CORRIDOR DIAGNOSTIC STUDY OF THE NORTHERN AND CENTRAL CORRIDORS OF EAST AFRICA

ACTION PLAN

Volume 2: Technical Papers

F. Lake Transport

SUBMITTED TO
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Chaired by East African Community (EAC)
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April 15, 2011

USAID Contract No. EEM-I-00-07-00009-00, Order No. 2
with funding provided by USAID and DFID

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Acronyms

CDC	Central Development Corridor
CDS	Corridor Diagnostic Study
COFC	container on flat car
DFID	U.K. Department for International Development
DRC	Democratic Republic of Congo
EAC	East African Community
EPD	Exploitation du Port de Bujumbura
GRT	Gross register tonnage
ICD	inland container depots
KPA	Kenya Port Authority
LoLo	lift on-lift off
KRR	Kenya Rail Road
MLL	Marine Logistics Ltd.
RAHCO	Reli Assets Holding Company
RoRo	roll on-roll off
RVR	Rift Valley Railroads
SDI	Spatial Development Initiative
TAZARA	Tanzania-Zambia Railway Authority
TEU	twenty-foot equivalent unit
TOFC	trailer on flat car
TPA	Tanzania Port Authority
TRC	Tanzania Railroad Corporation
TRL	Tanzania Railroad Limited
USAID	U.S. Agency for International Development
URC	Uganda Railways Corporation

1. Introduction

Background

The Northern Corridor anchored by the port of Mombasa in Kenya, and the Central Corridor, anchored by the port of Dar es Salaam in Tanzania, are principal and crucial transport routes for national, regional and international trade of the five East African Community (EAC) countries, namely; Burundi, Kenya, Rwanda, Tanzania and Uganda. Due to inadequate physical infrastructure and inefficiency, these corridors are characterized by long transit times and high cost. Freight costs per km are more than 50 percent higher than the USA and Europe and for the landlocked countries; transport costs can be as high as 75 percent of the value of exports. Modernization of transport infrastructure and removal of non-tariff barriers along these corridors is critical for trade expansion and economic growth, which are key to the success of regional integration as well as creation of wealth and poverty alleviation in the individual countries.

The Heads of State in the COMESA, EAC and SADC, the Tripartite, have determined that the transport inefficiencies are among the biggest impediments to realizing their vision to lead their countries out of poverty. Transport costs are prohibitively high and are a barrier to trade and investment, which are the cornerstone for the aspired economic growth to regional prosperity.

Having had the experience of successful development of an action plan to effectively tackle transport bottlenecks on the North-South Corridor, the Tripartite have ordered the preparation of a similar action plan for the key trade routes of Eastern Africa. As a technical foundation for the action plan, regional stakeholders in March 2009 agreed to carry out a Corridor Diagnostic Study (CDS) with funding from the U.S. Agency for International Development (USAID) and the U.K. Department for International Development (DFID).

Study Scope

This technical paper focuses on proposing specific actions or projects that can be undertaken or be developed in a three to five years time horizon to facilitate the improvement of maritime trade on the Lakes Victoria and Tanganyika.

Over the past century Lakes Victoria and Tanganyika have functioned as an essential component of an integrated rail/water transportation system connecting the Ports of Dar es Salaam and Mombasa to the land locked countries of central Africa namely Uganda, Rwanda, Burundi, the Democratic Republic of the Congo (DRC) and Zambia. The system focused on the use of the railways as the prime and cheapest mover of cargo to the lakes for onward distribution to the landlocked countries via lake shipping at even lower costs. The importance of the lakes as a conduit for trade, however, has declined dramatically over the last decade for a variety of reasons of which the most important are:

- Lack of port infrastructure investment
- Decline of the railways
- Insecurity especially on Lake Tanganyika due to regional conflicts in the area;
- Focus on the development of highway infrastructure

The CDS team visited and studied the current status of the Ports of Mwanza (Tanzania), Kisumu (Kenya), Port Bell and Jinja (Uganda) on Lake Victoria; and the Ports of Kigoma (Tanzania) and Bujumbura (Burundi) on Lake Tanganyika (Figure 1).

Figure 1. CDS Geographic Scope and Location of Lake Ports Studied

Source: Nathan Associates Inc.

Organization of the Technical Paper

This technical paper is organized as follows. Chapter 2 describes the Lakes Victoria and Tanganyika shipping patterns and each of the six ports characteristic. Chapter 3 assesses the development options for each lake cargo services. And finally, Chapter 4 presents recommendations for projects to be included in the Action Plan.

2. Lake Shipping and Ports

Shipping Patterns

The "Integrated Transport Strategy – Lakes Tanganyika and Victoria" study developed by Marine Logistics Ltd. (MLL) for the Central Development Corridor (CDC) Spatial Development Initiative (SDI) project, February 2009, identified 23 vessels operating on Lake Tanganyika of which 56 percent were 50 years or older and six were laid up or inoperable. There were only three operating tugs on the lake, one in the Port of Kigoma and two in the Port of Bujumbura. Of the eight dry cargo barges in the fleet, only two have a total cargo capacity of 1,014 tons. In addition, only three general cargo vessels with a total capacity of 1,500 tons and three combo carriers with a total capacity of 74 TEUs were available for handling general or container cargo. Bujumbura was the sole port that had the capacity for handling lift on-lift off (LoLo) containers in the northern part of the lake. Most of its recent container traffic was coming from Zambia due to the four months closure of the Central Corridor rail service to Kigoma. By May 2010, the Port of Kigoma was expecting a new mobile harbor crane capable of handling containers in September. However, the design and age of the wharf will limit its effective use to less than 100 m of the quay.

On Lake Victoria the situation is a little different. The vessels are not nearly as ancient as those on Lake Tanganyika (with the oldest dating to 1938). However, according to the MLL study, of the 42 vessels that were listed ten were laid up. There were 13 operating passenger/general cargo vessels, and seven relatively new car ferries that were oriented primarily to the Tanzania local markets. There were only two general cargo vessels of less than 200 gross register tonnage (GRT) and three small tankers serving the transit markets.

Since most of the main Lake Victoria ports were formerly or currently owned and operated by the railways, the primary means of transporting transit cargo was via an integrated rail/ferry system in which each port was equipped with rail link span facilities for mooring and loading train wagon ferries. Five of these vessels were built between 1964 and 1979 of which one has sunk, two are laid up (Uganda), one has been reconditioned and is now operational (Kenya) and the Tanzania one is also in operation. They are capable of carrying 19 rail

wagons each (equivalent to 38 TEUs). During the first semester of 2010, the Tanzanian ferry was not been in operation because of repairs to the mainline rail track between Dar es Salaam and Dodoma. Therefore, even with a good rail service, the vessel carrying capacity for general or containerized cargo has deteriorated to the point where it has become non viable as an economically competitive transport mode.

TRAFFIC

The Ports of Bujumbura and, to a lesser extent, Kigoma are in position to handle increased general cargo or container traffic. They are reliant on the Tanzanian rail system for the majority of their throughput. Bujumbura is modern in its management and operation. The Tanzanian government has a non investment concession agreement with an experienced operator who manages the cargo marketing and handling component of the business at Kigoma. Most of the free stowed bagged cargo coming into the port is placed on 2m x 2m terminal pallets in the hold and then lifted out using specialized rigging for pallets and placed directly on the apron. All movement of the palletized cargo from then on is done by forklift. Consequently, productivity is highest on the lakes.

Traffic through both Kigoma and Bujumbura ports, however, has fallen off significantly since 2004. The situation has been particularly acute from the beginning of 2010 since rail service to Kigoma has been shut down due to emergency repairs to a segment of the railway that had been washed out due to river flooding. The rail service resumed in mid-June 2010.

None of Lake Victoria ports are in a position to effectively handle increased volumes of general and (much less) container traffic. The ports in Tanzania (Mwanza and others) are owned by tha Railways Asset Holding Company (RAHCO) and operated by Tanzania Marine Services Company (TMSC). The he ports in Uganda (Port Bell and Jinja) and Kenya (Kisumu) are owned and operated by the Rift Valley Railroads (RVR). Neither the RVR nor its predecessors the Kenyan and Ugandan railways have made any infrastructure investments in the ports for more than two decades. In general, for these ports to become economically viable the owner/operators will have to make significant upgrades to the foundation infrastructure and greatly improve their cargo handling capabilities. They would also need to see some corollary improvements in the rail services and significant changes in the types of shipping that is available.

DECLINE OF THE RAILWAYS

The decline of the lakes ports can be directly linked to the decline of the railways connecting them to their principal source ports on the coasts. Transit cargo carried by the Tanzania Railroad Corporation now Tanzania Railways Limited (TRL) had declined from around 474,000 tons in 2004 to 198,000 tons in 2008 with a low of 157,000 tons in 2007 (Table 1). Bujumbura saw its trade through Kigoma drop from 79,715 tons in 2005 to 30,581 tons in 2009 with a low of 23,681 tons in 2007. Over the last four years Bujumbura handled an average of 57

percent of Kigoma's throughput. Essentially the economic health of these two ports is intimately linked to the railroad and its ability to provide a reliable service to Kigoma.

Table 1. Freight Traffic on the Tanzanian Railways System, 2003-2009 (tons)

Year	2003	2004	2005	2006	2007	2008	2009
Domestic	997,567	858,558	765,272	534,771	388,137	233,654	n.a.
Transit	445,146	474,691	363,236	240,510	157,104	197,831	n.a.
Total	1,442,713	1,333,249	1,128,508	775,281	545,241	431,485	505,373

Source: Reli Assets Holding Company, Medium Term Corporate Strategic Plan and TRL/ RAHCO.

Before the rail operations were concessioned in 2006, the system was managed by the TRC. In that year the operations were turned over to the Tanzania Railroad Limited (TRL), a joint venture company with 51 percent of the shares owned by Rites of India while the Tanzanian government retained 49 percent of the shares. Rites of India had management responsibility of the company. RAHCO was established to maintain and develop the assets that were not concessioned (mainly the tracks and fixed infrastructure) and was given the responsibility for future developments, which remained the duty of the Tanzanian government. At the time of writing this report, the government was in negotiations with Rites on separation. Consequently, both the TRL and RAHCO still exist.

RAHCO has completed a five year development plan that includes among others the following objectives by 2014 that are critically pertinent to the lake ports:

- Upgrade the 982 km of railway from Dar es Salaam to Isaka from meter gauge to standard gauge
- Undertake a feasibility study for upgrading the railway from Isaka to Mwanza and from Tabora to Kigoma to standard gauge

This schedule essentially means that the rail into Kigoma will not be upgraded to standard gauge for at least five to seven years. Fortunately, the concession agreement requires that the operator provides a minimum of four trains per week service to the port during the interim. At the moment the trains are only capable of carrying 40 TEUs per trip or 160 TEUs per week. Hopefully, if a greater demand is created the TRL can respond with more frequent service to Kigoma.

On Lake Victoria the situation, with exception of Mwanza (which is served by TRL), is a significantly different which makes port development on the lake more problematical. In 2006 the operation of the Kenyan and Ugandan national railways was privatized as the RVR. As in Tanzania, the governments owned Kenyan and Ugandan railways retaining the responsibility of developing the fixed infrastructure. The RVR operates 153 km of light 30 kg/m track between Nairobi and Kisumu as well as a 902 km of 40 kg/m track to Kampala from Nairobi. Consequently, the three ports of Kisumu, Port Bell and Jinja are connected to the same railway

bsystem. Because the Ugandan railway was dependent on the Kenyan lines for access to Mombasa, there was no real competition among lines on the lake except the operation of the a rail wagon ferry service between Kisumu and Port Bell or Jinja, which shortened the travel distance from Mombasa to Kampala by almost 600 km. This intermodal service gave the Kenyan railway a competitive advantage in the Kampala market.

Under the current arrangement (combined with the fact that only one wagon ferry is operating out of Tanzania), there is no real incentive to do so again since the RVR will carry the cargo regardless of the destination. Consequently, Kisumu no longer handles containers and Port Bell has seen its cargo throughput drop from an average of 360,000-400,000 tons annually prior to the privatization to a current average of 60,000 tons. Even if the Ugandan government renovates its two wagon ferries and all four are operable, there still is little economic incentive for RVR to reactivate the service through Kisumu due to the high cost of operating the ferries. Potentially the most economically justifiable routes for the wagon ferry service would be Mwanza to both Kisumu and Port Bell since RAHCO and RVR are not currently interconnected.

Lake Victoria Ports

The CDS team examined the infrastructure and identified the challenges for the Ports of Mwanza, Kisumu, Port Bell and Jinja on Lake Victoria.

PORT OF MWANZA, TANZANIA

Port Overview

The port was formerly operated by the Marine Services Department of the Tanzanian Rail Corp and was turned over to the Tanzanian Port Authority in 2006. Prior to 2006 all of the lake ports were in this organization.

The Port of Mwanza is highly dependent on its rail connections with Dar es Salaam for its throughput. Also as in Kigoma the rail service has been suspended for major repairs along the line until July 2010. It for the moment is handling only local traffic and WFO shipments. Even with the rail service operating it has limited ability to handle containers. It does not have a harbor crane; reach stacker, top pick or forklift to lift containers off a train or put them on to a vessel. In fact it has only one 5-ton forklift in operation and that is used in the warehouses. The port has two, 5-ton jetty cranes that were built in 1929 but only one still works. The only mobile crane available in the port belongs to the ship repair operator. Any other equipment that they have including an old heavy lift mobile harbor crane are non functional or repairable. Consequently, general cargo discharging operations are done manually using the only operating jetty crane to lift heavy cargo from the hold.

With respect to COFC traffic containers are transshipped using a rail ferry service in which the rail wagons are shunted on to a rail ferry using a farm tractor and shunted off at the port of call. The container remains' on the wagons and is stripped at the destination port. The wagon with the container sill on it is then returned to Mwanza on the rail ferry.

There are currently only two operable rail ferries on the Lake, the Umoja which is Tanzanian and in operation and the other is the Kenyan registered Uhuru which though operable is out of service waiting certification and insurance. It is home ported in Kisumu. Its interior operating deck is 14m X 89m and it has a carrying capacity of 19 to 20 rail wagons. The vessel and rail link are well maintained and fully operational. Uganda had three vessels but two collided and one sunk. The other two are laid up in Port Bell in poor condition. There are no other container carriers on the lake. One group has proposed building a container ship but at the moment it does not make economic sense due to the problems of the railroad.

The main jetty is a pile structure approximately 265 m long overall of which 180 m are bi-level as in Kigoma. It was constructed on piles between 1919 and 1925. The lower level jetty is 6m wide. The upper level is approximately 1m higher than the lower one and is also 6m wide. The two are separated by a drainage culvert approximately a half a meter deep. The TPA is planning on putting a new cap on the lower apron to bring it even with the upper level. However, there is no available

information on the original design and the TPA must do an engineering feasibility study to determine if and how it can be done. The TPA is also planning to remove the transit sheds on the wharf and build a container yard in their place and incorporate the large nearly unused rail yard behind the warehouses as well.

One of the positives in the port are the two relatively new dry docks that are fully functional. The large one is the newest and is 100 m X 24 m with a lifting capacity of 2,100 tons. The smaller one is 70 m X 13 m and has a lifting capacity of 860 tons. These dry docks are supported by a small machine shop that has significant arc welding capability backed up by a large diesel generator. The remainder shops are poorly equipped and would need a significant upgrade to be competitive.

Other than the one's belonging to the administrative staff, there are no other computers in the port. The port operations offices keeps operational statistics in a large hand written ledger and does very little statistical evaluation regarding cargo throughput, operational efficiencies, etc. The maintenance shop, what there is of it, keeps very poor records on the status of equipment and with only one 5 ton fork lift and a tractor to maintain, it is not very busy.

Principal Problem Areas

Overall, it is clear that the port is in a difficult situation. First of all as is Kigoma it is highly dependent on the railroad for much of its business. But the railroad has not been able to provide adequate service to the port or its trading partners across the lake. This has forced shippers to use Mombasa or deliver via rail to Dodona and then by expensive truck to Dar es Salaam. On the other side there no viable container services on the lake and most of the available vessels are LoLo operations. Neither Kigoma nor Mwanza currently have this capability and with the bi-level jetties cannot use a mobile tower crane (which both ports are supposed to receive shortly) effectively without major repairs to the quay. Mwanza has virtually no container or general cargo handling equipment to speak of and operations are reduced to the use of manual labor.

Cargo Throughput

Cargo throughput statistics were not available.

Passenger Terminal

Government of Tanzania owns and operates three passenger/cargo vessels built between 1961 and 1980 with a total capacity for 1,690 passengers and 340 tons of general cargo. The Victoria is 75 length over all (loa) and carries 1,200 passengers with a cargo capacity of 230 tons. The other two passenger vessels are the Claris and the Butiama with a passenger capacity of 290 and 200 persons respectively. It also owns and operates one landing craft and six car ferries of recent vintage.

Mwanza operates a passenger terminal several miles away from the cargo terminal called South Port. The main berth is approximately 95 m long of which 70 m is deep enough to accommodate the largest passenger vessel on the lake, the Victoria. There is also a second smaller berth that is approximately 30 m long. Both berths are restricted at the shore side ends by shallow depths causing the vessels to "hang over" beyond the end of the pier. There is a 46 m X 22 m transit shed adjacent to the main quay that serves as a short term storage shed for general cargo. The site also includes a two story administration building that is 24 m X 24 m.

Operations at the terminal are not highly mechanized. The Victoria is equipped with one deck crane with a 3-ton lifting capacity that is used to lift the cargo from the small hold. Cargo, agricultural products or household type goods are free stowed. They are placed on terminal pallets by stevedores in the hold and then hoisted to the ground to be received by the passengers and merchants. These cargos are then man handled onto small

trucks, carts, or whatever means that are available to transport them off the terminal. The debarkation and discharging process tends to be highly chaotic. The embarkation process is better organized as the passengers are kept out of the operations area until the vessels are ready to receive them. Unfortunately, the visit occurred on a Saturday and consequently passenger statistics were not available.

PORT OF KISUMU, KENYA

Port Overview

The port is owned and operated by the Kenya Rail Road (KRR) and consist of approximately 12 acres inside the KRR fence and 30 acres surrounding the port that is owned by the RR. The jetty is 900m long of which approximately 500m is operable due to the growth of thick hippo grass and siltation. The jetty is a pile supported structure built in the 1920's with an 18 inch thick facing wall that extends from the water level to the top of the jetty which was added latter when the level of the lake rose. Hard packed gravel/sand was filled behind the wall on top of the original apron to raise the level of the jetty. There is no information regarding the baring capacity of the wharf. To extend the operational length of the jetty, the port needs to carry out some light maintenance dredging at either end to remove the hippo grass and built up silt.

The port does not have any cargo handling equipment of its own. The KRR gets a jetty fee (wharfage) from vessel operators and all operations are carried out by using day labor hired directly by the vessel owner. The discharge loading processes is purely a manual operation. When handling equipment is needed it is rented from in town by the owners. The KRR functions strictly as a landlord and maintains the facilities. They also lease out storage space in the small transit shed backing part of the jetty.

The port includes a docking facility for the only other operable wagon ferry on the lake the Uhuru. Built in 1963 in the adjacent dry dock, it has recently been renovated and is ready to go. It, however, is waiting for certification and insurance to be put back into operation but has not been able to get an affordable policy. It is the same size and capacity as the wagon ferry in Mwanza. The original rail connections to the dock were built in 1929.

Therein lays the principal problem of the port. The track from Nairobi is in bad shape and the locomotives and wagons have not been maintained. Eng, Benjamin Nzive, Kenya Railways Port Manager, estimates that it is currently operating at 20 percent of its original capacity. The last full maintenance on the loco was in 2006 carried out by GE. Because of the problems with the track the train speed is reduced to 40 km/hr over long stretches of the route. There are two tracks entering into the port rail yard but have not been used accept for local petroleum movements in a long time. Consequently the yard is relative over grown. The petroleum pier consists of a small pump house and a mooring dolphin. Operations there are hampered by the long term mooring of cargo/passenger vessel built prior to the 1920's.

Perhaps its most valuable asset is the small ship building and repair yard adjacent to the rail yard which has been leased out to a private operator for repairing small lake vessels. It includes a working dry dock of 100 m X 30 m with a working draft of 6m. It takes approximately 24 hours to pump out the water. Access is controlled by a swing gate that floats when the water levels on either side are equalized. It is pulled open or closed by a small 250 hp tug built in 1958.

The facility includes two slip ways one of which lies derelict, fully grown over and unusable. The second one is gradually being renovated by the KRR for future use. It can accommodate vessels up to 800 tons. The facilities include:

- A large machine shop with aged but operating equipment
- A fabrication shop also with aged but operating equipment
- Carpenter shop
- Wrench house for pulling the boats onto the slip way

There is one other private tug of 470 tons available in the port when needed.

Principal Problem Areas

The port does not handle any containers by rail even when the wagon ferry is operating. Containers are moved to the KPA's inland container depot approximately 3 km away. Consequently, it does not handle any transit or container cargo and there is little incentive to invest in the port or develop the market. The outlet of the ship yard slipway needs to be dredged to remove hippo grass and some siltation.

Cargo Throughput

Therefore cargo throughput is limited strictly to local lake trade as follows:

- 28,000 tons of exports of which
  - 21,000 tons were petroleum products to Mwanza, Tanzania
  - 7,000 tons of break bulk including sweets, soap, salt, cooking oil, stationary and general merchandise.
- 8,000 tons of imports primarily cotton seed cake used for animal feed from Tanzania

PORT BELL, UGANDA

Port Overview

Port Bell is comprised of one finger pier that is 100 m long and 45-50 m wide. It is fitted with a standard rail link for the wagon ferry service operating on the lake. It currently has one operating mobile crane. It includes one warehouse approximately 75 m X 20 m that is divided into offices, stores rooms, and warehouse space. The depth along is 8m at the wagon carrier link and is one of the deepest ports on the lake.

It is owned and operated by the Rift Valley Railraod (RVR) The national Ugandan Railroad Company was privatized in 2006 and became the RVR. The port was designed to handle wagon ferries and the interlink system is still in good shape. The yard will hold 130 rail wagons which is equivalent to 260 TEUS. However, the two ferries that Uganda has floating are in very bad condition and are consequently out of service. They are moored in the port on one side of the pier. The government is considering letting a contract to rehabilitate the vessels and hand them over to the RVR to operate. No one has done an economic feasibility to determine if there is sufficient cargo potential to justify the rehabilitation costs and high operating costs nor has anyone talked with the railroad if they would be interested since they serve all of the principal ports on the lake in Uganda and Kenya. The port had been receiving calls from the Tanzanian wagon Ferry 4-6 times per month until the Tanzanian Rail Road had to shut down for repairs of a washout. This has forced some industries to move their goods by rail to Dodona and then by truck to Dar es Salaam. The operation handled 19 wagons, both covered and COFC per trip. These wagons were stripped at the RVR ICD 9 km from the port.

The CDS team discussed the idea of a RoRo barge service with Mr. Henry Atigeta, RVR Manager Lake Ports, who though it was a good idea. They could use the rail link to moor and discharge the barge. The trailers would be taken directly to the ICD for stripping. The problem with the idea, however, is that the railroad is not investing in the ports. This issue needs to be addressed.

Principal Problem Areas

The port's principal problem is a lack of operating space. It is located on a small peninsula with the pier constructed at its end. There is a shallow overgrown marsh area adjacent to the rail yard that could be reclaimed to create a yard area of approximately one hectare that would allow the construction of a 100m marginal wharf which would greatly improve operations. The RVR however has been reluctant to invest in any of the ports it owns. Consequently, the impetus for this type of investment must come from the government of Uganda. Also the port has a urgent need for two to three 5 ton forklifts.

Cargo Throughput

Henry indicated that when it was operated by the Uganda Railways Corporation (URC) the port handled between 360,000–400,000 tons annually. It is currently handling an average of 60,000 tons. Of this 45 percent is ginger. The remainders were wheat grain, cotton, seed, cooking oil and break bulk consumer goods. Recently they have been handling some rice from Tanzania after they opened up the export market. With the exception of heavier general cargo most of it is manually handled.

JINJA, UGANDA

Port Overview

Jinja was the most undeveloped and decayed of the ports that were visited. It is a finger pier measuring 50 m X 15 m with a standard rail link and dolphin mooring system attached to the end. It has not been in use since 2004 and consequently is in very poor condition with most of the planking and fendering systems decayed beyond use. When the wagon ferries were in operation it was used primarily as a relief port for Port Bell when it was congested. It also has a draft of 8 m and can handle boats up to 500 GRT.

Principal Problem Areas

In addition to the decayed state of the pier the rail line to the local ICD (3 km away) is 3 percent and is very dangerous to use with the poorly maintained equipment. There is a small rail yard near the entrance of the pier where wagons are marshaled. The second major problem is the dirt road running down to the port. It is steeply graded, heavily crevassed, and in several places the difference in the level of the left and right wheels is approximately 12-15 inches making it very dangerous for high trucks to drive down to the pier. The long term development potential of this port is not good.

Cargo Throughput

It currently handles approximately 1,000 tons per month, primarily cooking oil, and lime stone. During a period of high cement prices several years ago the local cement company in Tororo shipped cement out on barges. These exports have ceased since the prices went down.

Lake Tanganyika Ports

The CDS team also examined the infrastructure and identified the challenges for the Ports of Bujumbura and Kigoma on Lake Tanganyika.

PORT OF BUJUMBURA, BURUNDI

Port Overview

The port is owned by the Government but with the passage of a Code of Navigation law it is going through the process of being turned into a independent Ports and Maritime Authority with the responsibility of maintaining and investing in the infrastructure while concessioning out the operating responsibilities to a terminal management company. They are currently operating under a 10 years concession agreement with Societe Concessionnaire de l'Exploitation du Port de Bujumbura (EPD) who is only responsible for maintaining and operating the existing equipment and warehouses, and performing the cargo handling function.

They are not required to make investments in equipment. They manage and operate the following equipment:

- Four rail mount shore cranes with a maximum 5 tons capacity
- One mobile crane of 50 tons for handling containers
- One fixed 50 ton tripod crane

- Two forklifts of 25 tons
- 12 forklifts of 4.5 tons
- One yard tractor
- One 80 ton capacity weighbridge
- 18,560 square meters of warehousing
- 1, 745 horse power tug boat built in 1957 equipped with two diesel engines

The port occupies 21 hectares with a main quay that is 400 m long with a depth along side of 7 m. The basin has been recently dredged to this depth. On the opposite side of the basin is a 100 m long quay serving a small container yard. However this quay is presently being operated as a ship repair yard and is serviced by a stationary tripod heavy lift crane of 50 tons which is also used for LoLo containers. Around the point is a 25 m long quay that was projected to be used for a ferry or RoRo service which has yet to be developed. The main quay originally built between 1939 and 1957 was rehabilitated in 1990 during which the 100 m wide apron was resurfaced in concrete, the cranes rail were replaced, and quay facing was repaired and furnished with new bollards. The four, 50 years old rail mounted derrick cranes were rehabbed in 2001 and have a current lifting capacity of 2.5 ton at 36 m and 5 tons at 18 m. They are all in working condition although there is a major problem getting parts since they are no longer being made.

The port has four warehouses each 2,000 square meters, two of which are used for coffee or other bagged goods; one is used for general cargo and one for bagged cement. They have two smaller secured warehouses of 800 square meters in the back of the terminal for storing higher value cargo. The operation is quite modern. It employs terminal pallets for all of its cargo handling activities. The cargo generally comes in bags and is free loaded in the hold. The terminal pallets are loaded in the hold by stevedores and then transferred directly to the apron. These are then picked up and transported to the warehouse by forklifts. Truck loading is done at the back of the apron and behind the warehouses. The loaded pallets are placed on the back of the trucks by forklifts and stevedores remove the bags and free stow them on the trailer. EPD maintains a computerized inventory control systems for managing the operations in the warehouses. This is the only modern general cargo operation that was observed in the ports that were visited.

The passenger ship berth is located at the end of a long pier at the entrance to the port. It is well constructed with relatively new barrel fenders and with an apron that is approximately 10 m wide. It is physically located outside the port perimeter and has a separate terminal building for processing passengers. This building is an old warehouse that needs to be rehabilitated to properly handle passengers. However, the only operating passenger vessel on the lake is the 97 years old Liembra which sails only twice a month. Consequently, the terminal is little used.

There are two major vessel operators on the lake Ainolae and Batralac. Ainolae owns many old ships from colonial times including three tugs, nine barges, two self propelled cargo vessels. Half of the fleet is non operational. Batralac owns three relatively new LoLo container carriers that have capacities of 36, 24 and 14 TEUS. With the rail problems in Tanzania they are not very busy at the moment.

Principal Problem Areas

Although the shore cranes had been rehabilitated in 2002 they are now well over 50 years old and nearing the end of their service life. Parts are no longer manufactured or are available. When parts are needed they are manufactured on site when possible in the port's machine shop. The port is planning to replace these in the next five years.

There is a sewer outlet that runs under the end coffee warehouse that is undercutting the wharf in front of it causing it to collapse as shown in the photo below. This sewer needs to be rerouted and the wharf needs to be rehabilitated. The port also has a problem siltation due to a small stream that runs along the outside of the oil jetty. They want to also reroute it to enter the lake on the south side of the oil tank farm.

With the decline of service from the Tanzanian rail road system in the last several years the container yard has been converted to use as a ship repair facility. The port would like to expand and repave this area to handle containers based on the assumption that the railroad will be upgrading its services in the next four years as per their published development plan.

Cargo Traffic

The ports principal trading partners are Kigoma and Kasanga in Tanzania, Mpulungu, in Zambia and to a much lesser extent the DRC primarily via Kalenie. Import traffic from Kigoma in the last two years averaged 35,000 tons which is almost a third of the throughput average of 86,300 tons from 2000-2006. This same story applies to exports. The average exports through Kigoma during the period 2000-2006 were 17,200 tons versus 3,300 tons for the last two years. This steep drop off in traffic is attributed by the port to the decline in rail road service when the Tanzanian Railroad was privatized in 2006.

The port also has a significant import trade from Mpulungu that shows a similar trend. Import traffic for the period 2000-2006 averaged 49,300 tons while the average for the last two years was 23,000 tons. There have been no exports to Zambia for the last ten years. The reason given for this decline is the poor performance of the economy in Zambia over the last several years.

Finally, it was interesting to discover that the port also functions as a bonded ICD and Customs Inspection Zone in which both containerized and non containerized cargo moving in bond from the border crossings come into the port to be cleared and stripped when required. This has been a growing business which has increased from 13,500 tons in 2000 to 52,000 tons in 2008 with a peak of 60,000 tons in 2007.

Summary and Conclusions

Bujumbura is overall the best equipped, best organized, and best managed port on the two lakes. It employs modern practices for cargo handling. It has made significant investments in its infrastructure, it has a fully computerized operations and inventory control system, and its new organizational structure will most likely keep it in the forefront of port development in the region.

Additional data about the Port of Bujumbura regarding fleet composition and cago handled is available on Appendix B.

PORT OF KIGOMA, TANZANIA

Port Overview

The Port of Kigoma is operated by the TPA and is Tanzania's principal port on Lake Tanganyika. It was formerly the property of and operated the TRL. It was turned over to the TPA when the railroad was privatized in 2006.

The approximately 12 hectare site is divided into three sections: a horizontal slipway ship repair yard which is currently undergoing rehabilitation; a passenger terminal, a government pier support the military and customs organizations; and the main cargo terminal. The latter is managed by a private operator under a management contract that does not require direct investment. The TPA has turned over the facilities and cargo handling equipment to the operator who is responsible only for their operation. They in turn receive a US$ 4.60 wharfage fee from the operator. The infrastructure, facilities, and equipment are maintained by the port.

The existing jetty is a pile supported structure that was constructed in the 1920's and is in deteriorated condition. Apparently the top of the quay was at one time too low to the water and was being topped by waves. The port built a second level on to the wharf that was 0.85m higher than the original jetty resulting in a two tier wharf structure that was 205m long. The shore side apron is only 6m wide and supports three, 50 years old plus rail mounted shore cranes and a railroad track. The upper level also supports a rail tract extending to the end of the container yard. The port wants to level the

jetty off to operate a new harbour crane. However, the condition of the piles (see photo) may require that whole structure need to be replaced.

Originally the port was dredged to 6 m but siltation from the eroding hill behind the port is filling in the harbor. Current draft restrictions are 2.6 m-3 m. The TPA has purchased a new cutter suction dredge but did not have a maintenance agreement with the manufacturer. The dredge is currently not working because of a technical problem and the TPA procurement system has been very slow in obtaining the necessary parts. They are considering contracting with an operator to train the crew to better avoid similar future problems. This siltation problem is compounded by the fact that the level of the lake is dropping as water is being siphoned off into the DRC.

There are three shore cranes that are 57 years old and can only handle a maximum of 2.5-3 tons per pick when working. Only two are operational. The middle crane is not and is to be scrapped. Five of the ports eleven forklifts were out of service, three of five small mobile cranes and two of four yard tractors were also out of operation. Two of the working forklifts and the two working tractors were purchased in 2009 along with four container trailers. Its other principal asset is a 105 m wide bridge crane capable of lifting 35 tons. However, the hydraulic spreader bar is under repair. The port is expecting a new mobile container handling crane in September.

The bridge crane spans an approximate two hectare rail/container yard that in places is paved and in other areas hard packed. Quay is backed by a large two story warehouse that was built in 1920. Its dimensions are 84.5 m X 20 m and has second story veranda extending the length of the building on the berth side. In the past the shore cranes would transfer cargo directly from the vessel to the veranda for storage in the upper level. The upper level is now housing eleven offices and a number of small storage spaces. A new 54 m X 30 m warehouse and a machine were built behind the rail yard in 1982 and1988 respectively. Finally the port is the jumping off point for WFO food program serving the Congo. This cargo is stored in 12 temporary canvas

warehouses stretched out in a single row on either side of the new warehouse machine shop complex. Most of the cargo is break bulk primarily in bags.

The port is equipped with a set of slip ways that are used for the repairing of vessels on the lake. It has been out of service for some time and is now being renovated and is expected to be put back into service by August. It is 80m long. Behind it are associated carpentry and machine shops used for repairing vessels. The machine is old and will require some upgrading before the yard can come into full production.

The passenger terminal is operated directly by the TPA. The two berths are comprised of 4 short finger piers some mooring dolphins. The vessels are berthed at the end of these finger piers. Because of the decline in the draft alongside berth one; the port has had to insert an old barge at the end of the pier to allow the vessel to berth in deeper water. Two old passenger vessels were tied up at the births, the Liemba and the Mwongozo.

The Liemba is a passenger/cargo vessel that was built in 1913 and is the oldest commercially active vessel in the world. It has a capacity for 600 passengers and 200 tons of cargo and sails twice a month. Because of the situation the draft restrictions and the barge cargo must be discharged manually. This then requires the cargo to be lifted from the hold using the ship crane, and then hand carried it from the deck over the barge to a waiting wagon 50 to 70 meters away. This operation is handled by the TPA and not the terminal operator and consequently does not have forklifts available to assist in the operation.

Finally there is a small ship building yard situated on the bay just north of the port. The yard is currently building a 600 GRT general cargo carrier which is approximately 65-70 percent completed. The operations are relative primitive and machine and fabrication shops under equipped. However, it works. They can also assemble barges.

Principal Problem Areas

The principal problem in the port at the moment is the rail road on which it depends for traffic. The port used to receive four trains per week which was reduced to two when it was it was privatized. In February 2010 as large section of the track on the mainline between Dar es Salaam and Dodoma was washed out and

consequently service was halted. The railroad has made the repairs and will be undergoing test runs into July. They hopefully will be restarting the service to the port by the end of July 2010. The basic problem is that the rail access is a single narrow gauge track and the engines are old and under powered. Consequently, the maximum size trains are 20 flat cars or 40 TEUS. The port is pushing for the 4 times per week service to resume once the operation is back to normal.

The second major problem is the rapid silting of the harbor. There has been a major building boom of houses on the hill above the port. This has caused a rapid increase of soil erosion from the hill that drains into a stream that enter the bay just outside the boundaries of the port. As indicate above the port has instituted a dredging program but with the problems that they are having with the dredge the finding it difficult to keep up. The city has instituted a moratorium on construction on the hill but nothing as yet has been to address the existing erosion problem.

Finally, as indicated above and illustrated in the associated photo, the by-level quay is in bad shape and will need significant rehabilitation if not replacement. Considering the condition of the piling shown here one cannot assume that one can simply add a new cap to the structure. The TPA needs to undertake a detailed feasibility and design analysis before attempting to add a new cap. This assessment is strongly recommended if the port intends to use the new mobile container crane that is expected in September.

Cargo Throughput

Until the shutdown of the railroad in February 2010, Kigoma was averaging an annual throughput of 91,300 tons of cargo at the cargo terminal and 16,000 tons at the passenger terminal. (Tables 2 and 3). Although the 2009/10 figures represent only nine months of data, when a monthly average is taken and multiplied by 12 some indication of the impact that the rail shutdown has had on the port could be undestood. This forecast of 61,400 tons for the cargo terminal will represent a significant drop off of the previous year's total of 104,227. For the passenger terminal the forecast of 6,800 represents and even more precipitous drop off in cargo throughput for that terminal. The port attributes these declines to the shutdown of the railroad which illustrates how dependent this port is on the proper functioning of the rail road.

Table 2. Total Cargo Handled at the Cargo Terminal, July 2006-March 2010 (tons)

Year	2006/7	2007/8	2008/9	2009/10
Import	83,002	72,997	100,961	42,541
Export	11,117	2,575	3,368	3,517
Total	94,119	75,572	104,327	46,058

Source: Port of Kigoma, TPA.

Table 3. Total Cargo Handled at the Passenger Terminal, July 2006-March 2010 (tons)

Year	2006/7	2007/8	2008/9	2009/10
Import	6,535	6,365	13,007	4,259
Export	4,140	6,261	11,788	862
Total	10,675	12,626	24,795	5,121

Source: Port of Kigoma, TPA.

Additional data about the Port of Kigoma regarding vessel traffic, cago handled and equipment is available on Appendix B.

Summary

INFRASTRUCTURE

Of the six ports that were visited and evaluated only Bujumbura has made a major investment in the port infrastructure in the last two decades. The main quay, which was built between 1939 and 1957, was rehabilitated in 1990 in which the 100 m wide apron was resurfaced in concrete and new crane rails and bollards were installed. In addition, the 50 years old rail mounted derrick cranes were rehabilitated in 2001. The only other infrastructure project under way is the dredging of the Port of Kigoma and the rehabilitation of its slip ways.

With the exception of Bujumbura, the visited ports have some serious infrastructure problems. The Ports of Kigoma and Mwanza have bi-level pile supported quays in which the bottom water side level is only six meter wide. The top level, which is approximately one meter higher, was added in response to a rise in water level by simply adding a facing wall on top of the old deck and filling in dirt and gravel behind it. The Port of Kisumu essentially did the same thing but topped the entire original apron so that the quay is at one level, albeit surfaced with gravel. In all cases the original quays or piers, as in the case of Port Bell and Jinja, were built between 1920 and 1930. Consequently there are serious questions regarding their weight bearing capacity and

suitability for supporting heavier cranes. On Lake Victoria, the rail links at each of the ports are relatively well maintained except for Jinja which has deteriorated to the point of being unusable.

EQUIPMENT

Bujumbura is the best equipped of all the ports with four operating 5 ton rail mounted shore cranes, one fixed and one mobile container crane of 50 ton capacity, two 25 ton and twelve 4.5 ton forklifts, one yard tractor and one 80 ton weigh bridge. Kigoma is also relatively well equipped; it has two of three 60 years old rail mounted derrick cranes working and a 105 m wide rail mounted bridge crane of 35 tons operating in the container yard, three working yard tractors, and ten working forklifts.

With regards to the four ports visited on Lake Victoria, all are inadequately equipped. In Mwanza the two 5 ton jetty cranes were manufactured in 1929 and only one is still operational at a max of three tons. They have only one operating forklift which is used in the warehouse. All ship shore operations are primarily done using manual labor. There is one farm tractor used for shunting the rail cars on and off the wagon ferry. They also have two relative new floating dry docks that are fully functional. The largest is 100 m x 24 m with a lifting capacity of 2,100 tons while the smallest is 70 m x 13 m with a lifting capacity of 860 tons. However, the machine and repair shops are rather limited in scope and equipment.

Kisumu, Port Bell and Jinja do not have any working cargo handling equipment at all and consequently do not handle containers unless they are on a rail wagon. When a crane is needed it has to be rented from the associated towns. Kisumu, however, does have a built in functional dry dock 100 m x 30 m with a 6m draft. It is equipped with a swinging gate that is opened and shut using a 250 horse power tug built in 1958. The facility also includes one slipway under rehabilitation and one that is beyond use. It also has the most fully equipped machine, carpentry, and fabrication shops of the ports that were visited. The Port of Kisumu is also associated with a dry port operated by the Kenya Port Authority (KPA) that is approximately three kilometers from the port. Containers are transported in bond from Mombasa to the yard where they are inspected by Customs and released. They are then stripped for onward distribution by truck. None of this cargo, however, goes through the port at the moment.

3. Development Options for Lake Cargo Services

If a macro view of the overall regional geography of the Great Lakes and Central Africa is taken, it will be possible to identify a number of systemic possibilities for developing a land/water distribution system that would significantly reduce distribution costs while increasing revenues for the shipping companies, ports and railroads involved.

The distance between the Port of Bujumbura in Burundi and the Port of Mpulungu in Zambia on Lake Tanganyika is 645 km and represents a relatively inexpensive water transport route serving four countries. The Port of Kigoma is the only port on the lake that has a direct rail connection with the Port of Dar es Salaam via the RAHCO central railway. This rail connection provides a significant opportunity for developing a low cost container transport system from Dar es Salaam to Burundi, and Rwanda, DRC and potentially Zambia in competition with the TAZARA railway. MLL study has estimated that a rail/lake intermodal container transport system form Dar es Salaam to Bujumbura via Lake Tanganyika would be around US$ 60 per ton versus US$ 242 for an all road journey.

From a macro economic perspective these cost advantages of the rail/lake system give reason for focusing on its development as a long haul alternative to a truck/highway system into the region abutting Lake Tanganyika. However, what these numbers do not take into account the significant capital and technological investments (and associated financial risks) that initially must be undertaken to capture a sufficient share of a relatively small market (with a significant growth potential) to make it economically viable. The truck/highway system, despite being four times more costly per ton kilometer, offers significant advantages over its railroad competitors including:

- Greater flexibility in scheduling and destination
- Greater speed of transport

- Direct door to door service
- No intermediate model transfers

However, the principal negatives are:

- High costs per ton/km
- No economies of scale
- Road system from the principal ports into Burundi, Rwanda, DRC and Zambia are long, difficult, costly to maintain, and in places dangerous

Herein lays a business development opportunity. The Ports of Kigoma, Bujumbura and Kalemie are reasonably well developed and can easily handle containers if the shipping fleet was reconfigured to handle them. MLL study has recommended the development of LoLo container handling systems for the lake ports. This is perhaps not the best way to go for the following reasons:

- It requires significant infrastructure investments in each of the lake ports including a new quay in Kigoma, expensive shore cranes with a minimum of a 40 ton lift capacity, large paved holding yards, and expensive container handling and stacking equipment.
- It requires a large investment in the construction of fully cellular container vessels with sufficient capacity to meet the rising demand. These are costly and would be difficult to construct on the lake where there are no qualified ship yards to carry out the work.
- The current and near future volume of rail traffic (Table 1) cannot justify such high initial investment costs.
- There is an alternative low cost option available that has been proven in many places around the world.

The key requirements for developing an efficient low cost container distribution system via Lake Tanganyika to the adjoining countries are:

- Frequent delivery of block trains carrying 40-60 TEUs from Dar es Salaam to Kigoma
- A system for rapidly transferring the containers from the rail to the lake shipping service
- A low cost shipping service calling the principal ports on the lake
- A system for rapidly discharging the vessels and turning the containers around

The cheapest and most efficient distribution system to meet these criteria would be a rail-tug/barge feeder system.

The Tug/Barge Concept

Tugs towing or pushing barges stacked high with container are a common site on the principal rivers and lakes of North America, Europe and Asia. This system requires that each port on the vessel's itinerary be equipped

with LoLo capability. This is not the type of system most suitable for East Africa. There is, however, a sub system of this concept that is much more suitable for this market, roll on-roll off (RoRo) barges as illustrated in Figure 2. The RoRo barge pictured is approximately 120 m long by 20 m wide and has a capacity of 144 TEUs of containers on chassis. The barges are designed with a flat deck with water tight compartments below drafting 2-3 m and are towed in this case by a sea going tug. A smaller tug can be used on the lakes. The barge can be moored vertically to the quay with either a pull out, drop down ramp attached to the vessel or a portable ramp supplied by the port to be used to connect it with the yard. In ports where a vertical mooring system would cause navigational problems and alternative is to use a side loading design. Tractors from the port would then be used to roll the containers on chassis on and off the vessels. In operation the tugs will attach alongside the barge to maneuver it into or from the quay and then will switch to tow mode once it is in open water. The only power unit is the tug.

Figure 2. Early Tug/Barge RoRo Service between Philadelphia and San Juan, Puerto Rico

Source: Crowley Marine Transport, Pennsauken NY, US.

The overall distribution system will involved the following processes:

- Loading the containers on to a regularly scheduled block train going from Dar es Salaam to Kigoma.
- Establishing a chassis pool in Kigoma and discharging the container on flat car (COFC) onto the chassis using the existing bridge crane, a reach stacker, or a 40 ton forklift. It would be preferable to use modified slip chassis to speed up the operation.
- Adding trailer on flat car (TOFC) at hub logistics centers such as Isaka along the route and transport them in the same fashion as before (optional).

- Moving both the container on chassis or trailers by yard tractors to a holding area for loading on to an incoming barge or directly onto a barge in a coordinated scheduling system.
- Rolling off and moving containers and trailers at the receiving port to a buffer area or inland container depots (ICD) for Customs clearance and stripping when required.

The process would be reversed for moving empty or export containers back to Dar es Salaam.

The big issue would be getting a barge on the lake. There are a number of small ship yards on the lake that, with proper supervision from foreign barge construction specialist, can construct a barge from scratch. Typically, however, this will take a long time and may have problems getting Lloyds Certification[1]. A second option would be to order a barge from a modern shipyard that can be assembled in sections small enough to be transported on a train. Kigoma is rehabilitating their slip way which can be used for reassembling a barge up to 100 m long. With regards to the tug, because of the relatively benign climatic conditions on the lake and lack of strong currents, the operator may not need an overly large tug to do the job. Such a tug can be shipped overland by rail as they have been in the past.

Barge Feeder Services on Lake Victoria

As indicated above Lake Victoria has a different trade and distribution dynamic. The design of each of the different ports on the lake includes facilities for the mooring of rail wagon ferries. When these were developed in the 1960-70s the national railroads of Tanzania, Kenya and Uganda were a part of the now defunct East Africa Railways Corporation and was operated as one coordinated system. Currently, there are two separate railroads, the TRL serving Mwanza and the RVR serving Kisumu, Port Bell and Jinja. The natural competition therefore is between the TRL at Mwanza and RVR in the other ports. A second competitive option is for RVR to improve their rail track and service to Kisumu and offer a cheaper short cut service to Port Bell in Uganda. In the past both this services have been offered using rail wagon ferries. However, as indicated above the operating and maintenance costs of these vessels combined with a low carry capacity greatly increases the economic risk of such a venture in the present circumstances.

There are several options for developing container distribution services on the lake. One option is to convert the working rail wagon ferries to RoRo operations handling containers on chassis which with proper loading could increase their container carrying capacity by 15-25 percent. The logical services would be Mwanza to Kisumu or Mwanza to Port Bell and Kisumu to Port Bell.

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[1] The Lloyd's Register Group is a maritime classification society and independent risk management organization providing risk assessment and mitigation services and management systems certification.

However there are problems associated with this option. First of all the vessels are old and require extensive maintenance. Also, they are expensive to operate, and because of their inherent design limitations cannot maximize their revenue capacity to operating cost ratios in comparison to a tug barge operation. Therefore the second option would be to design a RoRo barge that can utilize the rail wagon mooring facilities at each of the ports while more than doubling the carrying capacity of the vessel per voyage. For this option the rail link system would have to be modified to facilitate the easy on and off movement of the trailers and containers. As in Kigoma the rail links into Mwanza and Kisumu will need to be improved and holding yards must to be developed as well. More importantly the ports need to be equipped with reachstackers or heavy forklifts to transfer the container from the flat cars to chassis and vice versa. Needless to say chassis pools would need to be developed in both rail head ports.

Barge Feeder Services on Lake Tanganyika

It is envisioned that because of its rail connection with Dar es Salaam, Kigoma would function as the hub port for the proposed container barge distribution services on the Lake Tanganyika. There are a number of options. Initially, an alternating pendulum service can be set in which Bujumbura and Kalemie can be serviced once a week. If multiple barges are put into service then there is the option of establishing a three or four port itinerary service depending on demand. The only investments that will be needed in the receiving ports are the purchase of yard tractors and the development of secured, hard packed, and bonded holding area for clearing customs and stripping containers as needed. Finally, because of its versatility it can also function as a truck ferry servicing the local commercial markets.

Passenger Services

Passenger service on Lake Victoria is well developed and most of the vessels are in the hands of the private sector. According to MLL, the Government of Tanzania owned Marine Services Company operates three passenger/cargo vessels built between 1961 and 1980, with a total capacity for 1,690 passengers and 340 tons of general cargo. The private sector owns and operates one landing craft and six car ferries of recent vintage. Uganda also operates one landing craft with a passenger capacity of 100. The private sector has ten passenger cargo ships currently in service with one new one under construction. Three additional vessels have been laid up.

The Tanzania Port Authority (TPA) operates a reasonably well developed passenger terminal at South Port in Mwanza that primarily services the government owned vessels on the lake. The passenger vessel Victoria was discharging passengers and cargo when the consultant visited the port. It was using its own crane to discharge general cargo from its only hold. The cargo was placed on terminal pallets in the hold which was then transferred to the apron. However, despite the fact that the cargo primarily was relatively heavy farm products and consumer goods there were no forklifts to assist the passengers and merchants in loading them onto their

carts or vehicles. Despite this absence of mechanization the entire terminal appeared to function reasonably well. In Kisumu, Port Bell and Jinja passenger services were in private hands and did not use the public port facilities.

The situation on Lake Tanganyika is significantly different. There are only two passenger vessels operating on the lake: one is the 97 years old 634 passenger Liemba which now sails only two times per month and the other is the Mwongozo which was built in 1979 with a capacity for 800 passengers and 80 tons of cargo. The Mwongozo however has been laid up with engine problems for several years and no date has been set for its return to service. A third passenger vessel is being renovated in Bujumbura and fitted with two, 125 horse power outboard motors by a private sector entrepreneur but no information is a available as to when it will be put into service and how it will be employed. The primary passenger services provided on the lake at this time are open wooden boats approximately 25-30 m long operated by mom and pop enterprises.

With respect to port facilities, both Kigoma and Bujumbura have passenger terminals separated from the main cargo terminal operations. Both the Liemba and the Mwongozo are moored in Kigoma. Because of heavy siltation at the quay the TPA must place an old barge between the wharf and the Liemba to have enough depth to operate. This necessity creates problems for unloading cargo as the deck of the barge is not suitable for placing pallets or operating forklifts. So cargo is lifted from the hold by the deck crane and then manhandled to a farm type trailer for delivery to a receiving area where it is loaded on to local carts or vehicles. The passenger ticketing and holding areas is rather primitive and provides little protection from the elements. The port processed 15,045 passengers in 2009/10 which was down significantly from the previous years. Unfortunately, the statistics are not broken down by country but the Port Director indicated that the great majority of the traffic involved domestic movements.

In Bujumbura the passenger berth is located at the end of a long pier near the entrance to the harbor. It is well constructed with new fenders and is in good shape. The problem is that passengers must walk 500 to 600 m to get to the terminal building which is a problem in bad weather. The terminal building, essentially an old warehouse, needs to be renovated to make it more functional as a passenger terminal. However, with the Mwongozo laid up, this upgrade has been put on hold until there is a greater demand passenger facility.

In recent years, the port's primary passenger market has been the DRC, comprising mostly of moving refugees from or to home in DRC. In 2006, the year before the Mwongozo went out of service the port handled 5,035 passengers (419 per month) from the DRC alone. In 2009, the port only handled a total of 693 passengers or 57 per month from the DRC primarily in the wooden boats described above. It is the lowest passenger count since 1997, when the port started maintaining passenger statistics from the DRC. The port attributes this decline to the absences of the Mwongozo and the reduced service frequency of the Liemba.

Unfortunately there no reliable statistics measuring overall passenger demand on Lake Tanganyika. However, it seems clear that the absence of passenger vessel capacity is negatively affecting passenger throughput at both Bujumbura and Kigoma. Somehow the operators have kept the Liemba going but it cannot be expected to operate much longer. Although the two port's passenger facilities could use some upgrading, there is little incentive to do so until new capacity has been added to the passenger fleet. However, until demand increases, as result of restoration of security and resumption or picking up of economic and social activities especially in DRC and Burundi, it will remain difficult for entrepreneurs to economically justify new construction.

Summary

Maritime and port operations on Lakes Tanganyika and Victoria have a significantly different structure and modus operandi. Lake Victoria has a much more modern and viable merchant fleet particularly with respect to passenger and RoRo ferry operations. They also have a more energetic private sector operating both shipping and port facilities. The public rail and port sector, however, lags well behind the private sector in developing its facilities and providing modern port services to the merchant fleet and shipping community. Paradoxically, on Lake Tanganyika with the exception of a few new constructions the shipping fleet is very old and antiquated while the ports, particularly Bujumbura, are reasonably well developed and have been investing in their infrastructure to upgrade their facilities.

The reasons for this dichotomy are in some ways clear and in other ways hard to pinpoint. In Tanzania and Burundi the primary responsibility for the development of the ports is in the hands of government authorities or agencies. In general, they have concessioned out the responsibilities of operating the terminals to the private sector while retaining the responsibility for investing in the infrastructure. This organizational structure has worked best in the Bujumbura were this separation of responsibilities have been in effect for at least a decade and a half. In Tanzania, the TPA only took over the responsibility for the lakes ports after the privatization of the railroad in 2006. Since then, they have initiated the dredging of the harbor in Kigoma and provided it with new cargo handling equipment. The TPA involvement in Mwanza has been relatively more recent. They have maintained the train/wagon ferry Umoja and have kept it in services. They also maintain two relatively new floating dry docks and are planning to upgrade the quay and add more cargo handling equipment.

On Lake Victoria the port's, with the exception of Mwanza, are operated by the RVR. Its focus and priority are to maintain its track and rolling stock and to generate traffic. It has no expertise and interest in operating or maintaining ports. Since the RVR is now a single system serving both Kenya and Uganda and their principal ports, there is no real economic incentive to continue operating the rail/wagon ferry system.

The discrepancy in the size and makeup of the merchant fleets on the two lakes is a little more difficult to explain. It is clear that the three nations bordering Lake Victoria have a more developed and diverse economy associated with the lake and combined with a large regional population provide more entrepreneurial opportunities for upgrading the shipping sector. It should be noted, however, that the focus of this development has been on car and passenger/RoRo vessels and not on cargo or container carriers. These latter types of vessels must compete directly with road based trucking services while the car ferries are integrated within that same highway distribution system.

On the other hand, despite the fact that the DRC and Burundi constitute a rapidly growing market the cost and difficulty of the overland transport make them highly dependent on shipment of goods to and from Dar es Salaam by rail. However, the development and maintenance of the Tanzanian railroad system responsibility of RAHCO has been neglected over the last decade or more to such an extent that it is consider too unreliable to generate the traffic requirements that are needed to justify new investment in the merchant fleet on the lake. The planned upgrade of the railroad, if implemented, may change this investment dynamic.

The proposed tug/barge RoRo service is particularly congruent with the geography, trade and operating environment on Lake Tanganyika. With only one railroad reaching the eastern shore of the lake the barge service will provide it with a direct extension of its services into Burundi, DRC and Zambia. The proposed upgrade of the track to standard gauge will make this type of operation even more viable. It would also act as an incentive for entrepreneurs to invest more in tankers, general cargo vessels and passenger services.

On Lake Victoria, the proposed barge service may only work where there is a direct competition between the two railroads, i.e. Mwanza to Port Bell or Kisumu. A service from Kisumu to Port Bell will require much more creative thinking by the RVR than they and their predecessors have displayed in the past.

4. Recommendations

The purpose of this paper has been to evaluate the overall maritime distribution system on Lakes Tanganyika and Victoria and to identify opportunities and options for facilitating maritime trade in the region. The following projects have been proposed for inclusion in the Action Plan:

- Lake Ports Rehabilitation, Dredging and Siltation Protection
- Establish RoRo Services on Lakes Tanganyika and Victoria
- Restructure Wagon Ferries to Carry MAFI Trailers
- Develop Vessel Maintenance Capacity on Lake Tanganyika
- Enhance Safe Navigation

A description of each of these proposed lake transport projects for the Northern and Central Corridors is presented below.

Lake Ports Rehabilitation, Dredging and Siltation Protection

Inland waterways on Lake Tanganyika have historically played an important role in providing least cost, most efficient and reliable means of transport for goods to/from Burundi, Eastern DRC and western Tanzania, as an important component of an intermodal supply chain along the Central Corridor linking these countries to Dar es Salaam port through Kigoma. Similarly inland waterways on Lake Victoria provided an important link for the Central and Northern Corridor transport intermodal system links to especially Uganda. In this way the Lake provided Uganda with an alternative access route to the sea.

This importance has declined due mainly to backlog maintenance or lack of investments in the ports and marine infrastructure. Insecurity on Lake Tanganyika and the decline in performance of rail links to Kigoma, Mwanza and Kisumu has also denied the lake services with traffic that would have motivated such investment. Many ports are severely silted, with depths at berths reduced to around 3–4m. Port facilities have also deteriorated. However, with better prospects of economic growth in the region, it is important that these

links are revived and strengthened. Investment in rehabilitating and improving Lake ports infrastructure and shipping services will be beneficial to the region.

Since traffic is low and needs to develop, it is proposed that initially a relatively cheaper tug and barge based roll on roll off (RoRo) system should be developed on both lakes to provide necessary capacity until cargo traffic builds up to justify more expensive lift on lift off system.

Dredging at some ports on Lake Tanganyika and Victoria has been done or is ongoing, with own funding (TPA) and assistance from Belgium. There are two major initiatives one each for the Lake Victoria and Lake Tanganyika that are ongoing and have established comprehensive investment strategies.

The proposed project will:

- Complete or initiate dredging of ports of especially Kigoma, Bujumbura, Kalemie, Mwanza, Port Bell, and Kisumu to restore design depths of generally around 6 m on approach to, in anchorage and along berths.
- Establish a watercourse management system to minimize soil erosion and sedimentation at ports.
- Rehabilitate or establishing areas and ramps to accommodate vehicles (in particular MAFI trailers and forklifts) involved with RoRo operations at ports.
- Further details regarding interventions at each lake port is presented below.

PORT OF KIGOMA

Kigoma was expecting to receive a mobile container crane in September 2010. However, there is only a small section of the main quay where it can be safely operated on. The port needs to rehabilitate its main bi-level quay which was built in the 1920s using a pile system that has not been used since the 1930's. An engineering survey needs to be undertaken to determine if the quay must be rebuilt or if it can be rehabilitated and to subsequently develop the appropriated designs and cost estimates to do the job. In addition they will need to replace the antiquated shore cranes for two modern 10-15 ton rail mounted derrick cranes for handling general cargo. Finally, the dredging projects needs to be completed for both the cargo and passenger terminals. This work should be contracted to an experienced operator.

PORT OF BUJUMBURA

The immediate need in Bujumbura is the rerouting of the sewer channel that is passing under one of the warehouse and causing part of the quay to crumble. There is also a need to expand the coverage of the pavement behind the quay that is proposed for the barge service. Finally although they are still working, the 60 years old shore cranes need to be replaced in the next five years because the parts to keep them operating are no longer available.

PORT OF MWANZA

Mwanza also needs to rehabilitate or replace its bi-level quay that was also built in the 1920's probably using the same pile system as found in Kigoma. Again an engineering survey as proposed for Kigoma is required to determine what needs to be done. The port will also need a couple of new 10-15 ton shore cranes and several forklifts for handling its general cargo traffic. If the barge service is implemented the port will also need 3-5 yard tractors and a reach stacker. Finally, although Mwanza is the home to two large relatively modern dry docks, its machine and ship repair shops are inadequate for doing any major repairs. If it wants to develop this business the machine shops will need a major upgrade.

PORT OF KISUMU

In addition to the infrastructure that will be required for the proposed barge service, the port needs to add at minimum one shore crane, either mobile or on rail, and several, 5 ton forklifts for handling general cargo. A reachstacker, 3-4 yard tractors, and a chassis pool would also be required if the proposed tug/barge RoRo service is developed.

PORT BELL

Being located in Kampala, Port Bell is Uganda's most important port. However, its current layout and underdevelopment greatly limits the way it can be used. Its biggest need is to expand its back up area as it is highly constrained for space. One option is to reclaim a low marsh area adjacent to the rail yard and add a marginal wharf approximately 100 meters long to expand its berthing capacity. In this respect, a study needs to be carried out to identify its development options and to generate a master plan. In the short term it will need a mobile crane and three or four forklifts to support the general cargo operations it currently has.

JINJA

Jinja is a very small virtually derelict port that handles primarily general cargo. If it is to be included in the proposed barge system the wagon ferry mooring system will have to be totally rehabilitated and the backup area needs to be expanded. The access road will also have to be reconstructed. If it is not to be included in the system then a small mobile crane and a 5 ton forklift would suffice.

The project will provide the potential to reduce transport/trade cost with the use of least cost links for especially for Burundi, part of Eastern DRC and Uganda. It will also provide viable alternative trade routes for countries using the lake services to avoid propensity to exploit monopoly situations,

Establish RoRo Services on Lakes Tanganyika and Victoria

In the course of revival of inland waterway services on Lakes Tanganyika and Victoria to service increasing volume of cargo, it has been proposed to initially adopt a tug and barge based RoRo services. These would be

quicker and relatively less costly to establish. Typically a tug and barge system also requires about a third of the crew compared to a self propelled vessel. Furthermore, barges can be built at low technology shipyards on the lakes, tugs can be bought and railed to the lakes, MAFI trailers can be assembled and fabricated locally and fork- lifts can be bought from local franchises.

There are some private sector operated barges on both lakes. Barges can be built at existing shipyards at some ports on both lakes, albeit with some slight improvement if need be. The project will aim to mobilize private sector, especially those involved in provision of lake services to buy into and establishing RoRo services and acquire barges fabricated at local shipyards. Private lake transport service providers will also be encouraged to purchase MAFI trailers fabricated locally and importation of tugs.

Restructure Wagon Ferries to Carry MAFI Trailers

Principal cargo transport services on Lake Victoria were designed as part of a railway system, with wagon ferries carrying wagons across the Lake. Link spans were built at all major ports Mwanza, Kemondo Bay and Musoma in Tanzania, Kisumu in Kenya and Jinja and Port Bell in Uganda to facilitate rolling wagons on/off the ferries. When the railways were performing well the wagon ferries had an important role to provide an important transport link for both Northern and Central corridors. However, with the near collapse of the railways in recent years the importance and use of wagon ferries declined and the ferries got no proper maintenance.

Out of the five ferries commissioned between 1964 and 1979 only four are serviceable or operational since the sinking of one (Ugandan) in 2005 after collision with a sister ferry. Two (Tanzanian and Kenyan) are operational and the remaining two (Ugandan) are being rehabilitated to be put back to service. This RoRo service is simple to operate and available to use, though some facilities at ports need rehabilitation. However, there is need to reduce the high cost of maintenance and operations of the ferries relative to their carrying capacity. They now carry 19 wagons (38 TEU), A 2009 analysis by Marine Logistics Limited for the Central Development Corridor determined the possibility of the ferries accommodating 62 TEU, an additional 24 TEU on MAFI trailers and on deck, without changing the structure of the vessel. There is a possibility to further improve this capacity by adjusting the superstructure to make the ferry more flexible, with ability to carry a full load of MAFI trailers when there are wagons to ferry. In addition the MAFI trailers have a tare weight of around 5 tons compared to 17 tons for the wagons.

There are no known existing plans to convert the wagon ferries. The project will include the conduct of a technical feasibility analysis of the conversion, especially related to stability and safety standards; and if found feasible, provide support for carrying out the conversions at local shipyards.

Develop Vessel Maintenance Capacity on Lake Tanganyika

There are old vessel building and repair facilities (slipway/dry docks) at the ports of Kigoma, Kalemie and Bujumbura, with different capacities and technical capabilities. However, there have been complaints by some

vessel operators of inadequate of capacity. In addition complaints have also been made on unfair treatment or discrimination by some owners of these facilities. Furthermore, with the drive to redevelop Lake Services, involving acquisition and deployment of newer vessels, as well as enhance safety standards, there is need to develop adequate capacity to handle vessel building, assembling and repairs. This capacity should also be developed and managed as common user facilities to service vessels from all countries.

Each main port (Kigoma, Kalemie and Bujumbura) has some repair facilities managed by respective Port Authorities. An assessment of these facilities is required to determine a strategy for development adequate and integrated vessel repair facilities on the Lake. The strategy should include an institutional framework to ensure access by vessels irrespective of their country of origin and steps to promote and secure the interest of potential investors and managers of the facilities.

Enhance Safe Navigation

The Lakes do not have up to date navigational aids to guide safe sailing of vessels. The certification and licensing of vessels and crew is also not harmonized among the countries allowing ship owners to operate a wide variety of vessels to different standards. Furthermore, there is no credible and effective search and rescue on the Lakes. Given this state there is no credible safety environment on the two Lakes. Partly due to this many avoidable accidents happen and major accidents have resulted in huge losses. The most dramatic accidents include the sinking 30 km off Mwanza port of MV Bukoba, a passenger steamer with capacity of 430. This accident, which occurred in 1996 resulted in the drowning of approximately 800 people. Rescuers were brought in from as far as South Africa. The other major accident was the collision of two wagon ferries in 2005, resulting with the drowning and loss of one of them. Enhancing safety regulations will create conditions for avoiding some of these accidents and losses.

Safety issues are included in the two main initiatives for the two Lakes: the Lake Victoria Basin Commission (LBVC) and Lake Tanganyika Basin Commission (LTBC) under which comprehensive development and investment strategies are being pursued. Key aspects include:

- Undertake/complete hydrographic surveys and install lake-wise and port navigational aids for safe passage of ships;
- Adopt recognized classification society rules regarding construction of ships/vessels;
- Introduce meteorological navigational warnings and other services;
- Establish search and rescue organization and adopt a harmonized implementation policy and strategy, including the possible use of *Global Maritime Distress Safety System* (*GMDSS*); and
- Harmonize port security, safety and environmental compliance strategies.

Passenger Services

Entrepreneurs on Lake Victoria seem to be addressing the requirements for passenger services very well and this can be allowed to continue without intervention by the public sector. The main problem is on Lake Tanganyika. The primary need is the development of low cost passenger services serving both the cross lake trades and long shore itineraries. Considering that there is a general lack of information regarding the traffic potential in the region it will be necessary to first carry out a detailed market and design feasibility study that would include the following components:

- A market assessment to determine traffic demand for both passengers and their associated cargo and to develop long term traffic forecasts.
- An engineering study to develop a more flexible design for vessels servicing the small ports and communities along both sides of the lake. Such a vessel needs to be fast enough to allow them to reach destinations within a reasonable travel time without requiring overnight accommodations, be able to carry both passenger and their cargo within the ability of the travelers to pay, and be able to enter ports with limited docking facilities and freight handling capabilities.
- With a design concept in hand, carryout an economic an operational feasibility analysis with the end objective of developing a business pro forma and an investment plan to be presented to entrepreneurs to implement either independently or in partnership the rail road or TPA.

This assessment identifies a number of opportunities to develop improved maritime services on both Lakes Tanganyika and Victoria. Because they are systemic in nature, the options that have been proposed will require cooperation between the private and public sectors in all of the countries involved. The proposed studies are a means for coalescing ideas and defining the scope, cost parameters, and economic viability of the projects. They will enable both sectors to visualize the end results and chart a course for their implementation.

Appendix A. Persons Contacted

Port/Depot	Contact Information
Tanzania Port Authority	J. R. Ngokota Operations Manager (GC) Tel: +(255) 222138590 Cell: +(255) 784390665 Email: ngokota@hotmail.com
Kenya Maritime Authority	Tumaini Namoya Tel: +(254) 412318398/9 Cell: +(254) 722771429 Email: tnamoya@maritimeauthority.co.ke John Omingo Commercial Shipping Manager Tel: +(254) 412318398/9 Cell: +(254) 721738625 Email: jomingo@maritimeauthority.co.ke omijod@yahoo.com
Kenya Port Authority CFS	Edward Opiyo Depot Manager Tel: +(254) 0572028054 Cell: +(254) 726828401
Kenya Ministry of Transport	Peter K Thuro Director of Shipping and Maritime Affairs Duncan Hunda Senior Economist
Port of Bujumbura	Melchior Barantandikiye Director International Transport Department Tel: +(257) 77757755
Societe Concessionnaire de l'Exploitation du Port de Bujumbura	Hon. Christian Nkurunziza, Administrateur Directeur General, a.i.
Petroleum Operator at Port de Bujumbura	Operations Manager

Port/Depot	Contact Information
Port of Kigoma	Winnie P. Mulindwa Lake Ports Manager, TPA Tel: +(255) 222127513, +(255) 787755449 Winnie@tanzaniaports.com Hebel Mhanga Kigoma Port Master, TPA Tel: +(255) 282802275, +(255) 7547394040 hmnanga@tanzaniaports.com
Port of Mwanza	Robbin M Maseke, Senior Operations Officer, TPA Tel: + (255) 262503074, +(255) 754830295 pmmwanza@tanzaniaports.com
Port of Kisumu	Eng. Benjamin Nzive Port Manager Kenya Railways Tel: +(254) 0202215796 Cell: +(254) 722416308 bmnzive-1@yahoo.com
Port Bell and Jinja RVR	Henry Ategeka, Manager Lake Ports Rift Valley Rail Road Tel: +(256) 772459176 ategeka2000@yahoo.com

Appendix B. Additional Data on Lake Tanganyika Ports

Table B1. Bujumbura Port Statistics

Imports (Tons)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DE KIGOMA ET KASANGA											
Alimentation	4,859	9,836	25,576	16,694	17,161	13,505	6,927	20,155	14,359	8,198	6,068
Boisson	-	-	138	-	234	284	603	169	-	-	-
Bitume	56	-	-	128	163	-	48	-	-	120	-
Chaux	17	-	227	84	178	95	324	516	669	753	-
Ciment	1,895	3,345	7,464	26,834	7,602	1,321	13,691	9,321	4,583	7,780	14,900
Engrais	5,440	9,888	6,073	14,766	3,593	9,639	6,824	6,829	6,079	2,201	1,301
Essence	-	8,913	5,409	219	4,335	8,399	5,514	661	312	-	-
Farine	7,072	7,991	11,929	5,641	3,197	777	1,269	615	1,694	1,360	38
Friperies	837	704	600	760	620	138	-	-	12	-	-
Froment(blé)	-	-	-	209	-	978	1,876	1,194	2,047	-	2,368
Gasoil	399	10,125	8,793	1,012	4,079	5,124	4,010	2,301	3,777	339	335
Jute(sac)	551	467	653	-	39	-	-	-	-	-	-
Lubrifiants	353	36	132	209	331	425	196	-	-	-	-
Mat. Agricole	1,176	650	1,233	1,607	2,586	1,770	1,684	993	431	555	254
Mat. Constr.	4,732	4,100	6,740	5,624	9,884	9,418	5,985	10,096	5,322	3,755	4,095
Malt	163	1,244	4,314	5,256	5,653	7,209	4,865	7,047	3,077	120	1,159
Papier	278	289	882	1,193	1,507	1,069	613	603	226	40	70
Pétrole	-	372	843	742	-	532	-	-	-	-	-
Produits chim.	881	1,487	3,057	2,274	3,123	2,607	2,714	2,215	2,201	223	142
Sel	9,122	18,698	12,347	13,833	14,980	15,946	14,268	9,440	9,214	4,617	1,305
Sucre	130	-	-	3,365	143	107	-	5	311	-	957
Tourteaux	158	141	71	345	200	70	283	914	220	-	20
Véhicules	4	29	13	32	7	-	3	1	31	-	-
Déchets coton	-	67	225	-	-	-	-	-	-	-	-
Divers	4,684	7,937	10,628	8,981	4,644	4,865	4,418	7,741	6,935	5,066	2,806
Total	***42,807***	***86,319***	***107,348***	***109,809***	***84,261***	***84,280***	***76,117***	***80,814***	***61,500***	***35,127***	***35,818***

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DE MPULUNGU											
Alimentation	6,476	110	148	12	35	41	-	-	-	36	668
Boisson	-	30	3	-	-	5	-	-	-	-	-
Bitume	313	180	-	-	250	-	-	-	-	-	-
Chaux	185	-	-	230	-	-	-	-	-	957	61
Ciment	32,571	25,744	32,151	14,493	35,862	46,631	28,946	46,142	42,079	12,035	7,039
Engrais	1,119	299	872	-	-	300	1,047	-	-	150	83
Essence	-	-	-	-	-	-	-	-	-	-	-
Farine	2,362	276	139	-	-	-	-	-	-	-	-
Friperies	-	-	-	-	-	-	-	-	-	-	-
Froment(blé)	-	-	-	-	-	-	-	-	-	-	-
Gasoil	1,785	830	-	-	-	-	-	-	-	-	-
Jute(sac)	97	2	-	-	-	-	-	-	-	-	-
Lubrifiants	650	96	-	21	7	-	-	-	-	-	-
Mat. Agricole	198	-	-	-	-	-	-	-	-	-	-
Mat. Constr.	1,192	298	253	469	502	309	568	118	58	322	601
Malt	11,361	5,137	2,280	250	497	-	116	-	180	820	55
Papier	676	238	116	90	213	169	113	35	111	36	-
Pétrole	-	-	-	-	-	-	-	-	-	-	-
Produits chim.	3,382	2,096	655	396	559	241	10	223	150	28	212
Sel	537	367	-	-	-	-	1,557	-	-	1,322	-
Sucre	2,478	4,891	10,285	11,754	10,299	14,004	9,861	12,579	14,087	10,938	9,660
Tourteaux	-	40	-	-	4	-	-	-	-	-	-
Véhicules	4	1	7	2	22	16	40	93	514	131	90
Déchets coton	14	94	356	-	-	-	-	-	-	-	-
Divers	2,649	1,161	-	301	251	197	151	301	282	351	335
Total	***68,049***	***41,890***	***47,264***	***28,017***	***48,500***	***61,914***	***42,409***	***59,491***	***57,461***	***27,126***	***18,805***
PAR ROUTE											
Alimentation	619	232	271	660	726	319	15	-	1,725	3,171	51
Boisson	-	-	34	-	-	-	1	-	-	70	-

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bitume	-	-	-	-	-	-	-	-	-	-	-
Bouteilles vides	-	-	-	-	-	-	51	-	-	-	-
Chaux	-	-	-	-	-	-	2	19	-	-	104
Ciment	-	119	81	505	2,689	1,577	5,468	5,369	4,235	1,761	1,107
Engrais	337	39	-	-	-	402	20	-	474	1,491	980
Essence	-	-	-	-	-	-	-	-	-	-	-
Farine	498	80	5	-	502	629	702	20	440	872	1,413
Friperies	819	1,277	1,376	1,672	2,090	2,325	2,020	5,602	3,091	1,731	2,245
Froment(blé)	-	-	-	-	-	-	-	-	-	-	-
Gasoil	-	-	-	-	-	-	-	-	-	-	-
Jute(sac)	-	3	19	-	59	37	-	-	-	-	-
Lubrifiants	89	62	4	-	-	-	-	-	-	-	-
Mat. Agricole	70	23	65	389	169	78	151	45	27	116	454
Mat. Constr.	1,881	2,095	1,843	775	2,311	3,881	4,309	7,242	11,479	16,928	13,785
Malt	60	-	179	63	797	792	1,087	389	215	58	29
Papier	200	78	69	223	432	72	338	260	315	848	1,414
Peaux	-	-	-	-	-	-	46	-	-	-	-
Pièces de rechange	-	-	-	-	-	-	-	-	1,726	1,605	1,959
Produits chim.	-	486	361	387	1,334	823	831	651	1,568	2,030	1,229
Sel	1,512	638	75	144	423	151	146	-	-	65	30
Sucre	125	-	51	-	-	21	-	-	383	1,270	632
Tourteaux	-	55	132	-	26	-	83	-	-	-	-
Véhicules	180	493	1,570	2,124	2,477	3,392	4,775	5,060	6,043	5,384	6,296
Déchets coton	-	-	81	-	-	-	-	-	-	-	-
Divers	3,370	6,354	7,252	7,437	8,603	8,590	13,025	15,532	18,671	22,646	20,298
Total	***9,760***	***12,034***	***13,468***	***14,379***	***22,637***	***23,092***	***33,071***	***40,188***	***50,394***	***60,045***	***52,026***
DU CONGO											
Ciment	2,280	2,000	1,000	3,070	1,630	6,114	17,420	7,960	2,900	1,200	-
Diver	-	335	-	-	-	-	-	-	26	8	662
Total	***2,280***	***2,335***	***1,000***	***3,070***	***1,630***	***6,114***	***17,420***	***7,960***	***2,926***	***1,208***	***662***

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DE KASANGA											
Total			431.5								
CONTAINERS (pleins)											
20' TEU		883	1,175	888	902	707	601	898	617	307	309
40' FEU		-	18	53	54	38	14	15	5	7	3

Exports (Tons)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
PAR LAC (VIA KIGOMA)											
Café		20,487	25,511	18,886	17,153	22,783	11,359	8,497	4,824	4,369	1,607
Cassitérite		90	39	269	64	-	-	463	44	71	23
Cont. Vides		1,648	2,171	1,604	2,001	1,258	749	863	748	202	-
Colombo tantalite		-	-	-	44	24	-	-	-	-	-
Effets personnels		-	6	-	99	-	-	-	-	-	-
Thé+quinquna		23	-	8	-	-	-	100	-	-	99
Peaux chèvres		-	20	15	-	20	86	-	-	-	-
Drivers		-	137	-	-	18	138	434	168	150	103
Total		***22,248***	***27,884***	***20,783***	***19,361***	***24,103***	***12,332***	***10,356***	***5,783***	***4,793***	***1,832***
PAR LAC (VIA MPULUNGU)											
Café	21,840	2,847									
Cassitérite	23	-									
Quinquina	100	-									
Tabac	92	-									
Thé	4,804	1,503									
PAR ROUTE											
Café		1,509	1,117	55	171	2,329	1,372	4,850	3,704	6,622	5,927
Cont. Vides		33	121	94	97	639	846	1,332	544	683	651
Cassitérite		-	-	-	17	-	-	-	-	-	115
Divers		-	-	-	-	5	97	-	423	462	-
Quinquina		-	-	-	-	-	-	-	74	-	-
Total		***1,542***	***1,238***	***149***	***285***	***2,974***	***2,315***	***6,182***	***4,746***	***7,767***	***6,692***
CONTAINERS (vides vers Kigoma)											
20' TEU		647	886	768	783	746	649	880	586	397	259
40" FEU		-	19	41	41	40	26	38	19	3	24

Table B2. Burundi's Fleet

Armateur	Nom du Bateau	Type de Bateau	Longuer ht (m)	Largeur (m)	Poinds Net (T)	Tirant d'eau Encharge(m)	Date de Mise en Service
ARNOLAC	KIZIGENZA	Remorqueur de ligne	33,50	7,58	65,584	3,25	1955
	TANGANYIKA	Remorqueur de ligne	31,20	5,18	36,886	1,58	1889
	KIRIMIOR	Remorqueur de ligne	23,50	4,55	25,107		1915
	MOSO	Remorquer de rade au port de Kigoma	12,25	3,00	8,997		1958
	RUREMESHA	Automoteur pour cargo mixte	41,25	9,00	350,000	2,25	1981
	NDAJE-TRANSPORT	Automoteur pour cargo mixte	54,75	8,70	600	3,20	2002
	COHOHA	Barge-citerne	42,35	7,00	335,556	2,71	1955
	RWERU	Barge-citerne	32,71	5,85	114,610	1,64	1953
	SAGAMBA	Barge pour cargo vrac	65,70	10,00	1,396,833	3,77	1955
	MURINZI		59,60	9,02	884,616	3,26	1931
	BURAGANE		54,05	8,50	626,716	2,61	1937
	MUMIRWA		52,77	8,82	544,428	2,75	1955
	BUYENZI		52,77	8,82	537,828	2,75	1955
	REMERA		47,25	8,00	477,068	3,36	1927
	BUYOGOMA		36,50	6,00	278,670	2,17	1918
	IMBO		37,77	6,50	246,270	2,08	1929
	TORA	Automoteur pour cargo vrac	58,00	10,00	1,110,000	3,50	1988
BATRALAC	RWEGURA	Automoteur pour cargo vrac	45,00	8,00	500,000	2,50	1984
	TEZA	Automoeur pour cargo mixte	60	11,00	1,500,000	3,60	2002
	TANGANYIKA-EXPLORER	Automoeur recherche et tourisme	25,30	6,86	125,000		1994
SOTRALAC	BWIZA	Automoteur pour cargo vrac	54,70	8,00	507,520	2,75	1913
TANGANYIKA TRANSPORT	MBAZA	Automoteur pour cargo vrac	42,50	7,30	450,110	2,35	1988
E.P.B.	NGIRI	Remorqueur de port	15,75	4,30			1959

Table B3. Vessel Traffic at Kigoma Port

	2006/07	2007/08	2008/09	2009/10
Ship Arrivals				
General Cargo	408	299	325	199
Passenger terminal	84	84	78	40
Tankers	34	23	16	-
Total	*526*	*406*	*419*	*239*
Total Cargo Handled at Cargo Terminal				
Import	83,002	72,997	100,961	42,542
Export	11,117	2,575	3,368	3,517
Total	*94,119*	*75,572*	*104,329*	*46,059*
Cargo Handled at Passenger Terminal				
Inward	6,535	6,366	13,007	4,259
Outward	4,140	6,261	11,788	863
Total	*10,675*	*12,627*	*24,795*	*5,121*
Cargo Handled at Passengers Terminals				
Embarked	12,206	8,306	12,109	8,328
Disembarked	9,157	11,590	10,838	6,720
Total	*21,363*	*19,896*	*22,947*	*15,048*
Cargo Handled at Kasanga Port				
Outward			1,060	5,045
Export			12,941	6,690
Total			*14,001*	*11,735*
Summary of Cargo Handled at Kigoma and Kasanga Ports				
Import	85,701	70,432	100,961	42,541
Export	13,167	16,377	10,425	2,675
Inward	6,535	8,939	4,779	5,259
Outward	4,335	3,594	1,441	705
Liquid	3,196	-	4,247	6,484
Total	*112,934*	*99,342*	*121,852*	*57,664*

Table B4. Handling Equipment at Kigoma Port

No	Type	Qty	Asset No.	Year in Service	Condition	Additional Requirement
1	FORKLIFT HYSTER 3 TONS	1	63-5002Q	1974	NOT SERVICEABLE	
2	FORKLIFT HYSTER 3 TONS	1	63-5005A	1982	OPERATIONAL	
3	FORKLIFT HYSTER 5 TONS	1	63-5000Q		NOT SERVICEABLE	
4	FORKLIFT HYSTER 5 TONS	1	63-5005Q	1982	OPERATIONAL	FORKLIFT 6 TONS QTY = 2
5	FORKLIFT HYSTER 6 TONS	1	63-5004Q	1982	NOT SERVICEABLE	
6	FORKLIFT HYSTER 6 TONS	1	63-5000Q	1962	NOT SERVICEABLE	
7	FORKLIFT HYSTER 6 TONS	1	63-5001Q	1962	NOT SERVICEABLE	
8	FORKLIFT HYSTER 3 TONS	1	FH 3217	2008	STILL OPERATING HOSTING WEIGHT REDUCED TO 2.5 TONS DUE TO AGE	
9	FORKLIFT HYSTER 3 TONS	1	FH 3218	2008	STILL OPERATING HOSTING WEIGHT REDUCED TO 2.5 TONS DUE TO AGE	
10	PORT CRANE 5 TONS	1	61-5001Q	1953	STILL OPERATING HOSTING WEIGHT REDUCED TO 2.5 TONS DUE TO AGE	PORT CRANE 10 TONS QTY 2
11	PORT CRANE 5 TONS	1	61-5003Q	1953	STILL OPERATING HOSTING WEIGHT REDUCED TO 2.5 TONS DUE TO AGE	
12	PORT CRANE 5 TONS	1	61-5002Q	1953	NOT SERVICEABLE	
13	COLES CRANE 1.5 TON	1	62-5002Q	1962	OPERATIONAL	MOBILE CRANE 35 TONS QTY 2
14	FARGH CRANE 30 TONS	1	62-5004Q	1982	NOT WORKING	
15	BENCINI CRANE 10 TONS	1	62-5003Q	1986	NOT WORKING	
16	TITAN CRANE 20 TONS	1	61-5000Q	1950	NOT WORKING	
17	GANTRY CRANE 35 TONS	1	61-5004Q	1982	OPERATIONAL	
18	VALMENT TRACTOR	1	65-5000Q	1985	OPERATIONAL	
19	ZEPHIR TRACTOR	1	65-5008Q	1998	NOT WORKING	ZEPHIR TRACTOR TYP 450 SQTY

No	Type	Qty	Asset No.	Year in Service	Condition	Additional Requirement
20	ZEPHIR TRACTOR	1	65-5009Q	1998	NOT WORKING	
21	MAFIA CONTN.TRAILER	1	65-5002Q	1965	OPERATIONAL	
22	MAFIA CONTN.TRAILER	1	65-5002Q	1965	OPERATIONAL	
23	20FT CONTN.TRAILER	1	65-5004Q	1965	OPERATIONAL	20 FT CONTN.TRAILERS QTY 2
24	20FT CONTN.TRAILER	1	65-5005Q	1965	OPERATIONAL	
25	20FT CONTN.TRAILER	1	65-5006Q	1965	OPERATIONAL	
26	20FT CONTN.TRAILER	1	65-5007Q	1965	OPERATIONAL	
27	FORKLIFT 5 TONS	1	FH 3212	2009	OPERATIONAL	
28	FORKLIFT 3 TONS	1	FH 3215	2009	OPERATIONAL	
29	TRACTOR	1	TT 45070088	2009	OPERATIONAL	
30	TRACTOR	1	TT 45070091	2009	OPERATIONAL	
31	TRAILER	1	TD 50070928	2009	OPERATIONAL	
32	TRAILER	1	TD 50070929	2009	OPERATIONAL	
33	TRAILER	1	40FT CALABRESE	2009	OPERATIONAL	
34	TRAILER	1	40FT CALABRESE	2009	OPERATIONAL	

Table B5. Fixed Assets at Kigoma Cargo Terminal

No	Asset No	Year in Service	Life Span	Code	Description	Condition	Remarks
					A. Buildings and Structure		
1	XX	1920	40	47	Main Office & Warehouse 2 Storey Building	Fair	11 office, warehouses upper front & group
2	LN 101 S/NO 18056	1982	40	46	New Godown Block Building	Good	capacity of 5,000 tons
3	LN 111 S/NO 18161	1988	40	46	Machine Shop Block Building	Good	
4	LN 121 S/NO 18162	1988	40	46	Main Store, Carpentry Shop & Shed Building	Good	
5		2000	40	46	Operations Office Block	Good	
6					WFP Rubhalls - Plastic	Good	12 No. Capacity @ 350 tons
7	xx	1920	40	47	Immigration, Customs & Security Building	Fair	
8	xx	1983	40	47	Customs Warehouse	Fair	
9	xx	1983	40	47	Canteen Building	Fair	Roof leakage
10	xx	1960	40	47	Clothes Changing Room	Fair	
11	xx			47	Sentry Office Building	Fair	
12				47	Temporary charcoal hut	Fair	
13	LN 113 S/NO 18163	1988	40	47	Toilet and Bath Building	Fair	Converted to store for condemned items
14	LN 114 S/NO 18164	1988	40	47	Toilet and Bath Building	Fair	Eastern type
15	LN 115 S/NO 18165	1988	40	47	Toilet Building	Fair	
16	xx	1920	40	47	Quay	Good	
17	xx	1920	40	47	Gantry Crane Rail Track	Good	
18	xx	1920	40	47	Portal Crane Rail Track	Good	
19	xx	1992	40	47	Container Yard	Good	Capacity of 380 TEU
20		1920	40	47	Railway Tracks	Good	1985 upgraded to 80lbs
21			40		Land	Good	
22	xx		40	47	General Cargo Yard	Fair	
23		1992	20		Corrugated Iron Sheet Fence	Fair	

No	Asset No	Year in Service	Life Span	Code	Description	Condition	Remarks
24	20427	1950	10	52	Flood Light Tower	Fair	
25	20428	1950	10	52	Flood Light Tower	Fair	
26	20429	1950	10	52	Flood Light Tower	Fair	
27	20430	1950	10	52	Flood Light Tower	Fair	
28	20431	1950	10	52	Flood Light Tower	Fair	
29	20432	1950	10	52	Flood Light Tower	Fair	
30	20433	1950	10	52	Flood Light Tower	Fair	
B. Equipment							
1	TR 6096	1962	5	63	6 tons Hyster Fork Lift	Poor	Grounded
2	20397	1992	5	63	6 tons Hyster Fork Lift	Poor	Grounded
3	20041	1982	5	63	6 tons Hyster Fork Lift	Poor	Grounded
4	20042	1982	5	63	6 tons Hyster Fork Lift	Poor	Grounded
5		1982	5	63	5 tons Hyster Fork Lift	Poor	Grounded
6	20044	1982	5	63	3 tons Hyster Fork Lift	Fair	
7	20043	1974	5	63	3 tons Hyster Fork Lift	Fair	
8	20441	1992	10	62	35 Tonnes Gantry Crane	Good	One gearbox under repair
9	20434	1950	10	62	23 Tonnes Crane	Fair	Stationed
10	20435	1953	10	62	5 Tonnes Grantry BM Crane	Fair	Capacity reduced to 2.5 tons
11	20436	1953	10	62	5 Tonnes Grantry BM Crane	Poor	Cracks in the cabin - to be written off
12	20437	1953	10	62	5 Tonnes Grantry BM Crane	Fair	
13	20399	1982	10	62	Fargh Crane - mobile	Poor	Not working
14	20049	1986	10	62	Bencini & C. Crane	Poor	Hydropower defective
15	20396	1962	10	62	Coles Crane	Poor	No brakes
16	20398	1991			Valmet Tractor	Fair	Crane not working
17	20419	1990	5	65	Trailer Front Mafram	Good	
18	20420	1990	5	65	Trailer Front Mafram	Good	
19	20442	1965	5	65	40ft Mafi Container Trailer	Good	
20	20443	1965	5	65	40ft Mafi Container Trailer	Good	
21	20444	1965	5	65	40ft Mafi Container Trailer	Good	
22	20445	1965	5	65	20ft Mafi Container Trailer	Fair	Wooden top
23	20438	1965	5	65	20ft Mafi Container Trailer	Fair	Wooden top
24					20ft Mafi Container Trailer	Good	

No	Asset No	Year in Service	Life Span	Code	Description	Condition	Remarks
25					20ft Mafi Container Trailer	Good	
26	20394	1994	10		Diesel Engine Generator	Good	400 KVA
27	20439	1972	10	52	Denyo Power Generator	Poor	Grounded
28	20440	1972	10	52	Denyo Power Generator	Poor	Grounded
29					Diesel generator for UN	Good	
30	20395				Fuel Surface Tank	Good	
31	20393	1991	10	71	Fuel Transfer Pump	Fair	
32	20400	1980	10	72	Autovac Cleaning Equipment	Poor	Grounded
33	20402	1988	10	71	Fuel Dispensing Pump	Fair	
34	20403	1990	10	72	Hand Shearing Machine	Fair	
35	20404	1986	10	72	Power Hacksaw Machine	Poor	Grounded
36	20405	1984	10	72	Column Drilling Machine	Fair	
37	20406	1974	10	72	Lathe Machine	Poor	Grounded
38	20407	1974	10	72	Lathe Machine	Poor	Motor not working
39	20050	1974	10	72	Pinacho Lathe Machine	Good	
40	20408	1991	10	72	Hydraulic Workshop Jack	Poor	Grounded
41	20409	1990	10	72	Grinding Machine	Poor	Grounded
42	20413	1989	10	72	Resurface Machine	Fair	
43	20414	1987	10	72	Hydraulic Pressing Machine	Fair	
44	20415	1992	10	72	Portable Esab Welding Machine	Fair	
45	20412	1986	10	72	Electrical Air Compressor	Poor	Grounded
46	20417	1988	10	72	Electrical Air Compressor	Fair	
47	MAR/AMI/AV				Anvil	Fair	
48	MAR/AMI/BE				Work Bench with 2 vices	Fair	
49	MAR/AM/BE				Work Bench	Fair	
50	MAR/AM/BE				Work Bench	Fair	
51	20410				Washing Basin	Poor	Not working
52	20411				Washing Basin	Poor	Not working
53					Steel platform big size	Good	
54					Steel platform big size	Good	
55					Steel platform small size	Good	
56					Steel platform small size	Good	
57					Coffee platform	Good	