

**Ministry of Transport,  
Public Works and Equipment  
Burundi**

# **The Study of Master Plan for Port Sector in the Republic of Burundi**

## **Final Report**

**September 2012**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**PADECO Co., Ltd.**

**Nippon Koei Co. Ltd.**

**International Development Center of Japan Incorporated**

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## **Abbreviations and Acronyms**

A/Q	Air Quality
ABEIE	Burundi Association for Environmental Impact Assessment
ACVE	Action Ceinture Verte pour l'Environnement
AfDB	African Development Bank
BIF	Burundian Franc
BMPRA	Burundi Maritime, Port and Railway Authority
BOTI	meaning “boat” in local tongue
CBD	Central Business District
CEO	Chief Executive Officer
CFBP	Congo Forest Basin Partnership
CFS	Container Freight Station
COD	Chemical Oxygen Demand
COMIFAC	Central African Forests Commission
CTB	Belgian Technical Cooperation
DES	Dar es Salaam
Dmax	Maximum Diameter of the Solid Grains
DoE	Department of Environment
DRC	Democratic Republic of Congo
DWT	Deadweight Tonnage
E.P.B.	Société Concessionnaire de L'Exploitation du Port Bujumbura
EAC	East African Community
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
FIRR	Financial Internal Rate of Return
FO	Fuel Oil
GBP	German British Petroleum
GDP	Gross Domestic Product

GOB	Government of Burundi
HIPC	Heavily Indebted Poor Countries
ICB	Interlocking Concrete Block
ICD	Inland Container Depot
IEE	Initial Environmental Examination
IGEBU	L'Institut Geographique du Burundi
IMF	International Monetary Fund
IMO	International Maritime Organization
INECN	National Institute for Environment and Nature Protection
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
LTA	Lake Tanganyika Authority
MoE	Ministry for Water, Environment, Land Management and Urban Development
MP	Master Plan
MSCL	Maritime Services Co., Ltd. (Tanzania)
MT	Motor Tanker
MTTPE	Ministère des Transport, des Travaux Publics et de l'Équipement
MV	Motor Vessel
N/A	Not Applicable
ND	“should not be detected”
NGO	Non-Governmental Organizations
OBR	Burundi Revenue Authority
OD	Origin and Destination
ODA	Official Development Assistance
PCB	Polychlorinated Biphenyl
RE	Resident Engineer
Ro/Ro	Roll on Roll off
RWF	Rwandan Franc
SADC	Southern African Development Community
SEA	Strategic Environmental Assessment

SNCC	Société Nationale des Chemis de Fer du Congo
SNCZ	Société Nationale de Fer Zaïrois
SP	Stated Preference
SPT	Standard Penetration Test
SS	Suspended Sediment
STS	Ship to Shore
SUMATRA	Surface and Maritime Regulatory Authority, Tanzania
TEU	Twenty Unit Equivalent
TPA	Tanzania Ports Authority
TRL	Tanzania Railway Limited
USD	United States Dollar
UXO	Unexploded Ordnance
VAT	Value Added Tax
W/Q	Water Quality
WFP	United Nations World Food Programme
Ys	Specific Gravity Dry
$\omega$ nat	Natural Water Content



## **Chapter 1 Introduction**

### **1.1 Background of the Study**

Among Burundi's transport infrastructure, the lake ports play an important role for the enhancement of economic growth. Thus port development is recognized as a high priority by the government of Burundi (GOB).

The port of Bujumbura, the biggest port not only in Burundi but also on Lake Tanganyika, is located on the northern shore of the lake, surrounded by Burundi, Tanzania, the Democratic Republic of Congo (DRC) and Zambia. Bujumbura Port was built in the 1950's, and its facilities and equipment are now facing a rapid increase of cargo due to the economic growth of these countries, where the socio-political conflicts of the region have almost subsided. However, the existing facilities and equipment of the port are aged even though they have been maintained and repaired with care by the concerned entities. A particularly pressing issue is that the port has neither the facilities nor equipment to properly handle container cargo, which is the majority of cargo transported from Dar es Salaam to Burundi by road.

As it can be seen from the fact that 80% of the total import and export cargo volume of Burundi is handled at the port, Bujumbura Port is the economic hub of transportation in Burundi. To sustain the economic growth of the country, the port has to be developed to cope with the increase in cargo. The important role of the port sector is recognized by the Ministère des Transport, des Travaux Publics et de l'Équipement (MTTPE) in its sector strategy (2006–2010). GOB has already established the Burundi Maritime, Port and Railway Authority (BMPRA) in accordance with the Presidential Decree No. 100/252 dated October 4, 2011. BMPRA has started its activities in January 2012. The establishment of BMPRA is to consolidate the port as a land-lord port and enhance private sector participation in port management and operation. To this end, MTTPE and BMPRA are working to invite bids for port concession and select the concessionaire by the end of 2012.

Meanwhile, Rumonge Port was virtually a natural beach, with an open stacking yard, warehouse and access road. No modernized port facilities like quay wall or paved stacking yard exist. MTTPE has completed a fence and gate surrounding the port premises. Unloading of cargo is taking place at present, as the regulation banning the cargo handling operation at Rumonge was lifted. The unloaded cargo is mainly agricultural produce coming from the west shore of Lake Tanganyika in DRC by small wooden ships.

As Bujumbura Port has to deal with the rapid increase of cargo, Rumonge Port can play the role of the second largest commercial port of the country and mitigate the congestion at Bujumbura Port. In this regard, the two ports can demarcate their roles with each other so that they will best function to sustain the economic growth of the country.

“The Study of Master Plan for Port Sector in the Republic of Burundi” (the Study) was conducted by the team comprised of members from three consulting firms headed by PADECO Co., Ltd (the JICA Study Team) in accordance with the scope of work which was agreed upon between MTTPE and Japan International Cooperation Agency (JICA) in November, 2009.

The Study covers a wide range of topics including the socio-economic framework of Burundi, cargo demand forecast, development strategy of the port sector of Burundi, facilities development of Bujumbura Port and Rumonge Port, maritime transport on Lake Tanganyika to meet the cargo demand, environmental considerations including strategic environmental assessment (SEA), urgent, short- and medium-term development of the ports, preliminary

facilities design, cost estimates, financial analysis, and a study on the conceding procedure of Bujumbura Port.

Comments and suggestions from the concerned government organizations and agencies including MTTPE, BMPRA, Société Concessionnaire de L'Exploitation du Port de Bujumbura (E.P.B) and private sectors concerned particularly from the shipping companies and forwarders have been incorporated in this Final Report.

## **1.2 Objectives of the Study**

The objectives of the Study are to carry out the demand forecast of cargo transport on Lake Tanganyika, prepare the master plan of port development for the target year of 2025, and based on the results of the master plan, prepare the short term development plan of port facilities in Burundi.

## **1.3 Study Area**

This study was conducted at Bujumbura Port, Rumonge Port and their vicinity. In addition, in consideration of the important role of the lake transportation, the JICA Study Team has visited the other major ports at Lake Tanganyika, i.e. Kigoma Port in Tanzania, Mpulungu Port in Zambia and Kalemie Port in DRC.

## **Chapter 2    Socio/Economic Developments in Burundi**

### **2.1    Trends in Socio/Economic Status**

#### **2.1.1    General Trend**

Burundi has an area of 278,500 km<sup>2</sup> and population of 8.5 million at present; making it one of the most densely populated countries in Africa, with a population density being 230 persons per km<sup>2</sup>. Most of the population lives in rural high lands.

Burundi is neighbored by DRC, Rwanda and Tanzania, and faces opposite of Zambia on Lake Tanganyika. The national land is comprised of roughly three north-south belts; the western belt covering Rusizi river basin and lake side of Tanganyika, the central belt which is mountainous and a major production area of coffee and tea, and the eastern zone which borders to Tanzania and a major production area of cotton.

GDP of Burundi is currently USD 13 billion. The rate has been growing steadily for the past few years; at 4.5% in 2009, 3.9% in 2010 and 4.5% in 2011. The government expects the rate to reach 5.2% in 2012. The national economy has just started to grow after the Peace Accord in 2005 and the accession to the East African Committee (EAC) in 2007.

GDP is composed of the agricultural sector contributing 44%, mining sector with 0.7%, manufacturing sector with 7.1%, and the service sector with 48.3%. It is conspicuous that the general government services represent 24.9% of the total GDP.

**Table 2.1: Sector-mix of GDP**

	<b>2005</b>	<b>2010</b>
Total GDP	100.0	100.0
Agriculture, forestry, fishing and logging	48.6	43.9
Mining and quarrying	0.9	0.7
Manufacturing	6.9	7.1
Electricity, gas and water	3.6	4.0
Construction	5.1	5.7
Wholesale, retail, hotels and restaurants	4.5	4.9
Transport, storage and communication	4.7	5.6
Finance, real estate and business services	3.2	3.2
General government services	22.5	24.9

Source: African Economic Outlook

Per capita income is USD 150, being the lowest in the world. However, a number of economists in the government as well as international organizations point out that the actual level of per capita income is supposed to be much higher. Therefore it can be presumed a substantial part of the economic activities have not been captured by existing statistics.

Major agricultural products are coffee, tea, cotton, oil palm and sugar. Coffee is a major export crop contributing to about two-thirds of the total national export. Production of these crops has been heavily dependent on weather conditions and fluctuating international prices as well as being constrained by limited room for farm land expansion. Fishery is active in Lake Tanganyika, but the production trend has been stagnant. Burundi has not been sufficient in food with food imports accounting for about 20% of the national total import. The country is endowed with a variety of mining resources, including gold, nickel, columbite, tantalite and construction materials. Gold production has been increasing thanks to a recent increase in international price.

Manufacturing is very limited, except for beer production led by Bararudi Beer, which is the largest tax payer in the country. Most of the manufactured products have been imported. Vehicles and fuels are major imported items.

Similarly with GDP statistics, a number of economists point out that trade statistics have not captured a substantial amount of informal external trade activities. They also point out that these informal trade activities have been mitigating negative impacts from recent shocks of the international economy.

### **2.1.2 Growth Potential**

Burundi has five major potentials for growth. First is the political stability since the late 2000s. The domestic market is quickly recovering. A stabilized national economy is attracting the internally and externally displaced people, including skilled workers and intellectuals, back to their original working places such as agriculture and services.

Second, Burundi is situated at a major inland crossroads, connecting Rwanda, DRC and Tanzania. As shown in Table 2.2, the population within 200 km from Bujumbura is estimated at about 20 million, including 3.2 million in cities.

**Table 2.2: Population within 200 km from Bujumbura**

Country	Province/Region		City		Approximate Direct Distance from Bujumbura (km)
	Name	Population Estimated at 2010 (thousand)	Name	Population Estimated at 2010 (thousand)	
Rwanda	Kigali	1,000	Kigali	1,000	190
	Southern	2,300	Butare	100	100
	Western	3,000	Cyangugu	30	110
DRC	North Kivu	5,800	Goma	400	186
	South Kivu	4,600	Bukavu	700	110
			Uvira	200	26
Burundi	Bujumbura	1,500	Bujumbura	800	0
	Kigoma	2,200	Kigoma	100	170
Total		20,400		3,230	

Source: The Study Team

Burundi has three major accesses to other countries, including both existing and potential, to Dar es Salaam major gateway for Burundi to the overseas thorough Tanzania; through Kagera region by road transport, through Kigoma region by road/shipping/railway transport and through Mbeya region in Tanzania by shipping. North-south shipping in Lake Tanganyika plays an important role in connecting Zambia and the Southern highlands of Tanzania with Burundi, Rwanda, a northern part of DRC, and even Uganda. Accession to the EAC will further increase the importance of Burundi as the inland crossroads.

Third, this strategic position stimulates urban economic activities and investments such as transport, wholesale, construction, real estate and banking, particularly in Bujumbura. Urbanization has been quite rapid, with a proportion of urban population to have increased from 8% to 14% during the period from 2003 to 2008. Population of Bujumbura has reached approximately 0.8 million.

Fourth, in response to the expanding domestic market, the strategic position and the urbanization, private investments are accelerated especially since permitted investment activities



have been recently streamlined. In 2009 a lone 60 private investment projects have been approved in the fields of food production and communications. The government expects the private investments to expand in energy, tourism, food processing and fisheries. Foreign investors include those from China and Qatar in addition to European countries.

Fifth, there is a proved nickel reserve of 185 million tons. Total deposit is estimated to account for 6% of the world's total. Major deposits exist at Musongati, which is closed to Tanzania. If developed, it would substantially contribute to the country's export earnings.

### **2.1.3 Constraints to Be Overcome**

Despite these growth potentials, Burundi suffers from three basic constraints on economic growth. First is the fluctuating international prices of export commodities and the dependence of agriculture on changing weather conditions. Second is the large cost of transportation. It represents 45% of the total export value and 35% of the import value. Third is excessive intervention of the government in direct economic activities, typically, the proliferation of government enterprises.

## **2.2 Current Plans for Economic Development**

In an effort to utilize the development potentials and overcome the constraints, the government of Burundi and international organizations recently prepared a number of policy/planning documents as follows:

AfDB, An Infrastructure Plan for Burundi: Accelerating Regional Integration, September 2009

IMF, Growth and Poverty Reduction Strategy Framework II, October 2010

The Burundian Government, the Burundi Vision 2025 in June 2011

AfDB, Country Strategy Paper: 2012–2016, October 2011.

The longest-term policy/plan is the Burundi Vision 2025. It has a very ambitious target of attaining a per capita income of USD 720 in 2025, being about five times as much as at present. According to the vision, the poverty rate will be half of the present level which is 67% in the target year. Population growth will be slowed down to 2% a year. Also, a proportion of the urban population will reach 40%.

In view of these targets, the vision identifies eight pillars for development:

- Good governance and capacity development of the government administration;
- Human resource development;
- Economic growth and fight against poverty;
- Regional integration;
- Population control;
- Social cohesion;
- Physical planning and urban development; and
- Partnership

In response to the vision, AfDB has prepared the Country Strategy Paper: 2012–2016, October 2011. It emphasizes agricultural export, mining development, a maximum use of strategic position, food self-sufficiency, infrastructure development, improvement of business climate, and strengthening of the government capability to plan and implement developmental activities.

It is in the context of these policy/planning documents that the Bujumbura port development is proposed to make maxim use of the growth potentials and overcome the constraints of Burundi.

In view of the growth potential, constraints and the current plans for economic development, a possible and sustainable scenario for the Burundian economy may be as follows:

- 1 Bujumbura will be not only the trade center of the Burundian economy but a major base of the intermediate trade among land-locked neighboring regions, including Rwanda, Eastern DRC as well as Tanganyika lakeside regions, including Zambia and Tanzania. Bujumbura, together with Kigali, is a largest urban agglomeration in these regions. The experience of many countries shows that the concentration of goods is followed by that of investments, such as construction, transportation, communications and repairs.
- 2 Burundi, Bujumbura in particular, will be a major center of trade and quality improvement for the coffee produced in neighboring regions, including Eastern DRC, Rwanda and western parts of Tanzania, especially Kagera, as well as Burundi itself. Though coffee production is constrained by a limit on the available lands within the country, its quality receives high reputation in the world coffee market. By making good use of trade center function of Bujumbura, it could attract coffee beans from the coffee farmers not only in Burundi, but from these surrounding regions/countries. Some coffee farmers in Kagera region reportedly send their products to Burundi so that their coffee is exported under the world famous brand of Burundian coffee. Actually Burundi is surrounded by large coffee producing areas, which are mostly found within the altitude being between 1,300 to 2,000 meters. For instance, coffee export volume in 60 kg-bag is 511 thousand in Burundi, 514 thousand in Rwanda and 282 thousand in DRC, during the period from March 2010 to February 2012, according to the International Coffee Organization. A total of export from these countries exceed the total coffee export of Tanzania being 1283 thousand and that of Kenya being 1190 thousand.

## Chapter 3 Current Status of Port Sector in Burundi

### 3.1 Bujumbura Port

#### 3.1.1 Natural Conditions

##### (1) Meteorological Conditions

The temperature in Burundi is comparatively cool, although Lake Tanganyika is in the western part of Burundi and its climate belongs to the Torrid Zone in the plateau, many of whose countries are about 2,000 m altitude. The climate of Burundi is warm, and it has a rainy season from around November to April and the dry season from around May to October. The temperature of Bujumbura (south latitude 3°16', east longitude 29°18') from 1996 to 2009 is shown in Table 3.1 and average monthly temperature and rainfall are as shown in Table 3.2 and Table 3.3 respectively.

**Table 3.1: Temperature of Bujumbura**

Unit: °C

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Maximum	34.6	35.5	33.6	33.1	33.6	29.4	33.3	35.0	30.5	34.5	35.5	34.5	34.5	35.2
Minimum	12.6	13.6	14.6	15.2	11.2	19.1	15.0	14.1	18.7	14.0	14.4	14.5	13.1	14.1
Average	23.6	24.6	24.1	24.2	22.4	24.2	24.7	24.9	24.6	25.1	24.9	25.0	24.8	25.1

Source: Annuaire Statistique du Burundi 2011, 1996–2009

**Table 3.2: Average Monthly Temperature of Bujumbura**

Unit: °C

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average Temperature	23.2	23.1	23.0	23.0	23.2	22.9	22.5	23.4	24.0	23.8	22.9	22.9	23.2

Source: Newest Every Country in the World Directory, The 11 Versions

**Table 3.3: Average Monthly Rainfall of Bujumbura**

Unit: mm

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Month Average
Jan	116.5	19.9	105.7	71.7	103.1	113.1	135.4	46.5	104.2	195.2	87.0	143.0	99.1	125.0	97.0
Feb	42.8	19.0	116.9	13.9	37.0	77.2	121.6	60.9	19.9	61.0	121.0	81.7	166.7	148.0	77.7
Mar	221.0	180.5	219.8	147.2	149.4	99.9	124.4	100.8	162.8	145.9	124.0	86.5	71.0	188.4	144.4
Apr	81.8	90.5	73.7	92.5	42.1	97.9	79.5	68.1	93.7	70.2	111.0	150.0	69.2	133.3	89.5
May	8.0	31.6	92.8	14.7	0	93.0	34.0	25.0	0.7	130.6	88.9	22.2	23.2	86.8	46.5
Jun	20.4	3.7	19.9	0.3	0	4.8	0	1.9	0	1.1	2.5	10.7	89.2	1.6	11.2
Jul	0	0	3.8	0	0	76.0	0	0.5	1.5	0	0.9	52.3	15.1	0	10.7
Aug	1.2	32.1	2.0	28.0	0	0	0	2.5	1.7	4.8	38.1	6.9	3.6	3.5	8.9
Sep	39.1	10.8	21.6	60.6	2.5	62.3	5.6	54.0	73.6	4.2	32.3	29.9	31.9	5.1	31.0
Oct	105.0	91.8	13.1	48.2	40.2	67.6	74.9	77.0	37.1	32.9	63.0	113.0	69.7	67.6	64.3
Nov	51.6	135.1	33.4	128.3	203.8	91.4	57.1	68.0	45.4	116.1	157.0	63.4	65.1	248.7	104.6
Dec	77.0	161.5	53.4	159.6	150.7	88.0	134.2	38.3	181.5	55.0	215.0	94.6	37.0	225.8	119.4
Year Average	63.7	64.7	63.0	63.8	60.7	72.6	63.9	45.3	60.2	68.1	86.7	71.1	61.7	102.8	67.7

Source: Annuaire Statistique du Burundi 2011, 1996–2009

The meteorological data in IGEBU Bujumbura airport are shown in Table 3.4 to Table 3.6.

**Table 3.4: Average Atmospheric Pressure by Month**

		Unit ; hPa									
Year Month	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Jan	922.7	922.9	922.5	922.8	921.3	923.3	923.3	921.7	922.5	921.8	922.5
Feb	923.5	922.7	923.2	920.8	922.2	923.3	922.8	922.4	951.7	921.4	925.4
Mar	923.3	921.6	922.3	921.8	922.1	922.3	922.1	922.2	922.1	921.2	922.1
Apr	922.9	922.3	922.7	922.4	922.5	921.7	922.7	922.7	923.0	922.5	922.5
May	923.2	923.1	923.5	922.5	923.7	922.8	921.8	923.2	924.3	923.4	923.2
Jun	923.6	920.2	924.0	924.8	923.4	923.8	920.9	921.4	925.5	923.8	923.1
Jul	922.6	925.0	925.1	924.9	924.5	923.6	921.7	925.4	924.8	925.0	924.3
Aug	921.4	924.2	924.4	924.1	923.2	923.3	922.2	924.4	923.6	923.8	923.5
Sep	920.9	922.5	922.2	922.6	923.1	923.1	922.3	922.5	923.4	922.8	922.5
Oct	921.2	922.7	922.2	922.1	922.2	921.6	922.2	922.7	923.6	922.5	922.3
Nov	922.0	922.6	921.0	922.1	922.3	921.8	921.1	922.4	921.9	923.3	922.1
Dec	920.8	922.8	922.5	922.4	923.0	922.5	921.6	923.0	922.6	922.9	922.4

Source : IGEBU Bujumbura Airport

**Table 3.5: Average Humidity by Month**

		Unit ; %									
Year Month	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Jan	79	78	69	73	79	74	77	75	73	75	75.2
Feb	77	76	68	75	76	74	69	77	76	76	74.4
Mar	78	75	71	76	76	73	72	76	75	75	74.7
Apr	75	78	72	78	74	75	74	76	76	75	75.3
May	74	73	69	76	75	74	72	69	75	73	73.0
Jun	72	66	65	64	72	68	70	68	69	68	68.2
Jul	69	65	61	63	64	65	68	67	64	65	65.1
Aug	61	55	54	60	63	64	66	65	62	61	61.1
Sep	70	56	59	68	61	60	66	62	60	65	62.7
Oct	73	68	57	68	67	65	69	70	67	67	67.1
Nov	69	74	68	76	73	79	76	73	75	73	73.6
Dec	75	75	70	78	73	77	75	74	76	74	74.7

Source : IGEBU Bujumbura Airport

**Table 3.6: Average Sunshine Hours by Month**

		Unit ; hours									
Year Month	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Average
Jan	208.5	154.2	181.8	166.5	146.7	167.7	146.6	232.4	201.6	192.5	179.9
Feb	190.7	179.5	100.9	170.8	175.5	202.7	155.0	140.4	196.2	160.5	167.2
Mar	181.3	222.2	184.3	168.9	203.8	167.7	175.5	152.5	207.1	193.2	185.7
Apr	179.7	208.4	184.7	153.5	229.9	164.3	196.2	211.1	212.0	192.4	193.2
May	253.7	284.2	248.6	211.9	213.4	252.1	234.4	257.7	195.1	238.2	238.9
Jun	278.4	300.2	245.1	283.6	226.9	300.0	266.8	309.7	259.1	217.6	268.7
Jul	263.8	232.5	321.8	287.0	315.2	232.4	264.3	318.0	174.5	301.2	271.1
Aug	224.3	246.3	280.4	296.5	282.5	225.8	259.4	271.2	219.1	286.3	259.2
Sep	246.0	240.0	180.0	212.7	205.3	224.1	220.1	205.3	144.7	231.4	211.0
Oct	173.3	210.9	187.0	211.0	228.0	187.0	191.2	223.3	170.2	195.3	197.7
Nov	186.9	151.8	191.7	145.5	149.2	190.9	176.4	175.3	141.6	191.6	170.1
Dec	180.4	187.3	177.3	152.0	247.0	169.5	174.2	168.1	154.6	196.1	180.7

Source : IGEBU Bujumbura Airport

The monthly average wind velocity for about 5 km northeast of the Bujumbura Port from 2004 to 2008 is as shown in Table 3.7.

**Table 3.7: Monthly Average Velocity**

		Unit: m/sec				
Year Month	2004	2005	2006	2007	2008	5 Years Average
Jan	0.7	0.6	0.9	0.8	0.6	0.72
Feb	0.3	0.5	1.0	1.0	0.6	0.68
Mar	0.4	0.7	0.8	0.7	0.5	0.62
Apr	1.0	0.5	0.6	0.6	-	0.68
May	1.2	1.0	0.5	0.4	-	0.78
Jun	1.1	1.1	1.3	0.6	-	1.03
Jul	1.0	1.1	1.3	1.1	-	1.13
Aug	1.3	1.3	1.2	1.5	-	1.33
Sep	1.1	1.3	1.4	1.7	1.7	1.44
Oct	0.9	1.1	1.2	1.4	1.2	1.16
Nov	0.9	0.9	0.4	1.1	0.7	0.80
Dec	1.0	0.9	0.4	1.2	0.4	0.74

Source: IGEBU (L'Institut Géographique du Burundi)

Wind directions are constantly changing from the east-northeast in the morning to east-southeast at noon, and from south-southeast at noon to south-southwest in the evening. Accordingly, the wind at Bujumbura Port changes from north to south in the morning and from south (from the lake) to north in the afternoon. During the morning, at the end of the oil berth or the army pier, the wind gradually changes from blowing from the land to blowing from the lake. Wind observation was previously carried out at the end of the oil berth (also used as the breakwater). However, since the observation equipment broke down, the wind observation has not been continued. Unlike the sea, there are no swells at Bujumbura Port and Rumonge Port. Instead, there are only wind waves generated by the winds blowing on the lake.

In view of the topographic and bathymetric conditions of Bujumbura Port, relatively high waves intrude the port when the southerly winds continuously blow, since the fetch on Lake Tanganyika is long from the north to the south and higher waves are likely to be generated. From Bujumbura Port to the opposite shore of Lake Tanganyika at Uvira, DRC is about 22.5 km away. As the port entrance of Bujumbura is open to the south, the wave height near the port entrance occasionally becomes about 1 m high when the strong winds blow from the south in the afternoon.

There is almost no flow of the current under the surface water in Lake Tanganyika regardless whether it is the rainy or the dry season, and it was not actually observed at the time of the bathymetric survey at Rumonge.

The fetch length by direction of Bujumbura Port and Rumonge Port are as shown in Table 3.8.

**Table 3.8: The Fetch Length by Direction of Bujumbura Port and Rumonge Port**

Bujumbura Port		Rumonge Port	
Direction	Fetch Length (Km)	Direction	Fetch Length (Km)
W	21	NW	45
WSW	25	WNW	37
SW	30	W	36
SSW	65	WSW	37
		SW	42
		SSW	30

## **(2) Water Level of Lake Tanganyika**

Water level records of Lake Tanganyika for 82 years from 1929 to 2010 is as shown in Table 3.9.

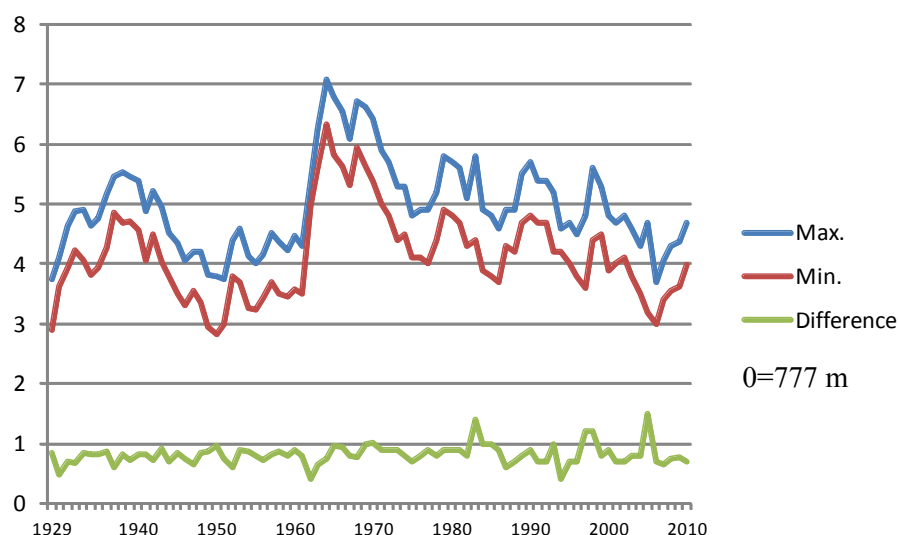
**Table 3.9: Water Level of Lake Tanganyika**

Year	Maximum	Minimum	Date of Max.	Date of Min.	Year	Maximum	Minimum	Date of Max.	Date of Min.
1929	773.75	772.90	15-May	5-Nov	1971	775.9	775.0	-	-
1930	774.11	773.62	15-May	10-Oct	1972	775.7	774.8	-	-
1931	774.65	773.95	5-May	20-Oct	1973	775.3	774.4	-	-
1932	774.89	774.22	20-Apr	1-Nov	1974	775.3	774.5	-	-
1933	774.91	774.07	25-Aug	15-Nov	1975	774.8	774.1	-	-
1934	774.63	773.82	20-Aug	20-Oct	1976	774.9	774.1	-	-
1935	774.76	773.93	1-May	1-Nov	1977	774.9	774.0	-	-
1936	775.16	774.28	10-May	20-Nov	1978	775.2	774.4	-	-
1937	775.45	774.85	20-May	20-Oct	1979	775.8	774.9	-	-
1938	775.53	774.70	1-May	15-Nov	1980	775.7	774.8	-	-
1939	775.45	774.72	1-May	1-Nov	1981	775.6	774.7	-	-
1940	775.40	774.57	20-May	20-Oct	1982	775.1	774.3	-	-
1941	774.88	774.05	20-Apr	1-Nov	1983	775.8	774.4	-	-
1942	775.22	774.50	5-May	1-Nov	1984	774.9	773.9	-	-
1943	774.95	774.03	15-May	15-Nov	1985	774.8	773.8	-	-
1944	774.51	773.80	1-May	1-Nov	1986	774.6	773.7	-	-
1945	774.35	773.51	20-Apr	15-Nov	1987	774.9	774.3	-	-
1946	774.07	773.32	10-May	10-Nov	1988	774.9	774.2	-	-
1947	774.21	773.55	5-May	15-Nov	1989	775.5	774.7	-	-
1948	774.20	773.35	1-May	20-Oct	1990	775.7	774.8	-	-
1949	773.82	772.95	1-Jun	5-Nov	1991	775.4	774.7	-	-
1950	773.79	772.83	15-May	5-Nov	1992	775.4	774.7	-	-
1951	773.75	773.00	15-May	1-Nov	1993	775.2	774.2	-	-
1952	774.41	773.80	15-May	10-Nov	1994	774.6	774.2	-	-
1953	774.60	773.70	15-May	5-Nov	1995	774.7	774.0	-	-
1954	774.13	773.25	25-Apr	15-Nov	1996	774.5	773.8	-	-
1955	774.02	773.23	15-May	1-Nov	1997	774.8	773.6	-	-
1956	774.15	773.42	20-May	10-Oct	1998	775.6	774.4	-	-
1957	774.52	773.70	1-Jun	10-Nov	1999	775.3	774.5	-	-
1958	774.38	773.50	10-May	15-Nov	2000	774.8	773.9	-	-
1959	774.24	773.45	1-May	10-Oct	2001	774.7	774.0	-	-
1960	774.46	773.57	15-May	20-Nov	2002	774.8	774.1	-	-
1961	774.31	773.51	5-May	1-Nov	2003	774.6	773.8	-	-
1962	775.39	774.98	20-May	15-Oct	2004	774.3	773.5	-	-
1963	776.29	775.64	10-May	5-Nov	2005	774.7	773.2	-	-
1964	777.07	776.32	1-May	25-Oct	2006	773.70	773.00	-	-
1965	776.80	775.83	15-Apr	20-Oct	2007	774.05	773.40	-	-
1966	776.56	775.63	20-Apr	1-Nov	2008	774.30	773.55	-	-
1967	776.10	775.31	10-May	5-Nov	2009	774.38	773.62	-	-
1968	776.72	775.95	10-May	5-Nov	2010	774.68	773.98	-	-
1969	776.62	775.64	1-May	15-Oct					

Source: E.P.B.

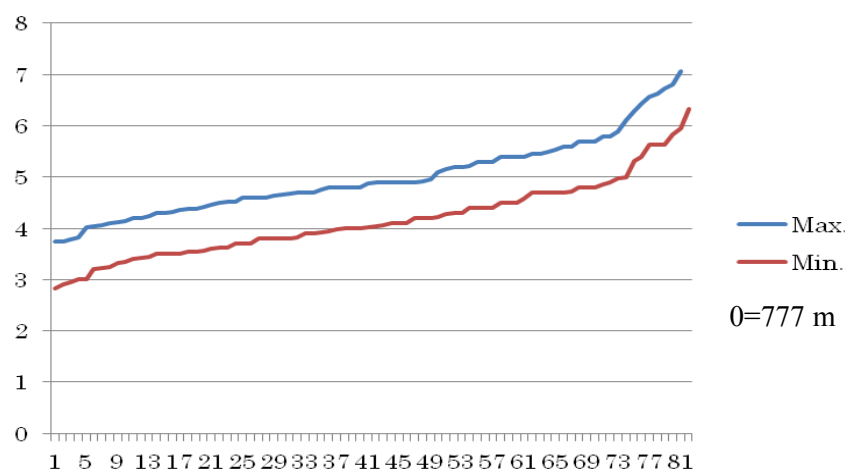
The highest recorded water level is 777.07 m (1964) and the lowest is 772.83 m (1950). During the past 20 years, the highest water level, 775.60 m (1998), is lower than the highest recorded one by about 1.5 m. At present, the water level observed by the JICA Study Team is 773.80 m.

Figure 3.1 shows the chronological changes of the water level from 1929 to 2010. It is observed that since the highest water level was recorded in 1964, the water level appears to be staggeringly lower and lower and recently has been close to the lowest level recorded in 1950. The maximum seasonal change of 1.50 m was observed in 2005 while the minimum was 0.40 m in 1994. The average annual water change is 0.82 m.



**Figure 3.1: Chronological Change of Water Level of Lake Tanganyika**

Figure 3.2 shows the water level arranged in ascending order of the annual maximum and minimum water levels. It is very seldom that the water level is higher than 776.5 m and lower than 773.0 m



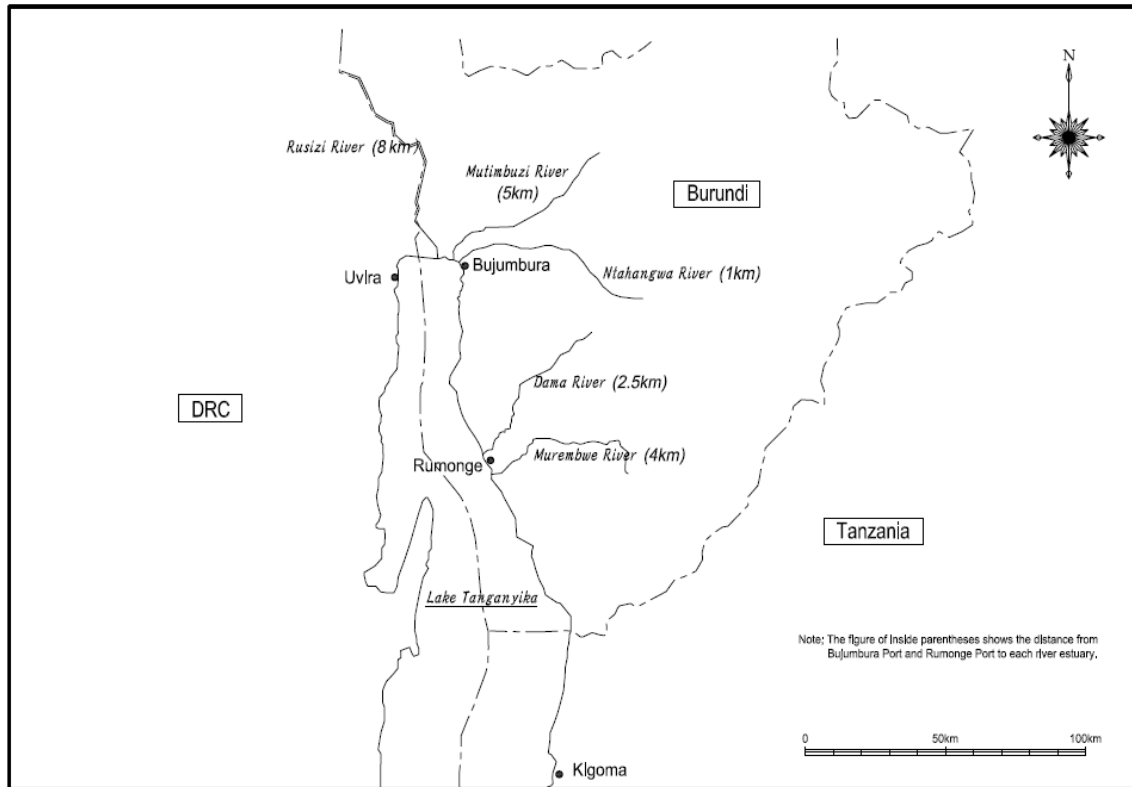
**Figure 3.2: Water Level of Lake Tanganyika in Ascending Order**

For the most part, the water level of Bujumbura Port does not change from day to day, although it slightly changes between the rainy and dry seasons.



### (3) Sedimentation

The neighboring rivers of Bujumbura port and Rumonge port are as shown in Figure 3.3 and the deposition situation of earth and sand are as shown below.



**Figure 3.3: Neighboring Rivers of Bujumbura and Rumonge Ports**

The distance of between ports and neighboring rivers are as shown in the same figure.

The Rusizi river located about 8 km northwest of Bujumbura Port which flows near the border with DRC. Flow of the river is considerable and at the river mouth it forms a delta with several estuaries. The Ntahangwa river flows very near to Bujumbura Port at about 1 km north. The route of flow has been changing when rainfall was intense and storm water flooded. The Mutimbuzi river is located about 3 km from Bujumbura Port and in between the Rusizi river and the Ntahangwa river. Although this river is not so big, and garbage such as pet bottles is accumulating near the river mouth. It seems that the Muimbuzi river transports sediments and sand from upstream at the time of heavy rain.

The secular change of river estuary in Ntahangwa River is shown below. It shows that the accretion took place behind the Oil Jetty with sediments and sands transported by the river.



Figure 3.4: Change of Flow of River Ntahangwa

#### (4) Storm Water Drainage at Bujumbura Port

A storm water drainage called Buyenzi Canal flows into the port basin of Bujumbura Port. Figure 3.5 shows the route of the drainage

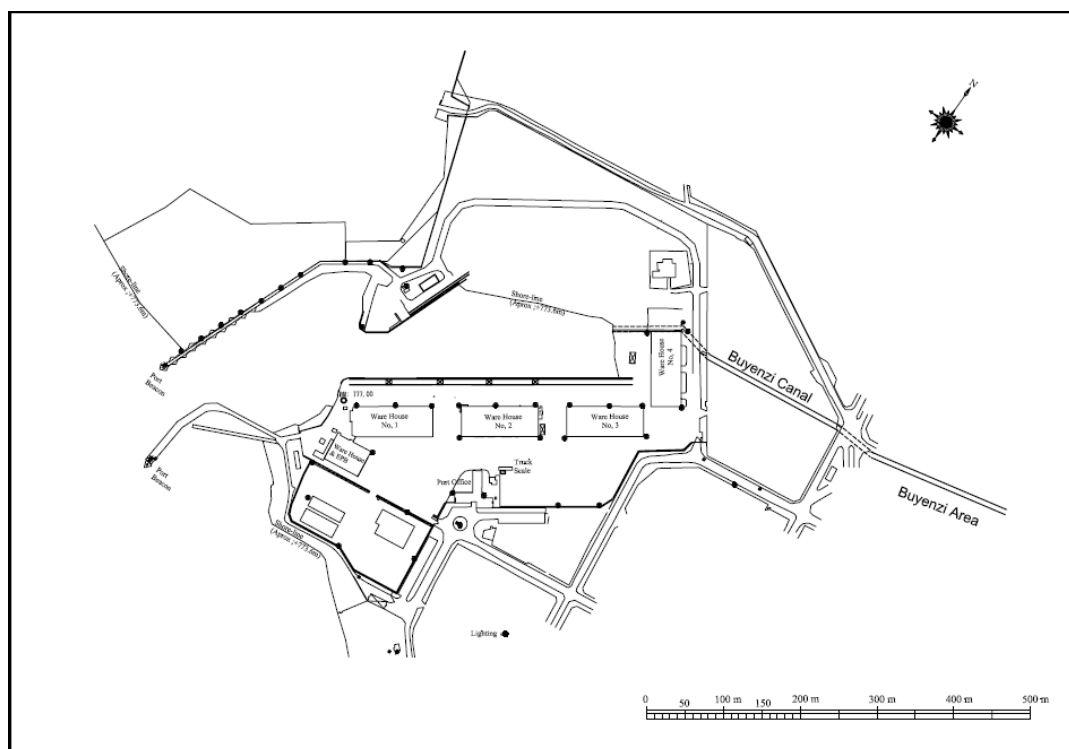


Figure 3.5: Inflow Route to Bujumbura Port of Drainage (Buyenzi Canal)

Photo 3.1 to Photo 3.4 show the environments through which the canal flows.



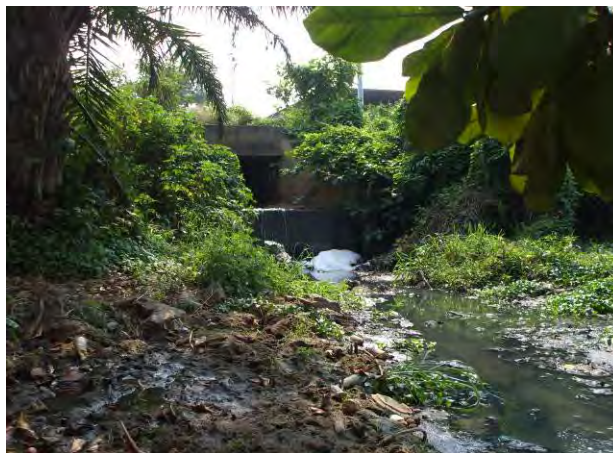
**Photo 3.1: Buyenzi Canal at Buyenzi Area**



**Photo 3.2: Buyenzi Canal at Adjacent Arterial Road**



**Photo 3.3: Dust Deposition of Buyenzi Canal  
at Adjacent Arterial Road (about 3 m)**



**Photo 3.4: Buyenzi Canal by the Side of No.4 Warehouse**

The Buyenzi Canal is not big canal, but it passes along the Buyenzi district, the hinterland of Bujumbura Port. The canal debouches to the port basin sediments and sand but also domestic wastewater and debris and factory disposals. After heavy rain, the canal debouches sediments, sands and debris into the port basin and this is the reason why the port basin is getting shallower.

#### **(5) Dredging Works of Bujumbura Port**

The recent dredging works of Bujumbura Port were carried out in 2009 and the volume dredged was 95,000 m<sup>3</sup>. The capital dredging was done in 1960 by Dutch company. Before 2009, a local construction company called “Amsar” tried to deepen the port basin d during 2006–2008, but no volume was excavated.

#### **(6) Topography and Bathymetry at Bujumbura Port**

Topographical and bathymetrical surveys were conducted in Bujumbura Port. The water level of Bujumbura Port and Rumonge Port was 773.80 m at the time of the surveys. As confirmed by the geotechnical investigation, the terrain where Bujumbura Port exists has been formed with diluvial materials debouched from the River Ntakangwa. The terrain gradually gets higher towards the east as it is nearing the mountains formed by the orogenic movement of the Great Rift Valley.

The results of the topographic and bathymetric surveys at Bujumbura Port are as shown in Figure 3.6.



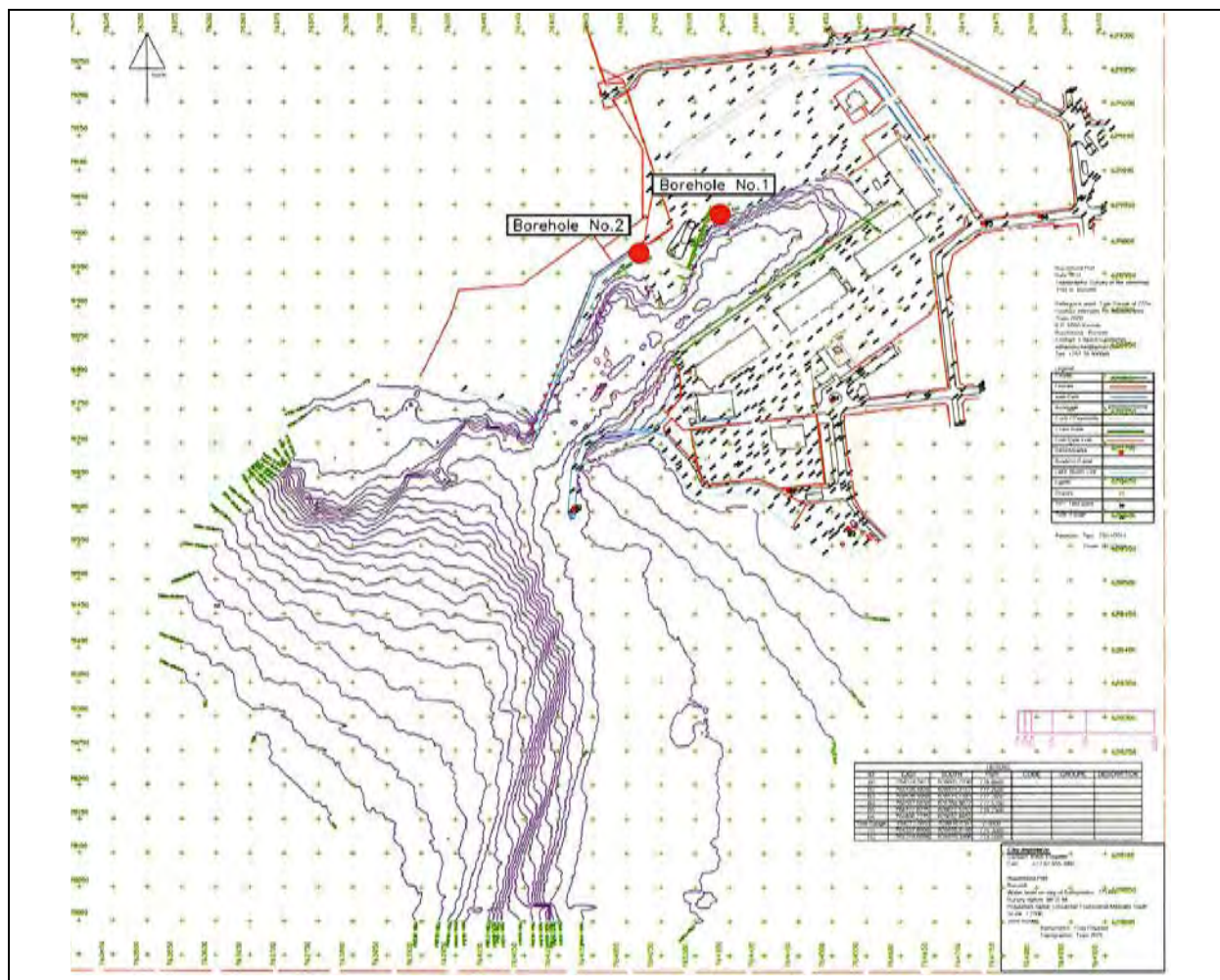
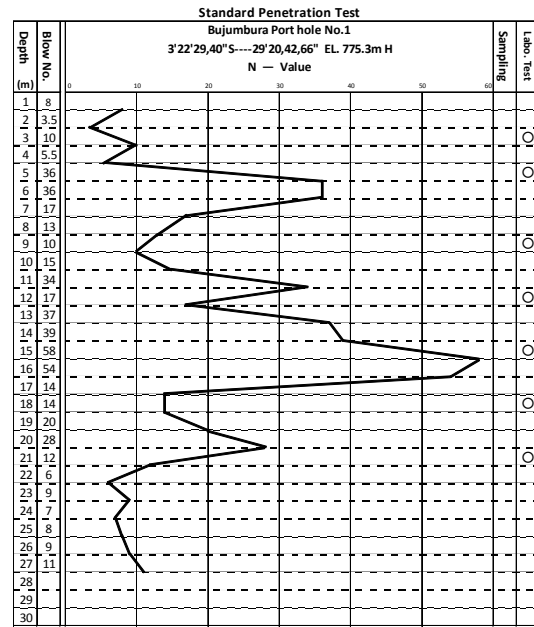


Figure 3.6: Topography and Bathymetry at Bujumbura Port

### (7) Geotechnical Investigation at Bujumbura Port

The boring in Bujumbura port was carried out in the position shown in Figure 3.6, and the result is as shown in Figure 3.7. The subsoil mostly consists of the sand and boulders of diluvial origins debouched by the River Ntakangwa. Therefore, the subsoil has sufficient bearing strength to support the heavy structures but will resist the penetration of piles. Furthermore, as the existing quay structure is gravity type, the quay walls to be built in future will also be the same.

SPT Test						
Bujumbura Port hole No.1						
Date 9/9/2011						
Position 3°22'29.40"S - 29°20'42.66" EL - 775.3m H						
Hight @ start	Depth	Blow count	Blow count	Blow count	Coment	SPT 'N'- Value
775.3	1m	3	3	5	Back fill Construction phase	8
774.3	2m	3	2.5	1	Mud then Sand	3.5
773.3	3m	3	4	6	Sand	10
772.3	4m	2	3.5	2	Sand	5.5
771.3	5m	12	17	19	Clay 100mm	36
770.3	6m	10	17	19	Sand	36
769.3	7m	4	8	9	Sand	17
768.3	8m	6	8	5	Sample tube empty	13
767.3	9m	3	5	5	Sand	10
766.3	10m	2	5	10	Sand	15
765.3	11m	4	13	21	Sand	34
764.3	12m	12	4	13	sand	17
763.3	13m	3	12	25	sand	37
762.3	14m	4	13	26	sand	39
761.3	15m	12	22	36	sand	58
760.3	16m	7	18	36	sand	54
759.3	17m	3	4	10	sand	14
758.3	18m	2	4	10	sand	14
757.3	19m	3	6	14	Sample tube empty	20
756.3	20m	3	7	21	sand	28
755.3	21m	2	3	9	sand	12
754.3	22m	2	2	4	sand positive water presure	6
753.3	23m	4	4	5	sand	9
752.3	24m	2	3	4	sample tube empty	7
751.3	25m	2	3	5	Sample tube empty	8
750.3	26m	1	3	6	sand	9
749.3	27m	3	4	7	sand	11
748.3	28m	Drilling on stone hole collapsed and had to abandon hole				0
747.3	29m	and 11m of road and drill head				0
746.3	30m					0



SPT Test						
Bujumbura Port hole No.2						
Date 21/09/2011						
Position 3°22'31.32"S - 29°20'38.54" EL - 774.5m H						
Hight @ start	Depth	Blow count	Blow count	Blow count	Coment	SPT 'N'- Value
774.5	1m				Stones Back Fill	0
773.5	2m					0
772.5	3m				placed cassing To miss stones	0
771.5	4m					0
770.5	5m					0
769.5	6m	8	15	19	Sand	34
768.5	7m	6	16	20	Sand	36
767.5	8m	8	26	28	Sand & Stones	54
766.5	9m	4	13	17	Sand	30
765.5	10m	7	13	11	Sand	24
764.5	11m	3	5	11	sand	16
763.5	12m	4	7	13	Sand	20
762.5	13m	5	7	8	sand	15
761.5	14m	2	6	18	sand	24
760.5	15m	14	23	23	Sand	46
759.5	16m	10	23	33	Sand	56
758.5	17m	12	20	34	sand	54
757.5	18m	13	28	38	Sand & stones	66
756.5	19m	10	16	21	Sand	37
755.5	20m	12	25	39	Sand	64
754.5	21m	14	27	47	sand	74
753.5	22m	13	30	35	sand	65
752.5	23m	12	22	39	sand	61
751.5	24m	16	30	38	sand	68
750.5	25m	13	21	36	sand	57
749.5	26m	17	28	42	sand	70
748.5	27m	14	26	20	Sand Green	46
747.5	28m	7	15	27	Sand Dark Green	42
746.5	29m	8	15	19	sand Green	34
745.5	30m	9	25	28	Sand Green	53

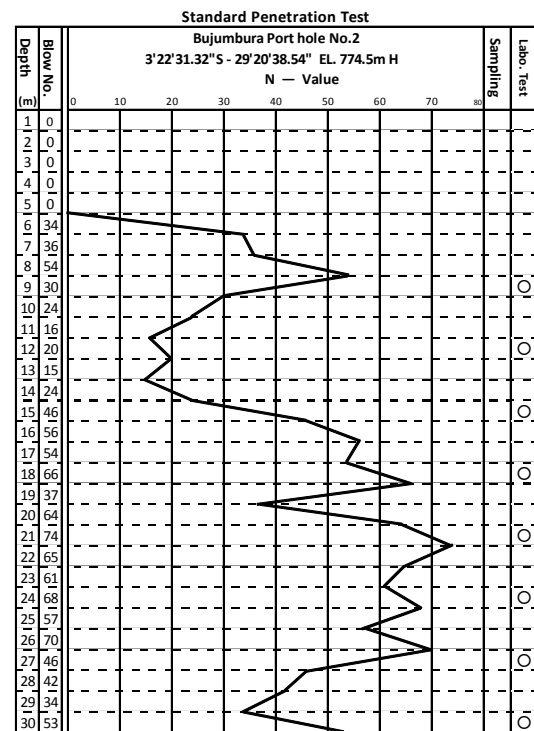


Figure 3.7: Boring Results at Bujumbura Port

The laboratory test results of the soil samples are shown below:

**Table 3.10: Laboratory Test Results of Soils Sampled at Bujumbura Port (1)**

Bujumbura Port Hole-1  
Coordinates: 3°22'29, 40"S, 29°20'42, 66"E  
Ground elevation: 775.3 m

Sample Depth (m)	Grain Size Analysis			$\omega_{nat}$ (%)	Ys
	D max(mm)	% < 2 mm	% < 80 $\mu$ m		
3	4.0	96.7	7.5	24.9	2.71
5	2.5	99.7	89.5	46.1	2.66
9	4.0	96.4	13.0	30.7	2.71
12	8.0	90.3	11.5	29.3	2.68
15	10.0	89.2	2.9	26.1	2.70
18	6.3	80.4	30.6	31.4	2.70
21	5.0	91.0	29.3	32.5	2.66
Average					2.69

**Table 3.11: Laboratory Test Results of Soils Sampled at Bujumbura Port (2)**

Bujumbura Port Hole-2  
Coordinates: 3°22'31, 32"S, 29°20'38, 54"E  
Ground elevation: 774.5 m

Sample Depth (m)	Grain Size Analysis			$\omega_{nat}$ (%)	Ys
	D max(mm)	% < 2 mm	% < 80 $\mu$ m		
9	10.0	30.1	1.5	28.3	2.685
12	6.3	86.5	21.1	30.3	2.505
15	2.5	99.7	17.7	19.9	2.725
18	8.0	96.4	4.7	26.8	2.700
21	8.0	93.4	5.9	22.5	2.705
24	0.8	0	1.4	25.3	2.765
27	12.5	49.4	0.9	21.4	2.605
30	2.5	99.3	26.2	24.8	2.725
Average					2.677

Notes: Dmax = Maximum Diameter of the Solid Grains

$\omega_{nat}$  = Natural Water Content

Ys = Specific Gravity Dry

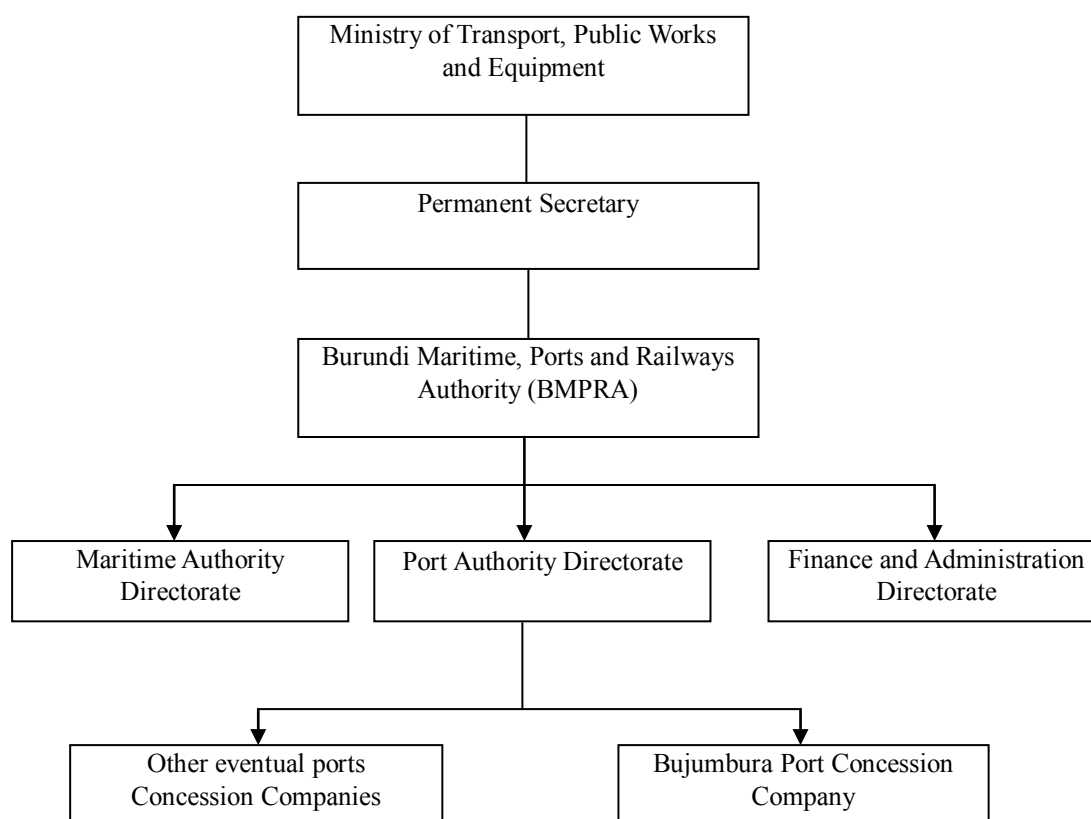
### 3.1.2 Management and Operation

#### (1) Establishment of Port Authority and Selection New Concessionaire

The Burundi Maritime, Port and Railway Authority (BMPRA) was established as the “land lord” of the ports of Burundi according to the Presidential Decree No. 100/252 dated 4 October 2011. BMPRA has commenced its activities in January 2012 but their progress has been limited at present. Also, as the current concession contract with E.P.B will cease in December 2012, BMPRA is seeking for a new concessionaire for the port operation. The JICA Study Team formed a team to assist BMPRA in selecting a new concessionaire for port operation and detailed discussion about the procedures, recommendations are described in Chapter 13. In this section, the current organizations engaged in port management and operation are described.

#### (2) Organizations of Port Sector

The port sector of Burundi is under the jurisdiction of the Ministère des Transport, des Travaux Publics et de l'Équipement (MTTPE). In Figure 3.8 below the organization chart for the port sector is shown.

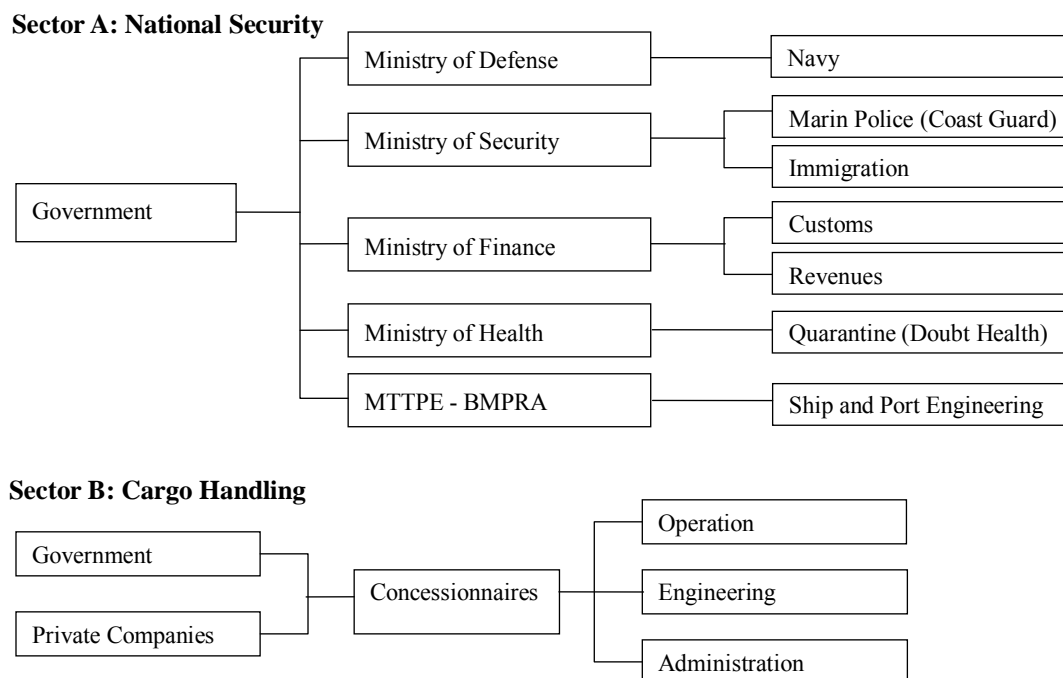


**Figure 3.8: Organization Chart for Port Sector of Ministère des Transport, des Travaux Publics et de l'Équipement (MTTPE)**

Water area, land area and facilities and port building, sheds and shore cranes belong to the Government.

The port is managed and operated by 2 sectors; namely National Security and Cargo Handling, and Port Security and Port Maintenance. Outline of the organization of Port Bujumbura is shown in Figure 3.9.





MTTPE: Ministère des Transport, des Travaux Publics et de l'Équipement  
Concessionnaire (EPB): PPP Corporation for Operation of the Port

**Figure 3.9: Organization for Bujumbura Port**

### (3) National Security

#### Navy

The Navy office is located on the south shore of the outer harbor of the port where 2 armed landing crafts are moored on an old passenger jetty. In the inner harbor about 8 to 9 armed speed crafts are anchored.

#### Marine Police (or Coast Guard)

The main office is in the port building. Marine Police was separated from the Navy and established in 2009. Marine Police has no marine craft at present and maintains the navigational signal on the coast.

#### Quarantine and Immigration

The office is outside of the port premises but inspection of travel documents is carried-out in Shed No. 1 for group travelers who cross the border.

#### Customs and Revenue

Main Customs office is in the port building and the revenue booths are located in Shed No. 1.

#### Ship and Port Engineering

Office is located in the port building. It is in charge of granting permission for vessels to enter and depart the port. The office is responsible for annual ship inspection and survey.

#### **(4) Burundi Maritime, Ports and Railway Authority (BMPRA)**

BMPRA is responsible for the regulatory and development aspects of the ports and the transport by water and rail. BMPRA has started its activities in January 2012.

The progress of the BMPRA has been limited at present and is manned by three persons:

- Mr. Dieudonné Dukundane acting as CEO of BMPRA.
- Mr. Bahati acting as Director of Finance and Administration of BMPRA.
- Mr. Sindakira acting as Director of the Port Authority
- Director of Maritime Authority has been nominated very recently.

Due to the fact that BMPRA has just started its activities in January 2012, it is difficult to judge the as-is position of the organisation. Therefore, it is useful to look at the Presidential Decree which defines the foundation of the recently started organisation.

The Presidential Decree of 2011 consists of six chapters as follows:

Chapter 1 specifies the name and the head office location and confirms that the organisation falls under the responsibility of the Ministry of Transport.

Chapter 2 clearly defines the mission statement, responsibilities and tasks of the organisation. The mission statement makes a clear distinction between the regulatory mission statements and the development mission statements. In order to realize the mission statements, seventeen clearly defined tasks-responsibilities have been defined.

Chapter 3 covers the administrative organisation in which a distinction is made between the Management and the Supervisory Board. The Supervisory Board with seven members representing the Government, the private sector and the personnel has not yet been established. The roles and functions of the board are clearly specified. The representatives of the Government take a majority of the positions in the Board. The Management consists of four persons; the CEO and three directors namely the Director for the Maritime Authority, the Director for the Port Authority and the Director for Finance and Administration. The roles and functions of the Maritime Authority, the Port Authority and the Finance and Administration are clearly defined.

The revenues and expenses as well as the accounting principles of the organisation are clearly defined in Chapter 4.

Chapter 5 deals with the staff of the BMPRA.

Final provisions are dealt with in Chapter 6.

The Presidential Decree indeed confirms the potential of the Port Authority to be properly developed and operated as a Landlord business model which will largely contribute to the implementation of the development of Bujumbura Port.

#### **(5) Société Concessionnaire de l'Exploitation du Port de Bujumbura (E.P.B.)**

E.P.B. is a private limited liability company incorporated on June 22, 1967 in Bujumbura, Burundi. Its by-laws were amended on July 5, 2002.

Notwithstanding the fact that the State of Burundi is one of the major shareholders of the company, the by-laws of E.P.B. are the standards used for any limited liability company and do

not provide for any specific rights to the State of Burundi such as in terms of voting rights, number of directors, etc.

The governance of the company consists of:

- a board of directors which is comprised of 5 directors appointed for 4 years by the shareholders' meeting. Among those 5 directors, a President and a Vice President are appointed by the directors. Decisions of the Board of Directors are made by a simple majority,
- a General Director appointed by the Board of Directors and is in charge of the day to day business,
- a shareholders' meeting to which all and any shareholder may participate. Decisions of the shareholders' meeting are made by a simple majority.

Pursuant to article 37 of the by-laws, any undertaking of the company as well as any power or delegation given to any party is valid only if signed by at least two of the following persons: the President, the Vice President, the General Director or a director.

Moreover, a few of the decisions of the General Director listed under article 37 are subject to prior authorization of the Board of Directors such as the purchase or sale of real estates, the granting of mortgage and other security, the purchase or sale of equipment or goods exceeding a value defined by the Board of Directors.

E.P.B.'s share capital consists of 5,000 shares of equal value held by 18 shareholders among which the State of Burundi owns 2,029 shares, and the second major shareholders being the Ndamama succession, i.e., a private shareholder which owns 1,800 shares. All shares are freely negotiable and the sale and purchase of shares is not subject to any restriction or authorization whatsoever even in case of sale of shares to a third party (i.e., a non-shareholder).

None of the shareholders owns by itself a majority stake in the share capital of E.P.B. Moreover, from a strict legal point of view, the State of Burundi owns 42% of the share capital while private companies own 58%. Facts mentioned hereafter show that indeed the company is under the State of Burundi's control.

## **(6) Current Concession Contract**

The existing concession contract granted to E.P.B. on December 20, 2004 replaces the former concession contract granted to E.P.B. on December 24, 2002. Pursuant to article 25 of the existing concession contract, such concession has been granted for 10 years as from December 2002. A letter of termination of the concession contract was sent in 2011 to E.P.B. one year before December 24, 2012 according to the provisions of article 25.

Accordingly, the concession contract will automatically come to an end on December 23, 2012 unless extended for a new limited period prior to December 24, 2012. On or after December 24, it will be no longer possible to extend the concession contract.

The concessionaire's obligation is only to operate the Port of Bujumbura as it is without any defined and substantial obligation either to invest in equipment or otherwise or to develop the activities of the Port. The sole provision of the concession contract dealing with investment lies in article 21. This article provides that E.P.B. is bound to invest or fund up to a maximum of 10% of its charges and to dedicate such investment or funding to the purchase of equipment and tools for the operation and maintenance of infrastructures. It emerges from article 21, that investment is de facto conditioned by the level of charges of E.P.B. However, E.P.B. has not

undertaken any obligation to reduce its charges and the concession contract does not contain any provision dealing with the control of charges.

One of the main aspects of the existing concession contract is that it was granted without any terms of reference to comply with and without any objectives to achieve by the concessionaire. Moreover, since the concessionaire is not bound to achieve any performance whatsoever, the concession contract does not contain any performance criteria and de facto the concessionaire is only bound not to interrupt the service of the port which is a minor obligation given the importance of the Port in the Burundi's economy.

Given the objective of the Government of Burundi vis-à-vis the Port, i.e., to transform the existing port in a logistic platform, the existing form of the concession contract (*contrat d'affermage*) cannot be maintained.

The concession contract is also qualified under Article 1 as a public service concession. Under the public service concession concept, the concessionaire is bound to comply with defined obligations imposed by the public conceding party to the benefit of the public (i.e., the users of the port) only. Theoretically, public service obligations are obligations which would not be undertaken by the concessionaire by itself since such obligations only results in charges or constraints and not in direct benefit for the concessionaire.

Article 1 gives a definition of public service:

- Continuation of the service. The concessionaire is not entitled to interrupt the service of the Port;
- Non-discriminatory practice: the users of the Port should be treated on an equal basis.

Those obligations are under the standard public obligations. Indeed in standard practice, the operating party, whatever its name, is bound to adapt the service to the needs and requirements of the market (i.e., the users) in order to always provide the most efficient service at the most competitive price.

## **(7) Specific Issues of Current Concession Contract**

The following specific issues about the current concession contracts have to be rectified in conceding Bujumbura Port to a new concessionaire. The rectifications shall be incorporated in the bidding documents for concession and their details are discussed in Chapter 13 Preparation of Concession Contract.

### **Installations, superstructures, infrastructures and equipment operated by the concessionaire**

The concession contract provides for an unusual definition of the infrastructures, superstructures and equipment to be operated by the concessionaire (article 3).

- The first category consists of the superstructures and infrastructures put at the disposal of the concessionaire but which property and maintenance remain to the State. This is very unusual. This kind of installation defined as “*biens de retour*” (installations retuning to the conceding party at the end of the concession) are usually maintained by the concessionaire and replaced or developed by the conceding party. For obvious reasons, it is practically impossible for the conceding party to maintain on a day to day basis installation operated by the concessionaire.

- The second category consists in “permanent works” (not defined) and equipment put at the disposal of the concessionaire which property remain at the State but which maintenance is transferred to the concessionaire. The renewal of such “permanent works” and equipment remain within the State’s responsibility.
- The third and last category consists in “permanent works” and equipment which are the concessionaire’s property, the latter being bound to maintain and renew such “permanent works” and equipment.

#### **Third parties within the limits of the concession**

Pursuant to article 5 of the concession contract, the concessionaire is bound to accept, without any compensation, the setting up within the limits of the port various public entities such as the customs (which is standard) and the armed force (which is not standard) but also entities which are not in charge of any public services such as the Office des Cafés du Burundi (Office of Cafés of Burundi).

#### **Tariffs and Royalties**

Tariffs are fixed by E.P.B. on the basis of the forecast of its proceeds and forecast of its charges and are submitted for authorization to the Ministry of transport. In case of dispute between E.P.B. and the Ministry, the dispute is deemed to be settled by the Committee in charge of privatization.

#### **Interference with governance**

Article 22 of the concession contract contains provisions which must be regarded as an interference of the conceding party in the corporate organization of the concessionaire. Indeed, this article deals with legal reserve of E.P.B. and the distribution of dividends by the shareholders’ meeting to E.P.B.

#### **Financial consequences resulting from the end of the concession contract**

Article 26 provides that at the end of the concession, the concessionaire is entitled to be reimbursed with the remaining charges of non-amortized loans if such loans were previously authorized by the conceding party.

While such provision is standard, it does not cover the situation whereby the concessionaire has invested on its own funding.

Article 26 also contains a provision which does not make sense. Indeed, article 26 provides that the State of Burundi shall reimburse E.P.B. with the value of the share capital which has been paid. Such value shall be determined by way of expertise.

One cannot understand the relationship between the share capital of the concessionaire and its rights for indemnification or compensation at the end of the concession contract.

Furthermore, this provision is an economic nonsense since, as previously mentioned, the main, not to say the sole purpose of E.P.B. is to operate the port as concessionaire. Therefore, at the end of the concession contract, E.P.B.’s share capital shall no longer have value and the indemnification of E.P.B. on the basis of the value of its shares, whether fully paid or not, is therefore nonsense.

### **(8) Activities and Organization of E.P.B.**

Cargo handling, port security and port maintenance are carried out by E. P. B. The investment ratio is as follows:

Investment Ratio: Government      42%  
Private Company      58%

Cargo Handling Department of E.P.B. is currently responsible for operation of shore cranes and other cargo handling equipment, controlling man-power and security of port area, and their office is located in Shed No. 2. Engineering Department is responsible for maintenance and repair of the equipment, and their office is located in the equipment repair yard. One of the issues in selecting a new concessionaire seems to ensure operation and maintenance of the port these departments have been engaged in for a long time.

The organization chart of E.P.B. is shown in Figure 3.10.

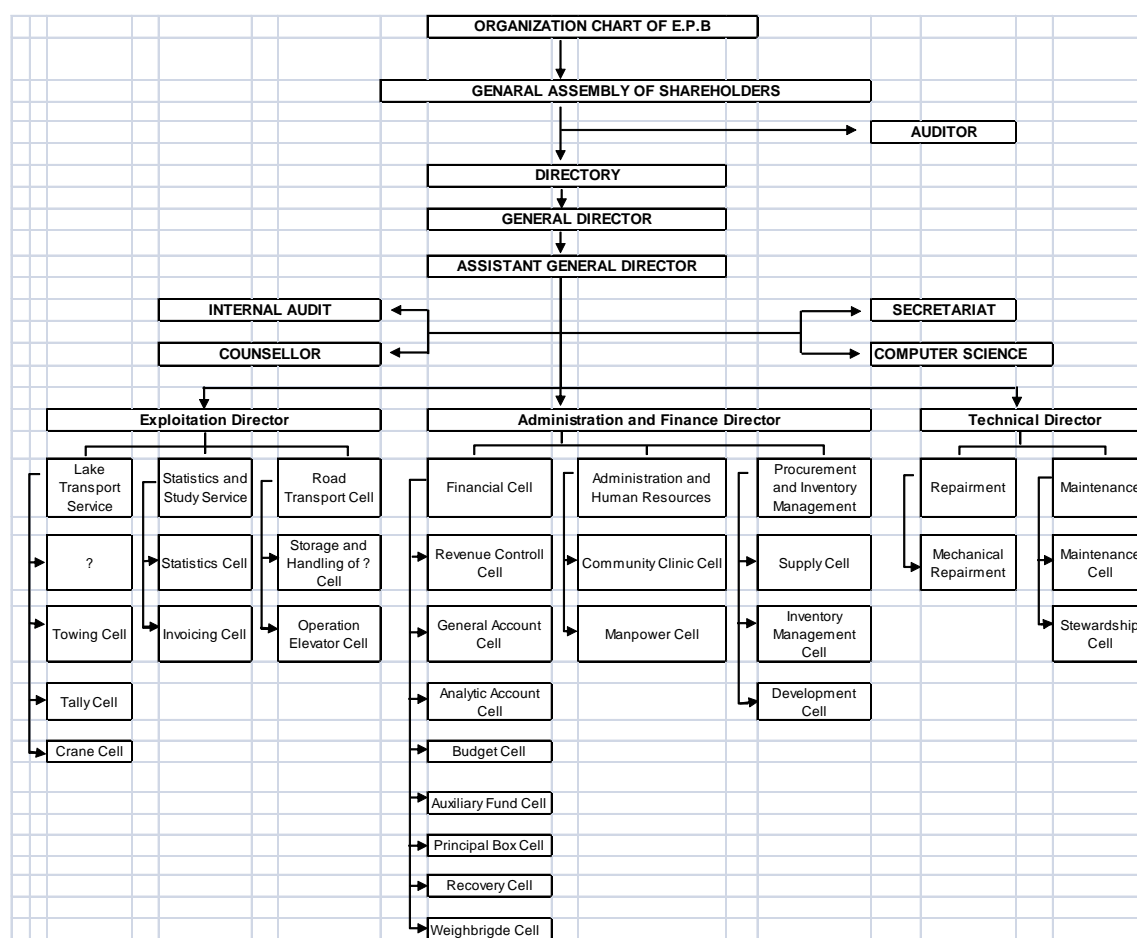


Figure 3.10: Organization Chart for E.P.B.

### 3.1.3 Port Facilities

#### (1) General

There are three wharfs existing in the Port of Bujumbura; general cargo wharf, container wharf and oil wharf. The general cargo wharf is 400 m in length with 4 units of 5 ton rail-mounted jib cranes, which are standard port cranes of 7.5 m/25 ft rail spun and appear to be maintained well.

Four warehouses of 2,000 square meters each are along the quay line, and each warehouse accommodates a designated lot cargo; sugar in No. 2, coffee beans in No. 4, and other general cargo in No. 1 and 3. The Immigration office is in a part of the No. 2 warehouse for passengers

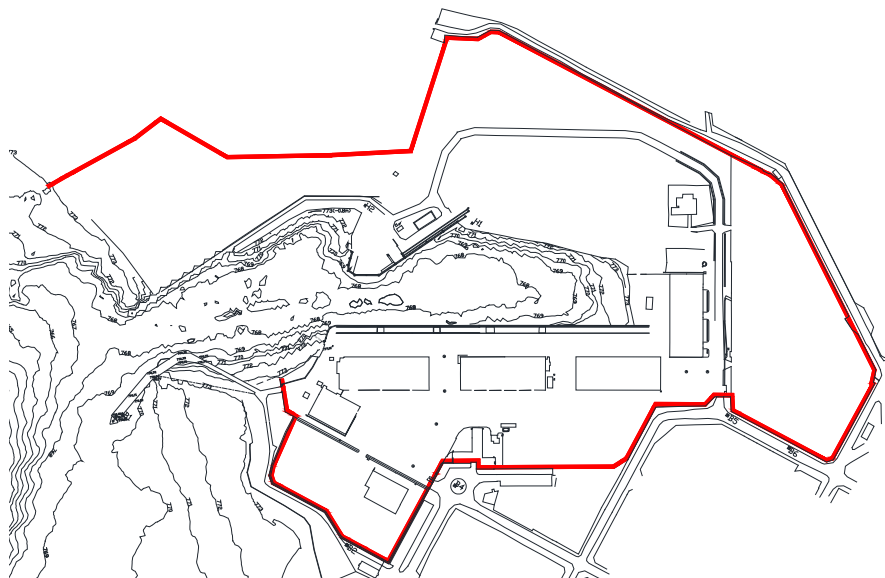
traveling in and out of Burundi by international long-distance buses. These buses arrive here for immigration through the center of the city.

There is a triangle-shaped paved backyard behind No. 1 and 2 warehouses, which is now used as parking space for external trucks. Three old, small warehouses are at the corner. This will be a significantly good space for cargo handling when there is a re-layout.

One unit of a 50 ton revolving crane is fixed on the 100 m container wharf at the opposite side of the general cargo wharf, where the containers have seldom been handled. This crane is not originally manufactured for container handling but for lifting boats from the sea for repair, and has been in service for more than 50 years. Therefore, the moving speed is extremely slow; 2 or 3 units of containers in productivity per hour. Moreover, much time is used to hook the lifting sling wire on the container corner fittings as the spreader cannot be attached on it, and to stop spinning and swinging wire ropes on containers during handling.

A 150 m Petroleum wharf is adjacent to this container wharf with several oil tanks settled closed by. ARNOLAC, a shipping company based at Bujumbura owns two oil tankers; namely Cohoha 335.556 dead weight ton, and Rweru 114.610 dead weight ton, but they have never been serviced to carry oil to this wharf for these few years from Kigoma Port, from where fuel has been transported to Uvira of DRC. Tank trucks directly transport the refined oil from Dar es Salaam in Tanzania or Eldoret in Kenya to the storage tanks here solely by road.

Development of Bujumbura Port was planned in 1956. Since then, civil facilities such as quay-walls, revetments, apron and storages were constructed after they were designed. Four (4) rail-mounted wharf cranes and one derrick crane were finally installed in the year 1959 at the general cargo berth and container berth respectively. Most of all the existing port facilities were completed before 1960. They are still maintained operational and are in relative good condition. Figure 3.11 shows the area of Bujumbura Port.



**Figure 3.11: Bujumbura Port Area**



**Figure 3.12: Major Port Facilities of Bujumbura Port**

## (2) General Cargo Berths

### a) Dimensions of quay-wall

Total length of berths: 350 m.  
 Crown height of quay: + 777.0 m. in design  
 Type of quay-wall: Gravity type: 3 layers concrete blocks  
 Bottom level of quay: 769.0 m. in design  
 Apron width: Face-line to rear crane rail line = 9.5 m.

The quay wall was designed around 1956 and completed around 1959. It is observed that its top elevation was supposedly determined according to the at-that-time-highest water level of 775.22 m recorded in 1942 plus allowance of 0.30 m plus 1.5 m for clearance. The bottom elevation was supposedly determined according to the at-that-time lowest water level of 772.83 m recorded in 1950. Supposedly, the water depth in front of the quay could be kept more than 3.83 m which is deeper than the draft of 3.77 m of MV Sagamaba put into service in 1955.

### b) Quay crane

Name of crane: 2.5/5.0 t-lifting crane  
 Number of crane: 4 units  
 Number of Power outlet: 4 units  
 Crane rail span: 11.2 m.  
 Length of rail: 350 m, end-stoppers at both ends  
 Lifting capacity: 5 ton for 18 m radius, 2.5 ton for 36 m radius  
 Built: 1959 year procured from Belgium

### c) Bollard

Number of bollards: 23 units      15 m interval  
 Capacity: 25 tons

### d) Fender

Originally designed and installed fenders were made with a wooden beam. However, all fenders were lost at present. All ships moored at the general cargo berth are using their rubber tires in between the ship hulls and the quay walls to decrease the impact during berthing.

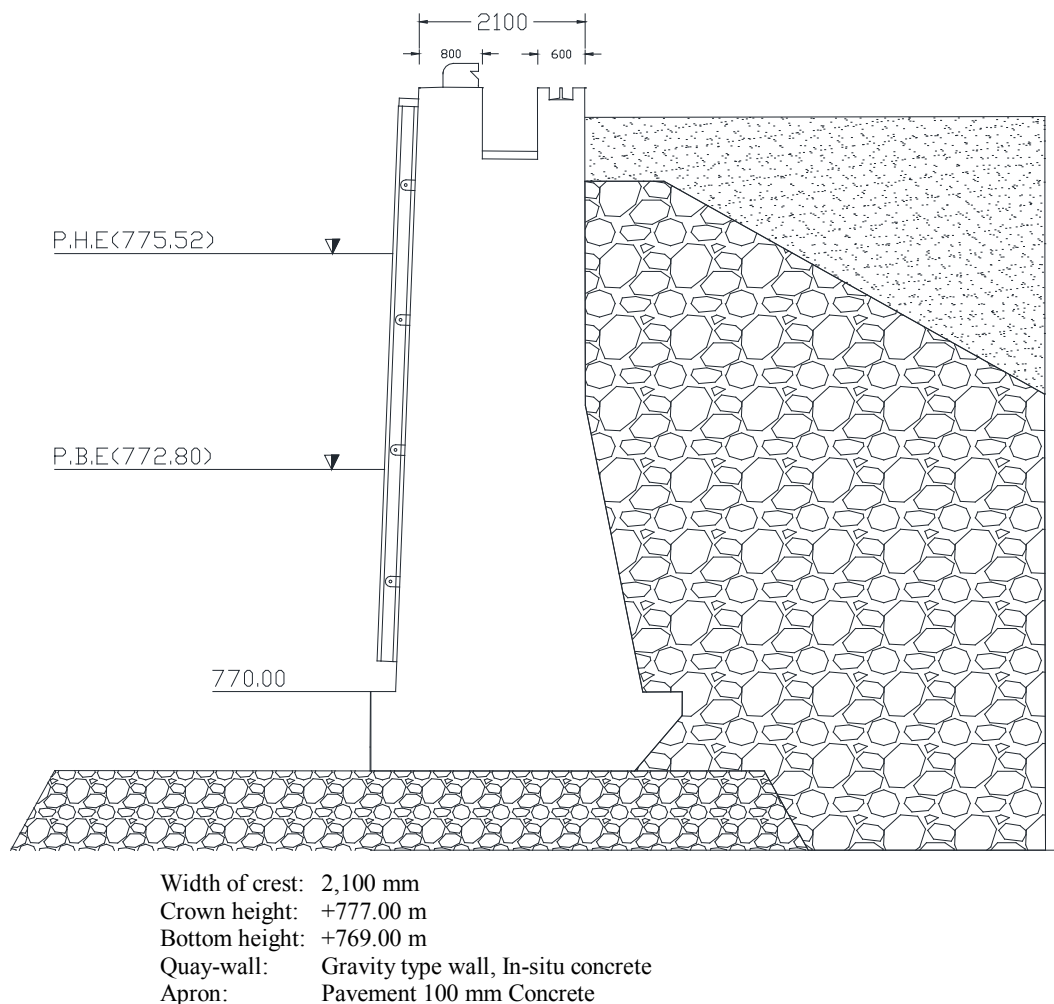


e) Utilities and other services on the quay

No water supply is carried out at the quay. Ships are fueled from a tank lorry.

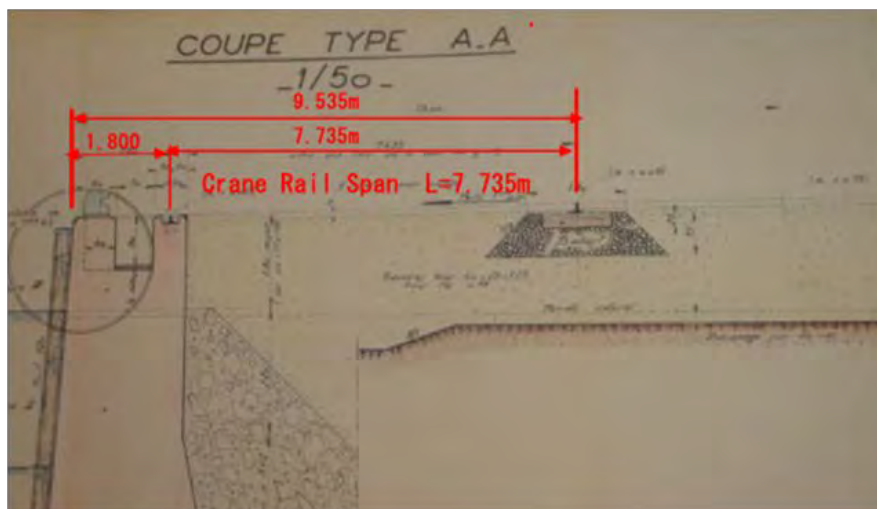
f) Cross-section of general cargo berth at the design

The design cross section of the general cargo berth is shown in Figure 3.13 below:



**Figure 3.13: Cross Section of General Cargo Berth**

The design cross section of the rail beam of the wharf cranes is shown in Figure 3.14 below:



**Figure 3.14: Crane Rail Foundation**

### **(3) Container Berth**

#### **a) Dimensions of quay-wall**

Total length of berth: 150 m (115 m + 35 m)  
Crown height of quay: 777 m in average  
Type of quay-wall: Gravity type: 3 layers concrete blocks  
Bottom level of quay: 769.0 m in design



Quay-wall: Gravity type  
Bollard: 25 tons

**Photo 3.5: Container Berth of Bujumbura Port**

#### **b) Quay crane**

Name of crane: Derrick crane  
Number of crane: 1 unit  
Lifting capacity: Fixed crane of 50 ton capacity  
Built: procured from Belgium in 1959



**Photo 3.6: Derrick Crane at Bujumbura Port**

c) Bollards

Number of bollards: 15 units, 15 m interval

Capacity: 25 tons

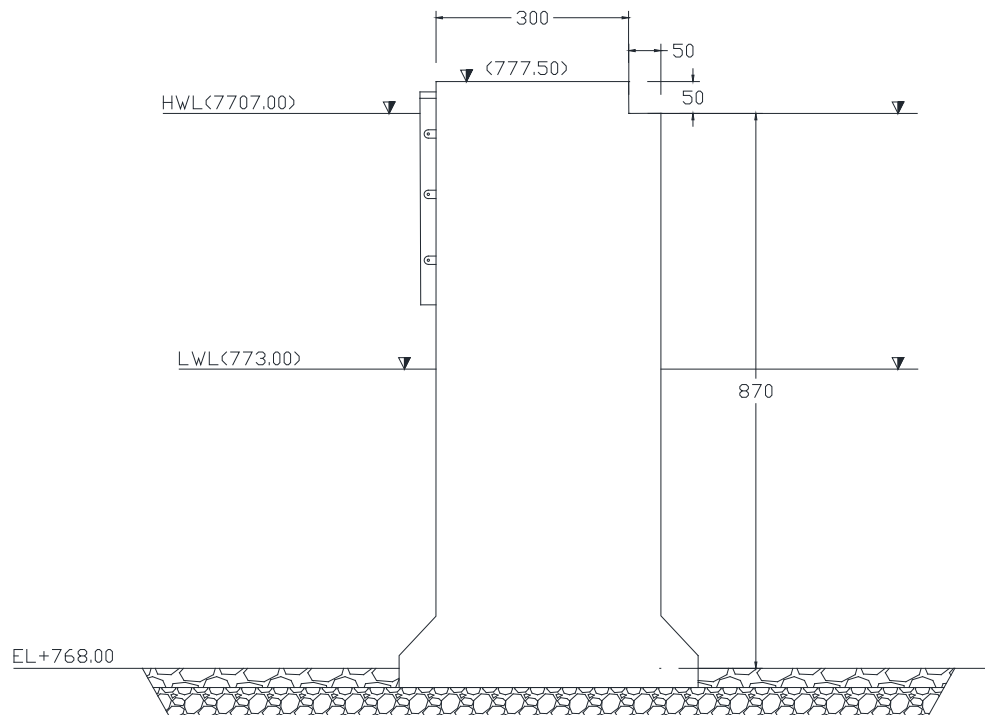
d) Fenders

Original type of fenders shown on the design drawing was a wooden beam. However, all fenders have been lost at present. All ships moored in Bujumbura Port are equipped with used rubber tires on the side of the ship to decrease berthing impact.

e) Utilities and other services on the quay

No utility and other services are available on the quay.

f) Cross-section of container berth at the design



**Figure 3.15: Quay Wall at Container Berth**

#### **(4) Oil Jetty**

Photo 3.7 and Photo 3.8 show the oil jetty of Bujumbura Port. The inside of the breakwater is used as the jetty even though it was planned to be outside the breakwater where the accretion of the sediments come in from the River Ntahangwa.



**Photo 3.7: Overall View of Oil Jetty  
(Rock Armor Revetment Side)**



**Photo 3.8: Mooring Point of Oil Berth**

##### **a) Dimensions of quay-wall**

Length of berth:	110 m
Length of revetment (rock armor):	120 m
Crown height of quay:	777 m in average
Type of quay-wall:	Circle cell type of steel sheet piles
Bottom level of quay:	+769.0 m in design

##### **b) Layout of Oil jetty**

Structural type of Oil jetty is of a cofferdam type framed with steel sheet piles as shown in Figure 3.16.



**Figure 3.16: Plan of Oil Jetty**

##### **c) Area behind Oil jetty**

When the oil jetty was constructed, the lake bed on both sides of the jetty was deep and flat. At present, however, the shoreline at the north of the breakwater has greatly shifted offshore. Accretion has been taking place here.

As the southerly winds are prevailing and the waves are generated to propagate from the south to the north on the lake, the littoral drifts are generated at the north end of the lake, one to the west and the other to the east. The latter littoral drift is augmented by the sediments debouched from the River Ntakangwa and moving to the navigation entrance of Bujumbura Port. Thus, it is considered that the accretion on the north side of the breakwater has been taking place.



**Photo 3.9: Sedimentary Area behind Oil Jetty**



**Photo 3.10: Present Shoreline at  
Bujumbura Port**



**Photo 3.11: Small Stream  
inside Sedimentary Area**

d) Present utilization of Oil Jetty

The oil jetty has not been here for a long time. Two oil tankers owned by ARNOLAC have not been in service for a while. All the fuel is transported to the tank yards in the port vicinity by the tank lorry.

**(5) Warehouses**

- a) There are four (4) warehouses in Bujumbura Port. Three of them are located along the face-line of the general cargo berths. The other one is located behind the basin end.
- b) Dimension and roles of each warehouse are tabulated below:



**Table 3.12: Dimensions of Warehouses**

No. of storage	No.1	No.2	No.3	No.4
Dimension: L. x W.	104x39	100x39	100x39	98x39
Area m <sup>2</sup>	4,050	3,900	3,900	3,820
Main commodity ①	Cement	Export transit	Sundry goods	exclusive coffee
②	Sundry goods	Bean Flour	sugar	nothing
Occupancy m <sup>3</sup>	4,050	3,900	3,900	3,820
Occupancy ratio (normal)%	50%	80%	85%	90%
Arrangement / order	Very well	well	well	Very well

Occupancy ratio was measured by observation from the 1<sup>st</sup> of September to the 9th of September. The height of the stockpile is about 2.0 m. The ratio of pure occupational area is half (50%) of the floor area.



**Photo 3.12: Warehouse No. 1  
Imported Cement**



**Photo 3.13: Warehouse No.2  
Salt Bags beneath Eaves**



**Photo 3.14: Warehouse No. 3  
Imported Sugar**



**Photo 3.15: Warehouse No. 4  
Coffee Beans for Export**

## **(6) Port Basin**

### **a) Sounding works**

Sounding works to produce a bathymetric map were carried out from late August to early September. The results are shown in Figure 3.17.

b) Outline of basin

The port basin is roughly shown in Figure 3.17.



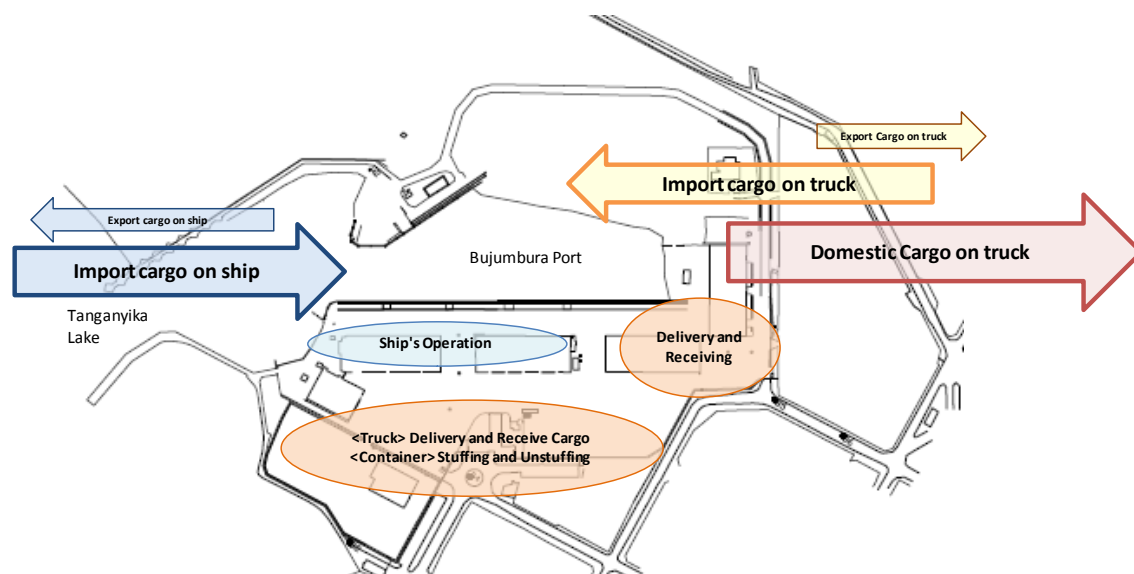
**Figure 3.17: Port Basin of Bujumbura Port**

The port basin of Bujumbura Port may be divided into two parts. One is the outer basin from the entrance to the tip of the general cargo berth and the other is the inner basin which is very narrow (60 m). The dimensions of the port basin are calculated based on the topographic survey results.

### 3.1.4 Cargo Handling

#### (1) Current Status

Particular character of Bujumbura Port is that more than 90% of the cargo it handles is import cargo. Out of the import cargo, about 40% is transported by truck not by ship. They are transported from Dar es Salaam Port in Tanzania or Mombasa Port in Kenya. They will not use the port facilities like berths and warehouses but they pass through the port for cargo checking, customs clearance and transferring it cargo to the other trucks.



**Figure 3.18: Working Zone of Bujumbura Port**

### Cargo Volume

Cargo being handled at Bujumbura Port is transported by road and by ship on Lake Tanganyika. The ratio between the lake and road transport is 57 to 43 on average from 2006 to 2010 as shown in Table 3.13. Around 43% of the total cargo in these 5 years did not conduct ship-to-shore cargo handling, but pass the port for customs clearance and cargo checking. Thus, Bujumbura Port is functioning as a logistic hub to carry out the customs clearance for the cargo transported by road as well as a port to handle the cargo transported by ship.

**Table 3.13: Cargo Volume Handled at Bujumbura Port**

	By Lake	By Road	Total
Import	93,396	65,337	158,733
Export	2,480	6,207	8,687
Total	<b>95,876 (57%)</b>	<b>71,544 (43%)</b>	<b>167,420 (100%)</b>

Source: E.P.B. (2006 to 2010)

### Commodities of Cargo

Major commodities of cargo being handled at Bujumbura Port are shown in Table 3.14 and Table 3.15. About 60% of import commodities are cement and sugar and around 90% of the export commodities are coffee beans. These major commodities are transported in bag. For efficiency, they are handled on a pallet with a forklift.

**Table 3.14: Imported Commodities in 2010**

Commodity	Share
Bagged Cement	45%
Bagged Sugar	19%
Sundries	10%
Construction Materials	11%
Vehicles	4%
Others	11%
Total	100%

Source: E.P.B.

**Table 3.15: Major Export Commodities (2005–2009)**

Commodity	Share
Bagged Coffee Beans	90%
Others	10%
Total	100%

Source: JICA Study Team

### Ship Calls

In recent 5 years, ship calls at Bujumbura Port is summarized in the table below.



**Table 3.16: Ship Calls at Bujumbura Port**

Year	Total	3 Companies*	Average per month	Max. in month	Small Boat
2007	108	105	8.8	14/July	3
2008	123	103	8.6	16/Oct.	20
2009	169	149	12.0	17/Dec.	20
2010	270	16.7	13.9	38/Dec.	109
2011**	250	132	14.7	37/Jan. Mar.	118

Note: \* 3 companies are ARNOLAC, BATRALAC, TANGANYIKA TRANSPORT.

\*\* 2011: January–September 9 months only

Departure and entry of the port are restricted only at day light time. Departure and entry of vessels are permitted by the ship control and inspection officer requesting from the shipping company before 24 hours by letters. Mooring of the vessels in the port and tug service are available.

#### Cargo Handling at Quay Side

The ration between import cargo to and export cargo from Burundi (excluding transit cargo) is about 97 to 3. A considerable majority of the cargo handled at the quay side are import cargo at Bujumbura Port.

**Table 3.17: Cargo Handling at Quay Side (2006–2010)**

	Import	Export	Total
Lake Transport	93,396 (97%)	2,480 (3%)	95,876 (100%)

Unit: ton

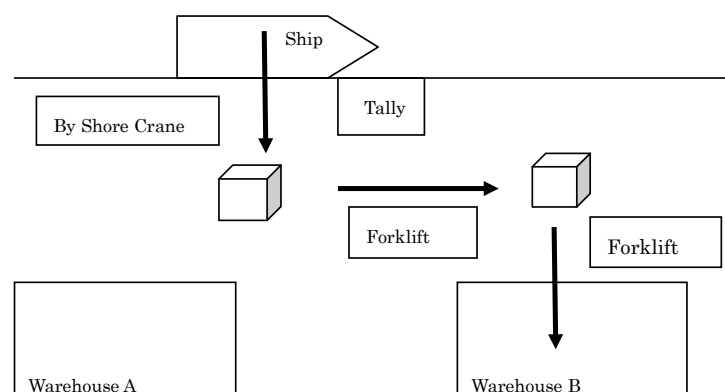
Source: E.P.B.

The total length of the existing general cargo berth is 400 m. At the inner part of the port basin, however, the water depth is too shallow for ship berthing. Therefore, the usable length of the berths for cargo handling is limited to about 300 m. The width of the apron is 30 m sufficiently wide for forklifts to efficiently work.

Ship-to-shore cargo handling is carried out by 4 shore cranes of a 5 ton lifting capacity, which were manufactured in 1959. They are aged and frequently under repair. Because of working condition of the shore cranes, three to four gangs are working for unloading cargo and two gangs can occasionally work for one ship. As the ship length is 60 m at maximum among the fleet, three ships can be accommodated at the same time by the 300 m long usable quay.

#### Cargo Unloading (Discharging)

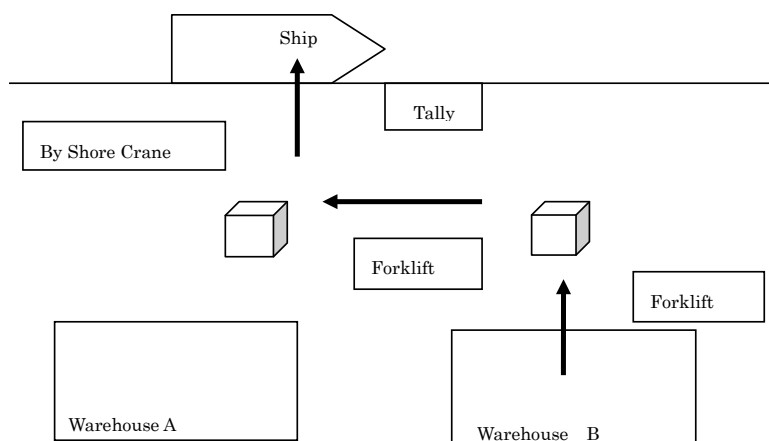
At the bottom of the ship hold, two to four workers are put bagged cargo on a pallet. Then, the pallet is lifted by a shore crane to the apron. After the sling is unhooked from the pallet, the cargo on the pallet is transferred by a forklift to the warehouse and stored there on the pallet. A tally man is counting the cargo unloaded from the ship at the quay side. His counting becomes the basis of the quantities of import cargo.



**Figure 3.19: Cargo Unloading Flow**

### Cargo Loading

The method of cargo loading is vice-versa of cargo unloading. Cargo on a pallet is transferred from a warehouse to the quay side by a forklift. Workers hook a sling of the shore crane to the pallet. Cargo on the pallet is lifted and moved onto the hold of a ship by the shore crane. At the ship hold, workers unhook the sling and move the bagged cargo from the pallet and pile them in the ship hold. The empty pallet is recovered from the ship to the quay side by the shore crane.



**Figure 3.20: Cargo Loading Flow**

### Cargo Transported by Truck

#### a. Carrying of Cargo into Port

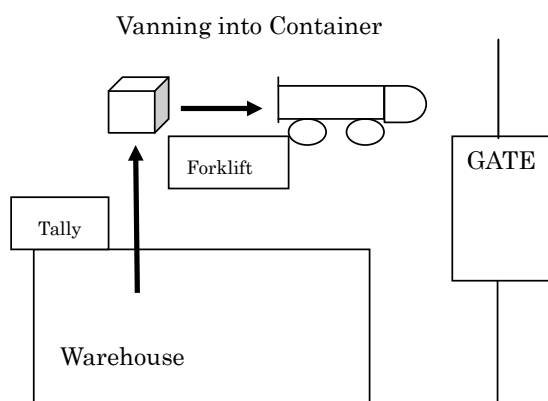
There are two types of cargo entering into the port by truck; cargo to export from Burundi and cargo to import to Burundi.

#### - Cargo to export from Burundi

Typical export cargo from Burundi is coffee beans. A truck carrying coffee beans into the port will park near the warehouse No. 4 where export coffee beans are stored. After a store keeper checks and accepts the delivery documents, off-loading will commence. Coffee beans will be moved onto a pallet and transferred by a forklift to the warehouse and stored there.

- Cargo to import to Burundi

The majority of cargo to import to Burundi is convenience goods. They are almost containerized. A number of containerized cargo passes through the port after customs clearance. Containerized cargo which is carried into the port by truck and unstuffed at the port is transferred near the warehouse where the cargo will be stored. After a warehouse keeper checks and accepts the delivery documents, the cargo will be moved onto a pallet and transferred into the warehouse and stored there. At this time, a tally man count quantities of cargo, which will be the basis of imported cargo by truck. Customs clearance is always carried out, too.



**Figure 3.21: Flow of Cargo to Import to Burundi by Truck**

b. Carrying Cargo out from Port

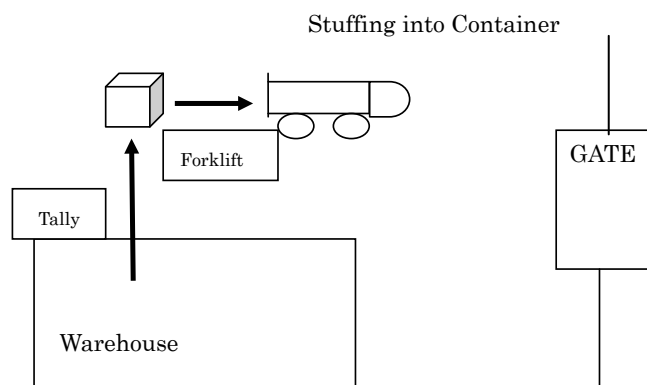
There are two types of cargo exiting from the port by truck; cargo to import to Burundi and cargo to export from Burundi both after custom clearance.

- Import Cargo after Custom Clearance

Usually, a forwarder working for custom clearance on behalf of cargo consignee will carry out the custom-cleared import cargo from the warehouse of the port to the storage of the consignee. The forwarder confirms documents related to the custom clearance and receipts for payments for storage and handling charges of cargo. He will bring in and park his truck near the warehouse of the port. A forklift takes the stored cargo from the warehouse to the truck for loading.

- Export Cargo after Custom Clearance

Export cargo is mainly coffee beans. After confirming documents about export license, custom-clearance, packing list, etc. and pays storage and handling charges, a forwarder commences to carry out the cargo out of the port. The forwarder parks his container truck near the warehouse and transferred the cargo from the warehouse to the container. After stuffing of cargo, he seals the container showing the cargo has finish custom clearance.



**Figure 3.22: Flow of Cargo to Export by Truck**

- Storage in Warehouse

A warehouse keeper decides space allocation of cargo and checks carrying in and out of cargo. He is posted in the warehouse. Bagged cargo of a considerable volume like cement and sugar is stored in good order in the warehouse. Cargo of a long bundle like steel pipes and cargo of an irregular shape is stored at random and to be improved.

**(2) Cargo Handling to/from Warehouses**

In addition to the cargo imported via Lake Tanganyika, there are many imported containerized cargo carried by road through Rwanda and Tanzania. Customs clearance of about sixty to seventy percent of the imported cargo of Burundi is undertaken in Bujumbura Port since Bujumbura City is the major consumption area and the port has well-established facilities for customs clearance. The containerized cargo transported by trucks are increasing owing to its high security

Currently, stuffing and un-stuffing work of containers are frequently taking place at the port. Since most commodities are kept on a pallet in the warehouse, containerized cargo are transferred by a forklift and manpower. The procedure of stuffing and un-stuffing cargo into/from containers is as follows:

- In case of stuffing, cargo on a pallet are moved from the warehouse and placed at the door-side of a container on the trailer by a forklift and loaded into the container by manpower.
- In case of un-stuffing, an empty pallet is placed at the door-side of a container on the trailer and cargo are moved onto the pallet from the container by manpower and the loaded pallet is transferred into the warehouse by a forklift.

A big lot cargo such as cement and coffee in bags on the pallets are stored neatly in the warehouse. However a small lot of cargo such as steel pipes and chemical products in drums are stored in disorder. Therefore, the stowage arrangement of these cargos should be improved.

**Table 3.18: Volume of Cargo Movement of Warehouse**

Unit: ton

	Via land		Via lake		Total
	IN	OUT	IN	OUT	
Month	6,215	14,991	10,157	936	32,299
Year	74,580	179,892	121,884	11,232	387,588

Source: EPB

Remarks: 1) Monthly data is an average based on six months data from January to June 2011.

2) Yearly data is monthly data multiplied by 12.

### (3) Other Operation

- In the backyard near the exit port gate there is an empty container deposit where a 20 ton capacity forklift handles empty containers.
- Trucks and trailers are weighed by a weighing scale near the administration office building and there are more than 10 units waiting in a queue line at peak periods.
- A large passenger bus is sometimes parked in the backyard for immigration control and customs clearance of travelers.

### (4) ICD (Inland Container Depot)

As a considerable import and export cargo are transported to and from Bujumbura Port by truck, the port has a function of an inland container depot (ICD). Containers of import cargo is unstuffed at the port and delivered to the consignee by truck from the port and containers of export cargo is stuffed at the port and transported out of the port to Dar es Salaam Port or Mombasa Port. Bujumbura Port plays the role as a logistic hub having functions of ICD and cargo storage. This is due to the fact the Bujumbura City is the largest city to consume goods in Burundi and administration like custom clearance can be smoothly carried out.

Containers of import cargo transported from Dar es Salaam or Mombasa Port to Bujumbura Port by truck, for example, are unstuffed at the port and the cargo is stored at the warehouse. The arrival and storage of such imported cargo are reported to the customs office. After receiving the import permit, it is carried out by truck out of the port for domestic consumption. A stacking area is allocated at the port for empty containers. The stacking capacity is considered to be about 50 TEU. Other containers of import cargo are transported from Dar es Salaam or Mombasa to go directly to the consignees.

Export cargo like coffee beans is stored at the port after delivery from its produce area. The warehouse of the port is used as a temporary storage for exporters. After its export is contracted, it is moved out from the warehouse into a container.

It is expected that the cargo transported by truck as well as the cargo transported by ship will considerably increase from now on. To avoid the excessive congestion of the port, it is necessary to build a new logistic hub having a function as an ICD.

### (5) Invoice and Payment of Tariff

E.P.B. has tariff of charges to be imposed on entering of ships, handling and storing of each type of cargo. Invoicing and paying of charges are being carried out at an office allocated each warehouse. Each warehouse keeper approves the carrying out of the cargo of which charges have been paid for.

### (6) Workers at Port

Workers of E.P.B. at Bujumbura Port are listed in the table below:

**Table 3.19: Personnel Deployed by E.P.B. in 2011**

Clerks	114
Workers	130
Crane Operators	7
Mechanical Engineers	11
Total	262

Source: E.P.B.

Regulations of safety and hygiene of workers are imposed by law. All the workers employed by E.P.B. wear a blue uniform and their safety and hygiene are ensured by the law. However, many workers temporarily employed for cargo handling are engaged in unloading of cargo from ship to shore. Safety regulation does not seem to be imposed on their work. The E.P.B employees are taking repose at the allocated space at each warehouse.

### **3.1.5 Maritime Transport**

The main cargo items handled in this port are cement in ply bags, coffee beans in gunny bags, steel bars in bundles for construction, etc. The cranes lift these bagged cargo that stevedore workers put on the skids in the ships' holds, and carry them onto the wharf with a sling. Forklifts take them into the warehouse to stow. This is a relatively progressed handling method among the lake ports at the moment. However, dense cement dust is rising from the broken bags due to rough handling by workers.

No containers can be seen being loaded or unloaded at the wharf in Bujumbura Port. There has been no container cargo transported by ships because of poor performance of the TRL railway between Dar es Salaam Port and Kigoma Port and suspension of a container gantry crane operation at Kigoma Port due to lack of spare parts. All cargo in containers coming to and going out from the port by truck is un-packed/packed on the apron or the open area wherever appropriate. Cargo is transported to and from outside of Bujumbura all the way through to the destinations by trucks.

There is a 50 ton crane at the wharf across the port basin. The container ship should be rope-shifted according to the indicated loading/discharging position for the ship on this wharf.

The ship owners in Bujumbura have two container loadable ships with container fittings welded on board. One is a full container ship "MV Teza" owned by BATRALAC which can load 40 TEU (26 TEU in hold and 14 TEU on deck). The other is a convertible ship "Ruremesha" owned by ARNOLAC which can only load 14 units of 20 FT on deck. Both have not loaded containers for these past several years as stated above.



**Photo 3.16: Container Fittings on the Hatch Cover of MV "Teza"**

Republic of Burundi is a member of the International Maritime Organization (IMO) and all international regulations for ships are applied. By domestic regulations for ships, all vessels shall have annual inspections including underwater survey by the government, who will issue a seaworthiness certificate for the next voyage. No Classification Society is applied for any vessel of Lake service.

The fleet registered in Bujumbura Port is the largest on Lake Tanganyika when compared with those of other countries situated around the lake; Tanzania, Zambia and DRC.

The fleet of ships registered in Bujumbura Port is tabulated below:

**Table 3.20: Burundian Fleet**

Ship Owner	Name of Vessel	Type of Vessel	Length Overall (m)	Width (m)	Dead Weight (ton)	Draft in Charge (m)	State	In-service Date (year)
1 ARNOLAC	Kizigenza	Tug Line	33.50	7.58	66	3.25	G.E	1955
	Tanganyika	Tug Line	31.20	5.18	37	1.58	G.E	1889
	Krimiro	Tug Line	23.50	4.55	25	–	S	1915
	Moso	Harbour Tug in Kigoma	12.25	3.00	9	–	G.E	1958
	Ruremesha	Mixed Cargo Ship	41.25	9.00	350	2.25	G.E	1981
	Ndaje	Mixed Cargo Ship	54.75	8.70	600	3.20	G	2002
	Cohoha	Tank Barge	42.35	7.00	336	2.71	G.E	1955
	Rweru	Tank Barge	32.71	5.58	115	1.64	G.E	1953
	Sagamba	Bulk Cargo Barge	65.70	10.00	1,397	3.77	S	1955
	Murinzi	Bulk Cargo Barge	59.60	9.02	885	3.26	G.E	1931
	Buragane	Bulk Cargo Barge	54.50	8.50	627	2.61	S	1937
	Mumirwa	Bulk Cargo Barge	52.77	8.82	544	2.75	G.E	1955
	Buyenzi	Bulk Cargo Barge	52.77	8.82	538	2.75	S	1955
	Remera	Bulk Cargo Barge	47.25	8.00	477	2.36	S	1927
	Buyogoma	Bulk Cargo Barge	36.50	6.00	278	2.17	S	1918
	Imbo	Bulk Cargo Barge	37.77	6.50	246	2.08	S	1929
	Baraka	Bulk Cargo Barge	47.25	8.00	–	–	W	1925
	Tanganyika	Tourism and Research Vessel	25.30	6.86	125	–	V.G	1994
2 BATRALAC	Tora	Bulk Cargo Ship	58.00	10.00	1,110	3.50	G	1988
	Rwegura	Bulk Cargo Ship	45.00	8.00	500	2.50	G.E	1984
	Teza	Mixed Cargo Ship	60.00	11.00	1,500	3.60	V.G	1992
3 SOTRALAC	Bwiza	Bulk Cargo Ship	54.70	8.00	508	2.75	W	1913
4 TANGANYIKA TRANSPORT	Mbaza	Bulk Cargo Ship	42.50	7.30	450	2.35	G.E	1988
5 E.P.B	Ngiri	Harbour Tug	15.75	4.30	–	–	G.E	1959

Notes:  
Mixed Cargo Ship = Container and/or Bulk Cargo Ship  
S = Suspended  
V.G = Very Good  
G = Good  
G.E = Good Enough

As shown in the table above, there are many ships that are not in service or have been wrecked (marked by grey cells) owned by ARNOLAC. The largest vessel currently in service is MV Teza owned by BATRALAC.

MV Teza is designed by a Greek company and was built and launched on the temporarily built slipway in Bujumbura Port. Main engines are Cummins KT19 marine diesels rated 425 HP each at 1,800 RPM × 2 sets. Sixteen crew are on board, and fuel oil is marine diesel oil. Hatch covers are fitted with corner fittings for container loading, and also containers are loadable in cargo holds.

#### Ship Repair

The ship repair facilities available on Lake Tanganyika are the slipway in Kigoma Port (Tanzania) and the dry dock in Kalemie Port (DRC). There is no slipway, dry dock nor floating dock in Burundi.

ARNOLAC, therefore, uses the dry dock at Kalemie Port for repair and inspections for their fleet. Even though it is much more distant than Kigoma, ARNOLAC chooses Kalemie because of the high cost in using the slipway at Kigoma. On the other hand, BATRALAC has not used

the dry dock at Kalemie since their two ships had propeller damages at aft bottom, due to inadequate water depth in the channel at Kalemie Port.

The ships which status is kept above the level of “G.E” seem in good condition by proper maintenance. ARNOLAC has its own workshop for machinery repair.

As the fleet is the largest on Lake Tanganyika, it is reasonable for Burundi to have the facilities for ship repair and inspection like slipway within its territorial water. Bujumbura Port is considered the best location for such facilities to be built for easy access by the government inspector and owners’ engineers. A slipway is considered better than a dry dock because of the calm and steady water of the lake, and easier facility maintenance. The slipway should have a sufficient length for conversion or elongation of the existing fleet of ships.

### 3.1.6 Particulars to Be Reported

#### (1) Drainage Flowing into Port Basin

The surface water drainage collecting the sewerage of Bujumbura city flows into the port basin. The embedded drainage enters to the port premises underground at the east of Warehouse No. 4 and reaches to the manhole, from where the embedded drainage passes around the warehouse to the port basin appearing at its north-east corner. The drainage not only gives a bad smell around the warehouse but also discharges considerable debris and sediments into the port basin, which is getting gradually shallower from its east end. When the port development is implemented, the drainage has to be relocated along the northern part of the port premises so that it will directly debouch to the lake. On a long term basis for the urban development of Bujumbura City, storm water drainage planning shall also be taken into account in planning the surface water drainage.

#### (2) Immigration Control of Bus Passengers, Custom Clearance of Cargo Carried by Road

Bujumbura port is currently handling cargo not only transported by ships but also transported by trucks, which are going to and coming from the neighboring countries. A considerable part of the cargo transported by road is imported from or exported to other countries through Dar es Salaam Port or Mombasa Port. During the last 5 years, the export and import cargo through Bujumbura Port are tabulated as shown in Table 3.21.

**Table 3.21: Export and Import through Bujumbura Port by Ship and Road**

Year	Export			Import			Total				
	Lake	Road	Sub-total	Lake	Road	Sub-total	Lake	%	Road	%	Total
2006	5,784	4,746	10,530	121,888	50,434	172,322	127,672	70%	55,180	30%	182,852
2007	4,771	7,787	12,558	63,472	60,045	123,517	68,243	50%	67,832	50%	136,075
2008	1,758	5,778	7,536	55,285	52,026	107,311	57,043	50%	57,804	50%	114,847
2009	87	5,725	5,812	93,075	74,564	167,639	93,162	54%	80,289	46%	173,451
2010	0	7,001	7,001	133,259	89,616	222,875	133,259	58%	96,617	42%	229,876

Source: E.P.B.

From the above table, the cargo exported from Burundi has recently shifted to the trucks and the majority of the imported cargo to Burundi are still transported by ships. However, as it is considered that the cargo volume will rapidly increase, there should be a purposely built dry port or inland depot where the exported and imported cargo by trucks have to be handled. The candidate location of such a dry port or inland depot is located at a flat area near the airport along National Road Route 5 in the suburb of Bujumbura City. For this purpose the facility layout of Bujumbura Port can be considered for handling the cargo loaded to and unloaded from the ships.



## **3.2 Rumonge Port**

Rumonge is one of the oldest cities in Burundi. Arab people coming from Tanzania via Kigoma have inhabited there. The city became a trade town with Tanzania, then later, with DRC and Zambia. It is located on the eastern shore of Lake Tanganyika, about 73 km south of Bujumbura. It is about 1.5 hours to drive from Bujumbura on the tarmac paved road.

The city is the economic and cultural center of the regions of Bruri, Gitega and Makamba. There is a private university in the city. The population is estimated at about 150,000 and there are many descendants of the people migrated from Congo crossing Lake Tanganyika. Refugees have come back after the civil war subsided and the population has sharply increased.

### **3.2.1 Natural Conditions**

The meteorological conditions are almost the same with those of Bujumbura Port and the water level of Lake Tanganyika including its chronological changes is also the same.

The fetch length by direction of Rumonge Port was shown in Table 3.8. From the shore Rumonge to the opposite shore of Lake Tanganyika at DRC is about 40 km. In case wind blows from the north, wind waves are generated since the fetch of Rumonge becomes longer than Bujumbura in this direction. In case wind blows from the south, wind waves are also generated since the shore at Rumonge is open to north, west and south. In Rumonge Port as well as the Bujumbura Port, the wind blows from land in the morning and from the lake in the afternoon. The neighboring rivers of Rumonge port was shown in Figure 3.3. The Dama river flows about 2.5 km north and the Murembwe river flows about 4 km south from Rumonge Por. Although both rivers are not so big, there is an outflow of the sediments and sands from the upstream at the time of rain since mountains exist relatively close to the shore.

#### **(1) Topography and Bathymetry at Rumonge Port**

The topographical and bathymetrical surveys were conducted in Rumonge Port. As confirmed by the geotechnical investigation, the terrain where Rumonge Port exists has been formed with the diluvial materials debouched from the River Murenbwe. The terrain is gradually getting higher towards the east as it is nearing the mountains formed by the orogenic movement of the Great Rift Valley. The access road is connected to National Road Route No. 3.

The results of the topographic and bathymetric surveys at Ruomonge Port are as shown in Figure 3.23.

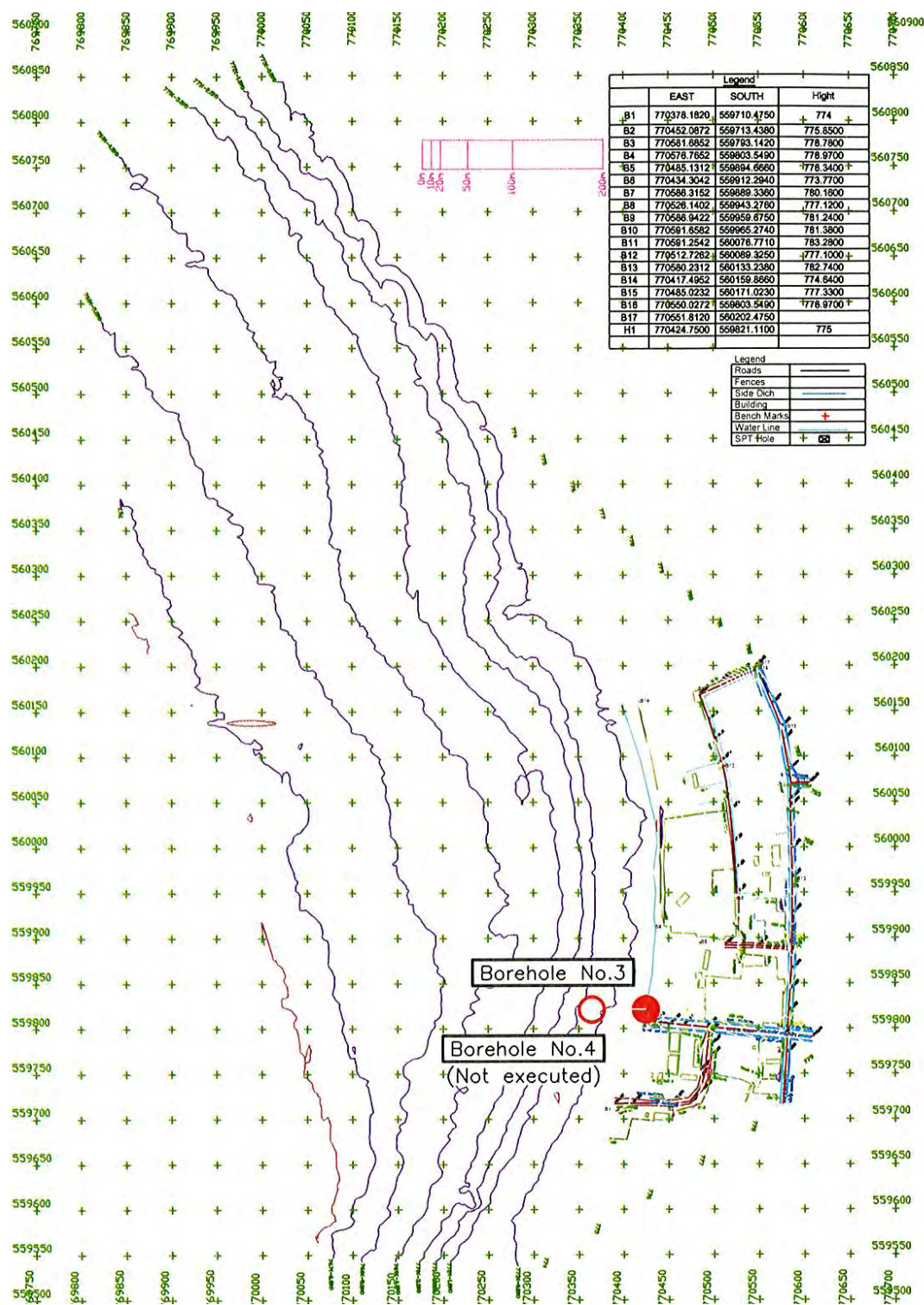


Figure 3.23: Topography and Bathymetry at Rumonge Port

## (2) Geotechnical Investigation at Rumonge Port

Two borehole explorations were attempted in Rumonge Port at the positions shown in Figure 3.23. The onshore boring could be carried out even though boring materials like steel casings, boring rods and split samplers could not be recovered, but the offshore boring was abandoned due to a great loss of the boring materials. However, because of the attempts, it was confirmed

that the subsoil composes of many boulders which resisted the penetration of the boring rods and pulling out of the steel casings. The rock is exposed at the open storage area and at a part of the lake shore.

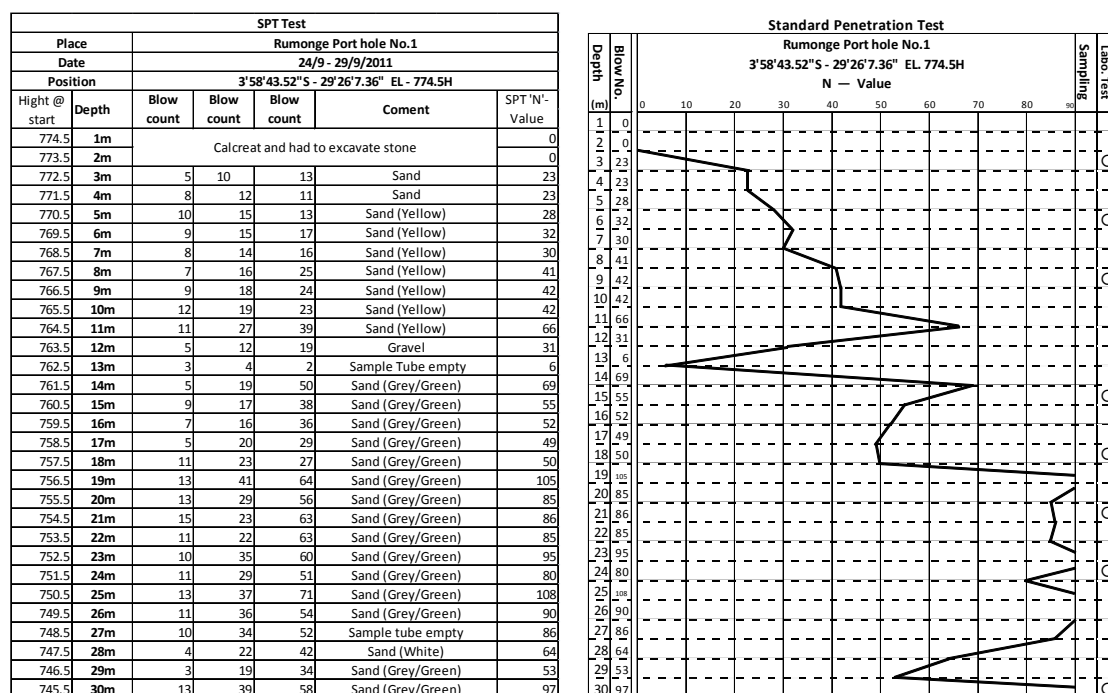


Figure 3.24: Boring Results at Rumonge Port

As shown in the figure above, the subsoil mostly consists of a mixture of sand and stones. The site of Rumonge Port is on the terrain formed with deposits debouched from the Rivers Dama and Murembwe.

Table 3.22: Laboratory Test Results of Subsoil Sampled at Rumonge

Rumonge Port Hole-1  
Coordinates: 3°58'43, 52"S, 29°26'7, 36"E  
Ground elevation: 774.5 m H

Sample Depth (m)	Grain Size Analysis			$\omega_{nat}$ (%)	$Y_s$
	D max(mm)	% < 2 mm	% < 80 $\mu$ m		
3	5.0	84.0	2.3	15.4	2.665
6	5.0	98.2	0.5	18.9	2.665
9	4.0	96.4	13.0	18.9	2.655
15	6.3	95.1	1.4	21.7	2.645
18	2.5	98.5	3.5	18.9	2.675
21	8.0	83.4	1.7	22.4	2.635
24	8.0	88.2	3.6	19.0	2.725
30	1.0	0	0	14.2	2.675
Average					2.668

Notes: Dmax = Maximum Diameter of the Solid Grains

$\omega_{nat}$  = Natural Water Content

$Y_s$  = Specific Gravity Dry

### 3.2.2 Management and Operation

#### (1) Organization of Rumonge Port

A small scaled organization for operation and management of the port is established.

a) National Security

Immigration (Ministry of Security), Custom (Ministry of Finance) – offices are located along side the access road to the port. BMPRA is to maintain navigational signals, which has not been functioning for a long time.

b) Cargo Handling

The local resident's committee is formed for cargo handling operation.

## **(2) Operation of Cargo Handling**

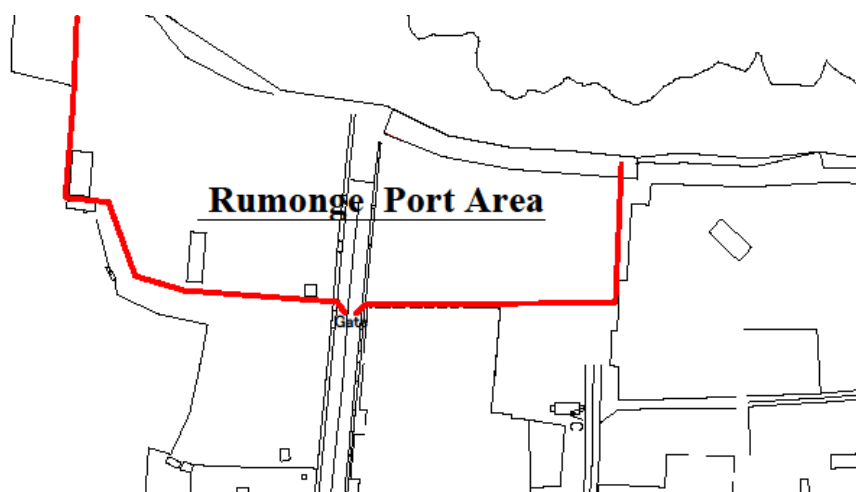
Off-shore cargo handling operation is employed. Cargoes on vessels are transferred to small boats (canoe type with an out-board engine or without) by hand or to the beach.

### **3.2.3 Port Facilities**

The land and waterfront of Rumonge Port have been acquired by MTTPE. Rumonge Port is not a port in the strict definition but just a handling beach site. The cargo ships calling Rumonge are wooden made and they are coming from the opposite shore of the lake in DRC and from villages situated on the lake shore in Tanzania but farther than Kigoma. It was observed that a 150 ton class wooden cargo ship was anchored offshore, small boats were carrying the cargo plying between the ship and several meters offshore, and from there, workers shouldered the cargo wading to the shore. It is therefore considered only cargo that can be occasionally wet are being unloaded at Rumonge.

The port site consists of a gentle slope lowering toward the lake and an access road has been built. There are two sheds and one warehouse, all of which seem to be unused. At the open storage area, cargo of WFP left behind was observed in August 2011. WFP used this site for loading the food aid to DRC. A concrete slope is constructed from the entrance road of the port zone into the sea water. A small ship may be windlassed to the land on the slope, in case of repairing or drying the bottom. There is a small vacant warehouse at the border between the port premises and the village.

MTTPE is currently building a fence, gate and small building for guards. The fence is made of bricks with concrete columns. These are scheduled to be completed in February 2012. The construction contract is made with a contractor in Rumonge. It was heard that an official of the revenue authority is collecting duties and levies.



**Figure 3.25: Port Area of Rumonge Port**

### 3.2.4 Maritime Transport

As the opposite shore of the lake in DRC is substantially the economic hinterland of Rumonge, small ships and merchants are visiting Rumonge crossing the lake. The land around Rumonge is fertile and its main agricultural produce is palm oil. After refined at Rumonge, besides the local consumption, the palm oil is exported to Rwanda, Tanzania and DRC. Fishing industries are also thriving at Rumonge and fish products like dry fish are being sold in Burundi.

The cargo ships are all wooden and the dimensions of a large wooden cargo ships are considered to be 24 m long, 4.0 m wide and 1.5 m deep in draft when full-loaded, most of which are coming from the opposite shore of DRC.

### 3.2.5 Particulars to Be Reported

#### (1) Ships to Be Accommodated

The cargo ships calling Rumonge Port are of a small size about 17–18 m long and 3.5 m wide plying Lake Tanganyika between Rumonge and the shore of DRC and of Tanzania. As it is considered that Bujumbura Port has to handle more cargo in the future and may accommodate bigger ships, the small size ships should be regulated to use Rumonge Port to avoid the congestion at Bujumbura Port.

When the regional economy grows to attract a large lot of cargo from Mpulungu Port, the port should be expanded for a large cargo ship to call at Rumonge Port.

#### (2) Safety of Fishing Boats

Many fishing boats are using the beach north of Rumonge Port. In case a jetty is built for the small cargo ships offshore, several lights have to be installed to avoid accidents such as the fishing boats colliding with the jetty.

## 3.3 Other Ports on Lake Tanganyika

### 3.3.1 Kigoma Port

For Burundi and DRC, the marine transport on Lake Tanganyika had been the important marine transport route for their trade. Kigoma Port used to load and unload a considerable volume of cargo to and from the TRL railway. The cargo was transported by ships plying the lake ports. However, in parallel with the decline in the railway transport, cargo handled at Kigoma Port has also been on the decline. See Table 3.23 International Traffic at Kigoma Port (2004–2010) for import and export cargo of Burundi and DRC through Kigoma.

**Table 3.23: International Traffic at Kigoma Port (2004–2010)**

Unit: Ton

INTERNATIONAL TRAFFIC		2004	2005	2006/7	2007/8	2008/9	2009/10
DRC	Import	69,529	86,259	52,861	51,388	67,575	30,073
	Export	11,107	10,610	11,117	4,176	10,441	14,904
	Sub total	80,636	96,869	63,978	55,564	78,016	44,977
BURUNDI	Import	17,382	21,564	20,751	14,868	32,272	13,745
	Export	2,221	2,652	0	0	0	504
	Sub total	19,603	24,216	20,751	14,868	32,272	14,249
DRC & Burundi	Import	86,911	107,823	73,612	66,256	99,847	43,818
	Export	13,328	13,262	11,117	4,176	10,441	15,408
	Sub total	100,239	121,085	84,729	70,432	110,288	59,226

Source: TPA



Kigoma is the largest Tanzanian port in Lake Tanganyika, and there is a TRL railway terminal hub connecting Dar es Salaam as the gate port toward Indian Ocean. This TRL railway is the shortest transport route between Dar es Salaam and Kigoma. TRL is the artery of the transportation for two countries surrounding the lake; Burundi and DRC on the west shore of the lake. It can be a reliable terminal in the central corridor for these countries, notwithstanding the fact that the railway is critically dying. The transportation capacity of TRL between Kigoma and Dar es Salaam is absolutely poor now. Only one freight train with 20 wagons and two passenger trains run a week, and it takes almost 3 days to arrive at the destination. The reason why the service is being debilitated is the extreme lack of supply for powerful locomotives, wagons, and coaches, and no track maintenance for these past several years.

General cargo wharf in Kigoma Port is 301 m in length, and the depth along the quayside is 2.85 m due to siltation, though it was originally 6 m in depth. The lake side which is 6 m in width on the wharf is 85 cm lower than the landside over the 205 m quay line. There are two stage wharfs on ground level as the following photograph shows. This is because the landside was filled with soil to avoid being covered by lake water when the water level of the lake was high.

Two units of portal cranes of 5 ton capacity are settled on the lower side, and they handle break bulk cargo between ships/railway wagons and ships/trucks put on the higher stage of the wharf. No forklift, therefore, can go down on the lower stage.

A warehouse and 10,000 m<sup>2</sup> general cargo yard are at the higher side of the quay, where trucks and containers on the wagons are kept, and the portal cranes carry the break bulk cargo taken out among them and ships.



(Seaside is 85 cm lower than the land side.)

**Photo 3.17: General Cargo Wharf of Kigoma Port**

Container wharf is 96 m in length with a 3,745 m<sup>2</sup> yard at the end of the general cargo berth. A rail-mounted gantry crane of 35 tons with cantilever is settled here for container handling, but it has not been in workable condition for these past several years due to the shortage of parts and no maintenance work. The condition is not bad for only having been in service for 20 years, and refurbishment may revive it to fully function.

It is impossible to load/discharge containers in Kigoma Port at the moment because no handling equipment is available.

Passenger ships go alongside the finger type pier which is 100 m in length. A small passenger terminal with an immigration office inside is located nearby. Water depth by the pier is shallow

due to siltation as that of the general cargo wharf. The ship, therefore, is moored apart from the pier with a dead ship placing between the ship and the pier. Passengers should walk on the catwalk across on the barge when embarking and disembarking.

The ships should be shifted to the general cargo wharf when handling cargo.

The railway sidings are located by the general cargo wharf and container wharf. Good-functioning cranes can handle cargo for loading/discharging to/from the ships and railway wagons very efficiently. Cargo will be able to be transported quickly and timely between Kigoma and Dar es Salaam after proper rehabilitation and restructuring of TRL are implemented. Shunting operation between the sidings and main lines of TRL shall be timely carried out to meet the time schedule of the ship departure and arrivals.

### **3.3.2 Kasanga Port**

Kasanga Port on the southern tip of Lake Tanganyika is connected by a gravel road to Sumbawanga where the unpaved road connects the TANZAM Highway and the TAZARA border station at Tunduma. Upgrading of the 223 km road from Tunduma, the border town with Zambia, to Sumbawanga, the capital city of Rukwa Region, is underway. The project is financed by the Millennium Challenge Corporation, US. The road will be paved in a few years time although the work progress seems much behind schedule to be completed by January 2013. Meanwhile, construction of the 112 km road from Sumbawanga to Kasanga Port is also underway. The project is financed by the Tanzanian Government and the upgrading is also scheduled to be completed in January 2013. Once these upgrading road projects are completed, Kasanga Port will be connected with Dar es Salaam Port with the paved trunk road. The transit cargo to/from DRC will likely pass through Kasanga Port, as using this upgraded road will be about a 1,000 km short cut between the west shore of Lake Tanganyika and Dar es Salaam.

Meanwhile, TPA Master Plan (TPA, 2009) proposes a railway link with TAZARA at Tunduma to Kigoma with a junction leading to Kasanga Port. If implemented, the railway will provide intermodal services to the DRC Ports of Kalemie, Moba and Muliro as well as Bujumbura in the north. The other proposal suggests another link that will connect the TRL end point of Mpanda to a cluster port of Karema along Lake Tanganyika, to facilitate an intermodal linkage with the DRC. The upgrading of the road between Tunduma and Kasanga Port may considerably decrease the significance of the rail extension from TAZARA to the port.

Kasanga Port has one berth of 20 m length supported by concrete pedestals on the tip of the rectangular reclamation of approximately 30 m length which is unpaved. As it is located on the small hilly peninsular, the water is deep and hinterland is high. Therefore, siltation is not a problem and the expansion of the quay wall is not costly. However, considerable cut and fill work may be necessary to create a wide flat cargo/container stacking area adjacent to the port. Expecting the completion of the road upgrading, TPA has a development plan to construct a container stacking yard on the hill behind the warehouses.

Currently MV Liemba makes a scheduled service to the port. The service, however, has been reduced to twice a month from the weekly services before MV Mwongozo was grounded for safety and technical reasons by SUMATRA in 2006. Further, the poor railway services have tremendously affected the volume of traffic movement at the major Kigoma Terminal, which similarly has influenced passengers transiting through Kigoma Port, subsequent cluster ports to/from Kigoma Port. Likewise, cement produced in Mbeya and maize or maize flour are also exported to Burundi through Kasanga Port. Imported/inbound cargo is not unloaded at Kasanga Port, since the population of Rukwa Region is not large and the general consumer merchandise imported to this region is transported by road through Tunduma.



**Photo 3.18: Kasanga Port**



**Photo 3.19: MV Liemba Moored at Kasanga Port**

### 3.3.3 Kalemie Port

Kalemie is a town on the northwest shore of Lake Tanganyika in Katanga Province, DRC. Port was constructed by Belgium during 1930 to 1931. The port is owned and operated by SNCC (the Société Nationale des Chemins de Fer du Congo) which was formerly SNCZ (Société Nationale des Chemins de Fer Zaïrois). SNCC is a state owned company which is also operating the national railway of DRC except for the Matadi–Kinshasa line.

The wharf has a total length of 380 m with the width varying from 10 to 15 m. It has two different elevations; the lower part is the quayside where the rail mounted gantry cranes sit and the higher part is the apron. On the apron, there is no space for trucks or other vehicles to reach the gantry cranes for loading/offloading the cargo, which makes the rail wagon the only accessible means of transport entering the port. Otherwise, all cargo is handled manually. The navigational channel is not clearly located, and the seabed depth along the berth line is around 3 m.

The port is suffering for its poor infrastructure and significantly deteriorated facilities. There are four rail mounted gantry cranes with 5 ton lifting capacity and one derrick crane of 50 ton lifting capacity, all of which were manufactured in the 1950's. Two gantry cranes are not operational and unable to repair. There is also one old rail wagon crane with a 5 ton lifting capacity.

The main cargo handled at the port is coal and general cargo. Gantry cranes are equipped with clam shell bucket for coal export. General cargo is offloaded from the ships manually and loaded onto the trucks which will mainly be transported to Lubumbashi. Usually, passengers travel together with this cargo. Vessels of private companies are carrying cargo as well. The cargo throughput of the port by SNCC is increasing as shown in Table 3.24.

**Table 3.24: Cargo Throughput of SNCC at Kalemie Port**

	Type of cargo	Year Unit	2006	2007	2008	2009	2010	2011
Export	Coal	ton	14,487	16,479	17,484	14,389	32,114	18,541
Import	General cargo	ton	791	8,904	9,461	11,724	15,281	36,202
	Total	ton	15,278	25,383	26,945	26,113	47,395	54,743

Source: Prepared by the Consultant based on the data obtained from SNCC

Note: The figure of 2011 is the total volume from 1st of January until the 7th of September.



The road condition in DRC around the Lake Tanganyika is very poor, and so is the railway. The distance between Lubumbashi and Kalemie is around 1,120 km. However, it takes more than three weeks by rail to transport cargo this distance. The road between Uvira to Kalemie and Lubumbashi to Kalemie are very bad, and they become inaccessible during the rainy seasons. Reportedly, there is no rehabilitation or development plan of the port.

The layout plan and photos of Kalemie Port are shown in Figure 3.26, Photo 3.20 and Photo 3.21 respectively.

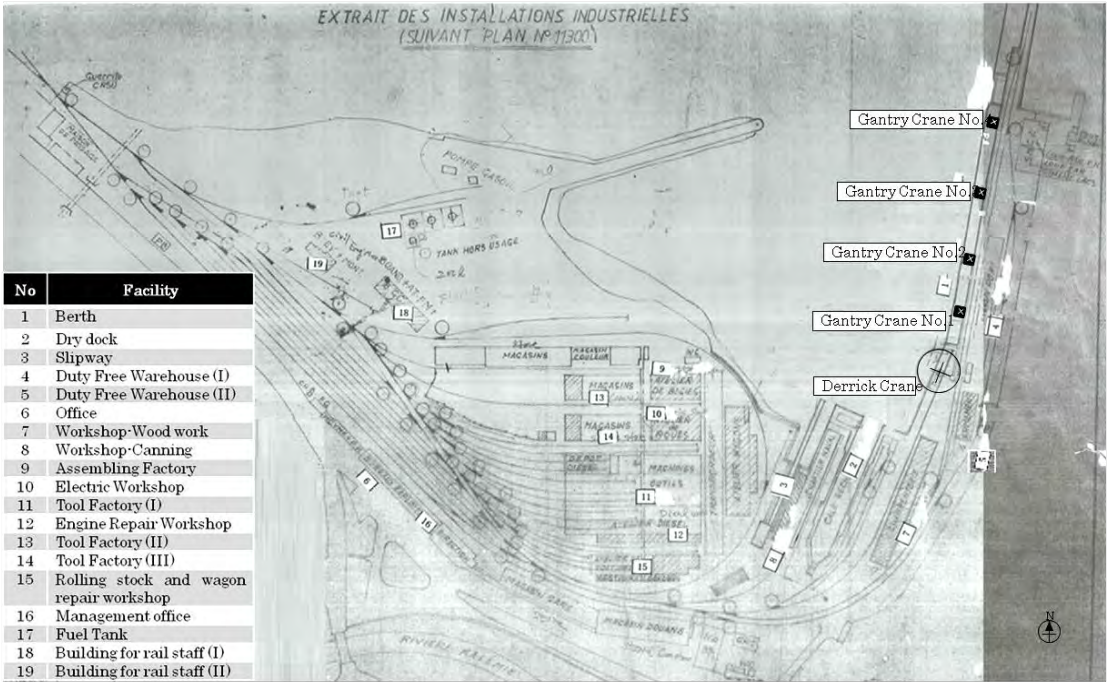


Figure 3.26: Plan Layout of Kalemie Port



Photo 3.20: Dual Elevation Wharf of Kalemie Port



Photo 3.21: Damaged Concrete Deck and Piles at Kalemie Port

Table 3.25 and Table 3.26 show the ships and barges owned by SNCC respectively.

**Table 3.25: Ships Owned by SNCC**

No	Name	Draft (m)		Gross Tonnage	DWT	Dimensions (m)			Capacity (litter)	Main Engine
		Empty	Full Loaded			L	W	D		
1	Sendwe	2.5	2.9	654.9	266.0	56.3	8.0	3.4	22,000	235HPx2
2	Zongwe	-	2.5	419.73	175.0	30.4	8.5	3.7	17,000	518HPx2
3	Yungu	-	1.65	354.23	81.0	14.0	5.3	2.6	6,184	300HPx2
4	Lukuga	1.45	3.1	355.42	608.3	49.2	8.5	3.5	30,000	345HPx2
5	Tembwe	-	2.4	136.72	500.0	37.4	8.2	3.0	6,800	180HPx2

**Table 3.26: Barges Owned by SNCC**

No	Name	Draft (m)		Capacity (ton)	Dimensions (m)			Hatch (nos × D × L × W)
		Empty	Full Loaded		L	W	D	
1	Katumbi	1.18	–	290	59.4	5.9	3.7	3 nos × 16.6 × 5.8
2	Marungu	1.24	–	580	52.7	8.8	3.0	2 nos × 1.0 × 17.4 × 8.8 1 nos × 22.0 × 8.8
3	Moba	1.23	–	497.6	50.0	8.8	4.7	2 nos × 2.0 × 45.2 × 8.8
4	Muhila	1.24	–	548.0	52.7	8.8	3.0	2 nos × 1.0 × 47.4 × 8.8 1 nos × 1.0 × 22.8 × 8.8
5	Batabwa	1.43	–	226.9	37.2	7.2	1.9	2 nos × 16.5 × 7.0
6	Ruzizi	1.40	–	977.0	64.2	9.0	3.9	3 nos × 1.0 × 15.7 × 9.2 1 nos × 1.0 × 16.8 × 2.2 1 nos × 1.0 × 18.0 × 9.2
7	Mpala	0.65	–	276.7	36.2	6.0	2.5	2 nos × 1.0 × 47.0 × 0.8
8	Uvira	0.83	–	477.1	47.3	8.0	2.4	2 nos × 1.0 × 22.0 × 8.0 1 nos × 1.0 × 19.4 × 8.0
9	Kavala	–	–	132	225.0	5.2	1.1	1 nos × 2.0 × 9.6 × 5.2
10	VVA	–	–	–	57.6	8.0	4.0	900 m <sup>3</sup> Fuel Tank
11	Kalonda	0.72	–	–	32.7	5.9	2.0	1,200 m <sup>3</sup> Fuel Tank

### 3.3.4 Mpulungu Port

Mpulungu Port is Zambia's only port. Mpulungu town is situated at the southern tip of Lake Tanganyika, between mountains along the shores. The port is the gateway to the neighboring counties on Lake Tanganyika. Zambia is currently exporting sugar, cement, rebars and other merchandise through this port to Burundi, Rwanda and DRC. After the construction boom for the World Cup 2010 in South Africa have subsided, and the construction boom has begun in Burundi, the export of the construction materials including cement and rebars has sharply increased. Table 3.27 shows the unloaded cargo at Bujumbura Port from Mpulungu Port in the past 10 years. It should be noted that the maximum amount of cement, construction materials and sugar exported to Bujumbura through Mpulungu Port were recorded in 2010.

The cement to export is transported from the cement factory at Lusaka to Mpulungu Port by road, which has a distance about 1,180 km. The sugar to export is also transported by road from Mazanbuka, west of Lusaka. The imported cargo is food produce like dry fish. If the transport route down to South Africa is improved, the coffee beans of Burundi may be transported through this port.

**Table 3.27: Import at Bujumbura Port from Mpulungu**

Items	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Consumables	12	36	41				36	668		
Drinks			5							
Bitumen		250								
Slate	230						957	61		
Cement	14,493	35,862	46,631	28,946	46,142	42,079	12,035	7,039	31,043	92,091
Engine oil			300	1,047			150	83		
Lubricants	21	7								
Construction materials	469	502	309	568	118	58	322	601		1,834
Malt	250	497		116		180	820	55		
Paper	90	213	169	113	35	111	36			
Chemical products	396	559	241	10	223	150	28	212	23	
Salt				1,557			1,322			
Sugar	11,754	10,299	14,004	9,861	12,579	14,087	10,938	9,660	14,031	15,777
Forage crops		4								
Vehicles	2	22	16	40	93	514	131	90	71	81
Cotton										
Others	301	251	197	151	301	282	351	335	237	357
<b>Total</b>	<b>28,017</b>	<b>48,500</b>	<b>61,914</b>	<b>42,409</b>	<b>59,491</b>	<b>57,461</b>	<b>27,126</b>	<b>18,805</b>	<b>45,405</b>	<b>110,140</b>

Not: Yellow cells show the maximum amounts in the past 10 years.

Source: E.P.B.

MV Liemba, a cargo-passenger ship operated by MSCL, used to provide weekly services but currently the services are twice a month due to the decrease of the cargo. The ship brings traders from Bujumbura in Burundi and Kigoma in Tanzania to sell their merchandise in Zambia. On its outward journey, it takes goods from Zambia to markets further north.



**Photo 3.22: MV Liemba at Mpulungu Port**

The port has a 20 m long berth and three warehouses. Cement and sugar to export are stored in the warehouses and transported by 4 flat bed chassis to the berth, where a crawler crane is located to load them onto the ship. The cargo handling operation is carried out by a semi-government entity, Agro-Fuel Investments Ltd.

The Africa Development Bank (AfDB) is assisting the Zambian government in rehabilitating the Mpulungu Port to provide a gateway for Zambia's exports and imports to the Great Lakes Region. Also, AfDB is proposing a railway from Mpulungu to Nseluka on the TAZARA line. The rail link between Mpika and Mchinji is also under consideration. If the link is built, the rail distance from Mpulungu to Nacala Port in Mozambique will be remarkably shortened. As a result of the completion of the railway link, the trade route between the east coast of Africa and land locked countries like Burundi and Rwanda, and the western shore of Lake Tanganyika of DRC, even the eastern shore of the lake within the Tanzanian territory, may change.

AfDB's study "Southern Africa Transport Network: Comparative Transit Transport Cost Analysis" in 2001 also discusses the development of Mpulungu Corridors which combines the road, railway and lake transport. The two routes are presented as follows:

Lusaka–Kigali (via Mpulungu)

Lusaka–Mpulungu (Zambia):	1,041 km Road
Mpulungu–Bujumbura (Lake Tanganyika):	650 km Water
Bujumbura–Kayanza (Burundi):	119 km Road
Kayanza–Kigali (Rwanda):	230 km Road
Total:	2,040 km

Lilongwe–Bujumbura (via Mpulungu)

Lilongwe–Karonga–Chitipa (Malawi):	693 km Road
Chipita–Mpulungu (Zambia):	328 km Road
Mpulungu–Bujumbura (Lake Tanganyika):	650 km Water
Total:	1,671 km

### **3.3.5 Cluster Ports**

#### **(1) Burundi**

There are many fishing ports on the shore within the territory of Burundi at Gitaza, Magara, Kagongo, Karonda, Nyanza Lac, etc. However, they have no port facilities to accommodate neither cargo ships nor fishing boats, but loading and unloading are carried out on the natural beach. This is due to the fact that the National Road Route 3 is running in parallel with the shoreline and cargo and passengers are transported by the road.

#### **(2) Tanzania**

There are 19 cluster ports on the shore of Lake Tanganyika within the territory of Tanzania. Among them, 7 ports are connected to the hinterland with unpaved roads. The villages where the remaining cluster ports are situated have the access from the lake only.

All the cluster ports have no port facilities to accommodate a ship. However, TPA is currently engaged in "Community Service Project" for the cluster ports on the lake. The project is intended to provide the cluster ports with port facilities like a jetty (19.2 m long, 10 m wide, 5 m water depth) and cargo shed (20 m long, 10 m wide, 3 office rooms) plus the road access, fence, toilet, generator house, gate house, gate and elevated water tank. The project are scheduled to be completed at 4 cluster ports (Lagosa, Kalya, Karema, Kipili) from December 2011 to February 2012. Selecting of the contractor is underway for the project of the other 2 ports (Kaguga, Kibirizi) is underway.

#### **(3) DRC**

##### Kalundu Port at Uvira

Other than Kalemie Port, there are several commercial ports on the shore within the territory of DRC. At Kalundu south of Uvira City located at the northern end of Lake Tanganyika, the largest port on the lake within the territory of DRC exists. The port has two straight quay walls of a 150 m length each and three warehouses. Further south of Kalundu Port, there are two jetties, one accommodates cargo ships and the other accommodates an oil tanker. Fuel is transported from Kigoma to the GBP tank yard by MT Songea of Marine Services Co., Ltd. (MSCL) of Tanzania.

### Moba Port

On the western shore of Lake Tanganyika, 140 km south-east of Kalemie, Moba Port is linked by regular boat services. A 5 km unpaved road from the port leads to the town of Kirungu on the plateau. The port is connected to the national road network of DRC servicing its hinterland area. The regular services for Kigoma Port of Tanzania have been suspended because of the breakdown of MV Mwongozo, which is currently under repair at the slipway at Kigoma Port. As there is no jetty, passengers and cargo are carried out by small boats between the calling ship and beach.

## **3.4 Status on Ship Repair on Lake Tanganyika**

### **3.4.1 Bujumbura Port**

There are no ship repairing facilities in Bujumbura although the largest fleet of ships is registered there. BATRARAC, one of the shipping companies in Bujumbura, informed that its ships had been sent to Kalemie Port in DRC for repair but the propellers of two ships were aground and damaged due to the shallow water at Kalemie Port. Other ship repairing facilities at Kigoma Port had been long closed but recently was opened resuming its operation. The shipping companies in Bujumbura are anxious to repair their ships at Bujumbura and want the port to build a slipway.

### **3.4.2 Kigoma Port**

TPA Kigoma office has the transversely launching type slipway built in 1912 for ship's repair, which is able to accommodate a ship of max. 70 m in length. The slipway is fitted with 11 horizontal cradles and an electro-hydraulic winch. Horizontal cradles were installed after 1925. In case the vessel is small, the main shaft can be divided into two shafts at center position, by removing the claw clutch. Vessels with flags of other countries can also use the slipway, but the Tanzania vessels have priority when congested.



**Photo 3.23: 11 Horizontal Cradles of  
Kigoma Slipway**



**Photo 3.24: MV Mwongozo  
on Slipway at Kigoma**

A workshop for engines, auxiliaries, equipment and fittings repair is located near the slipway, and lathes and other machine tools are arranged.

### **3.4.3 Kalemie Port**

Kalemie Port has a dry dock 120 m in length, 21 m in width and 7 m in depth which has a manually operated gate. However, the tools and machineries in the workshops are very old and cannot be used due to the lack of proper maintenance.



There is also a 6 degree gradient slipway of 130 m in length and 5 m in rail guage which was built during 1930 to 1931, and has not been used for the last 30 years. The winch to pull up the ships from the lake to the land was demolished.

On the western side of the slipway, there are several buildings such as workshops and factories with repair/maintenance equipments such as welders, air compressors etc. but almost all of them were manufactured around 1930's and are now unusable.

In September 2011, the vessel of the private company was under repair in the dry dock with workers and equipments of their own. The condition of the dry dock looked fine, and there was no water leakage found.



**Photo 3.25: Dry Dock of Kalemie Port**



**Photo 3.26: Slipway at Kalemie Port**

SNCC owns five steel ships and eleven flat barges which are old but usable. The ships are small and their sizes are around 200 to 600 DWT, with a length of 15 to 60 m, width of 5 to 8 m and height of 2.5 to 3.5 m. The barges are small as well with length of 25 to 60 m, width of 5 to 9 m and height of 1 to 5 m.

## **Chapter 4    Transport Demand Forecast**

### **4.1        General**

#### **(1)    Methodology**

This chapter describes an estimation method for the amount of future freight traffic at Bujumbura port, which is one of the required inputs of port planning for the Master Plan Study of this port. This chapter first presents glances of the present and past situation of freight flow by reviewing the statistical indicators, and then analyzes the relationship between the economic situation and the amount of traffic to develop a model for traffic estimation.

By using socioeconomic indicators such as population and GDP, this model estimates the amount of traffic which is generated and arrives at Burundi, as well as the traffic flow from neighboring countries (Republic of Rwanda, DRC) to foreign countries (some of which are handled as transit cargo at Bujumbura port).

Regarding the import/export cargo of the country, the traffic handled at Bujumbura port consists of freight which uses corridors, including Bujumbura port, and it is estimated here by each possible commodity.

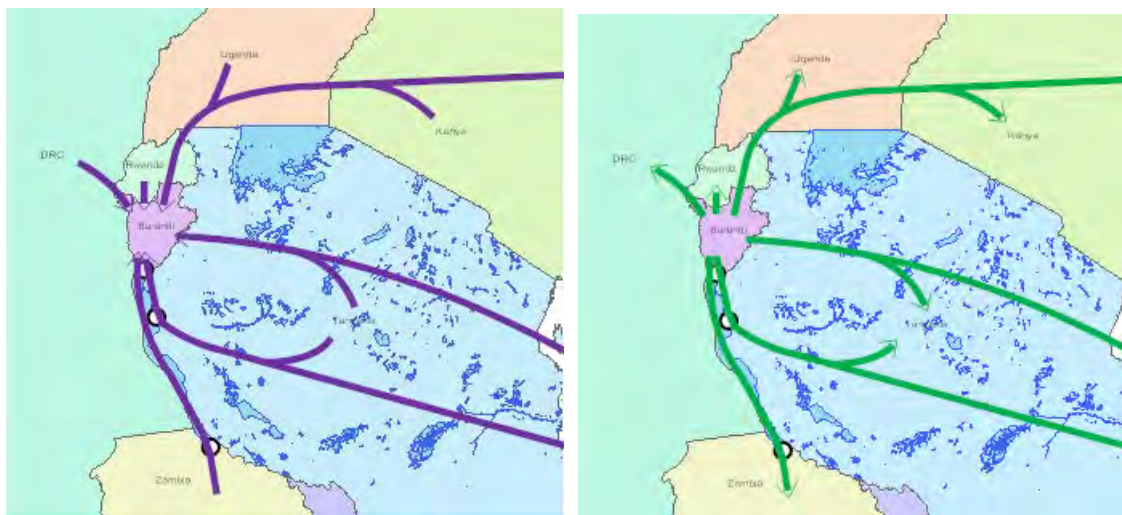
#### **(2)    Main Corridor of Transportation and Alternative Routes**

Alternative transportation routes for bilateral freight flow analyzed in this chapter are assumed as shown in the table below. Among these, routes 1) and 2) have transits at the Bujumbura port. In route 1), cargo is transported by land to the Bujumbura port, then by water to the Mpulungu port, and by land transport again to its destination (or vice versa). In route 2), they are likewise transported from the Bujumbura port to the Kigoma port by water, and then by rail (TRL) to Tanzania or the Dar es Salaam port. Route 1) has no possible alternative routes. On the other hand, there are possible alternative routes for route 2) as shown respectively in the table below. Therefore the route will be determined depending on the handling capacity of Kigoma port and the facilitated service level of TRL, causing variation in the amount of traffic to be handled at Bujumbura port.

**Table 4.1: Alternative Routes for Freight between Two Countries**

Country	Export to/ Import from	Alternative Routes for Transportation		
Burundi	Rwanda	Land		
	Tanzania	Land	Water to Kigoma and Railway 2)	
	Kenya	Land		
	Uganda	Land		
	DRC	Land		
	Southern Africa	Water to Mpulungu and Land 1)		
	Other Countries	Land to Mombasa	Land to DSM	Water to Kigoma and Railway to DSM 2)
Rwanda	Burundi	Land		
	Tanzania	Land	Land to Bujumbura, Water to Kigoma and Railway 2)	
	Kenya	Land		
	Uganda	Land		
	DRC	Land		
	Southern Africa	Land to Bujumbura, Water to Mpulungu and Land 1)		
	Other Countries	Land to Mombasa	Land to DSM	Land to Bujumbura, Water to Kigoma and Railway to DSM 2)
DRC	Burundi	Land		
	Rwanda	Land		
	Tanzania	Land	Land to Bujumbura, Water to Kigoma and Railway 2)	
	Kenya	Land		
	Uganda	Land		
	Southern Africa	Land to Bujumbura, Water to Mpulungu and Land 1)		
	Other Countries	Land to Mombasa	Land to DSM	Land to Bujumbura, Water to Kigoma and Railway to DSM 2)





**Figure 4.1: Import and Export Pathways for Burundi**



**Figure 4.2: Transit Pathways through Bujumbura Port**

## **4.2 Past Trend of Freight**

In this section, recent changes in the amount of freight, bilateral trade, and the types of commodities etc., are analyzed for subject countries, Burundi and Rwanda by using data obtained from COMTRADE (United Nations Commodity Trade Statistics Database). DRC is not included in the subject countries due to the lack of data storage in such databases.

### **(1) Trends in Trade of Burundi**

Figure 4.3 shows the import amount of Burundi by type of commodity. The number of total imports grew steadily until 2007, then there was a substantial decrease in 2008 and 2009. It seems, however, that the imports are recovering in 2010 as an extension of the previous trend. For the composition of imports by type of commodity in 2010, almost all the types of commodities were imported at similar rates. The commodities with particularly high rates include machinery/electrical, chemical products and transportation equipment, and it can be noted that mineral products (especially fuel) also have a slightly higher rate compared to others.

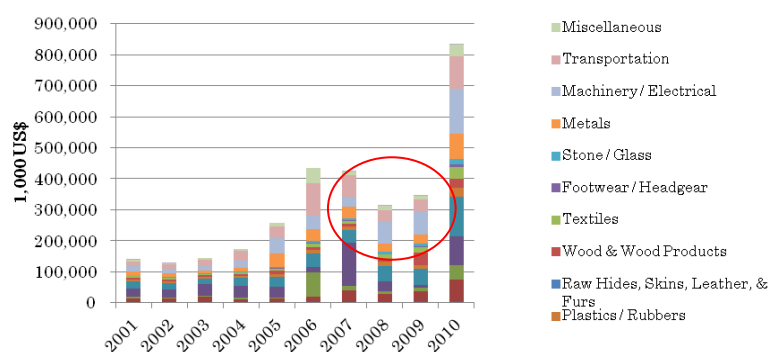


Figure 4.3: Import Trends of Shares by Type of Commodity

Table 4.2: Import Trends of Burundi by Type of Commodity

Unit: 1,000 USD

Import / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Animals & Animal Products	2,050	901	786	518	1,027	3,966	2,737	1,457	3,625	5,341
Vegetable Products	12,118	12,469	17,461	11,263	11,453	16,797	37,450	26,128	33,114	69,094
Foodstuffs	4,756	3,284	4,832	4,769	5,264	76,501	14,068	10,080	10,582	45,351
Mineral Products	26,260	26,600	35,853	39,011	34,669	17,484	140,451	32,266	9,418	93,946
Chemicals & Allied Industries	23,756	19,005	19,651	25,440	29,974	42,779	40,495	49,497	52,788	127,963
Plastics / Rubbers	5,741	7,406	6,002	5,969	9,874	11,751	9,688	12,120	10,576	28,489
Raw Hides, Skins, Leather, & Furs	183	119	71	49	146	323	172	466	2,184	518
Wood & Wood Products	6,582	5,079	3,600	5,543	11,016	9,626	8,716	10,221	39,253	28,401
Textiles	6,895	6,323	4,161	4,496	7,207	12,272	10,691	12,540	18,957	39,170
Footwear / Headgear	826	277	156	272	742	1,783	1,082	1,320	773	6,992
Stone / Glass	1,178	1,864	2,174	2,620	3,561	6,677	5,854	7,115	8,816	17,417
Metals	10,742	11,125	8,796	12,698	43,713	37,641	37,554	28,504	28,638	82,129
Machinery / Electrical	18,431	16,105	14,853	22,045	48,661	43,909	33,922	69,631	75,617	146,561
Transportation	13,134	12,842	21,011	32,019	39,263	102,963	69,208	36,730	38,766	104,082
Miscellaneous	5,662	4,592	5,243	6,017	11,582	49,164	10,232	15,656	10,960	36,322
Services	586	848	0	0	0	0	674	1,427	728	766
Total	138,898	128,839	144,651	172,729	258,153	433,636	422,996	315,157	344,796	832,543

Source: Calculated by JICA Study Team based on COMTRADE data.

On the other hand, Figure 4.4 illustrates the export amount of Burundi by type of commodity. The past trend of total exports shows that the exports in 2006 greatly exceeded those of the prior year. However, if individual items are the focus, export of transportation equipment was tremendous in this year, reflecting that there was an atypical exporting environment. As well as imports, the total number of exports subsequently declined in 2008 and 2009, but they seem to have recovered in 2010. Many of the exports are vegetable products, as represented by coffee, tea and grain, followed by a certain amount of stone/glass products, such as cement. These products have been on the decline after peaking in 2006. One of the factors for export growth in 2010 was that vegetable products which formed a large part of the export had a four-fold increase from the previous year.

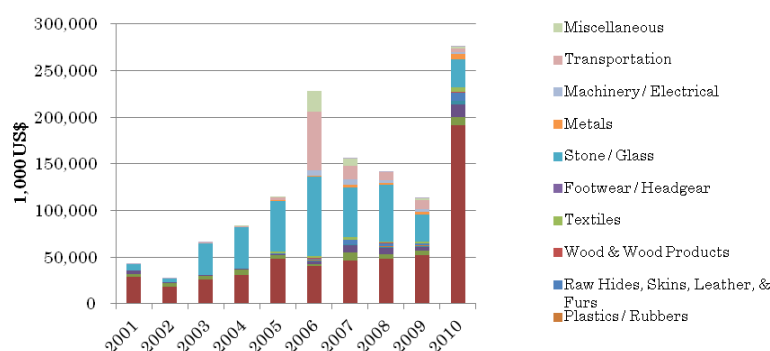


Figure 4.4: Export Trends of Shares by Type of Commodity

Table 4.3: Export Trends of Burundi by Type of Commodity

Unit: 1,000 USD

Export / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Animals & Animal Products	192	160	209	355	247	215	311	331	228	441
Vegetable Products	28,217	18,378	26,001	30,342	47,693	39,802	46,281	47,511	51,903	190,884
Foodstuffs	3,342	3,421	3,579	5,921	3,689	2,145	8,601	5,223	4,881	8,865
Mineral Products	3,689	791	586	471	1,025	3,199	7,777	6,613	3,595	13,700
Chemicals & Allied Industries	16	9	151	160	145	354	861	1,187	1,418	3,575
Plastics / Rubbers	159	264	130	169	237	1,000	158	551	558	285
Raw Hides, Skins, Leather, & Furs	57	27	44	261	419	1,736	3,959	3,319	1,908	8,438
Wood & Wood Products	3	4	49	32	37	257	355	379	329	1,123
Textiles	1	23	196	131	2,154	1,969	3,430	1,175	2,055	4,337
Footwear / Headgear	0	0	5	1	1	1	8	1	2	116
Stone / Glass	6,384	3,342	33,394	43,732	54,706	85,663	53,108	61,305	29,015	30,480
Metals	2	1	65	222	666	794	2,584	2,020	2,173	5,305
Machinery / Electrical	11	104	601	512	382	5,353	5,730	2,796	2,929	2,557
Transportation	0	11	824	280	2,216	63,783	14,939	8,120	10,001	3,843
Miscellaneous	7	8	70	136	139	22,251	7,707	713	1,626	1,124
Services	75	15	0	0	0	0	386	541	311	472
Total	42,156	26,560	65,903	82,725	113,756	228,522	156,195	141,786	112,932	275,547

Source: Calculated by JICA Study Team based on COMTRADE data.

Figure 4.5 shows the import trends between Burundi and partner countries and groups, and their amounts are summarized in Table 4.4. Many of the partner countries for Burundi's imports are in Europe and Asia. This trend was particularly seen as recently in 2010. The percentage of imports from the Middle East was temporarily high in 2007, but has been relatively low thereafter. In 2010, the percentages of imports from Europe and Asia, as well as from Southern Africa, especially the Republic of South Africa, were on the increase.

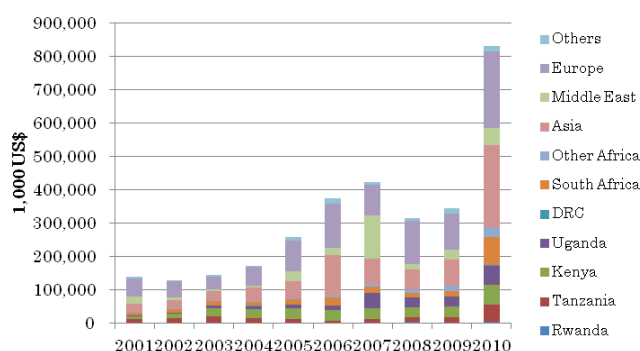


Figure 4.5: Import Trends of Burundi and Partner Countries/Groups

Table 4.4: Import Trends of Burundi and Partner Countries/Groups

Unit: 1,000 USD

Import / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Rwanda	535	847	692	741	842	965	2,089	3,499	1,790	5,252
Tanzania	11,336	13,452	19,836	14,558	12,635	6,391	10,075	15,651	15,231	49,653
Kenya	9,406	15,665	23,384	25,668	31,571	30,937	33,533	27,605	32,052	60,789
Uganda	803	1,240	9,049	9,906	10,166	14,397	45,421	30,257	29,652	56,861
DRC	731	598	1,342	2,003	1,120	685	804	305	652	1,445
Southern Africa	9,522	10,331	11,932	9,841	16,214	22,991	17,452	13,314	17,203	84,948
Other Africa	1,528	1,668	2,968	3,150	2,753	6,989	8,004	11,452	15,284	28,465
Asia	25,496	24,094	26,639	41,138	49,754	121,698	74,994	58,806	79,995	247,651
Middle East	21,954	9,837	5,317	5,258	31,072	20,770	129,985	17,636	28,110	49,761
Europe	52,015	47,537	38,508	56,692	91,746	133,568	93,801	129,247	110,109	231,536
Other	5,397	3,194	4,318	3,032	10,115	13,987	6,803	7,386	14,718	16,180
Total	138,724	128,464	143,986	171,985	257,990	373,378	422,962	315,157	344,796	832,543

Source: Calculated by JICA Study Team based on COMTRADE data.

On the other hand, the past trend in exports shows that many of the principal partners are in Europe and the Middle East. Notably, some 60% of the exports are for European countries. The exports to Asia were temporarily high in 2006, decreased afterward, and recovered to about 9% in 2010. In 2010, the export amount to the neighboring country of Kenya was nearly equal to that to Asia.

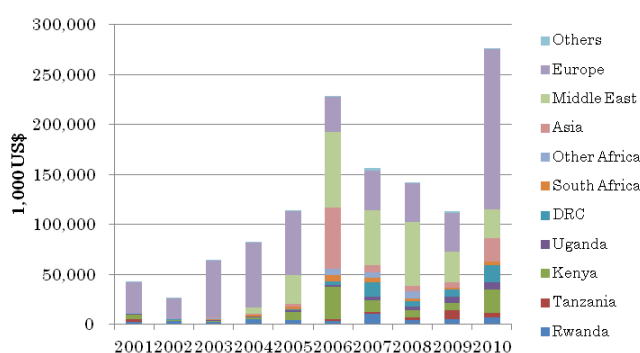


Figure 4.6: Export Trends of Burundi and Partner Countries/Groups

**Table 4.5: Export Trends of Burundi and Partner Countries/Groups**

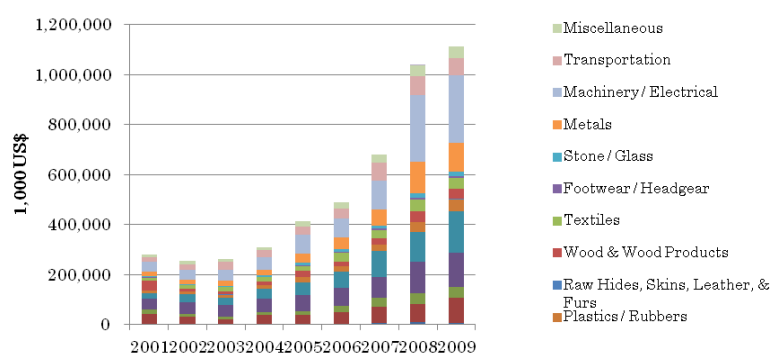
Unit: 1,000 USD

Export / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Rwanda	2,521	3,231	2,186	5,118	4,058	3,628	10,385	4,462	4,732	7,046
Tanzania	2,812	131	320	232	105	1,268	1,954	2,152	9,478	4,092
Kenya	4,610	502	642	1,655	8,022	32,281	11,225	7,559	7,268	23,984
Uganda	723	264	814	774	1,782	1,938	3,682	3,049	6,439	6,714
DRC	172	507	376	379	1,065	3,602	14,690	5,921	7,039	16,951
Southern Africa	6	6	758	1,000	2,306	6,033	4,607	2,697	1,504	3,563
Other Africa	147	59	1,819	53	225	7,104	5,045	6,804	430	519
Asia	6	179	1,043	1,590	2,536	60,795	7,741	5,643	5,349	23,245
Middle East	4	13	94	6,164	28,894	75,839	54,450	63,702	30,397	29,285
Europe	30,811	21,278	55,706	64,390	64,163	35,249	40,349	38,729	38,744	159,631
Other	53	84	910	627	229	786	2,068	1,069	1,551	517
Total	41,865	26,251	64,670	81,984	113,385	228,522	156,195	141,786	112,932	275,547

Source: Calculated by JICA Study Team based on COMTRADE data.

## (2) Trends in Trade of Rwanda

The amount of trade by Rwanda by type of commodity is shown in Figure 4.7 and Table 4.6. The import amount of Rwanda increased fourfold during the nine years from USD 278.7 million in 2001 to USD 1.1 billion in 2009. In particular, the export amounts in 2008 and 2009 spiked compared to previous years. Seen by the type of commodity for each year, the percentages of imports by item do not show any substantial change from year to year. This presumably means that similar items are imported at similar rates every year. Among other items, machinery/electrical and chemical industry account for 24.3% and 14.9% of the total, respectively.



**Figure 4.7: Import Trends of Rwanda by Type of Commodity**

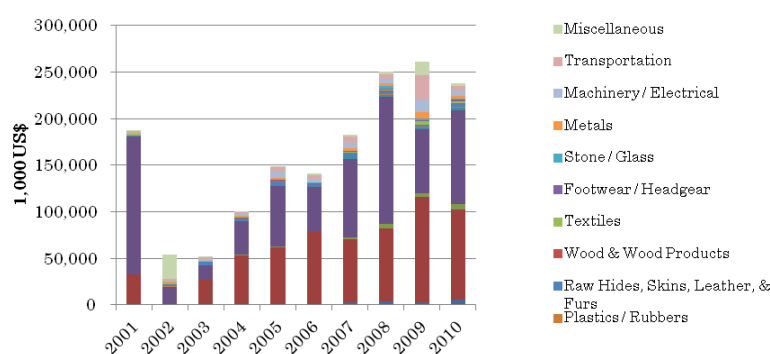
**Table 4.6: Import Trends of Rwanda by Type of Commodity**

Unit: 1,000 USD

Import / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Animals & Animal Products	3,676	3,184	1,473	1,396	1,148	1,187	5,483	7,551	6,013
Vegetable Products	37,911	26,029	19,568	35,897	36,646	47,332	66,114	75,204	99,827
Foodstuffs	16,618	12,898	10,018	12,756	16,270	24,805	34,111	41,426	44,188
Mineral Products	46,076	45,484	47,707	54,026	63,287	74,217	83,387	126,662	138,526
Chemicals & Allied Industries	21,804	31,695	27,973	37,920	52,350	64,432	105,704	118,458	165,412
Plastics / Rubbers	10,054	10,858	12,529	14,716	20,270	20,850	23,470	38,486	46,975
Raw Hides, Skins, Leather, & Furs	368	491	476	510	663	867	931	1,041	963
Wood & Wood Products	38,093	10,880	13,370	14,553	24,361	17,951	23,929	43,228	42,097
Textiles	12,735	15,494	16,496	16,889	19,497	35,726	35,144	47,150	40,991
Footwear / Headgear	1,643	1,495	1,541	2,429	3,377	4,014	5,504	7,409	7,987
Stone / Glass	3,229	3,882	3,407	5,583	8,247	8,309	11,845	17,452	18,715
Metals	18,980	16,127	22,137	22,492	38,715	48,740	64,763	128,362	114,043
Machinery / Electrical	40,623	38,127	42,169	50,900	73,430	76,697	116,561	265,504	269,894
Transportation	18,716	25,043	31,921	27,324	32,987	38,460	68,748	75,434	69,279
Miscellaneous	8,157	11,130	10,869	12,747	20,496	24,305	33,435	42,280	47,105
Services	0	0	0	0	0	0	0	41	0
Total	278,684	252,817	261,654	310,142	411,744	487,894	679,128	1,035,685	1,112,015

Source: Calculated by JICA Study Team based on COMTRADE data.

The exports in 2001 were exceptionally high compared to those in the following years. This does not seem to be the actual trend, but due to problems in statistics. The amount of export has shown favorable growth since 2002. Export commodities are mostly mineral and vegetable products.



**Figure 4.8: Export Trends of Rwanda by Type of Commodity**

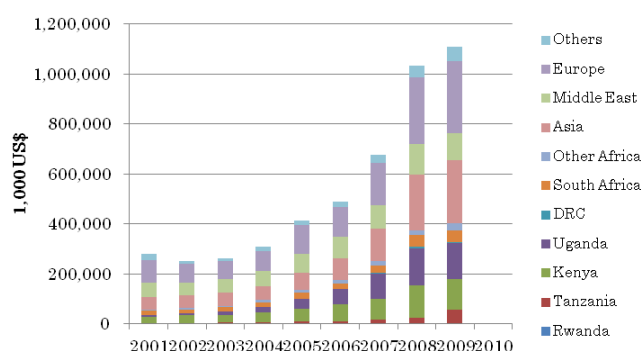
**Table 4.7: Export Trends of Rwanda by Type of Commodity**

Unit: 1,000 USD

Export / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Animals & Animal Products	74	0	139	184	461	234	2,334	3,724	2,890	5,158
Vegetable Products	32,729	120	26,687	53,200	61,391	77,454	67,818	77,861	112,994	96,889
Foodstuffs	143	343	355	526	383	225	1,888	5,155	3,439	6,094
Mineral Products	147,332	18,869	15,144	35,429	65,158	48,448	84,647	136,060	69,061	100,778
Chemicals & Allied Industries	254	209	226	231	815	1,050	2,381	1,958	1,860	2,263
Plastics/Rubbers	123	128	32	46	205	358	663	1,550	728	956
Raw Hides, Skins, Leather & Furs	783	2,337	3,296	3,438	4,845	1,987	3,560	3,078	2,051	3,880
Wood & Wood Products	88	31	20	217	500	344	122	406	268	519
Textiles	1,712	2,184	1,186	1,523	1,656	557	962	1,473	3,640	2,256
Footwear/Headgear	30	57	46	7	13	54	649	1,017	1,501	1,718
Stone/Glass	34	59	5	43	18	645	210	2,495	1,813	468
Metals	363	215	297	760	520	452	2,495	3,220	6,752	3,382
Machinery / Electrical	784	1,758	1,966	1,941	7,154	2,171	6,566	4,451	12,954	5,886
Transportation	2,143	1,673	1,602	1,497	4,914	5,036	6,702	4,560	26,544	5,037
Miscellaneous	113	26,128	277	501	1,057	1,729	1,781	3,160	14,165	2,530
Services	0	0	0	0	0	0	0	0	0	0
Total	186,707	54,109	51,277	99,542	149,091	140,745	182,778	250,168	260,660	237,815

Source: Calculated by JICA Study Team based on COMTRADE data.

Figure 4.9 and Table 4.8 describe the past trends of import between Rwanda and neighboring countries and the groups of the rest of countries. According to the amount of imports for Rwanda by partner countries/groups, the top partner is Europe with USD 288 million, followed by Asia with USD 254 million, regions which account for approximately half of the total imports in 2009. Trade with neighboring countries is also active, amounting to as high as USD 143 million with Uganda, and USD 123 million with Kenya.



**Figure 4.9: Import Trends of Rwanda by Partner Countries/Groups**

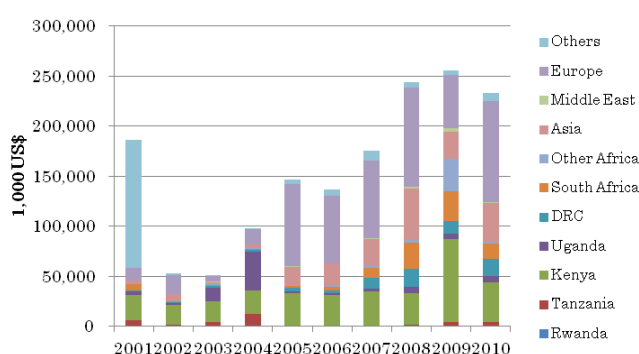
**Table 4.8: Import Trends of Rwanda by Partner Countries/Groups**

Unit: 1,000 USD

Import / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Burundi	419	356	202	498	306	365	2,051	3,547	3,334
Tanzania	2,121	3,429	5,507	5,160	8,113	8,298	15,668	25,434	54,631
Kenya	26,956	30,678	29,815	38,844	50,823	69,348	85,502	128,370	123,901
Uganda	5,962	8,007	14,204	23,357	39,772	61,546	98,324	148,534	143,049
DRC	855	348	71	936	325	1,613	2,877	6,106	5,995
Southern Africa	18,060	14,536	16,745	15,950	23,953	18,612	31,113	46,154	46,925
Other Africa	3,037	6,131	3,975	9,918	12,243	16,680	18,358	19,620	27,030
Asia	49,178	49,467	55,192	54,419	69,411	84,292	130,573	221,648	253,711
Middle East	56,912	52,598	52,010	63,157	74,956	87,285	92,234	125,339	108,929
Europe	92,720	75,867	74,631	78,403	114,938	120,708	170,151	263,853	288,671
Other	22,456	11,401	9,302	19,381	16,895	19,113	31,971	46,999	55,828
Total	278,676	252,817	261,654	310,025	411,736	487,861	678,821	1,035,602	1,112,003

Source: Calculated by JICA Study Team based on COMTRADE data.

The following figure and table show the past trends of import between Rwanda and the neighboring countries and the groups of the rest of countries. The amount of exports in 2001 is peculiar and there are many “others” for subject countries. The countries/groups with the most exports in 2010 are Europe, followed by Kenya and Asia.



**Figure 4.10: Export Trends of Rwanda by Partner Countries/Groups**

**Table 4.9: Export Trends of Rwanda by Partner Countries/Groups**

Unit: 1,000 USD

Export/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Burundi	570	971	1,241	1,558	2,176	4,024	7,141	6,217	5,384	4,677
Tanzania	6,031	1,701	4,081	12,157	239	865	385	1,100	4,054	4,288
Kenya	25,206	19,308	20,770	23,702	32,752	29,866	34,299	31,690	83,099	39,323
Uganda	3,611	1,866	13,705	38,425	1,785	1,859	3,166	6,811	5,579	6,834
DRC	1,260	1,403	2,075	1,839	3,766	3,015	10,286	17,493	12,686	16,358
South Africa	6,314	607	724	1,261	1,412	3,849	10,167	26,520	29,162	15,312
Other Africa	223	234	613	472	1,318	926	2,736	3,086	32,718	2,548
Asia	3,303	7,052	1,644	3,516	17,988	21,986	25,904	50,544	27,417	38,246
Middle East	83	341	777	517	994	306	1,328	1,901	2,815	786
Europe	12,016	18,706	5,317	15,229	82,061	67,501	77,626	99,194	53,427	101,278
Other	128,090	1,920	329	867	4,602	6,549	9,739	5,613	4,319	8,164
Total	186,707	54,109	51,277	99,542	149,091	140,745	182,778	250,168	260,660	237,815

Source: Calculated by JICA Study Team based on COMTRADE data.



### (3) Amount of Traffic at Bujumbura Port

Table 4.10 shows the comparison of Burundi's annual import/export amounts with the traffic handled at Bujumbura port using data compiled from COMTRADE. Although Bujumbura port handles transit cargo from other countries which should also be included as a parameter, the data of transit cargo are not available at this point, and so the comparison was tentatively made as shown below. For imports, more than 70% of the freight was handled at this port between 2001 and 2005. The amount of traffic, however, gradually decreased after 2006 and became very light in 2008.

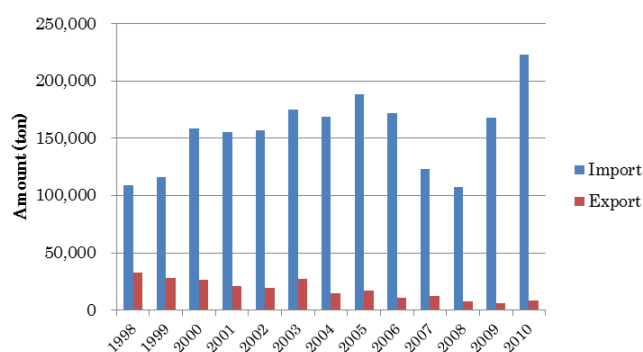


Figure 4.11: Amount of Traffic at Bujumbura Port

Table 4.10: Change in Amount of Traffic at Bujumbura Port

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Unit: tons										
Import										
Amount of Trading 1)	177,177	184,338	0	225,687	257,800	358,020	471,329	216,809	275,625	381,861
Bujumbura Port										
Traffic 2)	155,274	157,028	175,399	169,017	188,452	172,283	123,517	107,312	167,639	222,875
Share (%)	87.6	85.2	-	74.9	73.1	48.1	26.2	49.5	60.8	58.4
Export										
Amount of Trading 1)	38,694	29,346	0	30,979	48,945	43,952	71,422	53,353	53,793	55,046
Bujumbura Port										
Traffic 2)	20,938	19,625	27,076	14,647	17,316	11,134	12,560	7,536	5,812	8,396
Share (%)	54.1	66.9	-	47.3	35.4	25.3	17.6	14.1	10.8	15.3

Source: 1) COMTRADE data

2) Institut de Statistiques et D'études Economiques du Burundi

Table 4.11 shows the trend of import amount handled at Bujumbura port by origin lake port. The traffic from Kigoma port was more than 100 thousand tons in 2000 and 2001, and has been decreasing since then. The traffic from Mpulungu port indicates almost 40 to 60 thousand tons in the period of 1998 to 2006. The data is available until 2007.

Table 4.11: Change in Import Traffic from Each Lake Port

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Unit: tons										
Kigoma	52,345	85,274	107,333	109,809	84,261	84,280	76,117	80,814	61,500	24,580
Kalemie + Kabimba	1,000	65	1,000	3,070	1,630	6,115	17,420	7,960	2,928	1,219
Mpulungu	53,280	29,214	47,264	28,057	48,500	61,914	42,409	59,491	57,461	27,126
Others	2,243	1,375	29,352	35,277			33,071	40,188	50,394	70,592
Total	108,868	115,928	184,949	176,213	134,391	152,309	169,017	188,453	172,283	123,517

Source: Institut de Statistiques et D'études Economiques du Burundi

Table 4.12 shows the import amount handled at Bujumbura Port by kind of commodities from 1998 to 2009. The top two commodities are construction materials and food products. Major construction material and food product are cement and sugar respectively, both of which are mainly shipped from Zambia via Mpulungu Port. Figure 4.12 shows the trend in graph.

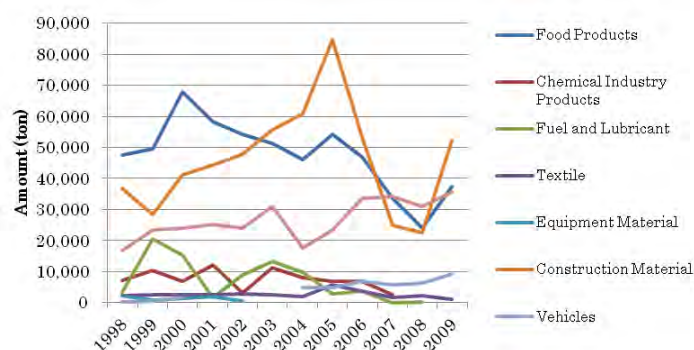


Figure 4.12: Amount of Imported Commodity at Bujumbura Port

Table 4.12: Traffic Volume of Imported Commodity at Bujumbura Port

Import / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Food Products	47,416	49,530	67,854	58,260	54,152	51,360	46,054	54,286	46,929	33,643	24,012	37,383
Chemical Industry Products	7,265	10,406	6,945	11,991	3,063	11,234	7,939	6,828	6,895	2,655		2,237
Fuels and Lubricants	3,276	20,434	15,172	1,549	8,944	13,401	9,720	2,814	3,650	46	336	
Textiles	2,304	2,453	2,648	2,432	2,961	2,520	2,020	5,602	3,555	1,676	2,103	1,153
Equipment Materials	2,333	673	1,298	1,877	611			1,038	1,110			
Construction Materials	36,746	28,273	41,048	44,377	47,868	55,659	60,865	84,714	53,287	25,013	22,441	52,316
Vehicles	188	551	1,590				4,818	4,874	6,785	5,576	6,406	9,097
Other	16,614	23,458	24,112	25,207	24,078	30,885	17,691	23,574	33,710	34,074	31,090	35,492
Total	116,142	135,778	160,667	145,693	141,677	165,059	149,107	183,730	155,921	102,683	86,388	137,678

Source: Institut de Statistiques et D'études Economiques du Burundi

Table 4.13 shows the export amount handled at Bujumbura Port by kind of commodities from 1998 to 2009. Coffee is the majority of the Burundian exports as seen from Figure 4.13.

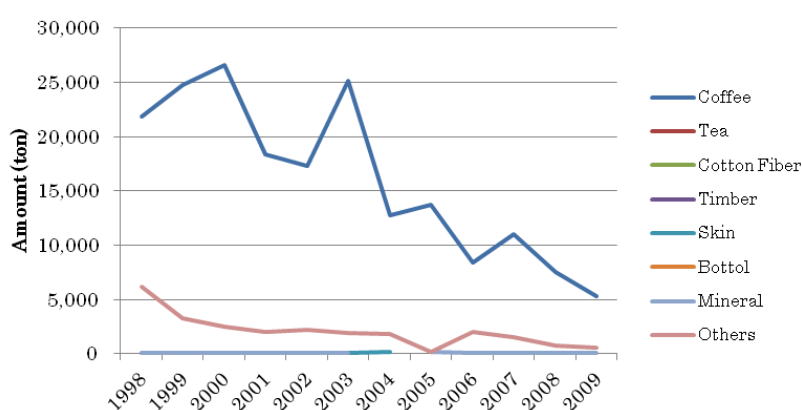


Figure 4.13: Amount of Exported Commodity at Bujumbura Port

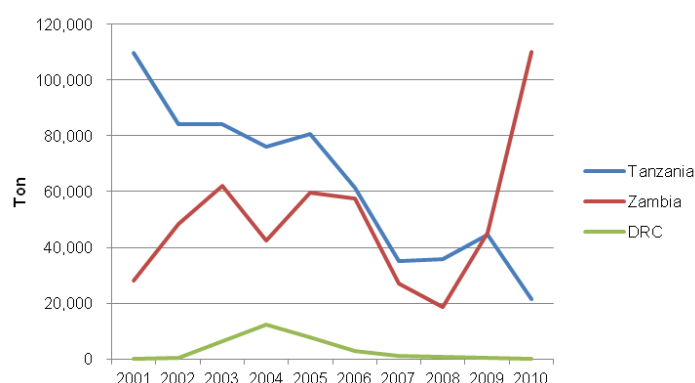
**Table 4.13: Traffic Volume of Exported Commodity at Bujumbura Port**

Unit: tons

Export / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Coffee	21,875	24,752	26,628	18,372	17,324	25,112	12,731	13,683	8,430	10,991	7,534	5,275
Tea	4,604							100				
Cotton Fiber												
Timber	100	23						259			99	
Skins				20		20	132					
Bottles												
Minerals	23	90	39	44	67	24		149	44	69	115	32
Equipment												
Other	6,166	3,242	2,455	2,046	2,234	1,920	1,814	149	1,998	1,500	777	528
Total	32,768	28,107	29,122	20,482	19,625	27,076	14,677	14,340	10,472	12,560	8,525	5,835

Source: Institut de Statistiques et D'études Economiques du Burundi

Among all the import cargos at Bujumbura port, the amount of traffic that was shipped from Kasanga and Kigoma ports (Tanzania), Mpulungu port (Zambia) and DRC port during the past ten years, are shown by commodity respectively in Table 4.14, Table 4.15 and Table 4.16. As for the total amount, annual import from Tanzania, which stayed at around 80 thousand tons until 2005, started to plunge in 2006 to as low as one fourth in 2010. On the other hand, the amount of import cargo from Zambia, which stayed at around 50–60 thousand tons until 2006, increased rapidly in recent years to as high as 110 thousand tons in 2010.



**Figure 4.14: Amount of Import at Bujumbura Port from Each Lake Port**

A closer look at the data by commodity shows that various goods were imported from Kigoma port in 2001, including food, salt, cement, fertilizer, and construction material. After 2002, however, the traffic of cement and fertilizer decreased, and the total traffic drastically decreased in 2007. Since 2007, major part of traffic consists of food and cement. Meanwhile, the import figures from Mpulungu port seem to specialize in cement and sugar. Cement especially showed a radical growth of a threefold increase from the previous year in 2010. Sugar has remained steady at around 10 thousand tons since 2001.

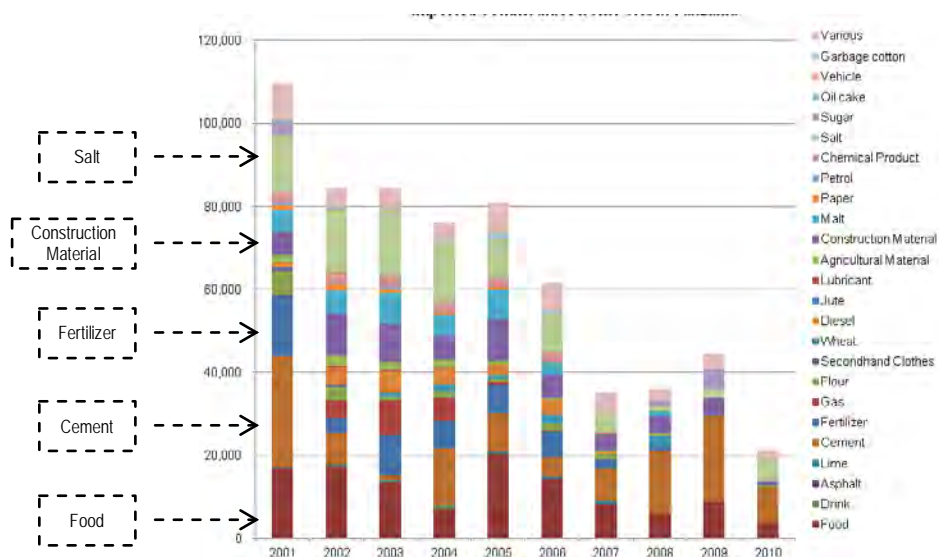


Figure 4.15: Change in Imported Commodities from Ports in Tanzania

Table 4.14: Volume of Imported Commodity at Bujumbura Port  
from Kasanga and Kigoma Port

Unit: tons

Commodity / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Food	16,694	17,161	13,505	6,927	20,155	14,359	8,198	6,068	8,867	3,771
Drink	0	234	284	603	169					
Asphalt	128	163		48			120			
Lime	84	178	95	324	516	669	753		60	84
Cement	26,834	7,602	1,321	13,691	9,321	4,583	7,780	14,900	20,385	8,402
Fertilizer	14,766	3,593	9,639	6,824	6,829	6,079	2,201	1,301		
Gas	219	4,335	8,399	5,514	661	312				
Flour	5,641	3,197	777	1,269	615	1,694	1,360	38	353	380
Secondhand Clothing	760	620	138			12				
Wheat	209	0	978	1,876	1,194	2,047		2,368		
Diesel	1,012	4,079	5,124	4,010	2,301	3,777	339	335		
Jute	0	39								
Lubricant	209	331	425	196						
Agricultural Material	1,607	2,586	1,770	1,684	993	431	555	254		
Construction Material	5,624	9,884	9,418	5,985	10,096	5,322	3,755	4,095	4,113	1,001
Malt	5,256	5,653	7,209	4,865	7,047	3,077	120	1,159		
Paper	1,193	1,507	1,069	613	603	226	40	70		
Petrol	742	0	532							
Chemical Products	2,274	3,123	2,607	2,714	2,215	2,201	223	142	150	
Salt	13,833	14,980	15,946	14,268	9,440	9,214	4,617	1,305	1,954	5,232
Sugar	3,365	143	107		5	311		957	4,858	
Oil cake	345	200	70	283	914	220		20		
Vehicles	32	7		3	1	31			13	
Garbage cotton	0	0								
Other	8,981	4,644	4,865	4,418	7,741	6,935	5,066	2,806	3,762	2,413
Total	109,809	84,261	84,280	76,117	80,814	61,500	35,127	35,818	44,515	21,282

Source: Institut de Statistiques et D'études Economiques du Burundi

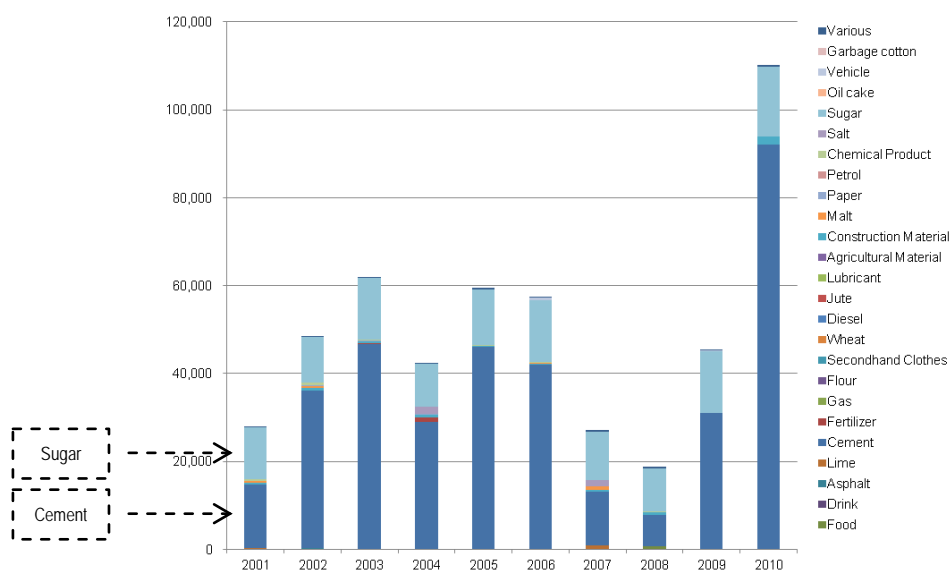


Figure 4.16: Change in Imported Commodities from Port of Zambia

Table 4.15: Volume of Imported Commodities at Bujumbura Port  
from Mpulungu Port

Commodity / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Food	12	35	41				36	668		
Drink			5							
Asphalt		250								
Lime	230						957	61		
Cement	14,493	35,862	46,631	28,946	46,142	42,079	12,035	7,039	31,043	92,091
Fertilizer			300	1,047			150	83		
Gas										
Flour										
Secondhand Clothing										
Wheat										
Diesel										
Jute										
Lubricant	21	7								
Agricultural Material										
Construction Material	469	502	309	568	118	58	322	601		1,834
Malt	250	497		116		180	820	55		
Paper	90	213	169	113	35	111	36			
Petrol										
Chemical Products	396	559	241	10	223	150	28	212	23	
Salt				1,557			1,322			
Sugar	11,754	10,299	14,004	9,861	12,579	14,087	10,938	9,660	14,031	15,777
Oil cake		4								
Vehicles	2	22	16	40	93	514	131	90	71	81
Garbage cotton										
Other	301	251	197	151	301	282	351	335	237	357
Total	28,017	48,500	61,914	42,409	59,491	57,461	27,126	18,805	45,405	110,140

Source: Institut de Statistiques et D'études Economiques du Burundi

**Table 4.16: Volume of Imported Commodity at Bujumbura Port from Ports of DRC**

Unit: tons

Commodity/ Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Food										
Drink										
Asphalt										
Lime										
Cement	120	300	6,440	12,400	7,960	2,900	1,200			
Fertilizer										
Gas										
Flour			44				12	4		
Secondhand Clothing										
Wheat										
Empty bottles								26		
Jute										
Copper									99	
Agricultural Material										
Construction Material							8			
Board						13			100	11
Paper										
Petrol										
Chemical Products										
Salt										
Sugar										
Oil cake										
Vehicles										
Garbage cotton										
Other						15		633	254	138
Total	120	300	6,484	12,400	7,960	2,928	1,220	662	453	149

Source: Institut de Statistiques et D'études Economiques du Burundi

### 4.3 Estimates of Future Freight Demand

#### (1) Estimates of Trade Amount by Country

Table 4.17 shows the trend of economic indicators in the previous years for Burundi and Rwanda according to data from IMF and the two following figures illustrate the relationship between the amount of import and export, and the economic indicators for each country.

**Table 4.17: Economic Situation of Burundi and Rwanda**

Year	Burundi				Rwanda			
	GDP (BIF billion)	AGR (%)	Population (million)	AGR (%)	GDP (RWF billion)	AGR (%)	Population (million)	AGR (%)
2001	521.5		6.750		733.5		8.383	
2002	544.7	4.4	7.000	3.7	830.2	13.2	8.614	2.8
2003	538.1	-1.2	7.200	2.9	848.5	2.2	8.758	1.7
2004	564.1	4.8	7.344	2.0	911.7	7.4	8.882	1.4
2005	569.2	0.9	7.491	2.0	997.1	9.4	9.038	1.8
2006	598.4	5.1	7.641	2.0	1,089.1	9.2	9.200	1.8
2007	619.8	3.6	7.794	2.0	1,149.2	5.5	9.394	2.1
2008	647.8	4.5	7.949	2.0	1,277.8	11.2	9.591	2.1
2009	670.4	3.5	8.108	2.0	1,330.7	4.1	9.792	2.1
2010	696.2	3.9	8.271	2.0	1,417.2	6.5	9.998	2.1

Source: World Economic Outlook Database, IMF

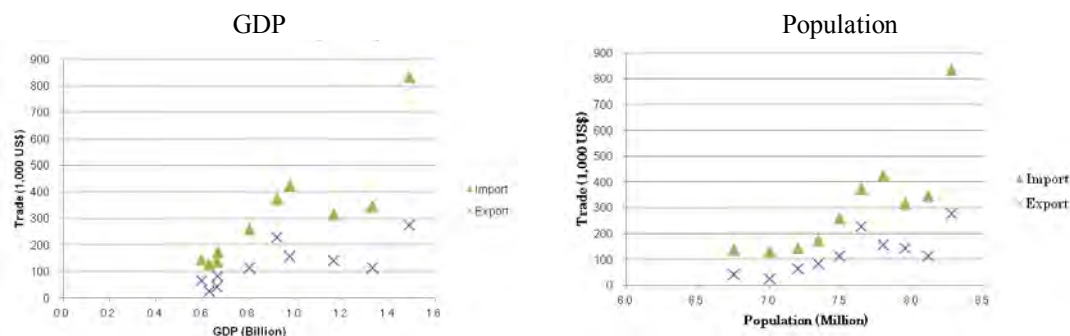


Figure 4.17: Relationship between Trade and Economic Growth for Burundi

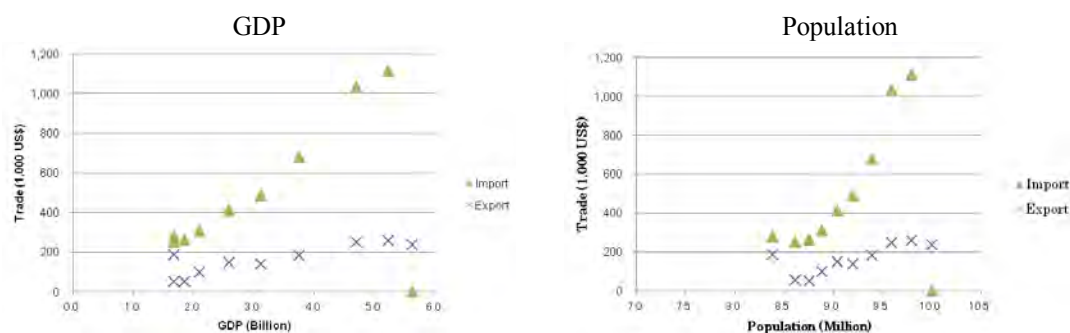


Figure 4.18: Relationship between Trade and Economic Growth for Rwanda

As is clear from the figures, the annual trade amounts of the said countries are positively correlated with their GDPs and populations. However, the trade amounts of Burundi in 2008 and in 2009 are excluded from the analysis because of their extreme drops compared to the average amounts in other years. By using these GDPs and the population as explanatory variables, a model for estimating the amount of future trade can be developed as follows.

$$y = a \cdot x_1 + b \cdot x_2 + c$$

Where  $y$  : Import and Export (USD million)  
 $x_1$  : GDP (USD billion)  
 $x_2$  : Population (million)  
 $a, b, c$  : Parameters (the table below)

Table 4.18: Parameters of Model for Forecasting Amounts of Trade

Country/ Parameter	Object (million USD) (y)	GDP (National Currency 1) (a)	Population (million) (b)	Constant (c)	Correlation Coefficient $r^2$
Burundi	Import	2.15	135.3	-2,001.6	0.832
	Export	0.63	101.4	-996.1	0.923
Rwanda	Import	0.67	251.2	-2,505.3	0.970
	Export	0.23	73.6	-773.2	0.955

Note: 1) Burundi: billion BIF, Rwanda: billion RWF  
Source: JICA Study Team

It is necessary to assume future figures of GDP and population as future frames, in order to estimate the amount of future trade for the subject countries. The future figures were assumed by adopting the outlook below.

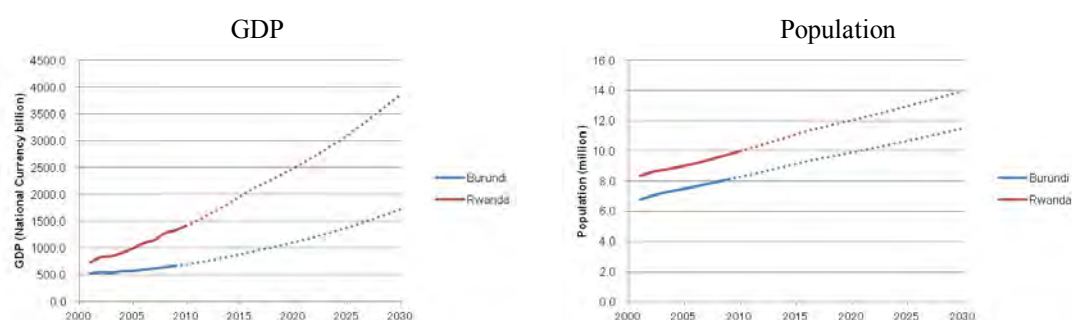
- For GDP and population, IMF's estimates are directly employed until 2016.
- For the figures after 2016, it is assumed that GDP will grow at 4.5%, and population at 1.5%.

The future frames of the subject countries estimated on the above assumption are shown below; the future figures for GDP in 2030 are 2.5 times higher for Burundi and 2.7 times higher for Rwanda than those in 2010 respectively, while the populations are estimated to become 1.4 times more for both countries.

**Table 4.19: Estimates of Future GDP and Population**

Year	GDP		Population (million)	
	Burundi (billion BIF)	Rwanda (billion RWF)	Burundi	Rwanda
2010	696.2	1,417.2	8.3	10.0
2015	882.7	1,956.4	9.1	11.1
2020	1,104.8	2,485.2	9.9	12.0
2025	1,376.8	3,097.0	10.6	13.0
2030	1,715.8	3,859.4	11.5	14.0

Source: JICA Study Team



**Figure 4.19: Future GDP and Population for Burundi and Rwanda**

The amounts of future trade were estimated by inputting the above future frames into the trade estimation model. In 2030, Burundi will experience more than a fourfold increase in trade from that of 2010.

**Table 4.20: Forecasting Result of Future Trade**

Unit: USD million

Year	Burundi				Rwanda			
	Import	Growth (ratio)	Export	Growth (ratio)	Import	Growth (ratio)	Export	Growth (ratio)
2010	832.5	1.0	275.5	1.0	1,112.0	1.0	237.8	1.0
2015	1,129.0	1.4	484.9	1.8	1,590.5	1.4	496.6	2.1
2020	1,708.0	2.1	701.1	2.5	2,177.4	2.0	687.4	2.9
2025	2,395.4	2.9	949.7	3.4	2,820.2	2.5	897.5	3.8
2030	3,234.6	3.9	1,246.4	4.5	3,581.8	3.2	1,147.7	4.8

Source: JICA Study Team

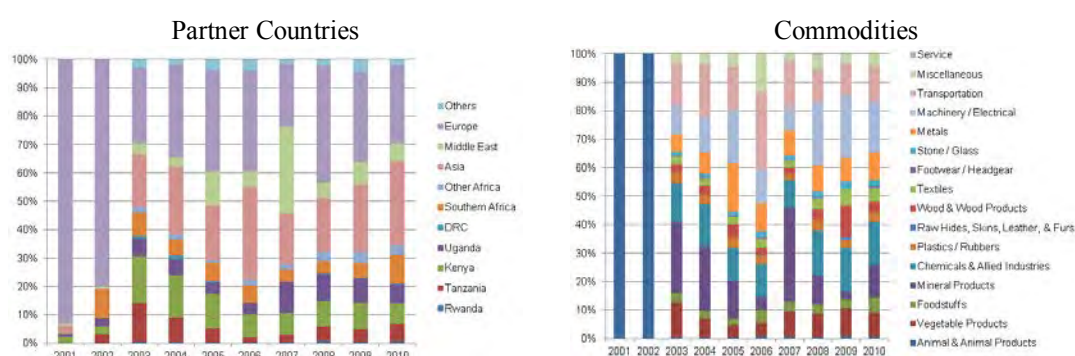


## (2) Estimates of OD Volume between Regions by Type of Commodity

In the previous section, the total trade amounts were estimated by assuming socioeconomic frames for the subject countries. In this section, these total trade amounts are broken down by partner country and by the type of commodity, to estimate bilateral traffic amounts per each item. In order to break down the trade amounts by partner country and the type of commodity, the average shares of partners and of commodities in the past are applied.

Figure 4.20 shows the shares of partners and of commodities for Burundi's import trading during the last ten years. This figure shows that they were both diversified after 2003 and there is not a great difference between each year. Accordingly, on the assumption that the average share from 2003 to 2010 will continue for the foreseeable future, the total import amount is multiplied by this share to obtain future import amounts by partner country and commodity.

Table 4.21 shows the average share during the eight year period from 2003 to 2010, and Table 4.22 shows the estimation results of the import amounts by partner country and commodity in the future, 2030.



**Figure 4.20: Share of Partner Countries and Commodities for Import Trade of Burundi**

**Table 4.21: Partner Countries' Shares of Trade per Import Commodity for Burundi**

Partner / Commodity	Animals & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemical & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather & Furs	Wood & Wood Products	Textiles	Foot-wear/ Head-gear	Stone / Glass	Metals	Machinery/ Electrical	Transportation	Total
Rwanda	1.4%	20.4%	7.0%	22.4%	13.6%	7.4%	0.0%	5.9%	1.1%	3.3%	2.6%	3.6%	9.5%	0.6%	1.4%	0.6%
Tanzania	0.5%	18.7%	1.5%	42.5%	8.2%	3.8%	0.8%	5.4%	4.8%	0.1%	3.9%	3.8%	2.0%	2.1%	2.0%	5.0%
Kenya	1.0%	1.5%	3.4%	24.3%	10.1%	5.9%	0.0%	3.8%	2.4%	0.6%	6.0%	29.7%	4.5%	1.5%	5.1%	9.3%
Uganda	1.8%	23.7%	5.2%	24.1%	6.0%	2.1%	0.2%	12.9%	2.7%	0.8%	0.3%	16.7%	1.6%	1.3%	0.6%	7.2%
DRC	0.5%	2.7%	0.4%	54.2%	36.9%	1.1%	0.0%	0.8%	0.8%	0.0%	0.0%	0.1%	1.0%	0.4%	1.0%	0.3%
Southern Africa	0.1%	0.5%	19.8%	43.2%	2.4%	0.7%	0.0%	7.4%	0.5%	0.2%	0.2%	7.5%	5.4%	7.2%	4.8%	6.8%
Other Africa	0.1%	28.1%	6.7%	4.5%	24.9%	3.2%	0.0%	1.4%	1.4%	0.3%	1.3%	12.7%	8.5%	4.7%	2.2%	2.8%
Asia	0.4%	4.1%	0.8%	0.6%	14.5%	3.9%	0.1%	2.1%	5.0%	0.8%	2.2%	5.0%	15.8%	40.4%	4.3%	24.5%
Middle East	0.9%	0.2%	1.9%	42.9%	3.4%	3.1%	0.1%	2.7%	3.6%	0.2%	2.9%	10.3%	15.8%	9.3%	2.6%	10.1%
Europe	0.7%	8.8%	3.6%	0.5%	21.5%	2.7%	0.1%	3.2%	3.3%	0.2%	0.5%	7.7%	28.1%	10.7%	8.4%	30.9%
Other	0.8%	12.8%	1.7%	0.8%	8.4%	4.1%	1.2%	5.7%	18.4%	0.5%	1.5%	3.7%	18.8%	15.8%	5.8%	2.7%
Respective Commodity's share	0.7%	7.8%	3.9%	14.1%	13.6%	3.3%	0.1%	4.1%	3.8%	0.5%	1.9%	9.8%	15.9%	15.5%	5.1%	100.0%

Source: Calculated by JICA Study Team based on COMTRADE data.

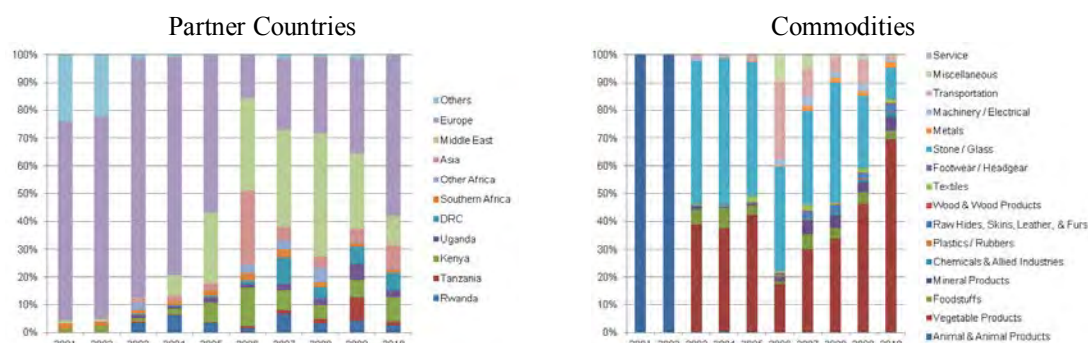
**Table 4.22: Partner Countries' Estimated Amounts of Trade per Import Commodity for Burundi, 2030**

Unit: USD million

Country/ Commodity	Animals & Animal Products	Vegetable Products	Food- stuffs	Mineral Products	Mineral Fuel and Oil	Chemical & Allied Indust- ries	Plastics / Rubbers	Raw Hides, Skins, Leather & Furs	Wood & Wood Products	Tex- tiles	Foot- wear / Head- gear	Stone / Glass	Metals	Machi- nery/ Electrical	Trans- portation	Total
Rwanda	0.2	3.6	1.3	4.0	2.4	1.3	0.0	1.1	0.2	0.6	0.5	0.6	1.7	0.1	0.2	17.9
Tanzania	0.8	30.4	2.5	69.2	13.3	6.1	1.2	8.9	7.8	0.2	6.4	6.2	3.3	3.4	3.2	162.9
Kenya	2.9	4.4	10.2	72.9	30.4	17.8	0.1	11.5	7.3	1.9	18.1	89.3	13.4	4.6	15.3	300.3
Uganda	4.2	55.2	12.1	56.0	14.0	5.0	0.4	30.1	6.2	1.9	0.8	38.9	3.6	2.9	1.4	232.7
DRC	0.0	0.3	0.0	5.1	3.5	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	9.4
Southern Africa	0.3	1.2	43.4	94.7	5.3	1.5	0.0	16.2	1.2	0.3	0.4	16.5	11.8	15.8	10.6	219.3
Other Africa	0.1	25.0	6.0	4.0	22.2	2.9	0.0	1.2	1.2	0.3	1.2	11.3	7.6	4.2	1.9	89.2
Asia	2.9	32.7	6.6	4.6	115.1	31.1	0.7	16.7	39.5	6.5	17.7	39.3	124.8	320.6	33.7	792.6
Middle East	2.8	0.6	6.3	139.7	11.1	10.2	0.4	8.9	11.7	0.5	9.4	33.7	51.3	30.3	8.6	325.4
Europe	7.0	87.6	35.8	5.1	214.6	27.2	0.5	31.9	32.6	2.2	5.5	77.3	280.6	106.6	84.0	998.6
Others	0.7	11.0	1.5	0.7	7.2	3.6	1.1	5.0	15.9	0.5	1.3	3.2	16.2	13.6	5.0	86.3
Total	22.0	252.0	125.8	456.0	439.2	106.8	4.4	131.6	123.7	14.8	61.3	316.2	514.4	502.3	164.1	3,234.6

Source: JICA Study Team

Burundi's export amounts and Rwanda's import/export amounts by partner country and commodity were estimated in a similar manner and the results are shown in Table 4.24, Table 4.26 and Table 4.28. Regarding Burundi's export commodities, the amounts fluctuate each year in terms of both partner countries and commodities, and those in 2001 and 2002 look much different from the rest, therefore an average of the share from 2003 to 2010 was used for estimation under the assumption that it will remain stable.



**Figure 4.21: Share of Partner Countries and Commodities for Export Trade of Burundi**

**Table 4.23: Partner Countries' Shares of Trade per Export Commodity for Burundi**

Partner / Commodity	Animals & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Foot-wear / Head-gear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Rwanda	0.0%	7.2%	48.2%	13.9%	10.8%	1.4%	0.1%	0.5%	3.2%	0.0%	1.1%	1.0%	5.5%	6.9%	0.2%	3.5%
Tanzania	0.1%	10.9%	1.4%	2.6%	1.7%	1.0%	0.4%	0.8%	2.3%	0.0%	0.0%	24.9%	12.4%	40.7%	0.7%	1.7%
Kenya	0.0%	45.0%	0.0%	0.2%	0.1%	0.0%	10.8%	0.0%	0.1%	0.0%	17.2%	0.8%	1.8%	13.0%	11.0%	7.9%
Uganda	0.1%	24.7%	41.4%	0.1%	0.1%	0.5%	1.0%	0.2%	0.2%	0.0%	0.2%	22.5%	3.0%	0.8%	5.2%	2.1%
DRC	0.3%	4.7%	20.0%	29.5%	3.5%	2.2%	0.0%	2.6%	1.9%	0.0%	0.4%	0.8%	5.4%	26.0%	2.5%	4.3%
Southern Africa	0.6%	47.2%	4.9%	0.2%	2.3%	0.0%	0.0%	0.0%	0.6%	0.0%	0.5%	0.6%	3.0%	30.1%	9.9%	1.9%
Other Africa	0.1%	4.2%	3.1%	0.0%	1.0%	0.2%	0.2%	0.1%	5.4%	0.5%	28.4%	0.3%	15.1%	37.7%	3.7%	1.9%
Asia	0.1%	27.6%	0.0%	8.1%	0.2%	0.9%	2.9%	0.3%	0.3%	0.0%	0.0%	0.2%	2.9%	46.2%	10.3%	9.2%
Middle East	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	94.9%	0.0%	0.1%	0.5%	0.3%	24.6%
Europe	0.3%	74.3%	0.0%	1.3%	0.0%	0.0%	0.8%	0.1%	2.2%	0.0%	19.0%	0.2%	0.7%	0.2%	0.9%	42.3%
Other	4.5%	62.2%	0.8%	3.0%	0.2%	0.0%	0.9%	0.9%	0.6%	0.0%	0.1%	0.2%	2.2%	5.7%	18.8%	0.6%
Total	0.2%	40.9%	3.6%	3.1%	0.7%	0.3%	1.7%	0.2%	1.3%	0.0%	33.3%	1.2%	1.8%	8.9%	2.9%	100.0%

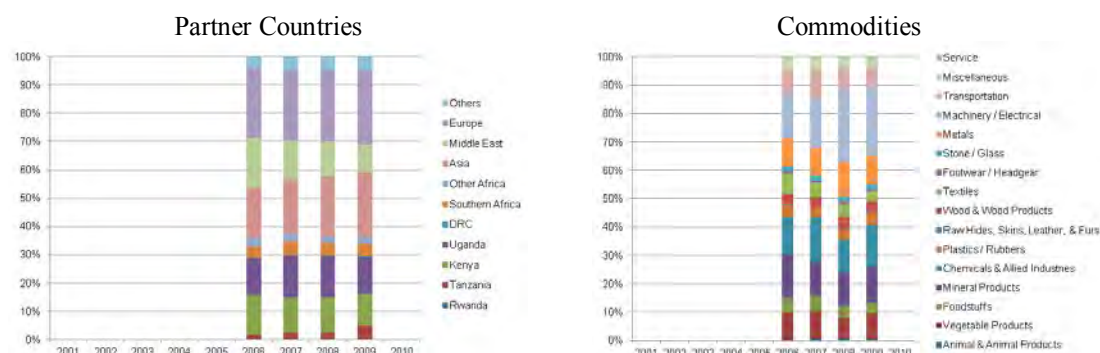
Source: Calculated by JICA Study Team based on COMTRADE data.

**Table 4.24: Partner Countries' Estimated Amounts of Trade per Export Commodity for Burundi, 2030**

Unit: USD million

Country / Commodity	Animals & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Foot-wear / Head-gear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Rwanda	0.0	3.2	21.3	6.1	4.8	0.6	0.1	0.2	1.4	0.0	0.5	0.5	2.4	3.0	0.1	44.1
Tanzania	0.0	2.3	0.3	0.5	0.4	0.2	0.1	0.2	0.5	0.0	0.0	5.1	2.6	8.4	0.2	20.7
Kenya	0.0	44.2	0.0	0.2	0.1	0.0	10.6	0.0	0.1	0.0	16.9	0.8	1.7	12.8	10.8	98.3
Uganda	0.0	6.6	11.1	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.1	6.0	0.8	0.2	1.4	26.8
DRC	0.2	2.5	10.6	15.7	1.9	1.2	0.0	1.4	1.0	0.0	0.2	0.4	2.9	13.8	1.3	53.1
Southern Africa	0.1	11.2	1.2	0.1	0.6	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.7	7.2	2.4	23.7
Other Africa	0.0	1.0	0.7	0.0	0.2	0.0	0.0	0.0	1.3	0.1	6.6	0.1	3.5	8.8	0.9	23.2
Asia	0.1	31.7	0.0	9.2	0.2	1.1	3.3	0.3	0.4	0.0	0.0	0.2	3.3	53.0	11.8	114.6
Middle East	0.0	10.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	291.0	0.0	0.3	1.7	1.0	306.6
Europe	1.5	391.6	0.1	7.1	0.2	0.0	4.4	0.3	11.5	0.0	99.9	1.1	3.7	1.2	4.5	527.2
Other	0.4	5.0	0.1	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.5	1.5	8.0
Total	2.4	509.2	45.4	39.2	8.3	3.3	21.3	2.7	16.4	0.1	415.3	14.4	22.1	110.5	35.8	1,246.4

Source: JICA Study Team



**Figure 4.22: Share of Partner Countries and Commodities for Import Trade of Rwanda**

**Table 4.25: Partner Countries' Shares of Trade per Import Commodity for Rwanda**

Partner/ Commodity	Animal & Animal Products	Vegetable Products	Food- stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Foot- wear / Head- gear	Stone / Glass	Metals	Machinery / Electrical	Trans- portation	Total
Burundi	2.1%	7.2%	52.2%	0.1%	0.1%	13.9%	0.5%	0.0%	0.6%	9.5%	0.0%	0.3%	1.4%	2.7%	9.5%	0.3%
Tanzania	4.4%	34.6%	1.7%	0.4%	2.9%	33.2%	3.6%	0.0%	1.7%	3.8%	0.1%	1.5%	8.4%	2.9%	0.8%	3.2%
Kenya	0.4%	7.9%	8.7%	8.9%	15.4%	15.4%	6.7%	0.1%	6.1%	2.5%	3.5%	3.1%	11.8%	7.2%	2.3%	12.4%
Uganda	2.3%	24.5%	3.7%	24.0%	0.6%	11.0%	2.3%	0.1%	3.2%	2.0%	0.4%	0.4%	22.9%	2.1%	0.5%	14.2%
DRC	1.7%	53.4%	11.0%	0.2%	0.0%	4.1%	0.2%	0.0%	18.4%	7.1%	0.2%	0.2%	0.4%	1.0%	2.1%	0.5%
Southern Africa	0.2%	0.5%	25.4%	0.9%	5.1%	7.1%	2.8%	0.0%	5.4%	1.4%	0.1%	0.5%	16.1%	31.0%	3.4%	4.3%
Other Africa	0.2%	3.2%	25.2%	0.1%	2.8%	14.4%	6.9%	0.0%	9.2%	3.5%	0.0%	2.8%	10.9%	15.9%	4.9%	2.5%
Asia	0.0%	3.9%	0.2%	0.1%	4.1%	12.4%	5.2%	0.2%	3.9%	6.5%	0.7%	2.5%	12.6%	27.3%	20.3%	20.9%
Middle East	0.2%	0.4%	2.1%	0.2%	37.4%	3.0%	4.6%	0.3%	3.0%	7.3%	0.7%	2.6%	6.0%	24.2%	8.0%	12.6%
Europe	0.2%	5.9%	2.1%	0.1%	2.8%	22.2%	2.8%	0.0%	3.6%	5.8%	0.1%	0.9%	5.8%	40.2%	7.4%	24.8%
Other	0.3%	18.8%	3.6%	0.3%	0.6%	13.7%	3.9%	0.1%	2.3%	8.8%	0.4%	2.9%	10.8%	29.4%	4.0%	4.3%
Total	0.6%	9.1%	4.6%	4.7%	8.7%	14.3%	4.1%	0.1%	4.0%	5.0%	0.8%	1.8%	11.2%	23.0%	8.0%	100.0%

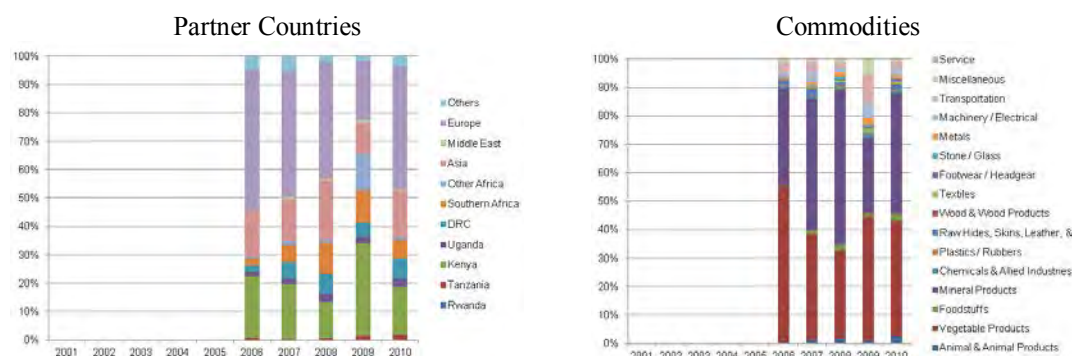
Source: Calculated by JICA Study Team based on COMTRADE data.

**Table 4.26: Partner Countries' Estimated Amounts of Trade  
per Import Commodity for Rwanda, 2030**

Unit: USD million

Country	Animal & Animal Products	Vegetable Products	Food- stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Trans- portation	Total
Burundi	0.3	1.5	6.8	0.0	0.0	0.8	0.0	0.0	0.0	0.7	0.0	0.0	0.1	0.0	0.2	10.5
Tanzania	7.0	82.4	2.4	2.1	7.0	20.3	2.4	0.0	1.0	3.1	0.1	1.8	6.7	0.3	0.2	136.8
Kenya	2.2	71.7	48.3	184.4	140.0	36.0	17.1	0.1	13.4	8.0	10.3	15.0	35.8	2.5	2.0	587.0
Uganda	16.1	254.9	23.1	567.1	6.3	29.4	6.8	0.3	8.1	7.2	1.2	2.0	79.8	0.8	0.5	1,003.4
DRC	0.4	20.5	2.6	0.1	0.0	0.4	0.0	0.0	1.7	0.9	0.0	0.0	0.0	0.0	0.1	26.9
Southern Africa	0.5	1.4	48.3	6.4	16.1	5.7	2.4	0.0	4.1	1.5	0.1	0.9	16.9	3.7	1.0	109.0
Other Africa	0.2	5.9	28.3	0.4	5.2	6.9	3.6	0.0	4.1	2.3	0.0	2.7	6.8	1.1	0.9	68.4
Asia	0.2	60.3	2.0	3.0	62.6	48.6	22.3	0.7	14.2	34.8	3.6	20.4	64.3	15.8	29.2	382.1
Middle East	1.0	3.8	11.8	4.8	346.4	7.0	11.8	0.7	6.7	23.6	2.1	12.5	18.5	8.5	7.0	466.3
Europe	2.7	106.5	22.9	5.9	51.4	103.5	14.3	0.1	15.9	36.5	0.6	8.5	35.2	27.5	12.6	444.1
Other	0.7	59.4	6.8	2.3	2.0	11.1	3.5	0.1	1.8	9.7	0.4	4.8	11.5	3.5	1.2	118.8
Total	31.4	668.3	203.2	776.6	637.1	269.7	84.3	2.1	70.9	128.3	18.4	68.8	275.8	63.7	54.7	3,353.2

Source: JICA Study Team



**Figure 4.23: Share of Partner Countries and Commodities  
for Export Trade of Rwanda**

**Table 4.27: Partner Countries' Shares of Trade per Export Commodity for Rwanda**

Partner / Commodity	Animal & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Burundi	0.6%	23.5%	2.7%	7.2%	4.7%	7.1%	5.1%	0.0%	0.6%	1.7%	6.2%	1.3%	9.2%	9.7%	20.5%	2.6%
Tanzania	0.0%	16.5%	0.6%	13.9%	2.0%	0.5%	0.5%	0.0%	0.1%	4.5%	0.0%	6.1%	4.0%	30.3%	21.1%	1.0%
Kenya	0.0%	94.3%	1.2%	0.5%	0.2%	0.0%	0.2%	1.9%	0.1%	0.2%	0.0%	0.1%	0.2%	0.7%	0.4%	20.2%
Uganda	0.5%	43.4%	0.9%	4.4%	0.1%	4.5%	1.0%	1.6%	1.3%	1.9%	0.1%	0.4%	20.9%	13.4%	5.6%	2.2%
DRC	23.0%	6.0%	21.4%	6.3%	4.3%	7.2%	3.6%	0.0%	0.0%	0.9%	5.2%	0.3%	7.8%	2.9%	11.0%	5.7%
Southern Africa	0.0%	32.7%	0.0%	60.5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.5%	0.1%	0.2%	0.3%	4.6%	0.9%	7.9%
Other Africa	0.0%	2.1%	0.0%	0.2%	1.1%	0.3%	0.1%	0.0%	0.1%	6.6%	0.0%	0.1%	5.3%	14.4%	69.7%	3.9%
Asia	0.1%	1.2%	0.0%	94.9%	0.2%	0.3%	0.0%	2.4%	0.0%	0.1%	0.0%	0.4%	0.1%	0.2%	0.1%	15.6%
Middle East	1.4%	2.6%	0.8%	24.2%	1.4%	0.8%	0.4%	1.8%	0.3%	1.5%	0.0%	9.1%	0.4%	50.8%	4.5%	0.7%
Europe	0.0%	42.2%	0.1%	53.4%	0.0%	0.1%	0.0%	1.5%	0.0%	0.6%	0.0%	0.6%	0.2%	1.1%	0.2%	37.4%
Others	0.3%	54.3%	0.1%	24.3%	0.1%	3.3%	0.0%	1.0%	2.3%	3.3%	0.0%	1.4%	0.7%	6.3%	2.7%	2.8%
Total	1.4%	41.3%	1.6%	41.3%	0.5%	0.9%	0.4%	1.4%	0.2%	0.8%	0.5%	0.5%	1.6%	3.1%	4.6%	100.0%

Source: Calculated by JICA Study Team based on COMTRADE data.

**Table 4.28: Partner Countries' Estimated Amounts of Trade per Export Commodity for Rwanda, 2030**

Unit: USD million

Country	Animal & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Burundi	0.3	2.5	6.7	0.5	1.8	0.8	0.7	0.0	0.4	0.1	0.6	2.6	6.1	0.4	0.4	23.7
Tanzania	0.0	0.7	0.6	0.4	0.3	0.0	0.0	0.0	0.0	0.1	0.0	4.7	1.0	0.4	0.2	8.4
Kenya	0.0	77.9	23.5	0.3	0.6	0.0	0.2	4.0	0.4	0.1	0.0	1.8	0.9	0.2	0.1	110.1
Uganda	0.2	3.9	2.0	0.3	0.0	0.4	0.1	0.4	0.7	0.1	0.0	0.6	11.9	0.4	0.1	21.1
DRC	24.8	1.4	116.9	1.0	3.6	1.7	1.1	0.0	0.1	0.1	1.1	1.5	11.4	0.2	0.5	165.4
Southern Africa	0.0	10.6	0.0	13.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	1.1	0.6	0.5	0.1	26.6
Other Africa	0.0	0.3	0.0	0.0	0.6	0.1	0.0	0.0	0.1	0.4	0.0	0.2	5.3	0.8	2.3	10.2
Asia	0.2	0.8	0.0	41.5	0.5	0.2	0.0	3.9	0.1	0.0	0.0	4.3	0.3	0.0	0.0	51.9
Middle East	0.2	0.1	0.5	0.5	0.1	0.0	0.0	0.1	0.1	0.0	0.0	4.8	0.1	0.5	0.0	7.0
Europe	0.0	64.6	3.3	55.9	0.2	0.1	0.0	5.9	0.5	0.3	0.0	17.1	1.7	0.6	0.1	150.3
Other	0.2	6.2	0.2	1.9	0.0	0.4	0.0	0.3	1.7	0.1	0.0	3.0	0.5	0.3	0.1	14.8
Total	25.9	169.0	153.8	115.7	7.8	3.8	2.2	14.6	4.1	1.2	1.8	41.8	39.8	4.3	3.8	589.6

Source: JICA Study Team

The freight ODs obtained from the above are bilateral traffic amounts in terms of currency. Therefore, in order to convert them to amounts in weight, the ratio of dollars to weight for each commodity derived from previous data was applied as shown below. The derived amounts of import/export by commodity and by partner country were multiplied by this ratio to convert them to amounts in dollar to weight. The calculated traffic amounts by commodity and by partner country in weight are shown in Table 4.31 and Table 4.34.

**Table 4.29: Value Weight Ratio by Commodity for Burundi**

No.	Commodity	Import	Export
		Value/ Weight Ratio (USD/kg)	Value/ Weight Ratio (USD/kg)
1	Animal & Animal Products	3.03	16.55
2	Vegetable Products	1.20	6.13
3	Foodstuffs	1.97	6.32
4	Mineral Products	0.47	13.61
5	Mineral Fuel and Oil	1.88	3.31
6	Chemicals & Allied Industries	5.40	2.49
7	Plastics / Rubbers	3.59	3.34
8	Raw Hides, Skins, Leather, & Furs	1.35	2.38
9	Wood & Wood Products	3.97	3.95
10	Textiles	4.09	4.13
11	Footwear / Headgear	2.48	11.82
12	Stone / Glass	1.67	332.44
13	Metals	2.28	0.51
14	Machinery / Electrical	16.72	72.26
15	Transportation	16.01	108.35

Source: Calculated by JICA Study Team based on COMTRADE data.

**Table 4.30: Value Weight Ratio by Commodity for Rwanda**

No.	Commodity	Import	Export
		Value/ Weight Ratio (USD/kg)	Value/ Weight Ratio (USD/kg)
1	Animal & Animal Products	0.73	0.61
2	Vegetable Products	0.49	2.80
3	Foodstuffs	0.80	0.12
4	Mineral Products	0.22	4.10
5	Mineral Fuel and Oil	0.49	0.79
6	Chemicals & Allied Industries	1.90	2.75
7	Plastics / Rubbers	1.74	2.11
8	Raw Hides, Skins, Leather, & Furs	2.08	1.09
9	Wood & Wood Products	2.03	0.45
10	Textiles	1.40	8.39
11	Footwear / Headgear	1.53	2.95
12	Stone / Glass	0.93	0.15
13	Metals	1.46	0.45
14	Machinery / Electrical	12.94	8.11
15	Transportation	5.20	13.72

Source: Calculated by JICA Study Team based on COMTRADE data.

**Table 4.31: Estimated Import Freight OD by Commodity for Burundi in 2030**

Unit: 1,000 tons

Partner / Commodity	Animal & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Rwanda	0.1	3.0	0.6	8.6	1.3	0.2	0.0	0.8	0.0	0.1	0.2	0.4	0.7	0.0	0.0	16.2
Tanzania	0.3	25.3	1.3	148.3	7.1	1.1	0.3	6.6	2.0	0.0	2.6	3.7	1.4	0.2	0.2	200.4
Kenya	1.0	3.7	5.2	156.4	16.1	3.3	0.0	8.5	1.8	0.5	7.3	53.4	5.9	0.3	1.0	264.3
Uganda	1.4	45.9	6.1	120.1	7.4	0.9	0.1	22.3	1.6	0.5	0.3	23.2	1.6	0.2	0.1	231.7
DRC	0.0	0.2	0.0	11.0	1.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2
Southern Africa	0.1	1.0	22.0	203.1	2.8	0.3	0.0	12.0	0.3	0.1	0.2	9.8	5.2	0.9	0.7	258.5
Other Africa	0.0	20.8	3.0	8.6	11.8	0.5	0.0	0.9	0.3	0.1	0.5	6.8	3.3	0.3	0.1	57.1
Asia	1.0	27.3	3.4	9.9	61.1	5.8	0.2	12.4	10.0	1.6	7.2	23.5	54.7	19.2	2.1	239.0
Middle East	0.9	0.5	3.2	299.5	5.9	1.9	0.1	6.6	2.9	0.1	3.8	20.1	22.5	1.8	0.5	370.4
Europe	2.3	73.0	18.1	11.0	113.9	5.0	0.2	23.6	8.2	0.5	2.2	46.2	122.9	6.4	5.2	438.8
Other	0.2	9.2	0.8	1.4	3.8	0.7	0.3	3.7	4.0	0.1	0.5	1.9	7.1	0.8	0.3	34.8
Total	7.3	209.9	63.7	977.9	233.1	19.8	1.2	97.4	31.2	3.6	24.8	189.0	225.3	30.0	10.3	2,124.4

Source: JICA Study Team

**Table 4.32: Estimated Export Freight OD by Commodity for Burundi in 2030**

Unit: 1,000 tons

Partner / Commodity	Animal & Animal Products	Vegetable Products	Food-stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Rwanda	0.0	0.5	3.4	0.4	1.4	0.2	0.0	0.1	0.4	0.0	0.0	0.0	4.7	0.0	0.0	11.3
Tanzania	0.0	0.4	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	5.0	0.1	0.0	6.0
Kenya	0.0	7.2	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	1.4	0.0	3.4	0.2	0.1	15.6
Uganda	0.0	1.1	1.8	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	4.6
DRC	0.0	0.4	1.7	1.2	0.6	0.5	0.0	0.6	0.3	0.0	0.0	0.0	5.6	0.2	0.0	11.0
Southern Africa	0.0	1.8	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.1	0.0	3.8
Other Africa	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.6	0.0	6.8	0.1	0.0	8.3
Asia	0.0	5.2	0.0	0.7	0.1	0.4	1.0	0.1	0.1	0.0	0.0	0.0	6.4	0.7	0.1	14.8
Middle East	0.0	1.6	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	24.6	0.0	0.7	0.0	0.0	27.7
Europe	0.1	63.8	0.0	0.5	0.1	0.0	1.3	0.1	2.9	0.0	8.5	0.0	7.3	0.0	0.0	84.7
Other	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.3
Total	0.1	83.0	7.2	2.9	2.5	1.3	6.4	1.1	4.1	0.0	35.1	0.0	43.2	1.5	0.3	189.0

Source: JICA Study Team

**Table 4.33: Estimated Import Freight OD by Commodity for Rwanda in 2030**

Unit: 1,000 tons

Partner/ Commodity	Animal & Animal Products	Vegetable Products	Food- stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Burundi	0.3	1.5	6.8	0.0	0.0	0.8	0.0	0.0	0.0	0.7	0.0	0.0	0.1	0.0	0.2	10.5
Tanzania	7.0	82.4	2.4	2.1	7.0	20.3	2.4	0.0	1.0	3.1	0.1	1.8	6.7	0.3	0.2	136.8
Kenya	2.2	71.7	48.3	184.4	140.0	36.0	17.1	0.1	13.4	8.0	10.3	15.0	35.8	2.5	2.0	587.0
Uganda	16.1	254.9	23.1	567.1	6.3	29.4	6.8	0.3	8.1	7.2	1.2	2.0	79.8	0.8	0.5	1,003.4
DRC	0.4	20.5	2.6	0.1	0.0	0.4	0.0	0.0	1.7	0.9	0.0	0.0	0.0	0.0	0.1	26.9
Southern Africa	0.5	1.4	48.3	6.4	16.1	5.7	2.4	0.0	4.1	1.5	0.1	0.9	16.9	3.7	1.0	109.0
Other Africa	0.2	5.9	28.3	0.4	5.2	6.9	3.6	0.0	4.1	2.3	0.0	2.7	6.8	1.1	0.9	68.4
Asia	0.2	60.3	2.0	3.0	62.6	48.6	22.3	0.7	14.2	34.8	3.6	20.4	64.3	15.8	29.2	382.1
Middle East	1.0	3.8	11.8	4.8	346.4	7.0	11.8	0.7	6.7	23.6	2.1	12.5	18.5	8.5	7.0	466.3
Europe	2.7	106.5	22.9	5.9	51.4	103.5	14.3	0.1	15.9	36.5	0.6	8.5	35.2	27.5	12.6	444.1
Other	0.7	59.4	6.8	2.3	2.0	11.1	3.5	0.1	1.8	9.7	0.4	4.8	11.5	3.5	1.2	118.8
Total	31.4	668.3	203.2	776.6	637.1	269.7	84.3	2.1	70.9	128.3	18.4	68.8	275.8	63.7	54.7	3,353.2

Source: JICA Study Team

**Table 4.34: Estimated Export Freight OD by Commodity for Rwanda in 2030**

Unit: 1,000 tons

Partner	Animal & Animal Products	Vegetable Products	Food- stuffs	Mineral Products	Mineral Fuel and Oil	Chemicals & Allied Industries	Plastics / Rubbers	Raw Hides, Skins, Leather, & Furs	Wood & Wood Products	Textiles	Footwear / Headgear	Stone / Glass	Metals	Machinery / Electrical	Transportation	Total
Burundi	0.3	2.5	6.7	0.5	1.8	0.8	0.7	0.0	0.4	0.1	0.6	2.6	6.1	0.4	0.4	23.7
Tanzania	0.0	0.7	0.6	0.4	0.3	0.0	0.0	0.0	0.0	0.1	0.0	4.7	1.0	0.4	0.2	8.4
Kenya	0.0	77.9	23.5	0.3	0.6	0.0	0.2	4.0	0.4	0.1	0.0	1.8	0.9	0.2	0.1	110.1
Uganda	0.2	3.9	2.0	0.3	0.0	0.4	0.1	0.4	0.7	0.1	0.0	0.6	11.9	0.4	0.1	21.1
DRC	24.8	1.4	116.9	1.0	3.6	1.7	1.1	0.0	0.1	0.1	1.1	1.5	11.4	0.2	0.5	165.4
Southern Africa	0.0	10.6	0.0	13.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	1.1	0.6	0.5	0.1	26.6
Other Africa	0.0	0.3	0.0	0.0	0.6	0.1	0.0	0.0	0.1	0.4	0.0	0.2	5.3	0.8	2.3	10.2
Asia	0.2	0.8	0.0	41.5	0.5	0.2	0.0	3.9	0.1	0.0	0.0	4.3	0.3	0.0	0.0	51.9
Middle East	0.2	0.1	0.5	0.5	0.1	0.0	0.0	0.1	0.1	0.0	0.0	4.8	0.1	0.5	0.0	7.0
Europe	0.0	64.6	3.3	55.9	0.2	0.1	0.0	5.9	0.5	0.3	0.0	17.1	1.7	0.6	0.1	150.3
Other	0.2	6.2	0.2	1.9	0.0	0.4	0.0	0.3	1.7	0.1	0.0	3.0	0.5	0.3	0.1	14.8
Total	25.9	169.0	153.8	115.7	7.8	3.8	2.2	14.6	4.1	1.2	1.8	41.8	39.8	4.3	3.8	589.6

Source: JICA Study Team

### (3) Forecasting Freight Loads at Bujumbura Port

Based on the estimated freight OD from Table 4.31 to Table 4.34 in the previous section, the cargo which are subjected to further examination whether they would be transported through Bujumbura port or not is summarized and shown in Table 4.35.



**Table 4.35: Freight Subjected to Further Examination, 2030**

Unit: 1,000 tons

Country	Import/ Export	Partner Country/Area					
		Tanzania	Southern Africa	Other Africa	Asia	Middle East	Europe Others
Burundi	Import	200.4	258.5	57.1	239.0	370.4	438.8
	Export	6.0	3.8	8.3	14.8	27.7	84.7
Rwanda	Import	136.8	109.0	68.4	382.1	466.3	444.1
	Export	8.4	26.6	10.2	51.9	7.0	150.3
Total		351.7	397.9	143.9	687.8	871.4	1,117.9

Source: JICA Study Team

Applying the idea of alternative transportation routes between two countries mentioned in the section 4-1, it would appear that in Southern Africa, including Zambia these potential freight loads will be transported using waterways through Tanganyika lake which connects Bujumbura port and Mpulungu port, whether in Burundi or in Rwanda, and thus the cargo amounting to 397.9 thousand tons will be handled at Bujumbura port.

The next possibilities are trade between Burundi, Rwanda and Tanzania, and freight to be transported from both countries to foreign countries. While there are options for these cargos to be transported either by corridor/land or by water, a questionnaire survey conducted on carriers in Burundi showed that, compared to land route, about 9% of those answered at this point that they might go to Tanzania from Kigoma port by water. Assuming that the share of Kigoma route will increase at about 12% according to the improvement of service level of TRL Kigoma line in 2030, the subject traffic will be 361.1 thousand tons out of 2,990.7 thousand tons, which is the sum of import and export between Burundi and Rwanda, and overseas except Tanzania and southern Africa, resulting in 759.0 thousand tons combined with that of Southern Africa. The result of the above estimation is shown in Table 4.36.

**Table 4.36: Summary of Estimated Freight Volume Handled at Bujumbura Port in 2030**

Unit: 1,000 tons

Case	Southern Africa	Others	Total
Base	397.9		397.9
Base + Kigoma	397.9	361.1	759.0

Source: JICA Study Team

As there is no alternative transport route other than the lake maritime route between Mpulungu Port and Bujumbura Port that can transport cargo as estimated as “Southern Africa” in Table 4.36, all of this demand has to be handled at Bujumbura Port. Meanwhile, the demand as estimated as “Others” in Table 4.36 is the maximum cargo demand which may occur in case all the favorable conditions for the maritime transport are materialized between Kigoma Port and Bujumbura Port. Therefore, the demand of “Others” depends on the transport development between Kigoma Port and other parts of Tanzania, particularly Dar es Salaam Port where most of the transit cargo for Burundi are loaded or unloaded. In this regard, the demand of Bujumbura Port has to be estimated based on the development of Tanzanian transport network, particularly the rehabilitation of TRL railway between Dar es Salaam Port and Kigoma Port. More specifically, the container block train operation between Dar es Salaam and Kigoma is the dominant factor over the maritime transport between Kigoma Port and Bujumbura Port.

The freight volume by commodity can be estimated as summarized in Table 4.37, by distributing the total volume handled at Bujumbura Port shown in Table 4.36 with the shares of commodities and partner countries discussed in the previous section (2).

**Table 4.37: Estimated Freight Volume by Commodity Handled  
at Bujumbura Port in 2030**

Unit: 1,000 tons

Commodity	Base	Base + Kigoma
Animal & Animal Products	0.6	1.1
Vegetable Products	14.8	59.7
Foodstuffs	70.5	72.8
Mineral Products	222.9	482.4
Mineral Fuel and Oil	19.1	31.7
Chemicals & Allied Industries	6.0	8.2
Plastics / Rubbers	2.5	3.1
Raw Hides, Skins, Leather, & Furs	12.0	23.62
Wood & Wood Products	4.5	8.1
Textiles	1.7	1.8
Footwear / Headgear	0.3	4.8
Stone / Glass	11.9	18.4
Metals	24.2	35.4
Machinery / Electrical	5.2	5.8
Transportation	1.7	2.1
Total	397.9	759.0

Source: JICA Study Team

The following tables show estimated freight volume by commodity, to be handled at Bujumbura port in 2020, calculated in the same manner mentioned earlier in this chapter.

**Table 4.38: Summary of Estimated Freight Volume Handled  
at Bujumbura Port in 2020**

Unit: 1,000 tons

Case	Southern Africa	Others	Total
Base	220.8		220.8
Base + Kigoma	220.8	164.1	384.9

Source: JICA Study Team

**Table 4.39: Estimated Freight Volume by Commodity Handled  
at Bujumbura Port in 2020**

Unit: 1,000 tons

Commodity	Base	Base + Kigoma
Animal & Animal Products	0.4	0.6
Vegetable Products	8.7	29.1
Foodstuffs	41.1	42.1
Mineral Products	119.2	236.9
Mineral Fuel and Oil	11.4	17.1
Chemicals & Allied Industries	3.7	4.6
Plastics / Rubbers	1.5	1.8
Raw Hides, Skins, Leather, & Furs	6.3	11.6
Wood & Wood Products	2.7	4.6
Textiles	1.0	1.1
Footwear / Headgear	0.2	2.2
Stone / Glass	6.4	9.4
Metals	14.2	19.6
Machinery / Electrical	3.1	3.4
Transportation	1.0	1.2
Total	220.8	384.9

Source: JICA Study Team