Chapter 7 Present Conditions of Tema Port

7.1 General

Tema Port construction began in 1954 and opened in 1962 as an outer port for Accra. The original layout of the Tema Port was composed of two breakwaters. A water basin, Quay No.1, and Quay No.2 were added between 1970 and 1975, completing the present port. Tema Port was one of the three integral components of the Volta River Project. The other two were the dam at Akosombo and the aluminium smelter at Tema. Tema Port is located about 30km east of Accra. About 80% of imported goods to Ghana is handled in Tema Port. The main commodities handled here are crude oil, clinker, oil products, rice, sugar, wheat, alumina, and aluminum. Recently the volume of container cargo has been increasing.

7.2 Existing Port Facility and its Physical Conditions

Main port facilities are shown in Table 7.2.1. There are 7 berths in Quay No.1 and 5 berths in Quay No.2. In addition, Oil Berth and Valco Berth are located along Lee Breakwater. Out of the 14 berths, 13 are used for cargo handling. Berth No.3 is used for tugboats and other small working vessels.

Berths in Quay No.1 are mainly used by general cargo vessels except Berth No.11 and Berth No. 12. Berth No.11 is mainly used by container vessels and Berth No.12 is mainly used by bulk carriers for import of clinker. Berths in Quay No.2 are mainly used by container vessels, Ro/Ro vessels and semi-container vessels.

The existing port layout plan of the Tema Port is shown in Fig. 7.2.1.

Table 7.2.1 Main Facility of Tema Port

(Breakwater, Berth)

Area	Facilities	Dimensions	Main Vessel Type
	Main Breakwater	L=1,905m	
	Lee Breakwater	L=1,100m	
	Channel	W=240m, D=10.6m	
Quay 1	Berth No.6	L=183m, D=7.2m	GC, CM
	Berth No.7	L=183m, D=7.25m	GC, CM
	Berth No.8	L=183m, D=7.25m	GC, TK
	Berth No.9	L=183m, D=7.25m	GC
	Berth No.10	L=183m, D=7.4m	GC, CO
	Berth No.11	L=183m, D=7.6m	CO, CM, RO
	Berth No.12	L=183m, D=7.65m	BU
Quay 2	Berth No.1	L=183m, D=9.6m	CO, CM, GC
	Berth No.2	L=183m, D=8.5m	RO, CO, GC
	Berth No.3	L=183m, D=7.6m	TG
	Berth No.4	L=183m, D=7.8m	GC, CO, CM
	Berth No.5	L=183m, D=7.8m	GC, RO
Water Basin	Valco Berth	L=183m, D=9.6m	GC, BU, CM
	Oil Berth	L=175m, D=9.8m	TK
	No.3 South Buoy	L=131m, D=9.8m	
	No.4 South Buoy	L=153m, D=9.8m	
	No.1 Buoy	46m, 4.3m	
	No.2 Buoy	91m, 6.4m	

BU: Bulk carrier, CM: Conteiner/Multipurpose, CO: Container cellular,
GC: General cargo carrier, RO: RoRo vessel, TG: Tugbaot, TK: Tanker

(Storage Area)

Area	Facilities	Dimensions	Main use
Quay 1	Shed No.7	122m x 36m	General cargo
	Shed No.9	122m x 36m	General cargo
	Shed No.11	122m x 36m	General cargo
	CFS	122m x 26m	Container
	Container Yard		Container
Quay 2	Shed No.1	140m x 26m	General cargo
	Shed No.2	150m x 26m	General cargo
	Shed No.4	140m x 26m	General cargo
	Shed No.5	140m x 26m	General cargo
Backyard	Cocoa Shed No.1	120m x 52m	Cocoa
	Cocoa Shed No.2	120m x 52m	Cocoa
	Cocoa Shed No.3	120m x 52m	Cocoa
	Cocoa Shed No.4	120m x 52m	Cocoa
	Container Devanning Area		Container
	Open Storage Yard		Imported Car

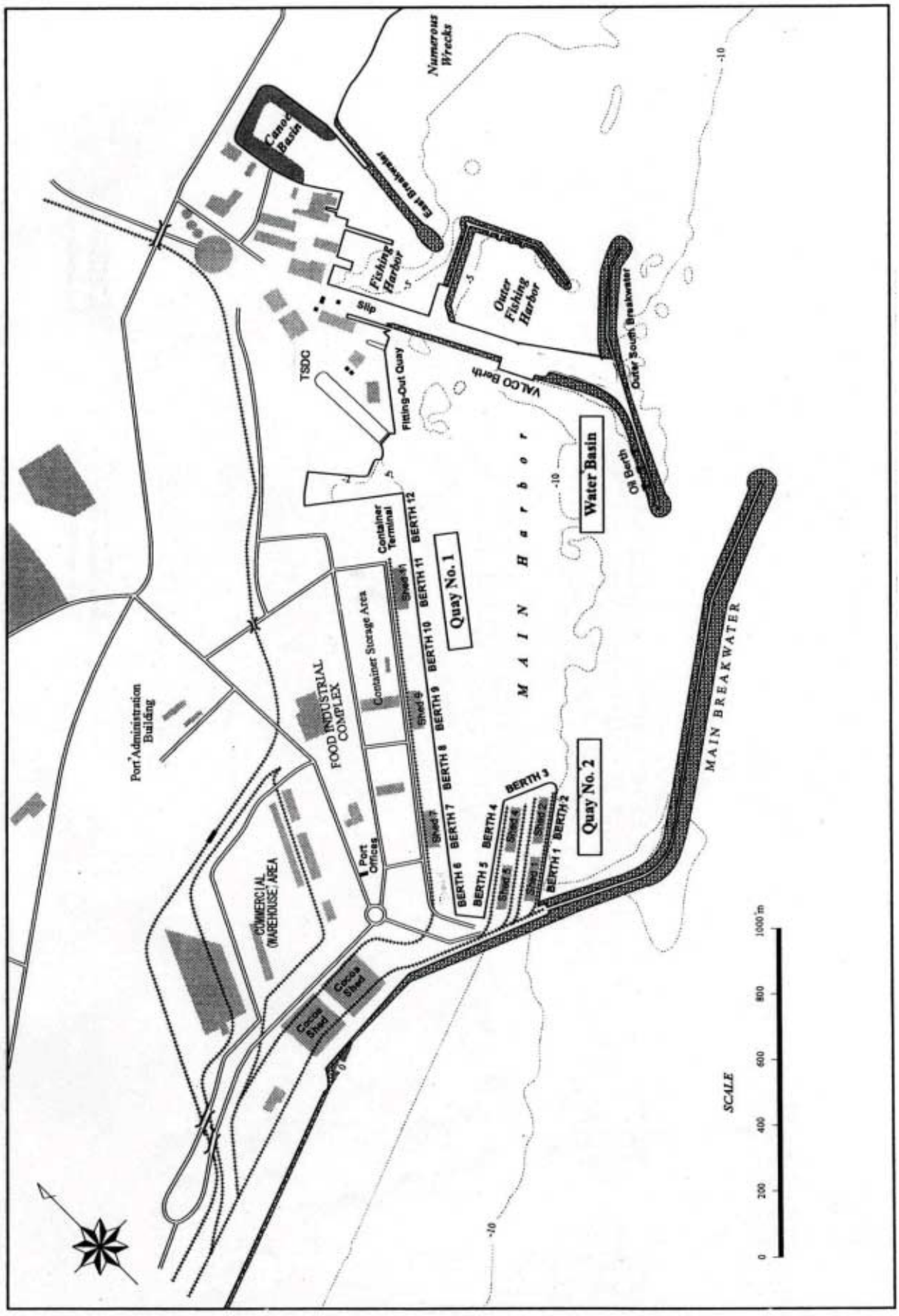

Fig. 7.2.1 Existing Port Layout (Tema Port)

7.3 Cargo Traffic

7.3.1 Cargo Traffic

Table 7.3.1 shows cargo handled at Tema Port from 1991 to 2000. Until 1999 cargo traffic of Tema Port had been increasing at the annual growth rate of 7.3%. Cargo traffic in 2000 decreased due to the recession of the Ghanaian economy. As Tema Port is located at Accra – Tema Metropolis and functions as a gateway to it, import cargo volume is always dominant to export cargo volume with a ratio of about 6 : 1.

Table 7.3.2 shows container traffic in TEU basis at Tema Port. In recent years container traffic has been increasing rapidly with an annual growth rate of 14%, although the year 2000 was an exception. Ratio between import and export of containerized cargo is 2.5 to 1.

Table 7.3.2 Container Cargo at Tema Port

(TEUs)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
IMPORT	**35,071**	**42,433**	**48,183**	**45,047**	**54,163**	**67,011**	**74,229**	**87,289**	**104,828**	**88,485**
full	33,472	39,182	43,832	39,823	49,918	60,695	68,359	81,104	99,089	83,224
empty	1,599	3,251	4,351	5,224	4,245	6,316	5,870	6,185	5,739	5,261
EXPORT	**35,652**	**42,696**	**45,040**	**43,487**	**48,646**	**58,631**	**66,031**	**82,398**	**93,072**	**80,125**
full	8,187	12,138	11,222	15,958	18,193	22,550	24,533	27,192	30,836	28,105
empty	27,465	30,558	33,818	27,529	30,453	36,081	41,498	55,206	62,236	52,020
TOTAL	**70,723**	**85,129**	**93,223**	**88,534**	**102,809**	**125,642**	**140,260**	**169,687**	**197,900**	**168,610**
full	41,659	51,320	55,054	55,781	68,111	83,245	92,892	108,296	129,925	111,329
empty	29,064	33,809	38,169	32,753	34,698	42,397	47,368	61,391	67,975	57,281

Source: GPHA

Table 7.3.1 Cargo Traffic at Tema Port

IMPORT	Code	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CEMENT	BC	9,125	2,268	10,315	300	1,377	3,072	50	48,920	1,001	1,000
FERTILIZER	BC	2,904	33,547	13,866	15,249	26,068	39,270	33,426	58,943	21,726	36,332
GRAIN (CORN)	BC	2,028	1,975	612		2,507	1,975	36,229	3,390	4,225	0
MALT	BC	3,075	3,312	2,502	2,422	2,915	4,784	2,595	1,239	400	0
OTHER	BC	10,439	13,580	15,925	4,947	5,927	1,577	8,324	6,244	11,711	53,703
RICE	BC	8,970	224,527	244,365	154,046	175,031	192,137	186,290	270,205	277,609	231,289
SOYA MEAL	BC	2,283	2,303	847	3,165	1,776	1,482	425	-	2,014	1,127
SUGAR	BC	86,032	92,069	109,493	100,130	111,244	127,321	99,425	189,933	212,806	190,941
WHEAT	BC	3,121	1,103	2,087	887	89	20,239	1,630	1,319	1,986	2,160
CONTAINER CARGO	CT	397,663	441,871	446,968	405,640	514,800	625,353	701,945	899,942	1,001,934	915,515
ALUMINA	DB	365,906	330,024	368,856	275,222	258,228	253,761	323,285	84,963	186,972	282,120
CEMENT	DB	-	-	-	-	-	-	190	3,228	6,615	-
CLINKER	DB	470,277	626,227	767,163	794,735	1,032,074	981,033	977,691	883,661	985,067	922,457
COKE	DB	63,123	78,149	67,298	55,264	52,516	53,480	61,078	32,641	76,871	62,057
GRAIN (CORN)	DB	-	11,974	8,023	-	8,950	-	22,981	3,000	-	14,375
GYPSUM	DB	-	16,229	31,963	32,000	-	49,416	44,800	41,315	48,049	78,551
OTHER	DB	-	-	-	-	21,491	28,281	31,038	49,200	55,738	27,876
PITCH	DB	18,647	18,502	18,289	22,484	15,494	17,674	18,017	11,152	12,089	18,068
WHEAT	DB	143,732	70,899	144,097	109,370	177,139	114,105	150,159	216,244	189,224	144,380
CARS	GC	10,913	15,964	12,236	10,127	10,807	15,351	15,261	12,427	20,445	15,471
CHEMICALS	GC	27,683	19,435	30,926	16,729	23,261	21,589	19,254	22,986	24,839	15,595
MACH/EQUIPM.	GC	12,394	4,281	6,077	7,600	7,732	8,137	11,120	6,922	8,083	10,061
OTHER	GC	44,519	46,328	67,359	34,557	72,152	88,775	80,508	25,838	37,121	23,564
PAPER REELS	GC	43,803	26,615	13,677	18,514	20,589	23,232	20,095	23,317	15,930	24,056
PLATES	GC	14,117	21,761	36,583	21,695	28,725	30,643	31,915	40,890	31,980	31,477
RODS/PIPES	GC	12,557	19,500	11,562	6,147	16,072	22,975	23,034	28,052	68,533	59,965
STEEL/WIRE COILS	GC	18,519	18,735	10,746	21,216	17,791	13,638	16,240	22,715	23,939	27,642
VALCO	GC	27,573	55,271	36,887	29,490	21,672	27,232	27,813	23,651	17,076	17,603
VEHICLES	GC	12,101	22,911	27,528	28,618	27,847	37,338	43,121	39,631	26,298	24,471
CHEMICALS	LB	923,318	10,194	14,162	13,877	28,658	17,377	22,571	8,919	8,725	3,489
CRUDE OIL	LB	165,112	755,371	519,976	979,643	832,775	942,298	265,467	766,106	1,101,503	1,189,980
PETROL PRODUCTS	LB	168,901	133,524	488,943	297,496	414,120	427,145	1,150,535	889,416	923,207	808,700
TOTAL IMPORTS		**3,068,835**	**3,118,449**	**3,529,331**	**3,461,570**	**3,929,827**	**4,190,690**	**4,426,512**	**4,716,409**	**5,403,716**	**5,234,025**
EXPORT	**Code**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2,000**
COCOA BEANS	BC	74,901	48,092	69,507	60,226	34,926	50,227	20,344	32,619	13,509	56,991
COFFEE	BC										0
OTHER	BC	5,994	9,449	11,714	22,130	5,787	8,932	20,336	7,103	10,866	4,043
SHEANUTS	BC	3,197	4,655	3,443	2,135	4,038	10,342	16,878	18,683	26,430	3,637
CONTAINER CARGO	CT	103,904	152,625	137,136	189,033	221,144	272,797	292,592	320,837	361,035	379,442
BULK SHEANUTS	DB										26,792
COTTON SEEDS	DB										8,550
CASSAVA CHIPS	DB										5,896
OTHER	DB										204
LOGS	FP										25
OTHER (e.g. CURLS)	FP		2,189	5,754	8,554	11,382		60	95	157	332
SAWN TIMBER	FP				172	1,346	222	305	4	277	279
ALUMINIUM	GC	177,369	73,119	-	94,351	111,499	111,051	88,395	50,215	110,128	136,149
CARS	GC	56	34	52	24	15	33	34	24	20	179
COCOA PRODUCTS	GC		1,200	3,619	1,687	3,140	952	2,723	3,880	1,210	0
LOCAL FOOD STUFF	GC					6,061	28,990	20,571	8,475	16,027	17,644
OTHER	GC	14,175	8,976	17,022	33,080	17,148	18,454	20,113	25,994	34,098	15,707
VALCO	GC		145,727	162,715	31,926	9,633		22,450	9,336	18,449	0
VEHICLES	GC	509	176	140	340	64	115	121	343	190	1,649
CHEMICALS	LB	988	1,544	2,000		1,099	4,342	5,200	-	-	9,508
PETROL PRODUCTS	LB	197,082	343,426	187,771	185,017	254,335	182,786	231,951	223,095	372,427	282,200
TOTAL EXPORTS		**578,175**	**791,212**	**600,873**	**628,675**	**681,617**	**689,243**	**742,073**	**700,703**	**964,823**	**949,227**
TOTAL IMPORT+EXPORT		**3,647,010**	**3,909,661**	**4,130,204**	**4,090,245**	**4,611,444**	**4,879,933**	**5,168,585**	**5,417,112**	**6,368,539**	**6,183,252**

Source: GPHA

7.3.2 Physical Distribution of Port Cargoes

According to the manifest of Tema Port on July/2000, the origin ports of imported container cargoes cover more than 80 countries in the world. The ports in Western Europe share 41 % of these cargoes. The ports in Asia-Australia area including Japan account for 26 % of the total. (See, Table 7.3.2.1) These imported general cargoes are distributed in Ghana locally. Around 80 % of these cargoes are destined to Greater Accra. Some imported cargoes in Tema Port are transited/transshipped to West African countries. Referring to the Tema Port statistics, transit cargoes in the year 2000 increased sharply. It is said that the transit cargo to the landlocked countries via Tema Port will increase in the future.

Exported cargoes are widely distributed to 42 countries in the world. European countries share more than 50 % of the total. African countries such as Nigeria, Liberia, Cote d'voire and Togo occupy 17.8 % next to European countries.

According to the above manifest, commodities of imported containers include many kind of daily necessities such as clothes, imported food stuffs, materials for housings, utensils, medicines, electric appliances etc. Ghana relies on the imported goods largely.

The contents of exported containers consist of major local products and are almost same as Takoradi Port excepting aluminium, vehicles, clothing and chemicals. Cargo types of these commodities shift increasingly from bagged cargo/break bulk cargo to container cargo.

Table 7.3.2.1 Origin Ports of Imported Containers
Tema Port

Destinations	Cargo Volume (MT)	Share (%)
Yokohama	4,909	10.05
Antwerp	4,383	8.97
Rotterdam	3,955	8.10
Felixstowe	3,494	7.15
Singapore	2,845	5.82
Pusan	2,361	4.83
Hamburg	2,282	4.67
Durban	2,203	4.51
Tilbury	2,070	4.24
Geneva	1,877	3.84
Shangai	1,441	2.95
New York	1,321	2.70
Hongkong	1,190	2.44
Barcelona	1,088	2.23
Amsterdam	1,028	2.10
Other	12,396	25.38
Total	48,843	100.00

Note: "Others" include 65 ports.

Source: Tema Port, Manifest/July 2000

7.4 Navigation and Calling Vessels

(1) Navigation

Pilotage is compulsory for all vessels expect those exempted by the Harbour Master. When vessels enter the port, a pilot is on board at 1.6 km east of the port entrance. With the pilot on board, vessels go west and enter the channel. Vessels that go to Berth No.1 and No.2 go directly to the berths. Vessels that go to Berth No.4 to No.9 turn north after entering the port and then turn west again and go to the berths. Vessels that go to Berth No.10 to No.12 turn north and go to the berths by drawing a semicircle. Vessels that go to Oil Berth turn sharply immediately after entering the port and go to the berth. Vessels that go to Valco Berth also turn northwest and go to the berth. When vessels depart the port, vessels turn around at the turning basin and then leave the port. The pilot leaves the vessel after she passes through the channel.

(2) Calling Vessels

Table 7.4.1 shows the number of vessels calling at Tema Port in the last 9 years. About 1,100 vessels call at the port annually.

Table 7.4.1 Number of Calling Ships by Type at Tema Port

SHIP TYPE		**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
CARGO	GC	344	322	292	221	226	289	376	313	283
RO-RO	RO	103	114	107	94	110	124	155	172	168
CONT. MULTIP.	CM	59	59	80	97	134	122	89	129	227
CONTAINER	CO	212	249	184	263	305	284	276	325	279
BULKCARRIERS	BU	83	93	94	106	115	108	78	74	76
OTHER	OT	55	75	81	102	137	87	53	85	−
TANKER	TK	57	110	96	110	100	107	68	82	122
TOTAL		**913**	**1,022**	**934**	**993**	**1,127**	**1,121**	**1,095**	**1,180**	**1,155**

Source: GPHA

7.5 Port Operation

7.5.1 Outline of Port Operations

(1) Determination of cargo handling system

(2) Documentation flow from/to the port

(3) Condition of cargo handling equipment

There are two quay side cranes of multi purpose type (capacity 40t/sling), which are located between Berth No.9 to 11, in the Quay 1 of Tema port. The cranes were procured using funds from the Japan Bank for International Cooperation (JBIC: former OECF) in 1989. One of the cranes is not in service due to a problem with the gear box. Spare parts are difficult to obtain because the crane is relatively old.

Approximately 44% of all handling equipment owned by GPHA at Tema Port requires repair and is not available for service. Among types of equipment, tractors and trailers appear to be in the worst state of disrepair as 52% of the total are not in service.

(4) Present Maintenance System

All preventive maintenance and most corrective maintenance of the equipment possessed by the port authority are carried out at the maintenance shop. There are 93 workers in the shop. The shop is equipped with two lathes, a shaping machine, a milling machine, a hack-sawing machine, two drilling machines, two bench grinding machines and so on.

(5) Working time

Refer to subsection 6.5.1 (5).

7.5.2 Cargo Handling System

(1) Container

In the case of Tema port, Full Container (CO), Semi Container (CM) and Ro-Ro (RO) type vessels transport more than 90% of total container traffic in the port. In particular, full container type (CO) vessels transport more than 60% of total container traffic. The container volumes handled by ship type are shown in Table 7.5.2. The above mentioned three types of vessels, which have deep draught, prefer to berth at Berth No.1 and No.2 of the southern side of Quay 2 because these berths are the deepest in Tema port (Depth of No.1 and No.2 is -9.6m and -8.5m respectively). These berths are congested at all times. Therefore vessels must frequently move to No.4 or No.5 (both -7.8m) of the northern side of Quay 2, or No.9 to No.11 (-7.25m to -7.60m) of Quay 1, after their draught is lessened.

(2) Bagged cargo

Flour and rice are imported as bagged cargoes in Tema port. The cargoes are discharged by using net sling or pallet by ship gears.

(3) Wheat

Wheat is imported as dry bulk in the port. Some semi type container vessels transport wheat as containerized cargo and bagged cargo. In the case of dry bulk wheat, the grain bulk might be handled by ship gears using grab bucket at the berth where the bagged cargo is discharged.

(4) Clinker

Clinker is imported as dry bulk in the port. The bulk vessels usually use Berth No.12 of Quay 1 where portable hoppers are set up.

(5) Cocoa

Cocoa is exported as containerized cargo or bagged cargo in the port. In the case of container transportation, the system is the same as the case of Takoradi port (refer to subsection 6.5.2).
Some cocoa cargo is transported as bagged cargo from the production area to general cargo vessels.

(6) Maize

Maize is imported as grain dry bulk. The bulk is lifted up by ship gears with grab bucket and is thrown down in the hopper which is installed on the portable bagging machine and bagged by it on the apron.

(7) Fertilizer

Fertilizer is imported as bagged cargo in the port. The handling system of the bagged fertilizer is the same as bagged rice, and that of the bulk fertilizer is the same as imported maize.

(8) Alumina

Alumina is imported as dry bulk cargo (as powder style) in the port. The cargo is handled by a private company, Volt Aluminum Company Limited (VALCO), and all the equipment for handling is owned by the company. The powder cargo is unloaded by pneumatic loader and transported to the private alumina terminal located outside the port area by belt conveyor and then carried to the factory through the dedicated industrial road.

(9) Labor formation of the above mentioned cargo handling systems

The labor formations of the above mentioned cargo handling systems are as follows:

i) Stevedoring work to Container: 8men, and to other cargo styles: 12 or 16men;

ii) Shore handling work (break bulk): 9men; and
iii) Cocoa handling: 17men/gang;

(10) Oil and Oil Products

Oil and oil products are handled as imported liquid bulk cargoes at the oil berth where is located near the fishing harbour. These cargoes are carried out using pipe line. However, there are no lightning systems to berthing at the oil berth, Oil handling vessels cannot accommodate to the oil berth in the nighttime

(11) Transit Cargo

At the Tema Port, there are many transit cargoes for Burkina Faso and Mari. These cargoes are handled at Shed 4. These transit cargoes in 2000 consisted of 2,819 TEUs of container cargo and 106,201 tons of general cargo, mainly bagged sugar, bagged flour, bagged rice.

7.5.3 Cargo Handling Productivity

Detailed crane/labor productivity of container handling of Tema port is shown in Table 7.5.4. Labor productivity by commodity is shown in Table 7.5.5.

Table 7.5.4 Ship Crane/Labor Productivity to Container of GPHA User Area of Tema Port in 2000

Productivity type	Vessel type	Unit of measure	Target in 2000	Actual				
				Annual av.	Jan~Mar.	Apr.~Jun	Jul.~Sep.	Oct.~Dec.
Crane productivity of discharging/loading	Full container (CO)	box/crane working hour	11	11	8	12	11	11
	Semi Container (CM)	box/crane working hour	8	6	5	8	8	6
	Ro-Ro (RO)	box/crane working hour	8	16	12	8	8	16
	General cargo (GC):	box/crane working hour	8	6	3	8	8	7
	Refer vessel (RE)	box/crane working hour	8	9	-	14	8	9
Labor productivity of discharging/loading		box/gross gang hour	10	10	-	-	-	-

Source: GPHA

Table 7.5.5 Labor Productivity by Commodity of GPHA User Area of Tema Port in 2000

Productivity type	Vessel type	Unit of measure	Target in 2000	Actual				
				Annual av.	Jan~Mar.	Apr.~Jun	Jul.~Sep.	Oct.~Dec.
Labor productivity of discharging	General cargo	tons/gross gang hour	15	24	2	19	17	15
	Bagged cargo	tons/gross gang hour	25	27	22	29	27	27
	Iron/Steel cargo	tons/gross gang hour	30	27	1	54	54	30
	Agricultural bulk	tons/gross gang hour	15	35	-	16	15	15
	Grain bulk	tons/gross gang hour	55	79	40	65	57	79
	Dry bulk (clinker)	tons/gross gang hour	250	233	82	284	275	245
	Machine/Equipment	tons/gross gang hour	30	68	37	83	46	68
	Vechicles	tons/gross gang hour	30	32	17	81	57	32

Source: GPHA

7.5.4 Customs Inspection

Most imported containers are opened at the container yard. The ratio of opened containers at the container yard in Tema Port is 60% to 70% of total containers (TEU) from 1994 to 1996. This is

one of the main reasons for the confusion in the container yard, which will worsen when the container cargo volume increases. Customs Exercise and Preventive Service (CEPS) in Ghana shifted its trade policy from pre-shipment inspection to destination inspection, i.e. inspection of imports at ports of import, as of April 1, 2000.

i) Computerized Risk Management System(CRMS)

By means of the Computerized Risk Management System (CRMS), information is allocated, assessed, and total risk is calculated and is evaluated to determine the risk level for each consignment.

ii) Transaction Price Data Base (TPD)

Transaction Price Data Base (TPD) assists CEPS to analyze prices accurately and timely. It will also be of use to Ghana in implementing the WTO Agreement on Customs Valuation (ACV).

iii) Container X-Ray Scanning System

Container X-Ray scanning system helps determine the contents of a container. By this CEPS is enable to quickly and reliably take a decision as to which container to hold or release without devanning.

Importers shall pay to the Government an Inspection fee of 1% of total dutiable CIF value of the goods to be imported at the same time when duties are being paid.

7.6 Engineering and Construction Aspects

(1) Structural Conditions of Port Main Facilities

The structural conditions of the port main facilities are summarized in Table 7.6.1, and typical sections of the main breakwater and berth are shown in Figure 7.6.1.

Table 7.6.1 Structural Conditions of Port Main Facilities (Tema Port)

Facility	Structural Type	Present Conditions	Remarks
1. Breakwaters -Main Breakwater	Rubble Mound (Partly wave and spray walls are provided)	Functional but a periodical repair is required to maintain slopes. Considerable damages on wave/ spray walls are observed at several locations, requiring repairs.	Armor rock sizes be examined.
-Lee Breakwater	Rubble Mound	No serious damage is seen., generally in good condition. The slope around the round-head area has become steeper than design.	
2. Quay No.1 -Berth 6~12	Precast concrete block	Generally in good condition.	
3. Quay No.2 -Berth 1~5	Precast concrete block	No significant deterioration or damage is observed. Along the southern side of the quay reinforcing works for Quay 2 Extension Work is being done.	Details of the reinforcement work be required.
4. Basin -Oil Berth	Concrete block dolphin	Generally in good condition.	
-Valco Berth	Concrete block	In good condition.	
5. On-land Facilities -Buildings and Sheds	Steel frame and concrete block	Maintenance is regularly being done thus generally in good condition. Cocoa sheds are planned to be demolished in future.	
-Yard and Paving	Concrete block paving (Quay1), concrete paving and asphalt	Concrete block pavement is generally in good condition. Paving at Quay 2 needs to be repaired.	

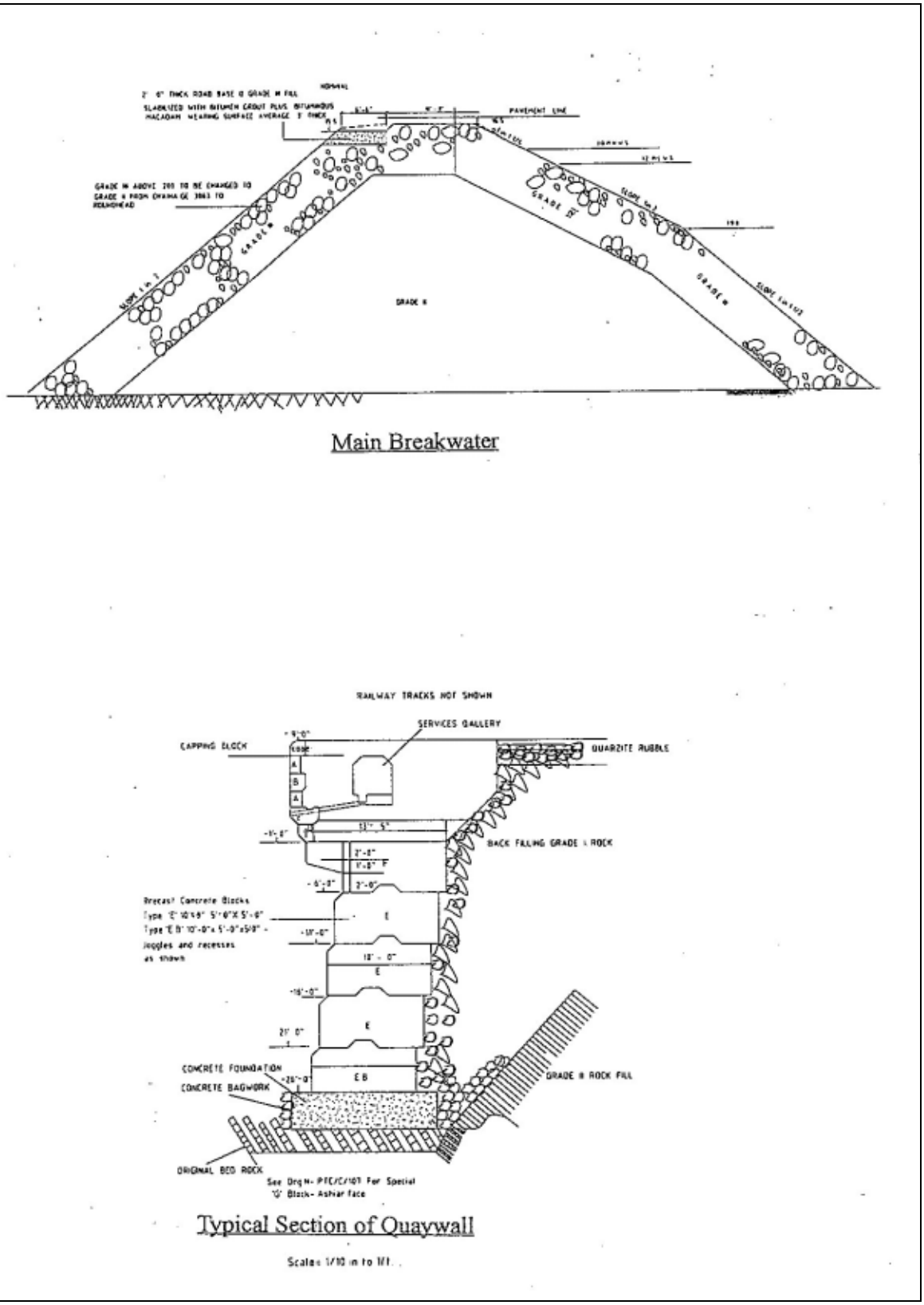

Figure 7.6.1 Typical Sections of Port Main Facilities

(2) Construction Materials and Equipment

1) Construction Materials

Locally available construction materials are limited as described in the previous Chapter. In Tema area a several grade of ready-mixed concrete is available from GHANA CEMENT FACTORY (GHACEM), as well as asphalt materials commercially.

Rock materials for use as armour rock, road subbase/ base materials and structural concrete works may be obtained from quarries exploiting various outcrops of Dahomeyan garnet hornblende gneisses along the Tema-Akosombo Road (Shai Hills). The haulage distances are of the order of 30 km on the average.

Natural gravel may be obtained from the natural gravel pit located at Mobole or Odumse with its hauliing distance of 20 km and 24 km respectively, and sand pits are available at the locations at Ayikuma and Akuse with the hauling distances of 40 km and 60 km respectively.

2) Construction Equipment

Similar to the Takoradi area, most of the construction equipment for on-land works are available with more advantages than Takoradi since major construction contractors and leasing companies are located in Tema and Accra.. No heavy floating equipment for use of marine works is available.

3) Unit Prices of Workers, Construction Materials and Equipment

Unit prices of locally available workers, construction materials and equipment are indicated in Tables 7.6.2, 7.6.3 and 7.6.4 respectively. There is no significant differences in the prices between Tema and Takoradi areas other than a few materials whose manufacturing base is located in the vicinity of Tema.

Table 7.6.2 Construction Workers Wage (Base Wage)

Classification	Unit	Cedi	USD	Remarks
Foreman	per day	12,850	1.92	
Technician	per day	12,250	1.83	Grade1
Electrician	per day	12,250	1.83	
Operator, heavy	per day	11,600	1.73	Grade2
Driver, dump truck	per day	10,100	1.51	
Driver, ordinary	per day	10,400	1.55	
Carpenter	per day	11,600	1.73	
Form worker	per day	11,600	1.73	Grade2
Mason	per day	11,600	1.73	Grade2
Plumber	per day	11,600	1.73	Grade2
Painter	per day	11,600	1.73	Grade2
Welder	per day	11,600	1.73	Grade2
Skilled worker	per day	10,100	1.51	
Seme-skilled worker	per day	9,750	1.46	
Common labor	per day	9,450	1.41	

Table 7.6.3 Unit Costs of Construction Materials

	Unit	Cedi	USD	Remarks
Gasoline	liter	1420	0.21	
Diesel Oil	liter	1325	0.2	
Electricity	kwh	85	-	
Asphalt (MC2)	ton	1,959,500	292.5	
Asphalt (S125)	ton	1,729,000	258.0	
Sand (Quarry sand)	m^3	22,000	3.2	
Sand	m^3	27,000	4.0	
Gravel (Natural)	m^3	33,300	4.9	
Coarse aggregate	m^3	66,000	9.9	
Crushed stone for subbase	m^3	41,000	6.1	
Crushed stone for base course	m^3	45,000	6.7	
Rubble stone (50kg-500kg)	m^3	50,000	7.5	
Rubble Stone (1,000kg)	m^3	60,000	9.0	
Portland cement	ton	500,000	74.6	
Ready-mixed concrete	m^3	420,000	62.7	
Reinforcing bar (Mild steel rod)	ton	2,400,000	358.2	
Welded wire mesh	M^2	90,000	13.4	
Timber,plank	m^3	944,000	140.9	
Timber,square	m^3	944,000	140.9	
Plywood (12.5mmTHK)	m^2	27,200	4.1	

Table 7.6.4 Costs of Construction Equipment

Equipment	Capacity	Cedi/day	USD/day	Remarks
Bulldozer	0.7D	3,500,000	522.4	
Backhoe	0.7m^3	3,500,000	522.4	
Trailer truck	20 ton	2,500,000	373.1	
Payloader	125 HP	2,000,000	298.5	
Excavator	0.6m^3	3,500,000	522.4	
Macadam roller	10-15 ton	1,600,000	238.8	
Tire roller	8-15 ton	1,600,000	238.8	
Motor grader	3.7m	7,000,000	1044.8	
Vibro-roller	1 ton	2,000,000	298.5	
Truck	6 ton	2,000,000	298.5	
Truck	11 ton	2,600,000	388.1	
Dump truck	11 ton	2,600,000	388.1	
Tire-mounted crane	30 ton	9,600,000	1432.8	
Asphalt distributor	1-1.5m	2,600,000	388.1	
Asphalt finisher	1.6-3.0m	2,600,000	388.1	
Concrete finisher	3-4.5m	-	-	
Concrete mixer	0.5m^3	300,000	44.8	
Microbus	15 persons	300,000	44.8	
Off-road car	2,500cc	450,000	67.2	
Light vehicle		270,000	40.3	
Diesel generator	250KVA	250,000	37.3	
Compressor	2.0m^3/min	200,000	29.9	

Note: Fuel cost not included.

7.7 Bottlenecks of Tema Port

(1) Shortage/Lack of Deep Berths

- Insufficient draft of berths prevents vessels from calling Tema Port with full draft. Full drafts of three quarters of total vessels are estimated to have full draft that exceed 9.6m, which is the draft of the deepest berth.

Table 7.7.1 Distribution of Vessels' DWT at Tema Port in 2000

DWT	CO	RO	CM	BU	Total
More than 50,001		2		3	5
40,001 - 50,000		14		26	40
30,001 - 40,000	43	16	13	14	86
18,001 - 30,000	145	107	93	16	361
Less than 18,000	62	15	62	11	150
Total	250	154	168	70	642

Source: Study team

- Shortage of deep berths forces vessels to wait long time to berth them and to move to shallow berths when vessels' drafts become less.

(2) Space Restriction

- Narrow apron and limited space for cargo handling hamper efficient handling.
- Shortage of container yards, especially yards close to berths and separation of them prevent from efficient operation.
- Shortage of parking space for trucks and number of gates and insufficient gate operation causes long queue of trucks and make port area more congested.

(3) Low Productivity of Cargo Handling

- Shortage of workable cargo handling equipment is one of main reasons of low productivity.
- Because of Lack of shore cranes cargo handling productivity is limited to the permissible limits of ship gears, some of which are very slow.
- Direct loading/unloading between vessels and trucks is another reason of low productivity for break-bulk cargo.
- Customs physical inspection in port area causes delay of cargo movement and request for strict and detailed documentation requires long time for documentation clearance.
- Lack of container yard storage planning causes low productivity of yard operation.

Table 7.7.2 shows the gross productivity of cargo handling by commodity at Tema Port in 2000.

(4) Restriction of Night Navigation

- Night navigation is restricted for vessels to/from Oil Berth and Valco Berth as explained in chapter 7.4.2, which causes additional cost.

(5) Institutional Matters

- Lack of practical competition on port operation and vague responsibility demarcation system between the port authority and port users make the responsibility for cargo handling ambiguous and weakens initiative of the both sides to improve operation.

Table 7.7.2 Gross Cargo Handling Productivity at Tema Port in 2000

Commodity	L/D	Type	Productivity	Unit	Remark
Cocoa beans	L	BC	35.8	t/hour/vessel	
Rice	D	BC	43.8	t/hour/vessel	
Sugar	D	BC	60.1	t/hour/vessel	
Container	L/D	CO	15.6	box/hour/vessel	CO Vessel
Alumina	D	DB	211.2	t/hour/vessel	
Bulk sheanuts	L	DB	26.7	t/hour/vessel	
Clinker	D	DB	299.3	t/hour/vessel	
Cocoa beans	L	DB	36.1	t/hour/vessel	
Gypsum	D	DB	289.5	t/hour/vessel	
Wheat	D	DB	67.8	t/hour/vessel	
Aluminum	L	GC	83.5	t/hour/vessel	
Gen. Valco	D	GC	125.4	t/hour/vessel	
Crude Oil	D	LB	2114.3	t/hour/vessel	
Gas Oil	D	LB	602.4	t/hour/vessel	
LPG	D	LB	219.5	t/hour/vessel	
Naptha	L	LB	281.1	t/hour/vessel	
RoRo Cargo	L/D	RO	121.5	t/hour/vessel	Berth No.2

Note: Based on data from Jan. to Nov. in 2000

Source: Study team

Chapter 8 Financial Situation

8.1 Present Financial Situation

The Ghana Ports and Harbours Authority (GPHA) was established in 1986 as a corporate body by P.N.D.C. law 160. The authority was charged with the responsibilities of planning, building, managing, maintaining, and operating all ports in Ghana. Upon its incorporation, the assets and liabilities of the erstwhile Ghana Ports Authority, Ghana Cargo Handling Company, and Takoradi Lighterage Company Limited were transferred to GPHA from July 1986.

There are four accounting units in Ghana Ports and Harbours Authority (GPHA).
1. Headquarters 2. Tema Port 3. Takoradi Port 4. Tema Fishing Harbour
The account of Headquarters is a consolidated one for all ports. Takoradi Port's account includes income/expenditure of Sekondi Fishing Harbour.

8.2 Tariff

Current port tariffs were prescribed in 1997. These tariffs have been applied to both Tema Port and Takoradi Port.

PART II DEVELOPMENT GUIDELINES

Chapter 9 Development Potential in Ghana

9.1 Development Policy in Ghana

9.1.1 Ghana Vision 2020

The National Development Policy Framework (NDPF) articulates the long-term, 25-year (1996-2020) perspective for Ghana's socio-economic development and represent GHANA - VISION 2020.

The basic objectives of the development agenda in Ghana are to reduce poverty, increase employment opportunity and average incomes, and reduce inequities in order to improve the general welfare and the material well-being of all Ghanaians.

The long-term development objectives have been formulated in accordance with the five basic themes of development. These development themes are:

(a) Human Development
(b) Economic Growth
(c) Rural Development
(d) Urban Development
(e) An Enabling Environment

9.1.2 Ghana Trade and Investment Gateway Project (GHATIG)

The Trade and Investment Gateway Programme is one of the programmes envisaged under Ghana Vision 2020. The Gateway Programme seeks to make Ghana the trade and investment gateway to West Africa and increase the participation of the private sector in the development of the national economy.

9.2 Future Trends in Major Sector Development

9.2.1 Agricultural Sector

(1) Vision 2020

Under Vision 2020, the agricultural sector was targeted to grow at an annual rate of 4%. The sector was also expected to ensure food security and adequate nutrition for all Ghanaians; to supply raw materials and other inputs to other sectors of the economy at efficient prices; to contribute to an improvement in balance of payments; and to provide producers with farm incomes comparable to earnings outside agriculture.

(2) Accelerated Agricultural Growth and Development Strategy (AAGDS)

The overall goal of AAGDS is to provide a framework within which agricultural development policies and programmes in support of Vision 2020 can be designed and implemented.
The policies and programmes designed to achieve the objective of the accelerated growth and

development strategy are based on five major elements:
(a) Promotion of selected products through improved access to markets
(b) Development and improved access to technology for sustainable natural resource management
(c) Improved access to agricultural financial services
(d) Improved rural infrastructure
(e) Enhanced human resource and institutional capacity.

9.2.2 Industrial Sector

Four years after the commencement of the Vision 2020 programme, the manufacturing sector, which is the leading sub-sector of the industrial sector, is yet to hit the targeted growth rate. For the economic growth of Ghana, the development of export-oriented industry and expansion of export market are indispensable due to the limited domestic market. The long-term objectives for industrial sector within the framework of the Vision 2020 are summarized below:

- Make Ghanaian manufactured products internationally competitive.
- Establish effective linkages between manufacturing, agriculture, education and services.
- Expand the range of manufactured goods to meet domestic demand and diversify exports.
- Ensure that all industrial operations are environmentally friendly.
- Secure increased domestic and foreign private investment in mining and expanded and diversified production of mineral products.
- Establish effective linkages between mining and quarry, manufacturing and construction.
- Establish an efficient and internationally competitive domestic construction industry.
- Maximize the use of local raw materials in the construction industry.

9.2.3 Services Sector

(1) Transport

Overall goal of the transport sector is to establish an integrated transport system for movement of goods and people at least cost, and to make Ghana easily accessible from outside.

(a) Railway Transportation

The main goal is to develop railway to provide a much safer and cheaper option for bulk haulage of goods for export and local distribution and support the development of mass transit systems in main cities.

(b) Road Transport

The development goal for road transport sub-sector is to provide a reliable road infrastructure network so as to ensure the availability of safe, reliable, efficient and effective transport services to meet the demand for socio-economic development.

(c) Sea transport
The goal is to develop adequate port infrastructure and management capacity in order to respond effectively to the demands of Ghana's captive trade and to attract transit and transshipment traffic

in the West African sub-region.

(d) Volta Lake Transport

The main development goal is to integrate Volta Lake transport into the national transportation system to meet the demand for reliable, efficient and economical transportation of bulk cargo between the Port of Tema and the Northern Regions of Ghana and attract transit cargo to Burkina Faso and other landlocked West African countries.

(e)Air Transport

The main development goal is to provide world class air transport facilities to meet the socio-economic demands for safe and reliable domestic and international transport services in a competitive environment.

(2) Telecommunications

The main development goal is to provide demand-responsive services that are well integrated into the world system so as to promote good governance, improve standard of living in Ghana and to enhance productivity and competitiveness of Businesses in Ghana.

(3) Tourism

The tourism sub-sector is very important for its contribution to the GDP and for the development of regional economy. The intensification of promotional activities by the Ghana Tourist Board over the past decade has made Ghana a more attractive tourist destination.

9.3 Potential Cargo Volume Growth in Ghana based on the Southeast Asian Experience

As part of its long-term vision, Ghana is aiming to become a middle-income country by the year 2020. Recently the southeast Asian region has developed rapidly. In particular, Malaysia, Indonesia, Philippines and Thailand, original members of ASEAN(Association of South East Asian Nations), have made remarkable progress.
The economies of these countries used to depend on the export of primary products. However the industrialization policy that these countries introduced in the 1960's eventually led to the influx of foreign capital in the 1980's. In this way economic growth has been realized.

ASEAN countries can serve as useful examples to in estimating the future cargo volume in Ghana.

9.3.1 Relation between GDP and Container Cargo Volume

According to the relation between GDP and container cargo volume in ASEAN countries, we can recognize that container cargo volume has a deep connection with GDP. It logically follows that future container cargo volume in Ghana will increase along with GDP.

9.3.2 Change of Industrial Structure

In the background of the ASEAN countries rapid economic growth a significant change in the industrial structure can be seen. Generally speaking, when industry and services gain ascendancy over the export of primary products, ports will experience a great increase in cargo handling volumes. This is because they will begin to import materials and export goods of local industry.

In ASEAN countries, it can be seen that growth of industrial and service sectors is remarkable while the share of the agricultural sector decreased.

In Ghana, however, agricultural sector forms about 40% of total industry in Ghana. That is, the economy of Ghana depends on the export of primary products.

Economies which depend on the export of primary products find it difficult to increase cargo flows and are less likely to sustain stable growth since they tend to be susceptible to influences from the world market.

Accordingly, the cargo handling volume in Ghana can be expected to increase when industry and services become the predominant sectors of the economy.

Chapter 10 Demand Forecast

10.1 Socio-economic Framework for the Target Year

(1) Population

Censuses have been carried out four times since Ghana's independence, that is in 1960, 1970, 1984 and 2000. The results of the census in 2000 have not been published but provisional results have been obtained. Table 10.1.1 shows the population trend of Ghana based on the past censuses.

Table 10.1.1 Population Trend of Ghana

Region / Year	**1960**	**1970**	**1984**	**2000**
Western	626,155	770,087	1,157,807	1,842,878
Central	752,392	890,135	1,142,335	1,580,047
GT. Accra	541,933	851,614	1,431,099	2,909,643
Volta	777,285	947,268	1,211,907	1,612,299
Eastern	1,044,080	1,261,661	1,680,890	2,108,852
Ashanti	1,109,133	1,481,698	2,090,100	3,187,601
Brong Ahafo	587,920	766,509	1,206,608	1,824,822
Northern	532,573	727,618	1,164,583	1,854,994
Upper East	468,638	542,858	772,744	917,251
Upper West	288,706	319,865	438,008	573,860
All Regions	6,728,815	8,559,313	12,296,081	18,412,247
Annual growth rate		2.41%	2.59%	2.52%

Although decreasing the population growth rate will take a long time since a decline in the birth rate will also be accompanied by a decline in the infant mortality rate and an increase in life expectancy, it is important to pursue the target of Ghana Vision 2020 to increase living standards. In Ghana Vision 2020, the average annual growth rate from 2000 to 2010 is set at 2.4% and that of from 2010 to 2020 is set at 2.1%. Table 10.1.2 shows the projected population based on these annual growth rates.

Table 10.1.2 Projected Population

Year	2000	2010	2020
Population	18,412,247	23,317,513	28,788,268
Annual Growth Rate	—	2.4%	2.1%

The future population of the regions has been projected using the ratio method adopted in the population projection study conducted by the Central Bureau of Statistics. The result of the regional population projections are shown in Table 10.1.3.

Table 10.1.3 Projected Distribution of Regional Population

Regions	2000 (Census)		2000 - 2010	2010		2020	
	Regional Share	Regional Population	Initial Rate of Growth	Regional Share	Regional Population	Regional Share	Regional Population
Western	10.0	1,842,878	0.003559	10.3	2,396,096	10.3	2,958,268
Central	8.6	1,580,047	-0.004947	8.1	1,886,724	8.1	2,329,387
GT. Accra	15.8	2,909,643	0.015541	18.3	4,259,847	18.3	5,259,293
Volta	8.8	1,612,299	-0.007365	8.1	1,878,976	8.1	2,319,821
Eastern	11.5	2,108,852	-0.008374	10.4	2,432,779	10.4	3,003,557
Ashanti	17.3	3,187,601	0.000003	17.2	3,999,945	17.2	4,938,413
Brong Ahafo	9.9	1,824,822	0.000621	9.9	2,304,066	9.9	2,844,646
Northern	10.1	1,854,994	0.003869	10.4	2,419,304	10.4	2,986,921
Upper East	5.0	917,251	-0.008016	4.6	1,061,967	4.6	1,311,125
Upper West	3.1	573,860	-0.006032	2.9	677,810	2.9	836,837
All Regions	100.0	18,412,247		100.0	23,317,513	100.0	28,788,268

10.1.2 Gross Domestic Product (GDP)

Ghanaian economy has been growing steadily for two decades. Average annual growth rates of GDP at constant price are 4.8% from 1986 to 1990, 4.3% from 1991 to 1995 and 4.5% from 1996 to 1999 (refer to Table 10.1.5). However, the growth rate of GDP in 2000 deteriorated owing to external factors such as increase of oil price and decrease of cocoa price and gold price in the world market. This shows that Ghanaian economy is still vulnerable to external factors and the efforts to enhance the strength of the Ghanaian economy need to be continued.

Ghana Vision 2020 sets the target to achieve an average annual rate of economic growth of over 8% from 1995 to 2020. Although prospect of the Ghanaian economy is not clear, it might be take some years to escape from the unfavorable world economic conditions. The study team draws three scenarios of economic development, that is high growth case, low growth case and medium growth case. The study team has concluded that the medium growth case is the most realistic. Under this scenario, the Ghanaian economy will struggle with external factors in the half of this decade as efforts are made to change the economic structure while in the latter half of 2000's Ghanaian economy will grow more vigorously. In 2010's, the target growth rate will be achieved. The average annual growth rate of GDP during 2001 – 2010 is set at 5% and that of during 2011 – 2020 is set at 8% in the study. Table 10.1.4 shows the projected GDP at the target years.

Table 10.1.4 Projected GDP at Target Years (at constant 1993 prices)

(Billion of cedis)

	1999	2010	2020
GDP	4,956.9	8,373.0	18076.7
Average annual growth rate		5.0%	8.0%

10.1.3 Future Socio-economic Frame by Industrial Fields in Ghana

Based on the forecasts conducted by the various organizations and the past trends in Ghana, the future Socio-economic frame in Ghana will be determined by the Study Team as follows.

Table 10.1.13 Future Growth Rates in Each Industrial Field

(%)

	2000-2010	2011-2020
Agriculture	4.5	4.0
Industry	5.7	11.7
Services	5.0	8.0
Total	5.0	8.0

10.2 Demand Forecast

10.2.1 Premise

It is assumed that the seaports in Ghana will be attractive to the port users and be competitive with the major ports in the West Africa after the extension and improvement of seaports in Ghana. Port traffic between each port will be allocated.

10.2.2 Functional Allotment of Ghana Sea Ports

The following functions are expected for the Ghana sea ports.

- Tema Port functions as a distribution center for its hinterland including Greater Accra.
- The development of Tema Port promotes the new industrial zones adding to the existing industries.
- Since Ghana relies on the imported goods largely, Takoradi Port functions possibly as a distribution center for its hinterland consisting of Western Region, part of Ashante Region, part of Brong Ahafo, part of Northern Region and Upper West Region. Distribution of the population at the hinterlands of Tema and Takoradi are assumed as 60% and 40% respectively.
- The development of Takoradi Port could materialize the cheap and mass transportation of mining resources, and contribute to establish the international competitive position of Ghana's mining.
- The development of Takoradi Port promotes the new industrial zone in the future.

Based on the above concepts, cargoes are allocated for both ports considering the existing trend and the future distribution of population. Table 10.2.2.1 shows the results of the cargo allocation on the main commodities by port.

Table 10.2.2.1 Cargo Allocation by Port

(Unit: %)

Commodity	Im./Ex.	2000		2010		2020	
		Tema	Takoradi	Tema	Takoradi	Tema	Takoradi
Almina	Import	100	0	100	0	100	0
Bauxite	Export	0	100	0	100	0	100
Manganese	Export	0	100	0	100	0	100
Clinker, Gypsum	Import	59	41	56	44	56	44
Wheat	Import	59	41	60	40	60	40
Rice	Import	100	0	85	15	60	40
Grain (Corn)	Import	100	0	85	15	60	40
Other Grain	Import	100	0	85	15	60	40
Sugar	Import	100	0	85	15	60	40
Cocoa Beans	Export	47	53	30	70	30	70
Cocoa Products	Export	100	0	60	40	60	40
NTAP	Export			60	40	60	40
Fertilizer	Import	88	12	60	40	60	40
Wood Products	Export	1	99	0	100	0	100
Crude Oil, Petro-Products	Import	100	0	100	0	100	0
Containerized Cargo	Import	94	6	80	20	70	30
Containerized Cargo	Export	58	42	50	50	60	40

10.2.3 Summary of the Forecast

(1) Import/Export Cargo

Cargo demand forecast by cargo type, by port is shown in the following tables.

Table 10.2.2 Cargo Demand Forecast in Takoradi Port

Import

(Unit:MT)

Cargo Type	1999	2000	2010	2020
Dry Bulk	826,772	949,980	1,258,530	1,823,978
Clinker	737,652	755,525	991,760	1,458,160
Liquid Bulk	130,069	138,000	224,787	366,154
Bagged Cargo	11,844	6,925	51,839	106,104
General Cargo	116,145	27,590	222,250	682,675
Containerized Carg	69,419	60,712	509,022	2,366,337
Total	1,154,249	1,183,207	2,266,428	5,345,248

Export

(Unit:MT)

Cargo Type	1999	2000	2010	2020
Dry Bulk	1,011,939	1,403,756	2,000,000	2,500,000
Bauxite	355,255	439,813	1,000,000	1,500,000
Manganese	656,684	935,608	1,000,000	1,000,000
Liquid Bulk	2,744	0	0	0
Bagged Cargo	67,132	84,018	21,944	29,062
General Cargo	147,716	125,919	37,517	37,977
Containerized Carg	238,929	278,800	789,981	1,273,734
Total	1,468,460	1,892,493	2,849,442	3,840,773

Table 10.2.3 Cargo Demand Forecast in Tema Port

Import

(Unit:MT)

Cargo Type	1999	2000	2010	2020
Dry Bulk	1,560,625	1,652,557	2,157,747	3,426,302
Alumina	186,972	301,755	384,950	800,645
Clinker	985,067	972,772	1,262,240	1,855,840
Liquid Bulk	2,033,435	1,853,315	3,439,000	5,815,000
Crude Oil	1,101,503	1,000,000	2,575,500	4,357,500
Petrol Products	923,207	850,000	858,500	1,452,500
Bagged Cargo	533,478	537,552	211,967	159,370
General Cargo	274,244	235,135	898,900	1,432,697
Containerized Carg	1,001,934	833,529	2,063,039	4,776,202
Total	5,403,716	5,112,088	8,770,653	15,609,571

Export

(Unit:MT)

Cargo Type	1999	2000	2010	2020
Dry Bulk	0	0	0	0
Liquid Bulk	372,427	246,584	401,659	867,152
Bagged Cargo	50,805	104,370	26,891	26,161
General Cargo	180,556	156,230	106,734	103,908
Containerized Carg	361,035	382,371	820,835	1,728,055
Total	964,823	889,555	1,356,119	2,725,276

(2) Transit Cargo

Here, transit cargo is defined as the cargo received through the seaports of Ghana and transported to their West African destinations by road.

Although the seaports of Ghana locate at the shortest distance from the landlocked countries, they had never handle any transit cargo until 1996. It is said that this was due to the difference of traditions and languages etc. between Ghana and the landlocked countries. However, in the recent years, transit cargo increased sharply. This depends on the economical viewpoint.

Past performances of the transit cargo are shown in Table 10.2.3.3. According to the port statistics in Tema Port, bagged cargo consisting of flour, rice and sugar shares 68 % of the total. These commodities are necessary for subsistence in the landlocked countries. At present, containerization rate is only 25 %, but it will increase in the future.

Table 10.2.3.3 Transit Cargo-Tema Port

(Unit: MT)

Year	1997	1998	1999	2000
Transit Cargo	8,580	30,769	64,700	145,763*

** Estimate*

Transit cargoes depend on the GDP of the landlocked countries. As a result, the transit cargo volume handled at seaports in Ghana is estimated as shown in Table 10.2.3.4. and 10.2.3.5.

Table 10.2.3.4 Demand Forecast of Transit Cargo

(Unit: MT)

Year	2000	2010	2020
Transit Cargo	145,763	237,432	319,089

Table 10.2.3.5 Demand Forecast of Transit Cargo by Cargo Type, by Port

Year	2000	2010	2020
Transit Cargo Total (MT)	N.A	237,432	319,089
Tema	145,763	213,689	287,180
Takoradi	N.A	23,743	31,909
General Cargo (MT)	N.A	83,101	79,772
Tema	108,299	74,791	71,795
Takoradi	N.A	8,310	7,977
TEU NETWEIGHT (MT)	N.A	154,331	239,317
Tema	37,464	138,898	215,385
Takoradi	N.A	15,433	23,932
TEU	N.A	11,688	18,125
Tema	2,751	10,519	16,312
Takoradi	N.A	1,169	1,813

Note: Rates of containerization are 65 % at 2010 and 75 % at 2020 respectively. These rates are coincident with the import container rates of Tema. Ave. cargo volume per TEU is 13.6 ton based on the existing data. Empty container ratio is assumed to be 3%.

(3) Transshipment Cargo

Here, transshipment cargo is defined as the cargo received through the seaports of Ghana and shipped through the seaports of Ghana to their West African destinations.

Recently, transshipment cargo became to be handled at Tema Port. In 2000, transshipment cargoes at Tema were around 18,000 MT. Cargoes consist of Containers, Ro/Ro cargoes and general cargoes, but are shared by containers mostly.

According to the data of Ghana shippers' council, destinations of transshipment cargo are 9 countries. (1st half 2000) Cote d'Ivoire accounted for the largest portion of 63.9 %. Benin (10.1 %) was followed by Togo and Cameroon by 6.7 % and 4.0 % respectively. (Table 10.3.14) The cargoes for Togo and Benin are shared by road (transit cargo) and by sea (transshipment cargo).

Although the transshipment cargo is small volume in 2000, the transshipment cargo will be expected to increase in the future. The followings are advantages of the Ghana seaports.

- Ghana seaports locate at the center of the West African countries.
- Ghana seaports are linked with those countries by road as well as by sea.
- In 1990s, Ghana seaports handled TEUs with the annual growth rate of 14 % in average. The TEUs volume and growth rate are large next to Abidjan in West African ports.
- The two existing deep-water berths at Tema are being extended and dredged to 11.5m. This improvement makes the larger vessels' callings to Tema possible and strengthens the function as the transshipment hub port for the region.

Assuming that Ghana seaports will transship the container cargoes to Cotonou and Lome with 38 thousands TEUs and 32 thousands TEUs respectively in 2020, the transshipment cargo volume handled at Tema Port is estimated as shown in Table 10.2.3.6.

Table 10.2.3.6 Demand Forecast of Transshipment Cargo

(Unit:TEU)

Year	2000	2010	2020
TEU Total*	1,858	58,749	78,952
TEU Loaded	1,718	54,397	73,104
TEU Empty	140	4,352	5,848

* *Equivalent to TEU*

10.2.4 Containerization

(1) Import Container

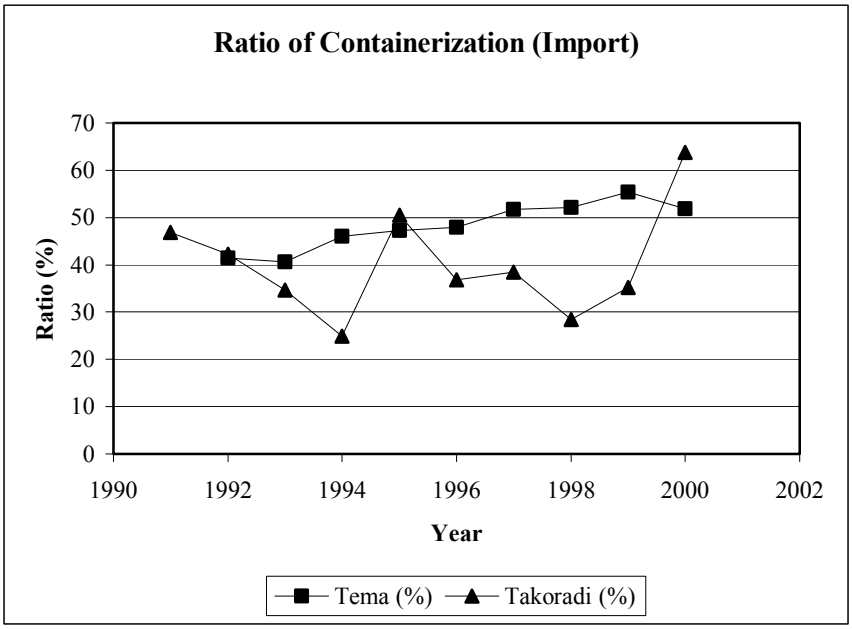

Figure 10.2.4.1 Performance of Containerization

Performances of containerization in 1990s are shown in Figure 10.2.4.1

Following table shows the forecast of containerization at each port.

Table 10.2.4.1 Containerization Rate (Import)

(Unit: %)

Port	2000	2010	2020
Tema	52	65	75
Takoradi	-	65	75

(2) Export Container

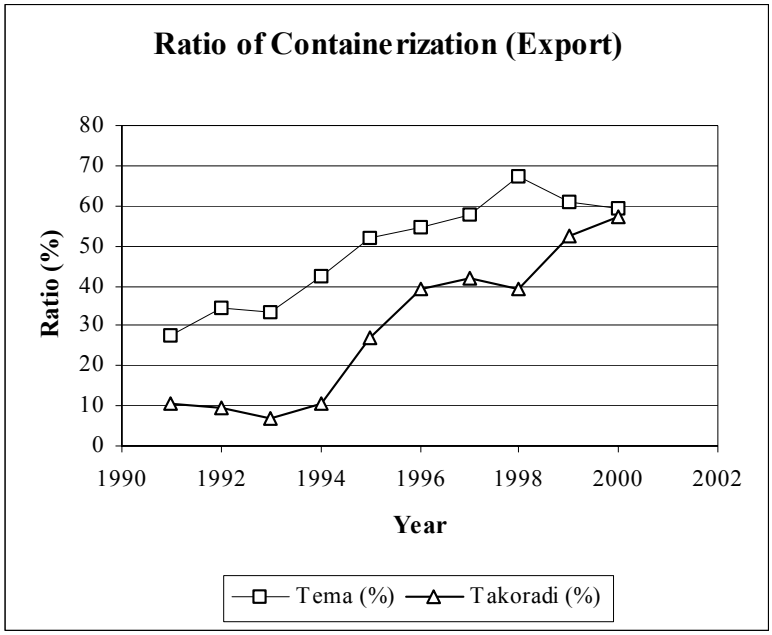

Figure 10.2.4.2 Performance of Containerization

Performances of containerization in 1990s are shown in Figure 10.2.4.2.

Following table shows the forecast of containerization at each port.

Table 10.2.4.2 Containerization Rate (Export)

(Unit: %)

Port	2000	2010	2020
Tema	76	86	93
Takoradi	60	93	95

(3) Future Container Cargo in Ghana seaports.

TEUs of future container cargo are summarized in the following table.

Table 10.2.4.3. Future Container Cargo in Ghana Seaports – TEUs

Tema Port

Year	Import			Export			Transit		Transshipment		Total	
	Loaded	Empty	Total	Loaded	Empty	Total	Loaded	Empty	Loaded	Empty	Loaded	Empty
2000	76,024	5,837	81,861	30,389	49,393	79,782	2,571	77	1,718	140	110,702	55,447
2010	192,807	9,640	202,447	67,282	146,000	213,282	10,213	306	54,397	4,352	324,699	160,298
2020	446,374	22,319	468,693	141,644	343,850	485,494	15,837	475	73,104	5,848	676,959	372,492

Takoradi Port

Year	Import			Export			Transit		Transshipment		Total	
	Loaded	Empty	Total	Loaded	Empty	Total	Loaded	Empty	Loaded	Empty	Loaded	Empty
2000	4,501	10,415	14,916	23,368	1,682	25,050	0	0	0	0	27,869	12,097
2010	41,384	25,510	66,894	63,708	4,390	68,098	1,135	34	0	0	106,227	29,934
2020	192,385	9,619	202,004	102,721	101,150	203,871	1,760	53	0	0	296,866	110,822

Chapter 11 Port Development Principle

11.1 Viability of a New Port Development

In the Final Report on the Special Assistance for Project Sustainability (SAPS) for Ports Rehabilitation Project[1], the SAPS Team recommended that a new master plan study be conducted in order to confirm that dredging the basin of the existing port is the best option among other alternative plans to provide deep water berthing facilities for container and bulk carriers. In this chapter, the viability of a new port development is examined.

Requirements of a new port are listed below.

① Deep berthing facilities for container and/or bulk carriers
② Close proximity to origins and destinations of cargoes in the case of container terminals
③ Berths that can be connected with production sites or storage areas by economical transport means such as belt conveyers and railways in the case of bulk terminals
④ Well linked with inland transportation modes
⑤ Accumulation of supporting services for maritime transport
⑥ No serious environmental problems

Possible sites for a new port are selected by considering the following points.

① Existence of calm water area such as coves
② Sites close to deep water areas (more than 12m deep under sea level)
③ Existence of enough space for development
④ Sites near to major consumption and production areas
⑤ Sites linked well with inland transportation facilities

Ada, Winneba, Apam and Dago from the west are selected as possible sites for a new port. Summary of evaluation is shown in Table 11.1.1. Winneba is the most favorable for a new port construction among 4 possible sites except the construction cost. As for Ada, breakwater is not necessary and dredging works is cheaper than other sites because seabed is sand. However, a huge amount of maintenance dredging would be necessitated.

The expansion of existing ports is more realistic than the development of a new port. This is because existing ports have enough space to handle future cargo forecasted up to the year 2020 and any evaluation item is favorable to existing ports. This means there is not any site that has topographical advantages to compensate for the reduced accessibility to major industrial and urban areas and the lack of facilities and services supporting port activity.

Even the construction cost is also favorable to existing ports. There is another reason that supports expansion of existing ports. Competition with foreign ports has become more and more severe and

[1] Final Report on The Special Assistance for Project Sustainability (SAPS) for Ports Rehabilitation Project in Republic of Ghana, SAPS Team for The Overseas Economic Cooperation Fund (OECF), February 1998

dispersion of port activities would weaken Ghanaian ports' competitiveness especially in the case of container ports. A new port development would be worth considering when development projects in the coastal area are planed such as large scale industrial area developments and construction of thermal power plants.

Table 11.1.1 Comparison of Possible Sites for a New Port Construction

Evaluation item	Ada	Winneba	Apam	Dago
Development space	1	3	3	2
Proximity to deep sea area	1	1	1	2
Proximity to OD of cargoes	1	2	2	1
Linkage to inland transport modes	2	1	2	2
Accumulation of supporting services	1	2	1	1
Environmental aspects	1	2	2	1
Natural conditions	1	2	2	1
Cost Index	1.0	1.5	1.6	1.3

Note: 3: Good, 2: Fair, 1: Poor

Cost consists of breakwater construction, capital dredging and reclamation

11.2 Ghana Sea Ports in West Africa

Table 11.2.1 shows the present situation of container terminals facilities in West Africa. In Abidjan to Douala range, Abidjan Port is the largest container port in terms of container traffic, followed by Tema Port and Douala Port.

Table 11.2.1 Container Ports in West Africa

Port	Nation	Traffic ('000TEUS)	Depth (m)	Length (m)	No. of Berths	Gantry Crane	Remarks
Dakar	Senegal	124.2	8-10.5	2,562	15	0	RO/RO Berth
Abidjan	Cote d'Ivoire	468.7	11.5-12.5	800	3	3	Channel: 10.5m deep
Tema	Ghana	197.9	7.6, 9.6	183, 366	2	0	Berth No.11, No.1/2
Takoradi	Ghana	37.8	8.0, 9.5	153, 225	2	0	Berth No.2, No.5/6
Lome	Togo	50.0	11.0	440	2	0	RO/RO Berth
Cotonou	Benin	59.6	11.0	220	1	0	
Lagos	Nigeria	3.2	11.5	1,005		3	
Douala	Cameroon	120.0	8.5	500	2	(2)	Channel: 5.1m deep
Cape Town	South Africa	325.3	14.1	1,371	5	3	
Durban	South Africa	985.9	12.8	1,583	6	12	

Note: Container traffic figures are from 1998 except Tema and Takoradi (1999) and Lagos (1997).

Source: Containerization International Year Book 2000, Lloyd's Ports in the World 2000, Shipping Statistics Yearbook 1999 and others

Table 11.2.2 shows the shipping loops for regular container, RORO and multipurpose vessels between West Africa and other regions operated by Delmas. Every loop calls at Abidjan Port while

almost every loop calls at Ghanaian ports and Lagos Port.

Table 11.2.2 Shipping Loop between West Africa and Other Regions by DELMAS

Loop	Vessel	Frequency	Abi.	Tak.	Tema	Lome	Coto.	Lag.	Dou.
West A – Europe	Container	1/7 days	○		○	○	○	○	F
West A – Europe	Container	1/11 days	○					○	
West A – Europe	RORO	1/8 days	○	○					○
West A – Europe	RORO	1/12.5 days	○	○	○			○	
West A – Asia	Multi.	1/10 days	○		○	○	○	○	○
West A – M East	Multi.	1/16 days	○	F	○	F	F	○	F

Note: ○ means vessels directly call at ports, F means feeder services

Source: Delmas

According to the sailing schedule of Maersk / Sealand, Abidjan has a favorable position in terms of trade with other regions. Abidjan Port is the first port of call in West Africa for vessels from other regions and the last port in West Africa for vessels to other regions.

It is clear that the strongest competitor of Ghana Sea Ports in container transshipment is Abidjan Port. Although Ghana Sea Ports should strive to become the leading container ports in the region and gateways to the landlocked countries, the Study Team thinks that over-zealous competition such as dumping of port charges for sake of acquiring transshipment container impedes sound port development. The purpose of Ghana Sea Port Development is not to make Ghana Sea Ports the hub of West Africa but to make Ghana Sea Port the most advanced container ports in West Africa in terms of facilities and management to facilitate captive container cargo transportation. Hub function will come naturally.

11.3 Development Principle of Ghana Sea Ports

At the beginning of 21st century, Ghana Sea Ports have been confronted with many difficulties. Among others, the main difficulties are as follows:

- Low productivity of cargo handling compared with international standards
- Lack of deep berths and yards for cargo handling

These are well recognized by GPHA and many effective measures have already been adopted. As a result, port performance has been improving. The efforts should be highly evaluated. However, despite these efforts cargo handling productivity is still low compared with international standards and together with the lack of deep berths and the shortage of yards many vessels have to wait for berthing for many hours and stay for long periods at the ports, and cargoes also have to dwell at ports for a long while.

GPHA might be losing cargoes and shippers and shipping companies are losing their money. However, hardest hit are Ghanaian people who have to pay more to buy goods and Ghanaian industries which lose competitiveness. These two difficulties are closely related with each other.

To solve these problems, fundamental countermeasures should be taken in addition to daily improvements.

There are three main reasons for these difficulties. One is that physical layouts of Ghana Sea Ports have become old-fashioned and not suitable to the recent trends and technological advancements in sea transportation such as containerization and utilization of large vessels. Another reason is that due to the rapid increase in cargo traffic, the demands on existing port space will reach beyond the port capacity in the near future. The other reason is the lack of practical competition on port management and operation and vague responsibility demarcation system between the port authority and port users, especially in cargo handling activities.

Although to settle these problems might necessitate enormous efforts, once Ghana Sea Ports have overcome them, Ghana Sea Ports have entered a new era and a new door to Ghana's future will have been opened. To resolve the present problems and meet increasing demand for handling conventional cargo and containerized cargo in the future, it is necessary to develop and modify Ghana Sea Ports into advanced ports.

Objectives of Development

- Enhancing the potential of container ports and becoming leading container ports in West Africa.
- Enhancing the potential of a bulk cargo distribution base for items such as clinker, manganese, bauxite, petroleum, alumina and wheat.
- Supporting agriculture by providing necessary facilities for import of fertilizer and export of crops.
- Supporting the EPZ and industrial estates by providing necessary facilities for import of materials and export of manufactured goods
- Providing necessary facilities for transportation of food and customer goods
- Becoming the most efficient port in West Africa and customer friendly port
- Providing employment opportunities in direct port services as well as numerous ancillary services
- Securing safe navigation in ports
- Becoming environment-friendly ports

11.4 Role Sharing between Tema Port and Takoradi Port

In 2000, Tema Port handled 82% of import cargo and 33% of export cargo in Ghana. As for containerized cargo, Tema handled 94% of import containerized cargo and 58% of export containerized cargo. Takoradi Port handled the remainder.

Thus, the characteristics of the two ports are different. This difference mainly comes from the different characteristics of their hinterlands such as population, geographical conditions, industrial conditions and infrastructure development situations. However, from the viewpoint of the national economy, severely imbalanced cargo flow is not desirable. To establish a rational physical distribution system it is necessary to balance cargo volumes between import and export in each port. For example, although most foodstuffs are imported at Tema Port, it would be rational for

Takoradi Port to import more foodstuffs given the size of its hinterland population of its hinterland. In formulating the master plans, rationalization of the national physical distribution has to be considered.

As explained in 11.2.2, the Study Team thinks that over-zealous competition such as dumping of port charges for the sake of acquiring transshipment container impedes sound port development. The purpose of Ghana Sea Port development is not to make Ghana Sea Ports the hub of West Africa but to create advanced container ports in West Africa. However, the function of Tema Port as a container port might be different from that of Takoradi Port. To compete with foreign container ports, the construction of deeper container berths at Tema Port seems to be a realistic strategy.

Chapter 12 EIA system in Ghana

The EIA system of Ghana launched in 1994 was reviewed. The EIA procedure in Ghana is shown in Figure 12.2.1. Since a full-scale EIA is mandatory for the proposed port development projects, items to be carried out for the proposed projects were identified as listed in Table 12.2.1.

Table 12.2.1 Environmental Assessment Procedure

Step	What is involved	Responsibility
Registration	Project proponent completes the registration forms obtained from the EPA. Information relating to the project, possible impacts, and proposed management measures are to be provided on the registration form.	Project proponent
Screening	Based on the information in the registration form the EPA determines whether or not an EIA needs to be undertaken.	EPA. Decision to be made within 25 days. Outcome of the screening process can be: - Objection to the undertaking - No objection to the undertaking - Preliminary Environmental Report (PER) required - EIA required If significant impacts are anticipated, an EIA is required and the following stages should be undertaken. An EIA results in the production of an Environmental Impact Statement (EIS).
Scoping study and TOR	First stage in the EIA process. Consultations are held with relevant government departments, NGOs and the public to identify potential concerns and impacts. This information is used as a basis for the Terms of Reference (TOR) for the EIA study.	Project proponent
Approval of the TOR	Project proponent submits a scoping report, which includes a draft TOR. 10 copies are submitted to the EPA.	EPA. Approval of the TOR is given within 25 days of receipt of the document.
Undertaking of the EIA and development of the EIS	EIS preparation is supposed to include a public information program. Public notice of the assessment process is to be issued by the project proponent through newspaper advertisements and/or posted in public places.	Project proponent.
EIS review	Proponent has to submit 12 copies of the EIS to the EPA. A 21 day public notice of the publication shall be served by EPA for public information and reaction through newspaper advertisement or posting in public places.	EPA. Comments from EPA are given within approximately 50 days.
Finalize EIS	Address comments received by EPA.	Project proponent.
Environmental Permit	Environmental Permit is issued.	EPA.

Figure 12.2.1 EIA Procedure in Ghana

Source: Environmental Assessment in Ghana. – A Guide -, EPA, 1996.