involving juxtaposed facilities based on existing and planned facilities on both sides of the border. All procedures would be conducted in the country of entry, i.e., all procedures for northbound traffic would be conducted in Zambia, and all procedures for southbound traffic would be conducted in Namibia. Estimated costs (2007) for reconfiguration of existing facilities for OSBP operation were about USD 270,000 (JPY 25 million equivalent at late November 2009 exchange rates) on the Namibia side and about USD 450,000 (JPY 40 million equivalent at late November 2009 exchange rates) on the Zambia side.

While DFID, SIDA, and UNCTAD have extended assistance for Wenela/Katima Mulilo, the major effort to date has been the 2007 JICA-assisted OSBP feasibility study. Japan could further assist with finalization of the physical facilities, establishment of a cross-border ICT interface to improve the efficiency of border operations, establishment of the bilateral legal framework and the national legal framework in Namibia, document harmonization and procedure simplification, and specification and implementation of OSBP operational procedures.

7. Oshikango/Santa Clara[40] (Namibia/Angola, Trans Cunene Corridor)

Traffic at the Oshikango/Santa Clara border crossing is about 50 vehicles per day (2007). The majority of imports into southern Angola are from overseas transiting via Walvis Bay port.

[38] A number of additional although minor comments on the draft could be made, e.g., the agreement is stated as provisional, which means that after implementation the parties may revert to the previous situation (Article 2).

[39] The Trans Caprivi Corridor (TCC) Cluster was established in 2005, with UNCTAD assistance provided from November 2005 to January 2009. A Program Manager for the corridor was appointed in January 2008. SIDA support has been provided from February 2008 to January 2010.

[40] This subsection draws from: (i) Corridor Development Consultants in collaboration with Burmeister & Partners, *Study for Implementation of One Stop Border Posts: Katima Mulilo/Wenela (Namibia-Zambia) and Oshikango-Santa Clara (Namibia-Angola)*, funded by JICA and commissioned by the Southern Africa Development Community, 30 March 2007; (ii) an interview with Mr. Hans Garoeb, Deputy Director: Operations, Customs and Excise Department, Ministry of Finance (11 November 2009); (iii) an interview with Mr. Johny M. Smith, Business Development Executive, Walvis Bay Corridor Group, 11 November 2009; (iv) an interview with Mr. Mr. D. M. Uys, General Manager, F. P. du Toit Transport (12 November 2009); and (iv) an interview with Mr. Bregnel Mhango (Transport Infrastructure Advisor), Southern African Development Community.

There is potential for traffic growth as the economy of Angola continues to recover, considering the poor state of roads and bridges linking southern Angola with Luanda port, which is heavily congested. Cargo volumes along this corridor have increased by more than 100% per annum over the last three years.

Waiting times at the border are anecdotally reported to be average about 3–5 days, but in some cases take 10 days or longer. Data from one freight forwarder indicate that for traffic from Namibia to Angola standing time at the border comprises 53% of total transit time and adds about 30% to the cost of the transport operation.

While Namibian border control authorities extended their building at Oshikango a few years ago and there is a good inspection bay within the control zone, the Angolan facility at Santa Clara consists of various temporary structures along with Trade Information Management System (TIMS) and bank facilities about 300 m from the border. There is a 30 m "no-man's land" between the two countries. Angola is reported to have a plan for constructing a new building at the border, but the details of the plan were unavailable to the team conducting a JICA-assisted (pre)feasibility study in 2007.[41]

A number of operational constraints are reported at the Oshikango/Santa Clara border crossing, some stemming from cultural differences between the two countries. These include language differences (English in Namibia and Portuguese in Angola), differences in legal systems, a serious corruption problem in Angola, and incompatible ICT systems used by the respective customs authorities (i.e., ASYCUDA +++ in Namibia and TIMS, developed by Crown Agents, in Angola). The border is open for less than half a 24-hour day, from 8 AM to 6 PM, which also creates inefficiencies.

The JICA-assisted (pre)feasibility study drafted a model OSBP bilateral agreement and law for Oshikango/Santa Clara similar to although not identical to that for Wenela/Katima Mulilo. Upon first review, the model bilateral agreement and law appear well drafted, but there are still some outstanding issues (e.g., regarding principles governing detention or return of people, goods, and vehicles), as noted above. Adoption of a OSBP law in Angola may be simpler than in Namibia in that the power to enact laws in Angola resides not only in the National Assembly, but also in the Council of Ministers (the Cabinet).

While the JICA-assisted (pre)feasibility study was completed in March 2007, implementation awaits funding, the establishment of an institutional structure, and adoption of an action plan. A bilateral meeting facilitated by SADC was held at Ongwediva, Namibia, on 2–3 November 2009 to establish a Namibia–Angola Forum along the Trans Cunene Corridor; the next meeting is to be held in Lubango, Angola, in February 2010. The USAID Southern Africa Global Competitiveness Hub has shown some interest in supporting the project, although USAID's Regional Economic Growth Office of Southern Africa is considering interventions over the next five years, and their recent focus on transport/trade facilitation may shift toward food security and climate change.[42]

[41] This study was conducted concurrently with the feasibility study for OSBP implementation at Wenela–Katima Mulilo.

[42] However, while the USAID focus may change, they may pursue similar initiatives, e.g., OSBPs to facilitate cross-border flows of agricultural products.

8. Trans Kalahari[43]/Mamuno[44] (Namibia/Botswana, Trans Kalahari Corridor)

Traffic is relatively light at the Trans Kalahari/Mamuno border crossing with about 60 trucks per day. However, since the growth rate in cargo tonnages in recent years has been 35–50%, and continued high traffic growth is expected along the Trans Kalahari Corridor, its future importance may be considered greater than its present importance.

A Trans Kalahari Corridor Management Committee Secretariat was established in 2001. Implementation of a OSBP at Trans Kalahari/Mamuno was agreed to in Article 2.2 of the Memorandum of Understanding among Botswana, Namibia, and South Africa on the Development and Management of the Trans Kalahari Corridor (TKMC MOU), signed in 2003.[45] Further, Trans Kalahari/Mamuno is one of the eight border crossing pairs identified for OSBP implementation under an initiative of the Southern Africa Customs Union (SACU).

Operations at Trans Kalahari/Mamuno are relatively efficient at present, with processing time having already been reduced from four hours to generally less than one hour on each side. Border operating hours have been gradually extended, and the border has been open from 7 AM to 12 midnight since December 2007 (with this adjusted during winter when Namibia moves to daylight savings time, to assure coordination of hours with Mamuno on the Botswana side)[46]; 24-hour operation is targeted by 2010.

The physical facilities on both sides were constructed 10–15 years ago and are in relatively good condition. The Namibian side has adequate inspection facilities for the two sides, although additional storage space is required (the current storage space is inadequate).

Both countries' Customs administrations use ASYCUDA ++, but a network challenge remains (e.g., Botswana Unified Revenue Service, BURS, officials are unable to log onto the system operated by the Namibian Customs administration; a third-party ICT solution, including all three corridor countries, i.e., also including South Africa, is now under consideration by TKMC).
The August 2008 feasibility study prepared a draft (model) bilateral agreement and domestic law for consideration by the two countries; these are similar to those proposed in other JICA-assisted OSBP feasibility/(pre)feasibility studies (e.g., Wenela/Shesheke, Oshikango/ Santa Clara). The JICA study team was informed that on the Botswana side the agreement and model law have been under the scrutiny of the country's Ministry of Justice; similar efforts are ongoing in Namibia. Again, upon first review, the model bilateral agreement (prepared by the same consultant as that for Wenela/Katima Mulilo and Oshikango/Santa Clara), appears well drafted, but there are still some outstanding issues, as noted above.

[43] Trans Kalahari is the new name of the Namibian border post; Buitepos (meaning "outpost" in Afrikaans) is no longer the formal name).

[44] This subsection draws from: (i) Corridor Development Consultants, *Feasibility Study of Establishing One Stop Border Posts on the Trans Kalahari Corridor (Botswana-Namibia)*, funded by the USAID Southern Africa Global Competitiveness Hub and commissioned by the Trans Kalahari Corridor Management Committee, 20 August 2008; (ii) an interview with Mr. Hans Garoeb, Deputy Director: Operations, Customs and Excise Department, Ministry of Finance, 11 November 2009; (iii) an interview with Mr. Bevan S. Simataa, Executive Director, Trans Kalahari Corridor Secretariat, 9 November 2009; (iv) an interview with Mr. Johny M. Smith, Business Development Executive, Walvis Bay Corridor Group, 11 November 2009; (v) a site visit to Trans Kalahari/Mamuno on 13 November 2009, including interviews with (a) Ms. Linda Shailemo, Senior Customs Officer, Trans Kalahari Border Post; and (b) Ms. Patronella Zakaapi, Principal Customs Officer, Botswana Unified Revenue Service (BURS), Mamuno Border Post); and (vi) an interview with Mr. Bregnel Mhango (Transport Infrastructure Advisor), Southern African Development Community (SADC), Infrastructure and Services Directorate, 15 October 2009.

[45] Botswana and South Africa have also agreed to implement a OSBP at Pioneer Gate/Skilpadshek after implementation of Trans Kalahari/Mamuno.

[46] Botswana and South Africa extended their border operating hours to 12 midnight at the same time.

Pursuant to the 2007 TKMC MOU, additional ongoing transport facilitation efforts along the corridor, at various stages of implementation, include: (i) movement toward implementation of an integrated bond guarantee arrangement; (ii) application of risk management techniques for selective inspection of goods; (iii) accreditation/registration of corridor users; (iv) development and implementation of a service charter between Customs and stakeholders; (v) the use of a single administrative document (SAD); (vi) standardization of weighbridge equipment along the corridor; (vii) harmonization of road traffic laws along the corridor; (viii) harmonization of driver training/testing/licensing; (ix) strengthening security of freight along the corridor to comply with international requirements; and (x) establishment of a data and information collection and dissemination system for corridor performance monitoring.

Recent initiatives by development partners regarding the Trans Kalahari/Mamuno border crossing include:

(i) completion of the feasibility study sponsored by the USAID Southern Africa Global Competitiveness Hub and commissioned by the Trans Kalahari Corridor Management Committee, in August 2008;
(ii) completion of related studies, also sponsored by the USAID Southern Africa Global Competitiveness Hub and commissioned by the Trans Kalahari Corridor Management Committee, including (a) TKC Authorized Economic Operators Based Accreditation Scheme (March 2009), (b) Development of Trans Kalahari Clients Services Charter (May 2009); (c) Study on Sustainable Funding of Corridor Management Institutions: The Case of the Trans Kalahari Corridor Management Committee Secretariat (June 2009); and (d) Study on Development and Establishment of a Corridor Performance Monitoring System for the Trans Kalahari Corridor (June 2009).

While USAID has actively extended assistance for Trans Kalahari/Mamuno, as noted above, USAID's Regional Economic Growth Office of Southern Africa is currently considering interventions over the next five years, and their focus may move from transport/trade facilitation to food security and climate change.[47] Accordingly, it is possible that Japanese assistance could build upon USAID's accomplishments to date, carrying forward the various regulatory/ operational/procedural initiatives supported by USAID (to the extent that USAID refocuses its assistance), while also assisting the development of physical facilities.

The August 2008 feasibility study found that the Trans Kalahari/Mamuno border crossing can be converted to OSBP operation with relatively minor adjustments compared to other border crossings although some infrastructure/facilities improvements will be required. As proposed in the feasibility study, the border would be operated with juxtaposed facilities using existing buildings, with the Namibian facility to handle all commercial traffic (in both directions) and the Botswana facility (which is more user friendly for passengers) to handle private cars, buses, and pedestrians (in both directions). A dedicated lane for authorized economic operators (AEOs) is recommended. An adjustment in the current office space on the Namibian side will be required to accommodate Botswana officials (as well as an expected increase in the number Namibian officials, corresponding to a planned increase in customs staff nationally) – this may be possible within the existing structure. Traffic flows will need to be adjusted to allow vehicles to bypass the facilities in one country and proceed directly to the designated facilities in the other country (with adequate fencing provided so that there can be no exit until the procedures are completed). Additional requirements include an expanded searching bay, equipment for offloading (e.g., forklifts), and expanded storage facilities (at present, storage space is inadequate, even for detained goods for the Namibia side, even leaving aside the Botswana's

[47] However, as noted, while the USAID focus may change, they may pursue similar initiatives, e.g., OSBPs to facilitate cross-border flows of agricultural products.

sides requirements if both sides inspect freight traffic on the Namibia side as is planned). Further, it has been suggested that a new weighbridge to be installed on the Namibia side be installed at the border, rather than at Gobabis (113 km from the border) as planned. Also, as noted above, ICT improvements are required to allow for the transfer of data between the respective Customs authorities; the Trans Kalahari Corridor Management Secretariat is currently working to improve the systems interface between Namibia and Botswana. In addition, staff accommodation for officials may be an issue when round-the-clock hour operation is implemented.

"First-order" cost estimates in the feasibility study totaled NAD 31.7 million, equivalent to JPY 356 million (and USD 4.10 million) at late November 2009 exchange rates.

After completion of the August 2008 feasibility study, national workshops were held in Namibia and Botswana in September 2008. After the workshops the countries agreed to move forward with national consultations. Each country has since moved to identify their lead agencies in the respective Ministries of Finance, where Namibia Customs/BURS reside. Each country is now assessing the findings of the feasibility study and establishing its respective conditions for negotiations. The first bilateral negotiation meeting to present country positions on issues raised in the feasibility study was to be held on 9–10 November 2009 in Namibia, but has been tentatively postponed to the first week of February 2010.

9. Mwami[48]/Mchinji[49] (Zambia/Malawi, Nacala Corridor)

Traffic is relatively light at the Mwami/Mchinji border crossing, with one source indicating an average of only 25 trucks per day, while another source indicated traffic of 80 trucks per day during the peak season (June to November). Zambia's principal exports through Mwami/Mchinji are tobacco and cotton (and maize when it is not banned by sanitary-phytosanitary authorities); Zambia's principal imports through this border crossing are timber, rice, and cement clinker. The border itself has been referred to as chaotic, with many informal traders. There is only 200 m between border gates, and the weighbridge for the Zambia side is located between border gates. Processing time at this border crossing has been reported to be about one hour. There is also inadequate border fencing and thus the border posts are not secure, resulting in illegal crossings in and out of the two countries.

A recent review of the current facilities at Mwami, on the Zambia side, found that:

(i) The current buildings at the Mwami border post were constructed in 1976 with a single building hosting Customs, Immigration, and Office of the President. A single "window" is shared by Immigration, Customs, and Health. Other border control agencies (e.g., Police, RTSA) operate outside of this main building.
(ii) The only weighbridge in eastern Zambia is at Mwami; it is operated manually and was not working in mid-2009.
(iii) Parking is available for 15 vehicles.
(iv) Lighting is poor and certain parts of the 100–200 m[50] "no-man's land" at this land border are dark at night.

[48] The Mwami border crossing is sometimes (incorrectly) referred to as Chipata.

[49] This subsection draws from: (i) *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, U.K. Department for International Development, 2009, pp. 78–94; (ii) *Malawi Transport and Road Sector Project Formation Study Report*, 2007, pp. 54–57; (iii) an interview with Mr. Muyangwa Muyangwa, Commissioner, Customs Services, Zambia Revenue Authority, 1 October 2009; (iv) an interview with Mr. Frank S. Kufakwandi (Resident Representative/Country Manager) and Mr. Benson B. Nkhoma (Infrastructure Specialist), African Development Bank, Malawi Country Office, 5 October 2009; and (v) Japan International Cooperation Agency, *The Preparatory Study on Road Development Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique, Draft Final Report*, December 2009, p. 222.

The review also found that the Government of Zambia is planning an "ultra modern integrated medium size office infrastructure"[51] at Mwami with a combined passenger and freight terminal taking the OSBP operational requirements into account. While the size of the office proposed is smaller than the current one, its design will accommodate all border control agencies to work together in the same building. Parking space for 150 trucks, 15 buses, and passenger cars is to be provided, which seems to greatly exceed likely demand in the foreseeable future.

The same review examined facilities on the Malawi side at Mchinji and found that:

(i) The current office buildings at Mchinji were constructed in 2005 with assistance from the EU. There is a single office building providing space for all border control agencies operating at Mchinji except for the Police and Road Administration Authority. Although the office building was constructed only four years ago, available space is considered insufficient for OSBP operation.
(ii) Lighting is insufficient considering this border crossing is operated 24 hours.
(iii) The weighbridge is 12 km from the border at the site of the pre-2005 border post.
(iv) Staff housing is at Mchinji town, not at the border.

The project was notionally included in AfDB's [draft] appraisal report for the Nacala Road Corridor Project (with an expected investment of UA [Units of Account = SDR] 1.67 million (JPY 237 million or USD 2.66 million equivalent at late November 2009 exchange rates) in year 4 of the five-year project, it reportedly awaits completion of the Mchinji-Chipata rail line.

A number of legal/operational issues need to be addressed before or during implementation of a OSBP at Mwami/Mchinji:

(i) While border operating hours are generally round the clock, the border closes at 6 PM for commercial truck traffic.
(ii) At least 10 public agencies are located on the Zambian side of the border and 8 on the Malawi side, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.[52]
(iii) While Zambia has enacted a generic law for OSBP implementation in connection with the Chirundu OSBP project, Zambia lacks such a law. Also, a bilateral agreement for OSBP implementation will need to be negotiated between Malawi and Zambia.
(iv) While both Malawi and Zambia use ASYCUDA ++, there is not currently a systems interface between the two countries.

The Agreed Minutes for a Meeting on the Development of Beira and Nacala Corridors, Beira, 16 December 2008, stated in paragraph 12 that the parties would facilitate development of OSBPs at various locations, including Chipata (i.e., Mwami/Mchinji), applying the Chirundu model. More recently, a project steering committee for the Nacala Corridor has been established coordinated by the SADC Secretariat.

The Nacala Road Corridor Project, including the Mwami/Mchinji OSBP, is to be funded under the African Development Fund (ADF), with cofinancing from JICA, the EU, and the Japan Bank for International Cooperation. This medium-term OSBP project would offer an opportunity for Japan to assist various elements of OSBP implementation, e.g., facilities/ infrastructure, legal aspects, operational procedures, training/human resource development.

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[50] Before 2005 the Mchinji border post was 12 km from its current site virtually at the border.
[51] *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, U.K. Department for International Development, 2009, p. 80.
[52] The Millennium Challenge Corporation (MCC) sought to assist development of a single window in Zambia, but the requisite policy directive from the Government was not forthcoming.

10. Mandimba (Milange)/Chiponde (Muloza)[53] (Mozambique/Malawi, Nacala Corridor)

Cross-border traffic is very light at Mandimba (Milange)/Chiponde (Muloza), with the 2009–10 JICA Cuamba–Mandimba–Lichinga road feasibility study finding an average of less 6–7 trucks crossing the border per day in 2008,[54] plus an average of 13 passenger vehicles per day and 430 persons per day. The low traffic volume has been attributed at least in part to the poor condition of the road on the Mozambique side. The average border crossing time has been reported to be only 30 minutes. A distance of 1.8 km separates the two border posts, with Malawi nationals (although not Mozambique nationals) residing within the "no-man's land". The border posts on both sides operate from 6 AM to 6 PM.

Specific findings regarding infrastructure/facilities/operations at Mandimba on the Mozambique side follow:

(i) The 135m^2 border office building, which was constructed in 2004 with EU assistance,[55] includes office space for Customs and Immigration as well as space for an insurance company selling third-party motor liability insurance.
(ii) There is no surplus office space available to accommodate an increase in staff. However, sufficient land is available to expand the office space.
(iii) There are no designated parking spaces for commercial and passenger vehicles.

Regarding Chiponde on the Malawi side, findings include the following:

(i) The 250m^2 border office building, which was constructed with EU assistance in 2005 or 2007 (different years are stated in different sources), provides office space for Customs and Immigration. Additional space is available to accommodate staff increases.
(ii) While there are no designated parking spaces for commercial and passenger vehicles, parking is available on a former school yard.
(iii) The approach road is inadequate.
(iv) There is sufficient land available for office expansion, if necessary.

The Agreed Minutes for a Meeting on the Development of Beira and Nacala Corridors, Beira, 16 December 2008, stated in paragraph 12 that the parties would facilitate development of OSBPs at various locations, including Mandimba/Chiponde, applying the Chirundu model.

The 2009–10 road feasibility study concluded that while there is no urgency for an OSBP at Mandimba/Chiponde in view of the low present cross-border traffic volumes, two-phased development of juxtaposed OBSP facilities at Mandimba/Chiponde was justifiable, with the first phase in 2014 and the second phase in 2024. Operations may be split either based on traffic direction (with inspection in the country of entry) or based on traffic type. (e.g., with

[53] This section draws from: (i) Japan International Cooperation Agency, *The Preparatory Study on Road Development Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique*, December 2009; (ii) *Malawi Transport and Road Sector Project Formation Study Report*, 2007, pp. 54–57; (iii) an interview with Mr. Frank S. Kufakwandi (Resident Representative/Country Manager) and Mr. Benson B. Nkhoma (Infrastructure Specialist), African Development Bank, Malawi Country Office, 5 October 2009; and (iv) M.O. Bata et al, *A Report on a Joint Rapid Assessment of Informal Cross Border Trade on the Mozambique-Malawi Border Regions*, 2005. This border crossing has been referred to as Mandimba/Chiponde, although it may properly be referred to as Milange/Muloza.

[54] Another traffic estimate for this border crossing was a total of about 50 trucks per day in both directions, but the figures from the JICA road feasibility study are reported in the main text as they are appear to be based on a more detailed data source for this border crossing.

[55] The road feasibility states that the office was constructed about 10 years ago, but this seems incorrect. See *Malawi Transport and Road Sector Project Formation Study Report*, 2007, p. 55.

commercial traffic processed at Mandimba and non-commercial traffic processed at Chiponde).[56]

This project was notionally included in AfDB's [draft] appraisal report for the Nacala Road Corridor Project (with an expected investment of UA [Units of Account = SDR] 1.67 million (JPY 237 million or USD 2.66 million equivalent at late November 2009 exchange rates) in year 4 of the five-year project. The Nacala Road Corridor Project, including the Mwami/Mchinji OSBP, is to be funded under the African Development Fund (ADF), with cofinancing from JICA, the EU, and Japan Export-Import Bank. Recently, a project steering committee for the Nacala Corridor has been established coordinated by the SADC Secretariat.

This medium- to longer-term OSBP project would offer an opportunity for Japan to assist various elements of OSBP implementation, e.g., facilities/infrastructure, legal aspects, operational procedures, training/human resource development. While Mozambique may be more interested than Malawi in implementing a OSBP at Mandimba/Chiponde, Malawi may be interested than Mozambique in implementing a OSBP at Dedza/Calomue and at Mwanza/Zobue, suggesting scope for a "win-win" deal between the two countries.

11. Dedza/Calomue[57] (Malawi/Mozambique, Nacala Corridor)

Traffic at the Dedza/Calomue border crossing is moderate, with reportedly 80–160 trucks (and about 250 lighter vehicles) per day. Traffic has increased over the last few years with improvement of the road in Tete province in Mozambique.[58] Most of the border crossing traffic is to/from Durban port, and to/from Beira port, with some small portion to/from Zimbabwe. Most goods transported through the border crossing are agricultural products, reflecting the economy of the central region of Malawi. Clearance times are of the order of 2–8 hours.

The distance between the Dedza (Malawi) and Calomue (Mozambique) border posts is only about 150–300 m; the "no-man's land" is very small, in contrast to the situation at the Mwanza (Malawi)/Zobue (Mozambique) border crossing (presented in the following subsection).

The following are the major findings regarding the infrastructure/facilities/operations at Dedza on the Malawi side:

(i) The Revenue Authority shares a building (renovated about five years ago) with Immigration but it is very small. They have 19 staff members deployed at Dedza but consider the border to be understaffed.
(ii) Customs, Immigration, the Bureau of Standards, Port Health, the Road Authority, and the Police are present; Agriculture delegates its duties to Customs. There are 36 private clearing agents, 2 insurance companies, and 1 direct trader input office, generally housed in shipping containers.
(iii) There is no examination bay, weighbridge, or scanner. The warehouse is very small.

[56] This was the example provided in the road feasibility study, but considering the larger existing structure on the Malawi side and the greater space requirements for commercial processing, the reverse may make more sense.
[57] This subsection draws from: (i) a site visit to Dedza/Calomue, on 10 October 2009, including interviews with (a) Mr. P.C. Kondowe (Deputy Station Manager, Dedza) and Mr. Peter Malata (Immigration Officer in Charge, Dedza), and (b) Mr. Emilio Sebastiao Tai (Assistente Aduaneiro, Caolmue); (ii) an interview with Ms. Eleanor Chirwa (Deputy Commissioner of Customs), Ms. Agness Katsonga (Deputy Commissioner - Operations), and Mr. Timothy Chikoti (Business Analyst), among others, Malawi Revenue Authority, Customs and Excise Tax Division, 8 October 2009; and (iii) Japan International Cooperation Agency, *The Preparatory Study on Road Development Plan in Nacala Development Corridor (N13: Cuamba–Mandimba–Lichinga) in the Republic of Mozambique, Draft Final Report*, December 2009, pp. 223–24, 251.
[58] The capacity of the Tete suspension bridge remains a constraint, however.

(iv) It was stated that the Revenue Authority physically inspects about 50% of cargo "because the [dusty] condition of the place does not allow 100% physical inspection", a comment reflecting little understanding of risk management or the transport facilitation objective.
(v) There are power cuts three times a day, with no power for almost half of the day; when the system is down the Malawi Revenue Authority clears traffic manually.
(vi) Dusty conditions affect computer operation; a tarred surface is necessary to reduce the dust levels.
(vii) As at Mwanza/Zobue discussed below, the official hours at Dedza/Calomue are from 6 AM to 6 PM but now they now stay open until 9 PM; this was negotiated when there was more fertilizer traffic, but such traffic has decreased and Mozambique wants to revert to closing at 6 PM.[59]

The following are the major findings regarding the infrastructure/facilities/operations at Calomue (a small village, 40 km from Angona) on the Mozambique side, which was visited briefly:

(i) Customs, Immigration, the National Road Administration (Administração Nacional de Estradas, ANE), Health, Agriculture, and the Border Guard, as well as three insurance companies, have permanent staff at Calomue. The agencies work together in a 50-year-old building, but there is insufficient space.
(ii) Mozambique Customs operates two teams with five per team; staff stay in Tete when not working. Since staff housing consists of a shared compound house, they cannot readily accommodate female officers.
(iii) There is no parking at Calomue.
(iv) The nearest weighbridge is 45 km away.
(v) Clearance is generally completed quickly as most traffic is transiting Mozambique.
(vi) There is no generator and Customs has only a single working computer. All Customs processes are manual (as are all Immigration processes); they physically send documents to Tete and Beira.
(vii) Smuggling and human trafficking is reportedly a problem at this border crossing point; last year Mozambican officials detained a truck transporting 155 illegal immigrants that had entered through Calomue.

The African Development Bank has financed a road section in Mozambique leading to Calomue. Malawi and Mozambique's Customs authorities signed an agreement in February 2009 committing to establishment of a OSBP at Dedza/Calomue, with a budget of USD 10 million, half of each to be paid by each country.[60] As was noted, while Malawi may be more interested than Mozambique in implementing a OSBP at Dedza/Calomue (and at Mwanza/Zobue, discussed in the next subsection), Mozambique may be more interested than Malawi in implementing one at Mandimba/Chiponde, suggesting scope for a "win-win" deal between the two countries.

[59] It is possible to open the border after regular operating hours if advance notice is provided or if there is a medical emergency.
[60] Malawi has been interested in further discussing a OSBP with Mozambique at Dedza/Calomue, but reportedly Mozambique has been postponing the meeting.

12. Mwanza/Zobue[61] (Malawi/Mozambique, Tete/Beira Corridor)

Traffic at Mwanza/Zobue is moderate, with 100 trucks entering and exiting per day,[62] plus about 12 buses, 50 fuel tankers, and 60 light vehicles (saloon cars). Traffic peaks in December and is at its low point in October. Most of the traffic at Mwanza/Zobue is coming from/going to Beira port. Container traffic moving through Mwanza/Zobue is three times that moving through Dedza/Calomue. Time spent at the border averages from 4–8 hours.

Mwanza/Zobue has a 3–6 km "no-man's land" (estimates vary) in hilly terrain, with informal houses located in the no-man's land. The boundary line is about 500 m from the Mozambique border gate.

The following are the major findings regarding the infrastructure/facilities at Mwanza on the Malawi side:

(i) The two-story Revenue Authority office building dates back to 2001; it was completed with EU assistance first provided in 1997. Because of a shortage of space at Mwanza, some of the other border control agencies are not located in the Revenue Authority building, which may cause delays; the Customs, Immigration, Agriculture, Bureau of Standards, Road Traffic, and Health authorities all have their own premises.
(ii) Additional, segregated traffic lanes are required for transport/trade facilitation.
(iii) Storage space and parking are adequate but could be improved; wet and dry cargo should not be parked together for security reasons.
(iv) At the entry point, trucks must descend a steep slope, which creates traffic safety issues.
(v) A generator is required to avoid frequent power cuts.
(vi) Fencing is inadequate.
(vii) A passenger arrivals hall is required.
(viii) There is a weighbridge at Mwanza operated by the Road Traffic authority; it was provided with EU assistance. There is no scanner.

Findings with respect to operations at Mwanza include the following:

(i) The border is open from 6 AM to 9 PM. The border is open seven days per week; but is relatively quiet on Mondays and Tuesdays.
(ii) The Revenue Authority has 49 staff members deployed at Mwanza working in five sections; they consider that an additional 20 staff members are required.
(iii) Nearly 10 public agencies are located at Mwanza, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.
(iv) Due to the different customs computer systems used in Malawi (ASYCUDA ++) and Mozambique (TIMS, developed by Crown Agents), data interchange has not proven possible.
(v) The two sides do not meet often, partly because of language and partly because of the distance between the respective border posts. Mozambique now tries to locate officers at

[61] This subsection draws from: (i) a site visit to Mwami/Zobue on 9 October 2009, including an interview with Mr. Benson B. Chiwaya (Station Manager); and (ii) an interview with Ms. Eleanor Chirwa (Deputy Commissioner of Customs), Ms. Agness Katsonga (Deputy Commissioner – Operations), and Mr. Timothy Chikoti (Business Analyst), among others, Malawi Revenue authority, Customs and Excise Tax Division, 8 October 2009; and (iii) Japan International Cooperation Agency, *The Preparatory Study on Road Development Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique, Draft Final Report*, December 2009, pp. 220–21, 225–26.

[62] Another source reported about a total of 50 trucks per day in both directions at this border crossing, but the traffic estimate in the text was based on a site visit to the border crossing and is therefore considered more reliable.

Zobue that can understand English; also, it is sometimes possible to converse in Chichewa, the local language.

Less time was spent at Zobue on the Mozambique side, which was visited informally. Findings follow:

(i) Customs and Immigration are located in the same small building, which was refurbished four years ago; other government agencies are in other buildings. Zobue lacks: (a) a warehouse; (b) an examination bay; (c) parking; and (d) a scanner, although this would be difficult to justify.
(ii) Customs has only 1 computer for its 11 Customs staff at Zobue.
(iii) There is a weighbridge operated by ANE.
(iv) About 90% of the traffic processed is transit.
(v) There are frequent power cuts; when there is no power, they clear traffic manually

Mwanza/Zobue may be a candidate for a OSBP in the medium to longer term.[63] However, considering the 3–6 km no-man's land separating the two current border posts, a OSBP would be difficult to implement unless one country's control authorities operate on the territory of the other, of if a new (perhaps) straddling facility were constructed in the no-man's land, although there may be resettlement impacts with this latter option. While Malawi may be more interested than Mozambique in implementing a OSBP at Mwanza/Zobue (and at Dedza/Calomue, discussed in the previous subsection), Mozambique may be more interested than Malawi in implementing one at Mandimba/Chiponde, suggesting scope for a "win-win" deal between the two countries.

13. Forbes/Macipanda (Zimbabwe/Mozambque, Beira Corridor)[64]

Only limited, largely anecdotal information was collected on the Forbes/Machipanda border crossing. A total of about 70 trucks per day cross the border in both directions. Zimbabwe and Mozambique signed a letter of intent to establish a OSBP in 2005, and signed the Beira Corridor Development Agreement between Zimbabwe and Mozambique in December 2007. The Agreed Minutes for a Meeting on the Development of Beira and Nacala Corridors, Beira, 16 December 2008, stated in paragraph 12 that the parties would facilitate development of OSBPs at various locations, including Forbes/Machipanda, applying the Chirundu model. Three working groups have been established to move toward implementation of a OSBP at Forbes/Machipanda: (i) customs and trade facilitation, working on the harmonization of laws related to goods movement; (ii) immigration and law enforcement, dealing with security issues; and (iii) information technology, dealing with cross-border electronic data interchange. Zimbabwe has enacted a OSBP facilitation law in relation to Chirundu. The Forbes/Machipanda OSBP project was mentioned as recently as October 2009 in a speech to Parliament by the President of Zimbabwe. DFID's RTFP examined this border crossing on a preliminary basis and RTFP's successor (TradeMark) may take a closer look. More recently, the EU has been undertaking a feasibility of improvement of the Beira-Machipanda link, including assessment of a OSBP at Forbes/Machipanda, which could eventually the subject of EU–Japan cooperation.

[63] The Agreed Minutes for a Meeting on the Development of Beira and Nacala Corridors, Beira, 16 December 2008, stated in paragraph 12 that the parties would facilitate development of OSBPs at various locations, including Mwanza–Zobue, applying the Chirundu model.
[64] This subsection draws largely from "Zimbabwe: One Stop Border Post for Forbes", *The Herald*, 14 February 2008.

14. Nakonde/Tunduma[65] (Zambia/Tanzania, Dar es Salaam Corridor/ North–South Corridor)

Border crossing traffic at Nakonde/Tunduma has been among the highest in the [Eastern-] Southern African study region, with a 2008 site visit report indicating that inbound traffic at Nakonde averaged 191 vehicles per day (and another source indicating 148 trucks per day), compared to a handling capacity of about 50 vehicles per day. However, a 3 October 2009 survey visit found that as a consequence of the current economic downturn inbound traffic volumes had decreased to 50 vehicles per day in April-July 2009 and 100 vehicles per day in October 2009, although with the recovery in commodity prices traffic is likely to return to previous levels. DFID's RTFP has reported delays of 4-5 days at the Nakonde/Tunduma border crossing.

Nakonde/Tunduma is a road and rail border crossing, with the border rail station at Tunduma about 1 km from the Tunduma road border and the rail border at Nakonde about 1.5 km from the Nakonde road border.

Clearance requirements are less on the Tunduma side, as Tanzanian authorities are mainly processing transit traffic (to/from Zambia or DRC), which usually involves only a check of documents and seal integrity.

Existing facilities at Tunduma opened relatively recently (2005) but are insufficient to support adequate one-stop (or the current two-stop) border post operation. Problems include:

(i) severe congestion at the border gate, with only one lane for inbound and outbound vehicles;
(ii) congestion in the existing office space,[66] although new space has recently been constructed from use by immigration and drug enforcement authorities, with USAID assistance[67];
(iii) a limited supply of paved parking;
(iv) inadequate inspection areas, which exacerbates the problem in (iii);
(v) inadequate demarcation of the controlled area with proper fencing, with implications for safety and security; and
(vi) inadequate water supply and staff housing.

Tanzania has been advised to "restructure its existing facilities in order to accommodate the OSBP concept". An Infrastructure Working Group on the Tanzania side is currently assessing whether the existing structure can accommodate OSBP operation. March 2010 has been established as a date for sourcing funds (internal and external) for the required construction. A restructuring of the existing structure to accommodate OSBP operations is to be accomplished in Tanzania by March 2011.

[65] This subsection draws from: (i) *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, 2009, pp. 56–77; (ii) interview notes and photographic review from 3 October 2009 site visit, Mr. T. Oikawa, Assistant Director, Office for TICAD IV Follow-up, Africa Department, JICA (in Japanese and English translation); (iii) an interview with Mr. Whytone Ngulube, Director of Buildings, and Mrs. Amatende, Chief Architect, Building Department, Ministry of Works and Supply (30 September 2009); and (iv) an interview with Mr. Muyangwa Muyangwa, Commissioner, Customs Services, Zambia Revenue Authority (1 October 2009).

[66] It could be useful to calculate staff per office space and compare the allocation with accepted standards, e.g., those of the EU.

[67] Note, however, that for integrated border management, ideally all border control agencies will be accommodated in the same building.

The current buildings at Nakonde were constructed over three decades ago; the design is a typical one with Customs, Immigration, Health, and the Office of the President accommodated in a single building. However, the Government of the Zambia is to construct an "ultra modern integrated office infrastructure"[68] at Nakonde reflecting OSBP principles. The project, to be completed by 2011 (although it is currently a few months behind schedule), will include (i) a freight terminal with offices for Customs and Immigration; (ii) parking for 15 buses, 150 trucks, and additional parking for passenger cars; and (iii) a passenger control terminal with windows for Customs, Immigration, and other border control services.[69]

It would be beneficial to replace the current linear processing, whereby all vehicles queue until the previous in line has been cleared by successive agencies, by a spur (or "herringbone") system that would not align clearance times to the longest processing time. It is important that different categories of vehicles (e.g., private cars, buses, trucks) and different categories of travelers (e.g., pedestrians, commuters, passengers arriving by taxi) be separated, as simplified procedures can be applied to some of them (e.g., transit trucks), and commercial traffic should be separated from private vehicles. That said, constructing additional vehicle lanes can be expensive, and may have resettlement impacts where, as at Tunduma, residences are located in close proximity to the border area.

Even assuming infrastructural issues at Nakonde/Tunduma can be resolved, a number of legal/operational issues remain:

(i) The border is open only from 6 AM to 6 PM, although they are considering extending the hours to 8 PM.
(ii) About 10 public agencies are located on each side of the border, which suggests the need for national single windows at the same time or ideally even before implementation of a bilateral OSBP.
(iii) While Zambia has enacted a generic law for OSBP implementation in connection with the Chirundu OSBP project, Tanzania lacks such a law. Also, a bilateral agreement for OSBP implementation will need to be negotiated between Tanzania and Zambia.
(iv) While both Tanzania and Zambia use ASYCUDA ++, there is not currently a systems interface between the two countries.
(v) There are reported serious security issues at Nakonde/Tunduma.[70]

DFID has recently considered providing assistance at Nakonde/Tunduma, with the implementation of an Integrated Border Management System including ICT elements. They were also considering supporting the construction of an inspection facility. However, since it is understood that DFID is not considering support with legal aspects, there would be scope for JICA support in this area.

That said, there are certain risks with the development of an OSBP at Nakonde/Tunduma. For example, Zambia is constructing a ZMK 30 billion/JPY 600 million/USD 6.5 million inland clearance depot 9 km from the border; when completed, this development will reduce the need for vehicles to wait for clearance at the border point, and hence the need for space at the border

[68] *Study on Situational Analysis of Border Facilities*, prepared for the Regional Trade Facilitation Programme, 2009, p. 59.
[69] In fact, Tunduma/Nakonde offers a good location for a straddling OSBP facility, but the countries have proceeded with new construction based on the straddling OSBP facility model. It would be better to modify the buildings under construction to suit OSBP operation rather than wait for construction to be completed. COMESA, SADC, and EAC, *North-South Corridor: Progress Report and Way Forward, Paper Prepared for the North-South Corridor Meeting of Ministers*, Lusaka, 7 December 2009, p. 44.
[70] Interview with Mr. Mark Pearson, Programme Director, DFID, Regional Trade Facilitation Programme (RTFP), 24 November 2009.

facility will decrease. Also, as noted, there may be land acquisition/resettlement issues if the Tanzania border facility is to be expanded.

Ultimately, the factors affecting the magnitude of investment in border facilities at Nakonde/Tunduma that will provide economic viability (i.e., rates of return in excess of the opportunity cost of capital) include: (i) the volume of traffic passing through the border[71], and (ii) processing times at the border. The latter (ii) will in turn be affected by a number of factors (e.g., measures that reduce Customs processing time at the border, such as use of preclearance, enhanced risk management, and the construction of the inland clearance depot 9 km from the border on the Zambia side[72]; a possible reduction in the number of agencies at the border[73] and the extent that border operations, within one country and between countries, can be integrated[74]).[75] It should also be noted that in principle, the volume of inspections should come down after OSBP implementation (because exit inspections will no longer take place in the country of exit).[76]

15. Songwe/Kasumulo[77] (Tanzania/Malawi, Dar es Salaam Corridor/ North–South Corridor)

Only limited information was collected on the Songwe/Kasumulo border crossing. While the Malawi Revenue Authority has constructed new office space at Kasumulo, it is considered insufficient. They have deployed only 10 Customs staff at Songwe, although they consider that 24 would be optimal. Since Malawi uses Dar es Salaam port, the Malawi Revenue Authority has been seeking interconnectivity with the Tanzania Revenue Authority using Revenue Authorities Digital Data Exchange (RADDEx), a system that has been used in East Africa; the Malawi and Tanzania Revenue Authorities have already signed an MOU on this subject.

The USAID Southern Africa Global Competitiveness Hub is reportedly planning to conduct a OSBP-related study at this border crossing, but as noted above, USAID's Regional Economic Growth Office of Southern Africa recent focus on transport/trade facilitation may change under the new administration, which may emphasize food security and climate change.[78] Accordingly,

[71] Border crossing points with low traffic volumes (say, less than 50 vehicles per day in one direction) do not justify spending of millions of USD equivalent, although some improvements can usually be justified in such cases.

[72] Ideally, the countries would adopt inland (i.e., at inland Customs stations or even importers' premises) clearance as the norm, thus minimizing border checks. Operations involving clearance or payment at the border, especially at distant locations, are difficult to control, and can more easily generate "rent-seeking" attitudes.

[73] There are more than 10 agencies represented on the Zambian side of the border, which is excessive by any international standard. Consider, for example, that Lao PDR and Cambodia have recently reduced the number of agencies at the border substantially (to about four).

[74] There is a risk that if only an integrated customs process is in place the other agencies will remain reluctant to join, and that one-stop inspection will only apply to customs procedures, while other formalities often take as long as customs clearance.

[75] In the (probably much) longer run, implementation of a customs union among the various RECs will substantially reduce the need for border facilities.

[76] On the other hand, it has been argued that combining export and import checks will not necessarily shorten delays because the juxtaposition of control structures may encourage Customs officials to carry out a check they might otherwise have waived, on the grounds that their colleagues from the other side are also performing one. However, this potential difficulty can be avoided if Customs officials from both sides have a good understanding of what regimes and procedures their cross-border counterparts numbers need to verify.

[77] This subsection draws from: (i) an interview with Ms. Eleanor Chirwa (Deputy Commissioner of Customs), Ms. Agness Katsonga (Deputy Commissioner – Operations), and Mr. Timothy Chikoti (Business Analyst), among others, Malawi Revenue authority, Customs and Excise Tax Division, 8 October 2009; and (ii) an interview with Mr. Bregnel Mhango (Transport Infrastructure Advisor), Southern African Development Community (SADC), Infrastructure and Services Directorate, 15 October 2009.

[78] However, as noted, while the USAID focus may change, they may pursue similar initiatives, e.g., OSBPs to facilitate cross-border flows of agricultural products.

there may be some scope for Japan to assist OSBP implementation at Songwe/Kasumulo in the medium to longer term.

16. Negomano/Mtambaswala[79] (Unity Bridge[80], Tanzania/Mozambque, Mtwara Corridor)

With the completion of the 720 m, two-lane Unity Bridge between Tanzania and Mozambique, consideration has been given to development of a OSBP at the site. Mozambique Customs lists the project among its top three priorities for OSBP development, most likely because the bridge is considered politically important to fulfill a dream of the founding presidents of the two countries. The bridge was funded by the governments of the respective governments at a cost estimated to be in the range of USD 24–40 million according to media accounts. Mozambique established a OSBP committee in February 2009 and its Ministries of Foreign Affairs and Home Affairs have been working on a draft bilateral agreement with Tanzania. The African Development Bank is to assist a road project over the Unity Bridge.

17. Preliminary Assessment of One-Stop Border Posts

OSBP projects may be prioritized based on a number of factors including traffic (present and future), delay time, and institutional readiness. OSBP projects to be assisted by a particular international development partner (in the case specifically addressed by this report, Japan) may also reflect to a degree the extent that other development partners are or have been involved in providing assistance at particular border crossing points. Also, the comparative advantages of respective development partners may be considered.

Table F.1 sets out a preliminary prioritization of OSBP projects based on the factors outlined above; the assessment should be considered together with the corridor prioritization presented in the main text of this report. In some cases no priority is given because of missing data. This assessment will be revised at later stages based on ongoing surveys, study findings regarding corridor prioritization, and any suggested refinements in methodology. The table also lists other possible donors.

[79] This section draws from: (i) an interview with Mr. Daniel Tovela, Executive Director of One-Stop Border Posts, Managing Director of Border Posts, and Southern Region Manager of Border Posts, and staff, Mozambique Customs (Autoridade Tributaria de Mozambique), 16 November 2009; (ii) Japan International Cooperation Agency, *The Preparatory Study on Road Development Plan in Nacala Development Corridor (N13: Cuamb–-Mandimba–Lichinga) in the Republic of Mozambique*, *Draft Final Report*, December 2009, p. 251; and (iii)anecdotal accounts published in allAfrica.com.

[80] A second Unity Bridge ("Unity 2") over Matchedje would be an interesting prospect considering the location of industrial towns/cities on the Tanzania side.

Table F.1 Preliminary Assessment of Border Crossings

Border Crossing	Traffic (trucks per day)	Delay Time	Institutio-nal Readiness	Overall Priority	Possible Project Elements	Other Possible Donors
Chirundu	High (270)	High (various)	High	High (9)	Risk management, integrated border management, further training, ICT, monitoring, community development	DFID, World Bank
Kazungula	Medium (115)	High (1.0–2.5 days)	High	High (8)	Potentially all aspects, with co-financing from AfDB	AfDB, DFID
Beitbridge	High (287)	High (1–2 days)	Medium	High (8)	Infrastructure/facilities, legal aspects, and training	DFID
Kasumbalesa	350 (High)	High (1–3 days)	Medium	High (8)	ICT, legal aspects, document harmonization, procedure simplification, implementation of OSBP procedures	France, DFID, DBSA
Lebombo/ Ressano Garcia	High (200–455)	Medium (6-7 hours)	Medium	Medium (7)	Immediate need is for proper master planning and feasibility studies	DIFD, DBSA
Wenela/ Katima Mulilo	Low (20–25)	High (1–3 days)	High	Medium (7)	All aspects, except for possibly legal aspects	DFID, SIDA, UNCTAD
Oshikango/ Santa Clara	Low (50)	High (3–5 days)	Low	Medium (5)	All aspects	USAID
Trans Kalahari/ Mamuno	Low (60)	Low (1 hour)	High	Medium (5)	Facilities, ICT, and specification/ implementation of OSBP operational procedures	USAID
Mwami/ Mchinji	Low (25)	Low (1 hour)	Medium	Low (4)	All aspects	AfDB, EU, JBIC
Mandimba (Muloza)/ Chiponde (Milange)	Low (6–7)	Low (30 minutes)	Medium	Low (4)	All aspects	AfDB
Dedza/ Calomue	Medium (80–160)	2–8 hours (Low)	Low	Low (4)	All aspects	AfDB
Mwanza/Zobue	Medium (100)	4–8 hours (Low to Medium)	Low	Low (4.5)	All aspects	-
Forbes/ Machipanda	Medium (70)	No data	Medium	-	-	DFID, EU
Nakonde/ Tunduma	Medium (148)	High (4–5 days)	Medium	Medium (7)	Legal aspects	DFID
Songwe/ Kasumulo	No data	No data	No data	-	All aspects	-
Negomano/ Mtambaswala	No data	No data	No data	-	All aspects	AfDB

Notes:
(1) Traffic: below 50 = low, 51–199 = medium, and 200+ = high
(2) Delay time: less than 6 hours = low, 6–12 hours = medium, more than 12 hours = high
(3) Institutional readiness based on subjective judgment of efforts at OSBP implementation to date and their success: low, medium, and high

(4) Overall priority at this stage notionally assessed by (i) assigning 3 points for high traffic, 2 points for medium traffic, and 1 point for low traffic; (ii) assigning 3 points for high (long) delay time, 2 points for medium low time, and 1 point for low delay time; (iii) assigning 3 points for high institutional readiness, 2 points for medium institutional readiness, and 1 point for low institutional reference; and (iv) ranking as high (8–9 points), medium (5–8 points), and low (4 points or less).
(5) As indicated in the text, a range of traffic estimates are available for Beitbridge and Lebombo/Ressano Garcia, as well as for others.

Source: JICA Study Team

Based on this preliminary assessment, the following projects (which are along the heavily trafficked North–South Corridor) may be considered the highest priority:

(i) Chirundu (ongoing, but requiring further assistance with risk management, integrated border management, further training, ICT, monitoring, and community redevelopment);
(ii) Kazungula (potentially all aspects, with cofinancing from AfDB);
(iii) Beitbridge (all aspects); and
(iv) Kasumbalesa (ICT, legal aspects, document harmonization, procedure simplification, and implementation of OSBP procedures).

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