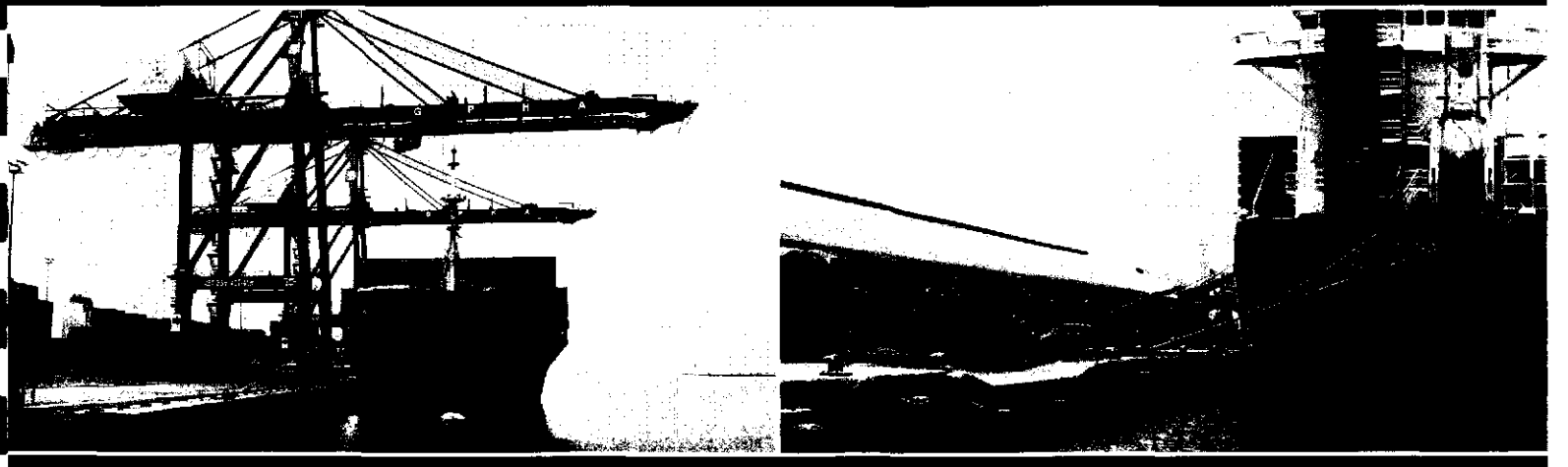
GHANA PORTS AND HARBOURS AUTHORITY

Feasibility Study for the Ghana Ports of Tema and Takoradi Master Plans

VOLUME 1

April 2010

Submitted by Halcrow Engineers, PC



Task 2: Analytical Assessment of Ghana Port Capabilites, Performance, and Market

Task 3: Review and Realignment of Ghana's Goals and Strategies

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VOLUME 1

Task 1: Analytical Assessment of Ghana Port Capabilities, Performance, and Market

Task 2: Review and Realignment of Ghana's Goals and Strategies

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TASK 1:

Chapter 1 - Introduction

This report constitutes the activities conducted as described in our proposal. It begins with an extensive review of the cargo handling operations at the ports, focusing exclusively on container handling in Tema and all cargo types in Takoradi. For Tema, we review operational performance, addressing berth occupancy rates, ship's average waiting time, and crane productivity. Our assessment extends to storage and gates as well. For Takoradi, we assess berth throughput and occupancy, ship's waiting time, and review the handling operations for Takoradi's most important cargoes, including manganese, cocoa beans, rice, wheat, and containers.

We then proceed to an assessment of the market and competition. In this discussion, we first review the shipping patterns as they are relevant to Ghana, particularly for the main carriers in the West Africa trades, including Maersk, CMA CGM, MSC, Mitsui OSK, Zim, and Grimaldi. We then review global trends in liner container handling and present the likely future shipping scenarios, focusing on the prospects for West Africa consolidation, increases in ship sizes, changes in fleet composition, and the transformation of the shipping system relevant to West Africa. From there, we then present shipping scenarios, referred to as "Direct Call", "Regional Hubs", "Global Hubs", and then formulate port scenarios for Ghana.

The shipping patterns analysis is followed with an evaluation of trends in Ghana and the presentation of forecast scenarios. Forecasts are presented Optimistic, Best-Estimate, and Pessimistic Scenarios for containers in Tema and for all cargo types in Takoradi through a 20-year planning horizon.

The review of shipping patterns, facilities, and markets is then used to generate a SWOT analysis. The analysis is presented in terms of four dimensions corresponding to the span of control available to GPHA and other port sector stakeholders over the variables affecting the ports in the future.

We conclude the report with a very preliminary assessment of GPHA's financial position. This is done in preparation for the more detailed financial feasibility assessment that has to be conducted later on in the project.

Chapter 2 - Port Operations and Facility Review

This chapter presents the results of a study of the cargo handling operations and facility review in the ports of Tema and Takoradi. The immediate objective is to evaluate operational performance, especially productivity and use of the main operations and facilities to identify those in need of improvement.

We cover here the main facilities and equipment, operations, and services for ship and cargo owners of Tema and Takoradi ports. The types of cargo addressed include dry bulk, liquid bulk, breakbulk, rolling, and containerized. The operational review of Tema Port focuses on containers. Container cargo in general is expected to undergo the fastest growth because of a combination of growth in foreign trade, conversion of breakbulk to containerized cargo, and changes in shipping patterns (as described later in this report). As a result, facilities for handling containers are likely to require the greatest investment. The review of Takoradi Port encompasses all forms of cargo, although the detailed analysis focuses only on those considered most critical: manganese, bagged cargo, and containers.

2.1 Methodology

2.1.1 PERFORMANCE INDICATORS

The methodology applied for the operational review was to define performance indicators, compile data and calculate their values, and assess the results, mainly by comparing them to international standards. The indicators selected relate to the two main port facilities, the berth and the container yard and storage, and the gate. The analysis is conducted from the point of view of the service provider, the port authority and port operators (both are referred to hereafter as Port), and the service receivers, the ship and cargo owners.

Before defining indicators and interpreting results, a general clarification is warranted about the inherent conflict between port performance and ship-level service indicators. The objective of the port is to maximize throughput. For berth and shore-based equipment (cranes), this can

be done by maximizing their use (occupancy) or the number of hours that the berths and cranes are involved in operations, and reducing the time they are idle, waiting for ships. A complementary way of achieving it is by increasing crane productivity.

The objective of ship owners is to minimize port time. This can be achieved by minimizing the waiting time for berths and by maximizing the number cranes working their ships, as well as by increasing crane productivity. Minimizing waiting time for berths though, means lowering berth use; maximizing the number of cranes means cutting the number of working hours per crane. There is an apparent conflict between the objectives of the port and ship owners, except for crane productivity—which both sides are interested in increasing. Our critical review of the operational performance of Ghana's port will take this unavoidable conflict into consideration.

2.1.2 SOURCES OF DATA

The main source of data is the Port's management information system (MIS). The data presented here are derived partially from reports produced by this MIS and partially from raw data. Another source of data is interviews with port staff, shipping lines, and MPS. Reference data are taken from previous studies conducted by our team, communication with ports, and a review of professional literature.

2.2 Tema Port

2.2.1 BERTH THROUGHPUT AND OCCUPANCY

Container Throughput per Berth

Our review of Tema addresses containers exclusively. Table 2-1 presents statistics on the throughput of each berth and the share of containerized throughput at the port of each berth. For the purpose of analyzing the throughput statistics, the berths of the main port are divided into three sections:

Berths 1 and 2, also referred to as Quay 2 South, the port section under concession to MPS, the deepest berth in Tema (at 13 meters) and the only ones equipped with shore-based gantry cranes;

Berths 3, 4, and 5, also referred to as Quay 2 North, located at the back of Quay 2 South; and

Berths 6–12, the rest of the port.

Table 2-1

Throughput of each Berth and its Share of Containerized Throughput at the Port

Berth	TEU	%
1	162,749	32.9
2	164,588	33.2
1, 2	327,337	66.1
3	36,216	7.3
4	29,055	5.9
5	8,921	1.8
3,4,5	74,191	15.0
6	2,237	0.5
7	17,470	3.5
8	26,276	5.3
9	24,279	4.9
10	17,943	3.6
11	5,694	1.1
12	-	0.0
6 - 12	93,899	19.0
All Berths	495,427	100.0

The first section of the main port, Quay 2 South, handled about 66 percent of throughput in 2007, with each berth handling about 160,000 TEU. Quay 2 South serves only specialized container ships – no Ro/Ro or other type of cargo. Quay 2 South is part of the new dedicated container terminal operated by MPS.

The second section, Quay 2 North, handled 15 percent of 2007's throughput, with each of the two outer berths, Berths 3 and 4, handling about 30,000 TEUs. Quay 2 North handles container ships as well as ro/ro and general cargo (e.g. bagged imports) vessels. The container ships handled in Quay 2 North are also usually smaller than those handled at Quay 2 South because of the shallower draft there of 10.5 meters (compared to 13 meters at Quay 2 South). The inner berth, Berth 5, is more difficult to reach and can handle only smaller ships and therefore is only rarely used for containers.

The third section of the main ports includes Berths 6–12, all of which are multipurpose berths. These berths handled 19 percent of the port's total 2007 container throughput, with Berths 8 and 9, the most active, handling about 25,000 TEUs each. This section of the port is even shallower than Quay 2 North, with drafts ranging from 7 meters to 9 meters, and handles mainly small container ships. Berth 12, which were rehabilitated mainly for handling containers, did not handle any containers in 2007 but were used mainly by clinker ships.

The Port plans to improve Berths 10, 11, and 12, which includes rehabilitating the dock structures, increasing the depth alongside the berths, and installation of mobile harbor cranes and in the long term, STSs.

Berth Occupancy

Berth occupancy is usually measured by the proportion of time that a ship is moored at this berth (working or idle) out of the total berth time available, which usually includes calendar time minus major holidays. In some ports, however, where berthed ships tend to stay idle for a long time, the occupancy relates only to the ship's working time. This is the case in Tema Port's reporting system, summarized in Table 2-2, which presents historical data on berth occupancy. There is a trend of increasing occupancy over the years, which reflects the growth in throughput. This trend is not uniform among all berths, however; for example, occupancy in Berth 11 declines. Variations in occupancy rates can be explained, perhaps, by a combination of changes in cargo mix, berthing policy, ship handling productivity, and others. The focus here is on containers and the berths that handle most of them; hence a more detailed analysis is conducted of Berths 1 and 2, where most containerized cargo is handled.

Table 2-2
Berth Occupancy, 2003–2007 (percent)

Berth	2003	2004	2005	2006	2007
Berth 1	59.1	24.8	70.1	71.1	75.1
Berth 2	51.0	18.4	39.8	67.2	73.0
Berth 3	0.0	0.0	21.5	59.7	60.5
Berth 4	59.8	46.1	56.3	54.8	49.5
Berth 5	58.0	33.5	50.4	34.9	45.7
Berth 6	38.8	59.7	43.8	32.4	38.9
Berth 7	49.0	67.9	67.9	53.6	48.2
Berth 8	34.1	61.4	58.3	47.8	54.3
Berth 9	60.1	64.6	56.9	47.8	51.2
Berth 10	15.5	50.2	59.2	54.5	51.2
Berth 11	66.4	48.1	42.2	16.3	22.3
Berth 12	35.2	29.4	24.0	23.1	30.0

Berths 1 and 2 had a large increase in occupancy in the past five years, reaching 75 percent and 73 percent respectively.

Figure 2-1
Occupancy Rates for Berths 1 and 2, 2003–2007

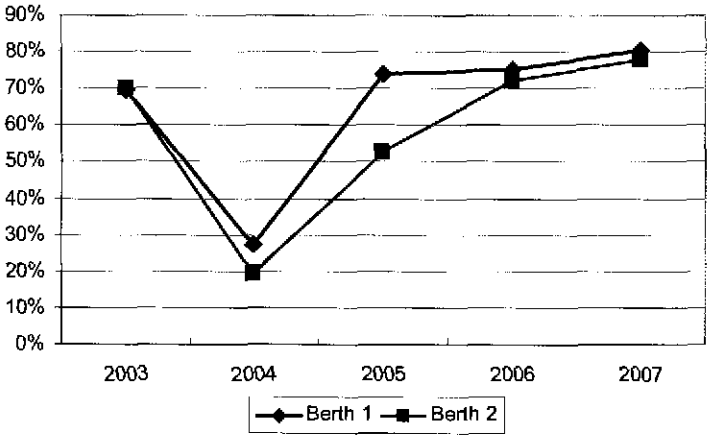


Figure 2-1 presents occupancy rates for Berths 1 and 2 from a different source, with occupancy including ships' working and idle time—the more common way of measuring occupancy. The occupancy rates in this figure reach 80 percent and 79 percent for Berths 1 and 2 respectively in 2007. This level of occupancy is considered high, suggesting that both berths are "full," considering the fact that berths are unavailable during the berthing and deberthing processes, which may require 30 minutes. This also indicates that a further increase in throughput by accommodating more ships requiring berth time is bound to result in congestion, ships' waiting time, and degradation of the service level. Hence, short of adding berths, the only way to increase throughput is by increasing crane productivity.

Figure 2-2
Monthly Occupancy Rates for Berths 1 and 2, 2007

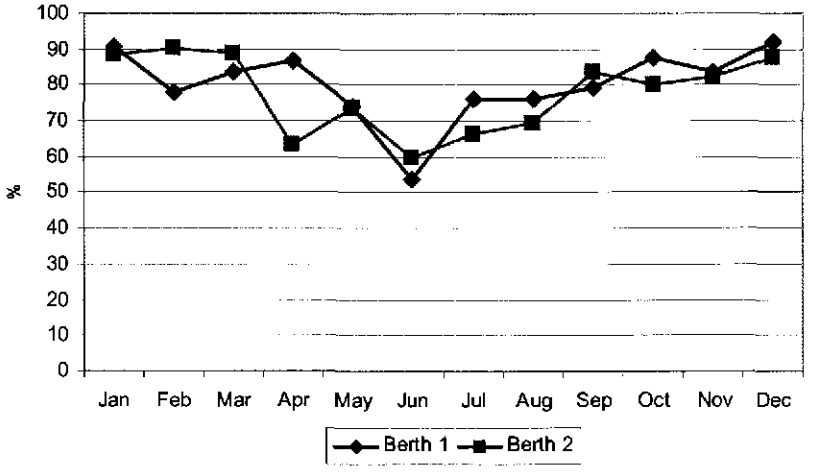


Figure 2-2 shows monthly occupancy for each berth for both working and idle times, similarly to Figure 2-1. The figure shows that the highest occupancy rate recorded reached 92.1 percent at Berth 1 in December 2007. At this level of occupancy, the berth is taken at all times. This strengthens the argument that Quay 2 South, under concession to MPS, is working at full occupancy.

Ships' Waiting

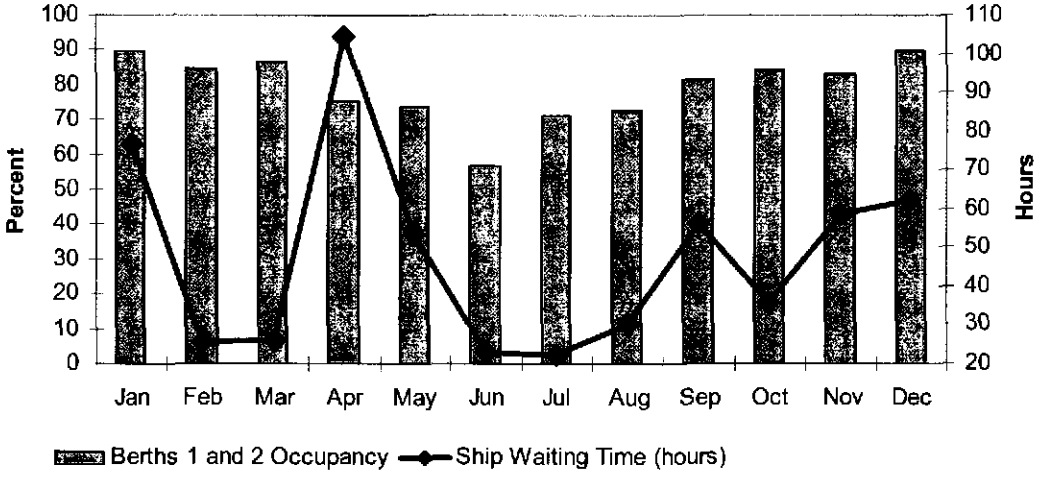
International experience suggests that occupancy rates in the 80–90 percent range usually result in substantial ship waiting time. Table 2-3 below presents the monthly average of ship waiting time in Berths 1 and 2 during 2007. The overall average was 47.8 hours, or about 2 days. The average ship berth time (working and idle) was 41.6 hours and total port time 89.5 hours or 3.7 days. The highest waiting time, recorded in April 2007, was 104.4 hours, about 4.5 days.

Table 2-3
Monthly Average of Ship Time in Berths 1 and 2, 2007 (Hours)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Ship call	27.0	24.0	30.0	21.0	26.0	24.0	32.0	31.0	37.0	33.0	33.0	32.0	350
Waiting time	76.8	25.5	26.2	104.4	53.3	22.7	22.4	30.2	56.2	35.7	58.5	62.1	46.93
Port navigation time	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.1	1.3	0.3	0.3	1.6	0.98
Berth time	50.6	49.4	49.0	53.8	44.9	35.7	34.9	40.8	35.5	39.5	32.6	40.4	41.55
Port time	128.4	76.0	76.4	159.2	99.2	59.3	58.4	72.0	92.9	75.6	91.4	104.2	89.46

Average 2007 waiting times are far beyond those common in specialized container terminals elsewhere in the world, although they are considered normal in West African ports. For example, during interviews conducted for this study, a major shipping line representative said that waiting times in Apapa, Lagos, typically range from four to six days and in other regional ports even more. Ship waiting time is directly related to berth occupancy. This can be clearly observed in Figure 2-3 below.

Figure 2-3
Tema Port Ship's Average Waiting and Occupancy of Berths 1 and 2



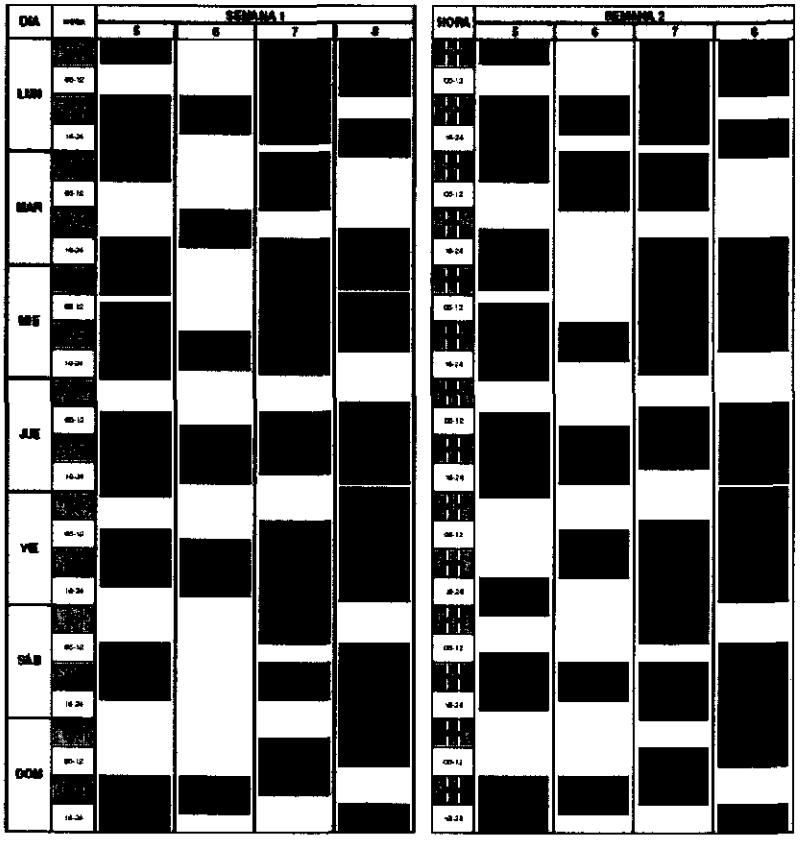
Typical waiting times in ports around the world are two to four hours, and often ships can berth upon arrival and start working immediately. Such short waiting times are achieved by terminal management applying a strict system of preplanned berthing windows, along with an efficient system of information exchange with shipping lines.

Figure 2-4 presents an example of a berthing plan taken from the Port of Cartagena, Colombia, that is based on windows. The color of the bars in this figure indicates the type of ship (e.g., green gearless container ships) and the width the time required. Berth time is calculated according to expected number of moves and data on past gross berth productivity.

Minimizing port time is of utmost importance to ship owners and, hence, a critical measure of the level of service provided by a port to its customers. A ship's port time has two main components, waiting-for-berth and berth times. Among these two, waiting time is especially harmful to liner shipping because of its unpredictability. A long waiting time disrupts the arrival schedule at other ports and throws the entire service off balance. Sometimes, to avoid delays, ships may bypass a congested port altogether, resulting in huge expenses for additional shipping and port handling. Finally, long waiting time triggers heavy congestion surcharges. The southbound West African congestion surcharge is EUR 100 per TEU for Tema, which is higher than the tariff rate for ship handling.

Figure 2-4

Example of Berthing Window System



Source: Sociedad Portuaria de Cartagena, S.A., Cartagena, Colombia

three STSs averaged 578 hours each during October 2007, which is equivalent to 77.6 percent of calendar time. The more common values in ports around the world are in the 50–60 percent range.

Table 2-4
Number of Moves, Crane Hours, and Productivity (Moves/Hour) of Berths 1 and 2, Fourth Quarter 2007

	Ship-to-Shore			Ship's Gear			All Cranes		
Month	Boxes	Hours	Boxes per Hour	Boxes	Hours	Boxes per Hour	Boxes	Hours	Boxes per Hour
October	21,864	1,733	12.6	4,098	531	7.7	25,962	2,263	11.5
November	15,321	1,061	14.4	5,395	512	10.5	20,716	1,573	13.2
December	20,008	1,592	12.6	7,823	1,092	7.2	27,831	2,684	10.4
Total	57,193	4,385	13.0	17,316	2,135	8.1	74,509	6,520	11.4

No comparative data are available for other West African ports. Discussions with shipping lines' representatives, however, indicated that performance there is similar. Crane productivity at Tema Port is low when compared to terminals around the world. For example, in New Orleans, which handles about 300,000 TEU annually and where the ship population is similar to Tema Port's Berths 1 and 2, STS average about 35 moves per hour and ships' gear averages about 15 moves per hour—twice the rates of Tema. Accordingly, berth productivity in New Orleans, based on two STCs, reaches 70 moves per hour. STS in larger U.S. ports reach about 40 moves per hour, and in Asia 45 and even 50 moves per hour. Accordingly, ships handled by three STSs achieve berth productivity of more than 100 moves per hour.

MPS Performance Reports

Table 2-5 summarizes ship handling reports (courtesy of MPS), based on four recent ship calls (ships' names are removed). STS handled three of the ships; a combination of one STS and one ship's gear (stick crane) handled the fourth. The MPS reporting system categorizes crane and ship times as gross and net. Crane gross time refers to the time elapsed from when a crane is assigned to work a ship until it finishes the assignment. Crane net time refers to the gross time minus delays. The reporting system has a long list of delays, which for the purpose of analysis are grouped here into unavoidable (weather, hatch cover handling) and avoidable (breakdowns, awaiting instruction).

Ship's berth gross time encompasses the entire time that the ship is at the berth, either working or idling. Net berth time refers only to a ship's working time. These definitions are in line with those common in most container terminals.

The discussion here focuses on Table 2-5's Ships A and B because of the relatively large number of moves (above 1,000 moves) and their being handled by three STSs. In both ships, the operations went relatively smoothly, avoidable delays accounting for only 1.8 percent and 8.8 percent of the gross time, respectively. Likewise, ships' operation began within an hour of ship's berthing time and continued without a break for the entire stay of the ship at berth (no idling before or after work). In these two ships, STSs' net productivity was 16.7 and 13.3 moves per hour, respectively. Accordingly, berth gross productivity, the figure that is of greatest interest to ship owners, also was relatively low at 31.7 and 19.8 moves per hour, respectively.

Table 2-5

Summary of Ship Handling Reports

		Ship A	Ship B	Ship C	Ship D
Ship Handling	Moves	1,115	1,049	514	723
Berth Time	Gross	35.17	52.92	31.42	71.17
	Net	32.17	47.92	26.75	64.20
	Net/Gross	91.5%	90.6%	85.1%	
		PRODUCTIVITY			
Berth	Moves–Gross-Hr	31.71	19.82	16.36	10.16
	Moves–Net-Hr	34.66	21.89	19.21	11.26
All Cranes		3	3	2	3
STS Cranes	Moves	1,115	1,049	301	723
Ship's Cranes	Moves	n/a	n/a	213	n/a
STS Cranes	Gross	83.80	90.83	22.42	176.37
	Net	66.73	78.47	20.90	-
	Net/gross	79.6%	86.4%	93.2%	
	Moves–gross-hr	13.31	11.55	22.93	4.10
	Moves–net-hr	16.71	13.37	24.59	
	Avoidable crane delay	1.47	8.03	0	
	% Avoidable delays	1.8%	8.8%	0.0%	
Ship's Cranes	Gross	n/a	n/a	23.53	n/a
	Net	n/a	n/a	22.15	n/a
	Moves–gross-hr	n/a	n/a	9.05	n/a
	Moves–net-hr	n/a	n/a	9.62	n/a
	Avoidable crane delay	n/a	n/a	0.30	n/a
	% avoidable delays	n/a	n/a	1.3%	n/a

n/a – not applicable

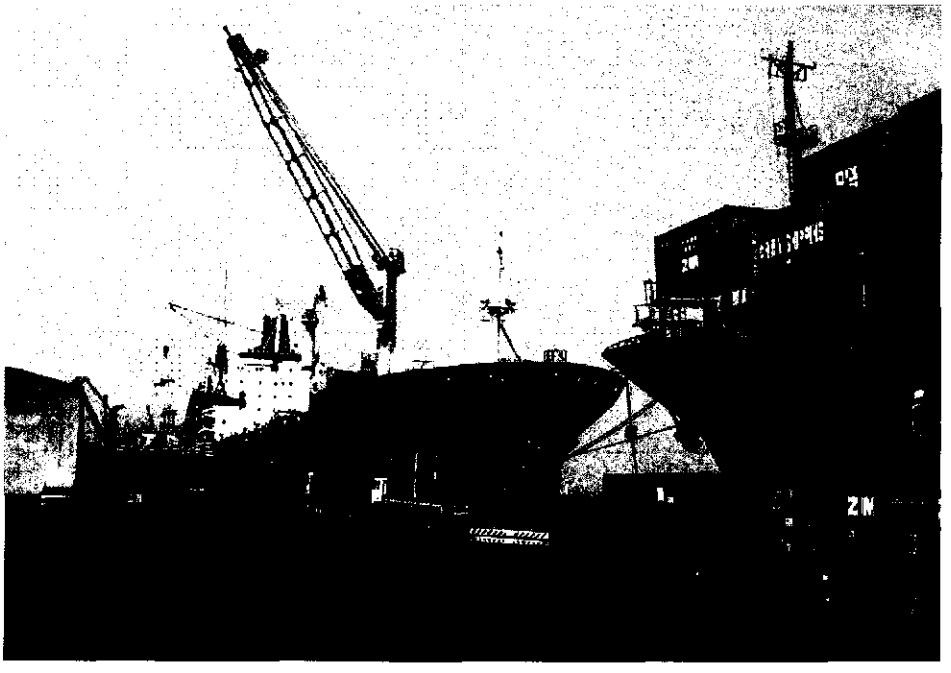
As indicated in the previous section, MPS performance is far below international standards, although it is reportedly similar to that of other West African ports. One reason for this poor performance is the odd shape of the terminal, with two container yards and the main yard far from the berth. Another and perhaps more relevant reason is that the new terminal organization is still at a learning stage.

Conventional Berths

Although most large container ships are handled by MPS, about one-third of the containerized throughput, or about 170,000 TEU, is handled in conventional berths, including ships with about 1,000 moves. All handling at conventional berths is performed by ship's gear, with the containers first staged alongside the ship in a temporary buffer, from which they are later loaded by reach-stackers onto port trucks and drayed to a nearby yard (and vice versa for exports).

The operation is inefficient mainly because of to a severe lack of space. Figure 2-6 is a picture taken of a typical ship-handling operation showing the congestion on the narrow dock near the ship. First, a long line of trucks is waiting on the dock with export containers for the ship's crane; second, a truck is loading bagged sugar from the nearby shed; and third, a pile of containers is on dock, all of which were discharged by the adjacent ship and are awaiting a reach stacker and trucks to be moved to the container yard behind the shed. Another common problem quoted by shipping lines is a shortage of equipment, mainly reach stackers and trucks. The resulting productivity is about 5–7 moves per hour, which is not much different from that recorded in Berths 1 and 2 for ship's gear. This productivity relates only to the ship-to-dock transfer (or vice versa) and not to the complete move of ship to container yard, as is the case with MPS.

Figure 2-6
Typical Ship-Handling Operation



There is also congestion in the container yards serving the conventional berths, the storage areas and, especially, roads inside the conventional section of the port. Many open areas are taken by noncontainerized cargo such as steel coils, dimensional steel, and lumber. Likewise, roads are used for truck parking, including trucks carrying export and import containers. Many trucks also carry transit cargo for which they need Customs clearance.

2.3 Storage and Gates

2.3.1 CONTAINER YARDS

The container yard function in Tema Port is divided between container yards inside the port and container yards outside the port; container yards outside the port are called inland container depots (ICD). Most import boxes stay less than three days at the in-port container yard before they are transferred to nearby ICDs, where they usually stay until cleared and claimed by the cargo owner. Export boxes are usually delivered directly to the in-port container yard. Although the present process involves double handling, the ICDs are essential to the orderly functioning of the port because the waterfront area of Tema is limited and the need for storage acute. In other words, without ICDs the port would not be able to handle its current throughput.

2.3.2 DWELL TIMES

The port has no system for collecting and analyzing data on dwell time. This could be attributed partially to the divided container yard situation—about six ICDs, all private. Interviews with shipping lines and operators indicated that the average dwell time is about 22 days for imports and 3 days for exports. The long average dwell time of import boxes is apparently skewed by the dwell time of a few boxes containing inexpensive cargo; according to interviews, the consignees lack the money to claim or the space to accommodate the boxes at the time of box arrival to the port. Nevertheless, 22 days is an improvement from the 28 days of three years ago. The port tariff allows for seven free days, and since automation, Customs can complete the clearing process in two to five days. There is no need for a Customs inspection for export containers. Hence, theoretically the dwell time for import containers should resemble the dwell time common in ports around the world—seven to 10 days.

Dwell time data are not available for ICDs. One ICD operator estimated 17 days for imports and 10 days for export and said that transit cargo tends to stay much longer.

2.3.3 TERMINAL GATE

MPS has its own, modern gate, which seems to operate efficiently because no waiting line was observed in the several visits conducted at the port. The containers for the conventional berths use the general gate. No waiting was observed at this gate either.

2.4 Port of Takoradi

2.4.1 BERTH THROUGHPUT AND OCCUPANCY

All Cargo Types

Whereas we focused on containers for Tema Port, our operational review of Takoradi Port covers several types of cargo. The two ports have separate systems for collecting and analyzing operational data, with that of Takoradi less detailed. Accordingly, although the operational review for Takoradi followed the review of Tema Port in a general way, it is less detailed and focuses on possible improvements.

Table 2-6 presents data on berth productivity at Takoradi Port for 2007 by cargo type and direction (discharge and load). Because Takoradi Port has no shore cranes, all ship handling is conducted there by ship's gear. No recent statistics are available on berth occupancy. In any case, such statistics might be misleading because (1) berth definition does not always match actual berthing because of the wide variation in ship length; and (2) substantial handling is carried out midstream, using mooring buoys in the middle of the basin, not at berth. An indirect indication of berth occupancy can be found by the statistics on ship waiting time.

Table 2-6
Crane (Ship's Gear) Productivity, Takoradi Port, 2007

	Unit	Discharge	Load
General cargo	Tons/hour	20.0	24.0
Bagged cargo	Tons/hour	32.7	33.7
Iron and steel	Tons/hour	25.3	31.6
Bulk Wheat	Tons/hour	68.9	32.3
Quick lime	Tons/hour	63.7	
Palm kernel	Tons/hour		24.5
Machinery and equipment	Tons/hour	40.1	34.6
Pine poles	Tons/hour	89.0	
Teak poles	Tons/hour		6.9
Sawn timber	Tons/hour	10.7	15.9
Vehicle	Units/hour	12.4	9.6
Loaded containers	Boxes/hour	7.0	6.0
Empty containers	Boxes/hour	8.5	6.5
Ro/Ro containers	Boxes/hour	16.5	10.5

Table 2-7
Takoradi Port Ship Waiting Time (2007)

		Total Berth Time (hrs.)		Average Berth Time (hrs.)	
Ship Type	No. of Calls	Working	Waiting	Working	Waiting
General cargo	129	7,154	744	55.5	5.8
Ro/Ro	87	1,624	208	18.7	2.4
Container ships	82	2,410	120	29.4	1.5
Tug	5	206	5	41.1	1.0
Bulker	123	11,779	866	95.8	7.0
Barge carrier	14	375	91	26.8	6.5
Tanker	47	2,737	933	58.2	19.8
Fishing, reefer	37	2,917	220	78.8	5.9
Others	67	2,595	273	38.7	4.1
Exhibition, passenger	3	293	-	97.6	-
Total	594	32,089	3,459	54.0	5.8

Table 2-7 presents summary data on the subject for 2007. As these data indicate, ship waiting time is limited, except for tankers. This would seem to indicate relatively low occupancy rates, but discussions with shipping line representatives and personal observation indicate that the occupancy rate is actually high.

Overall Operational Setting

Most of the activity in Takoradi Port is concentrated at a single finger pier with six continuous berths of about 150–180 meters each:

Berth 1—almost exclusively for loading bulk manganese with continuous loaders
Berths 2 and 3—for various kinds of cargo
Berth 4—almost exclusively for loading bulk cocoa with continuous loaders
Berths 5 and 6—for various cargo, including containers and Ro/Ro

In addition, on the outer side of this pier are dolphins used as an oil berth, bauxite berth and, in a separate jetty nearby, a clinker berth. Depth alongside the main pier is 8.5 meters. Deeper water—10.4 meters and 9.2 meters—near two buoys at the center of the turning basin is used for lightering and topping off dry bulk cargo.

The following sections review each of the main types of cargo handled at Takoradi.

Manganese

Maganese is a dry bulk cargo brought to the port mainly by unit trains from mines in Nsuta, about 63 km away. The mines and the loading installation at the port are operated by the Ghana Manganese Company. The company has a land lease on the area near Berth 1. The terminal includes a storage pile and an on-dock loading gallery with a two-way loading boom that can be used for both loading ships and stacking at the storage pile behind the gallery. The gallery conveyor is fed from the storage pile by a front-end loader using a hopper and an inclined conveyer. The terminal also includes switching and storage tracks for railcars, an automatic rotator for discharging railcars, and a dumping pit with a stacker.

Manganese is typical carried by ships of 30,000–40,000 dwt. Because of a combination of water and air draft limitations, only 20,000–25,000 tons are handled at the terminal's berth, with the rest handled at the buoy. The handling at the buoy takes places at the beginning of the process, when the ship's main deck is too high for the ship loader, and at the end, when the ship is too deep for the water draft alongside Berth 1. The handling at the buoy is conducted by ship's gear (grab cranes), with the transport between the buoy and the terminal conducted by two 1,000-ton barges and one 2,000-ton self-propelled ship. Ship loading productivity at the buoys is 6,000 tons per day (tpd) and at berth 18,000 tpd.

The two-stage handling process is both expensive and time consuming: handling from ship to barge and from barge to terminal (and vice-versa at the end) and additional transport between buoy and berth. The barge handling with ship's gear is slow; and two additional ship moves, from buoy to berth and vice-versa each requires a pilot and two tugs.

The handling process at berth also is somewhat slow. The theoretical rate of the ship loading belt, using a 100-cm belt, is 1,400 tons per hour (tph) or 47,000 tpd. The loading process involves frequent shifting of the loader between holds to keep the ship trimmed, however,

and some ships need several hours for pumping ballast water. Delays are also caused by the insufficient size of the storage, with a capacity of 32,000 tons. An additional, remote storage pile has a capacity of 48,000 tons but this pile is not connected to the conveyor system. Therefore, the connection between the remote storage pile to the terminal pile storage pile is by front-end loader and dump truck, making its use expensive.

Despite these problems, there is no meaningful ship waiting time because the current throughput is about 1.2 million tons per year (tpy), about one-third less than the past throughput of 1.8 million. Also, the berth is almost exclusively used for manganese, because the on-dock gallery makes any other usage difficult.

The loading system is now under rehabilitation; a new ship loader has been ordered to so that the equipment breaks down less, the loading rate increases, and berth time declines.

Cocoa Beans

Takoradi is considered the cocoa port of Ghana. Generally, cocoa is handled in three ways:

Bagged—the traditional form, in which an entire ship is loaded with loose bags (sometimes called neobulk)

Bulk—a recent trend, in which loose beans are loaded directly into the ship hold

Containers—either in bulk or in bags.

The trend is away from loose bags and toward either bulk or containers.

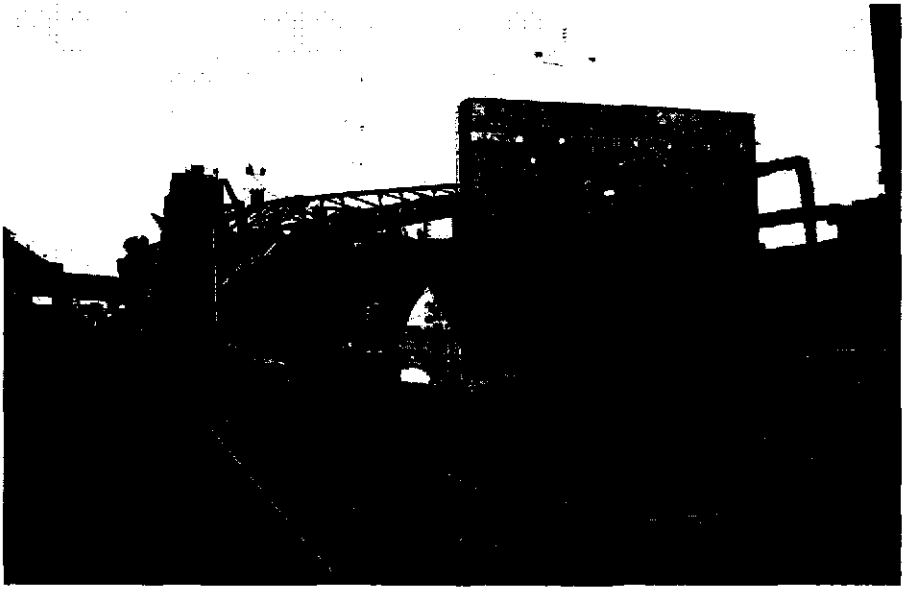
Bagged cocoa is handled by ship's gear using stevedoring pallets. If the storage shed is near the dock, the pallets are brought in by forklift and staged shipside. If the storage shed is off-dock or outside the port, trucks are used for the transfer to shipside. The port has more than 20,000 square meters of cocoa sheds within its boundaries. The rest is stored at sheds nearby the port. No data are available on loading productivity of bagged cocoa, but assuming the bagged cargo in Table 2-6 refers mainly to cocoa, it is 33 tph per crane. Most ships can work three to four cranes simultaneously. Therefore, assuming an average of three cranes, berth productivity is about 100 tph.

The bulk cocoa operation is concentrated in Berth 4. It is controlled by Unicontrol Commodity Ghana Ltd. Unicontrol is a Dutch company specializing in bulk cocoa, with terminals in Ivory Coast, Amsterdam, and Antwerp. In 2005, Unicontrol obtained a land lease on the area across from Berth 4, on which it constructed a shed of about 8,000 square meters. The bagged cocoa is brought to this shed by trucks, unloaded by hand, slashed, and dumped on special cutting tables with central slots through which the beans fall onto a conveyor with portable sections. At the end of the conveyor is a portable stacker pouring the beans and creating storage piles to be fumigated later. The shed can hold six piles of 5,000 tons each, or a total of 30,000 tons.

The cocoa is handled by relatively small ships of about 6,000 tons. Figure 2-7 depicts the ship loading process. As the picture shows, a portable conveyor feeds cocoa onto a portable ship

loader. The loading of the conveyor is by hopper, and beans are brought in from the shed by front-end loader. The current throughput is 200,000 tpy, and loading productivity is 200 tph, or twice that of bagged cocoa. Unicontrol also mentioned a recent trend of using larger ships, of up to 13,000 tons. In this case the ship would be served by two loaders at a combined productivity of 400 tph.

Figure 2-7
Cocoa Loading



Unicontrol is also involved in loading bulk containers with cocoa beans. The loading is conducted by stacking conveyors. The beans are dumped into containers with bulkheads.

Another bulk system of loading cocoa beans is based on using special barges and barge-carrying ships, both provided by Baco Liner.[2] In this system, the bags are brought near to the barge, lifted onto the barge, slashed manually, and their content manually poured into the barge hold. Figure 2-8 depicts this operation, with the lifting onto barges performed by truck-mounted crane.

[2] Barge-Container-Carrier or Baco-Liner has a single service between West Africa and North Europe maintained by 3 barge-carrying containerships. Each ship carries 12 x 800-ton (500-ton cocoa) float on/off barges and 652 TEU on the weather deck, which is also equipped with a 40-ton gantry crane. Hence, the ship is totally self sustained. There are 3 sets of barges per ship, on-board, at the loading port and at the discharge port, so barges can be handled independent of the mother ship.

Figure 2-8
Takoradi Port Cocoa Handling to Barge

Rice

Rice in bags is the largest bagged import cargo at Takoradi Port. Much of it is transit cargo to landlocked countries. Almost all rice imports are handled by direct transfer to trucks. Figures 2-9 and 2-10 depict this handling. Figure 2-9 shows stevedoring nets holding the rice in 80–100 loose bags. Workers in the ship put the bags in the nets, which are staged directly on trucks; workers pick up each bag individually and stack it at the front of the truck.

Figure 2-9
Takoradi Port Discharge of Bagged Rice, Earlier Stage

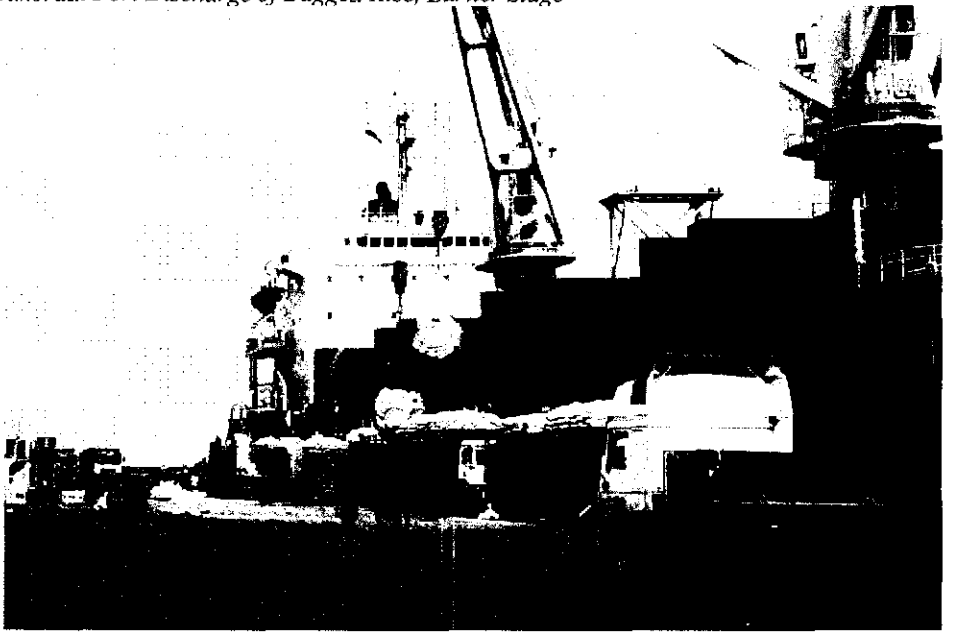
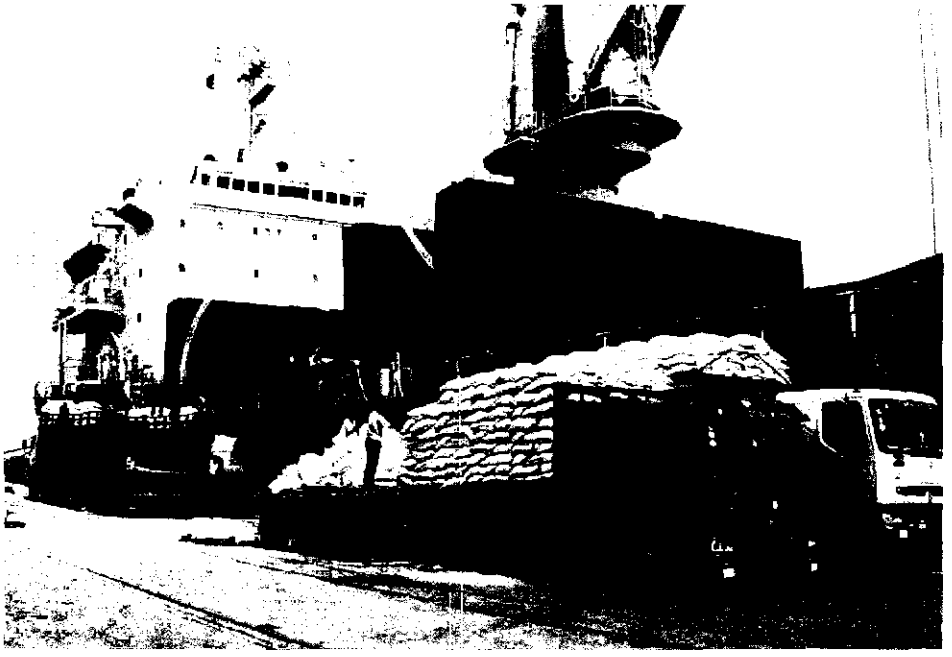


Figure 2-10
Takoradi Port Discharge of Bagged Rice, Later Stage



When the truck is about two-thirds full, leaving no staging space for the nets, the nets are staged on an improvised "ramp" made up of a stack of pallets, as seen in Figure 2-10. The figure also shows the rice on the ground, the result of this handling. Besides being damage prone, the system is also labor intensive. Twenty-nine people are involved in this operation: 17 on ship and 12 on trucks.

Takoradi Port does not maintain an operational database by commodity, so no productivity figure for rice imports is available. Assuming that most bagged imports are rice, and the rest is sugar (handled in the same way), the productivity rate of 32.7 tph per crane can be safely assumed for rice. This figure also was confirmed in observation of the operation and interviews with the director of operations. According to the director of operations, a typical gang handles about 250 tons per eight-hour shift, with rice ships usually handled by four gangs working two shifts per day. Accordingly, berth productivity is 2,000 tpd (250 x 4 x 2). Ships involved in rice imports typically carry 15,000–20,000 tons. Discharging the entire ship in Takoradi would require seven to 10 days at berth. These ships usually distribute cargo among several ports in West Africa, however, so the berth stay in Takoradi is usually three to five days.

The rice handling system is inefficient. International practice offers three more advanced systems of handling bagged cargo:

Continuous – based on mechanical ship unloaders (Spiralveyors), conveyors, and stackers

Pre-slinging – unitizing the bags by special sling, creating larger multibag units at the loading port, and using these slings along the entire transport chain

Captive pallets – stevedoring pallets for ship handling, truck transfer, and temporary storage.

The first two systems are capital intensive and thus very expensive. The third is simple and does not require major investment. In this system, the bags are staged at the ship's hold on stevedoring pallets and the ship's crane stages the pallets on the dock alongside the ships, creating a temporary buffer. Later, a forklift mounts the pallets on trucks. The pallets go with the trucks to the storage shed and are discharged there by forklift. If the storage period is short, the pallets can stay with the cargo to avoid double handling; otherwise, the pallets can be carried into the shed by forklifts and the bags taken manually off them and staged onto a pile, with the forklift serving as a lifting platform. The system requires an investment in pallets, which can be jointly owned by all stevedores.

The advantage of the system stems from (1) the intermediate buffers and (2) reduction in manual handling. The buffering takes place first in the ship's hold, when the gang can load pallets independently of the crane.[3] Second, it takes place on the dock, when the crane can work independently of the truck-loading gang. As a result, crane productivity using stevedoring pallets can reach 50–60 tph, twice the present productivity rate. The number of people needed in the hold is reduced by about half because there is no need for the manual stacking of bags on trucks or removing bags from the truck at the warehouse. Reducing manual bag handling also results in reduced damage.

Wheat

The wheat is brought by ships of about 30,000 dwt, with about 10,000–15,000 tons discharged in Takoradi Port. The total throughput for 2007 was 170,000 tons, a slight decline from the 160,000 tons in 2006. All the wheat is destined for a mill located outside the port on land leased from the port by Takoradi Flour Mill Ltd. The mill has storage for 34,000 tons of grain and grinding capacity of 400 tpd.

The ship discharge system is based on ship's cranes with grabs using portable dock-mounted hopper and tipper trucks. The average productivity of discharging bulk wheat was 68.9 tph (see Table 2-7). This figure does not coincide with the port operator's figures. According to him, crane productivity is 125 tph and berth productivity, based on three cranes, is 375 tph (3 x 125). Theoretically, daily throughput, working 20 hours continuously, should reach 7,500 tpd. In reality the throughput is only 3,000–5,000 tpd. First, crane productivity is much lower when reaching the bottom of the ship where floors must be swept; additionally, a shortage of trucks leads to many interruptions.

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[3] Unlike the sling, the pallets are not hooked to the crane. Usually the crane drops several pallets at the hold and the gang is divided into smaller groups working in three or four corners, each amassing bags on its own pallets.

The operator also complains of ship waiting due to a shortage of berths, especially when a berth was last used for fertilizers and has to be washed.

There is not much that can be done to improve the handling system without major investments. A major improvement requires installation of a continuous ship unloader linked to an elevated conveyor leading directly to the mill. It is doubtful if such investment would be justified by the limited volume handled at Takoradi Port.

Containers

Takoradi Port has no shore cranes that can handle containers, so all container handling is done by ship's gear. The resulting crane productivity is low, ranging from 6 to 10 boxes per hour. Assuming two cranes per ship, berth productivity ranges from 12 boxes to 20 boxes per hour. All container ships are handled in Berth 6, which has a very limited container yard. Therefore, the containers are typically drayed to and from two off-dock yards, which are about 1 km from the berth. Using remote container yards makes the operation prone to interruption, resulting in ship delays.

2.4.2 STORAGE AND GATES

Container Yards

The containers in Takoradi Ports are stored in three yards:

Berth 6—usually temporary storage for transshipment or export;
Kamphil yard—mainly exports; and
New platform—mainly imports.

The yards are small and are served by reach stackers. The split operation is not conducive to efficiency. There is no container freight station (CFS) in the port, and destuffing of containers is done "on the pavement" near the New Platform container yard. Overall, the present container handling in Takoradi Port is in need of improvement in terms of both berth and yard operation.

Dwell Time

Data on dwell time of containers are not available; it can be assumed that they are similar to those for Tema Port. Bagged import cargo tends to have long storage time, sometimes several months, especially if the cargo is destined for the landlocked countries. This also is the case with cocoa bean exports, which is a seasonal cargo.

Chapter 3 -Market and Competition

3.1 Shipping Patterns Analysis

Ghana's ports at Tema and Takoradi handle five forms of cargo: dry bulk, liquid bulk, breakbulk, Ro/Ro, and containerized. The largest is containerized cargo. It already occupies most port facilities and is expected to grow quickly because of growth in foreign trade and the conversion of breakbulk cargo into containers. Containerized cargo is handled by liner shipping, a system based on "strings" of equal-capacity container ships following the same route and calling ports at a fixed frequency. Liner services are categorized by "service patterns," a term that refers mainly to the service route. These patterns are critical to ports because they determine the type of ships and the traffic volumes handled by ports, and determine whether a port is a gateway or transshipment hub. The service pattern of a shipping system usually does not pertain to a single port but to a trade region that encompasses several ports. Tema and Takoradi are part of the West Africa trade region and its subregion, Bay of Guinea.

We analyze trends in the liner shipping system that serves West Africa and Ghana, focusing on the service pattern. First, we review the system for shipping containers to/from West Africa in general and the Bay of Guinea in particular. The review covers service patterns used to handle the trade lanes, shipping lines involved in these trades, and the type and size of ships employed by them. The review is followed by a brief discussion of worldwide shipping trends and their impact on the West African shipping system. Then we define future shipping scenarios, including likely shipping service patterns, traffic volumes, type and size of ships, and their implications for Ghana's ports. We emphasize transshipment, which has the potential to fundamentally change the regional shipping system and facility requirements for Ghana's ports. Our findings will serve as input for Ghana's port facilities master plan.

We gathered most of our data through in-depth interviews with local shipping interests including Maersk Line, Mediterranean Shipping Corporation (MSC), CMA CGM, Mistui OSK

Line (MOL), and Grimaldi. Secondary sources include professional and trade magazines, especially Containerization International, WorldCargo News, Container Management and Cargo Systems, and the websites of various shipping lines and regional ports.

WEST AFRICA'S MAIN TRADE LANES

The trade lanes of West Africa are generally divided into deep sea and short sea. Deep sea lanes involve out-of region countries and usually require crossing major oceans. The main deep sea lanes are as follows:

European- including North Europe ("Continent") and the Mediterranean.
Asian- including the Middle East, South Asia, and the Far East.
North American- including the Atlantic and Gulf Coasts.
South American- mainly the Atlantic Coast.

The European trade lane, especially the segment with North Europe, has traditionally been the largest for West Africa, which imports European manufactured goods and exports raw materials. In recent years, the Asian trade lane, especially the Far East segment, has gained prominence, with China and South Korea becoming the main sources of manufactured goods. No accurate data on trade volumes to West Africa are available. On the basis of published interviews with shipping executives, we estimate that the Asian trade lane accounts for 45 percent, Europe 40 percent, and North and South America 10–15 percent each. As elaborated on in the sections below concerned with forecasts, the Asian trade lane is expected to increase its market share. These growing trade volumes combined with the long route may encourage shipping lines serving the lane to deploy larger ships, and this in turn may encourage transshipment.

The short sea lanes are usually within the region. Short sea services can be divided into feeders and intra-Africa. Feeder services are extensions of deep sea services using smaller ships to call smaller regional ports. Intra-Africa services serve the regional trade, mainly between countries in West Africa and South Africa. Intra-Africa services sometimes handle the regional feedering.

Service Pattern

A service pattern refers to the sailing route that a shipping service applies to a trade lane. Each lane can be served by services following several patterns. For example, Asian trade can be handled by a pattern based on a route connecting Asia to West Africa through the Cape of Good Hope, or a route through the Suez and the Mediterranean. In the latter case, the trade is handled by two services: (1) an Asia–Europe service to a Mediterranean hub, and (2) a feeder service from the Mediterranean hub to West Africa. The second leg can also be provided by a European service routed through this hub.

There are often variations in the same service pattern. Services following the same general pattern do not necessarily call at exactly the same regional ports with the same calling sequence. For example, most of the services handling the North Europe trade lane follow a pattern based on calling roughly five ports in Europe and five ports in West Africa. However, some services end their southbound route in Dakar, Senegal, serving as regional hub, from which they serve the rest of the West African ports via feeder services; others will bypass Dakar and call only ports in the Bay of Guinea.

The present system of service patterns may change in response to growth in trade, new port developments, and global changes. Future changes in service patterns, in turn, are expected to affect West African ports, including Ghana's.

Conferences

Most lines operating on the Europe-West Africa trade lane have been organized in a liner conference or consortium: the Europe West Africa Trade Agreement (EWATA). Established in 2000, EWATA has seven members:

CSAV
Libra
Maersk Line
NileDutch
Delmas
OTAL
Safmarine.

Libra is part of Hamburg Sud; Delmas and OTAL are part of CMA CGM; and Safmarine is part of Maersk Line. EWATA encompasses about 60–70 percent of the trade. It does not include, for example, MSC or Zim (Goldstar). The main function of EWATA is to publish a freight tariff based on two European zones. The tariff includes port surcharges to compensate lines for port congestion in the region.

The European Union recently decided to repeal Regulation 4056/86 governing shipping conferences. As of October 2008, the repeal will put an end to the possibility of lines meeting in conferences, fixing prices, and regulating capacity. Lines involved in the European trades may appeal, especially with regard to consultation on and publication of supply and demand data. Some cooperation among lines may be allowed, but no final decision has been made. Even if such data exchanges are allowed, the abolition of conferences, especially their control over supply and tariffs, is likely to have a far-reaching impact on lines. The most probable impact will be heightened competition, which would likely accelerate the demise of smaller lines and encourage consolidation. This, in turn, could alter service patterns and the deployment of larger ships.

Another conference, the Asia-West Africa Trade Agreement, controls the freight market for Asian trades. Members include CMA CGM, Delmas, Gold Star Line (Zim), MOL, and PIL, all of which are affiliated with global carriers. This conference is not under any threat of being disbanded, so the impact of this conference on future service patterns is limited.

3.2 MAIN LINES AND SERVICES

Six major shipping lines and their subsidiaries control Ghana's shipping market. According to recent estimates of traffic market share, Maersk Line has about 40 percent; CMA CGM 25 percent; Mediterranean Shipping Corporation (MSC) 15 percent; Mitsui OSK Line (MOL) 10 percent; and Grimaldi and Zim 5 percent each. CMA CGM has more market share than MSC, though MSC is much larger. The imparity is due to CMA CGM's purchase of Delmas, traditionally a large African specialist, and MSC's having only a European service (none to Asia). In the following paragraphs, we review each of these lines and their main services to and from West Africa according to service patterns.

Maersk Line

European Services: Maersk has seven weekly services between West Africa and Europe (WAF 1, 2, 3, 5, 6, 7, 8), all of which begin and end at Algeciras and Malaga, Spain, or at Tangier, Morocco. These ports serve as relay ports to other Maersk services and as the line's global hubs providing transshipment and connections to many of the world's ports. Maersk's sister company, APM Terminals, controls major terminals in these ports.

WAF1 calls Tema, Abidjan, and Cotonu, connecting them with Tangier and Algeciras, both located at or near Gibraltar. The service is provided by three 2,000 TEU ships.[4] WAF4 calls Takoradi, Cotonou, Benin, and Onne, Nigeria, connecting them with Algeciras and Malaga. This service employs four 1,500 TEU ships.

The other services follow the same pattern: connect three or four ports in West Africa and then connect them to hubs near Gibraltar. The simplicity of this service pattern, with its relatively short rotation and few ports, reduces transit times and vulnerability to problems stemming from long waiting times at ports. Having global hubs as the northern end also makes it possible for West African cargo to reach destinations throughout the world. The pattern, however, requires deploying a large number of small ships following very similar routes for most of each rotation and having nearly all European boxes undergo transshipment, which adds to transit time and handling costs. It seems that this system is

[4] Here, ship size (e.g., 2,000 TEU) refers to a rough average. In most African services the ships are not of uniform capacity. Also, the service system of lines is constantly changing. The review here refers to the situation at the end of April 2008.

adapted to the conditions of African ports, which tend to be shallow, congested, and lacking in equipment.

Maersk's subsidiary, Safmarine, offers a multipurpose service to West Africa based on four 600 TEU. Maersk recently deployed new buildings on this service: OPEX, geared tweendeckers capable of lifting up to 140 tons, a capability required for handling mining and oil drilling equipment.

Asian Services: Maersk has two weekly services between Asia (Far East) and West Africa, FEW 1 and 2. The second was added in September 2007 in response to a surge in Asian trade with West Africa. Both services follow the Cape Hope route, but only FEW 1 stops at Namibia (Figure 3-1). FEW 1 is also the only service that calls Tema as well as Apapa in West Africa. FEW 2 calls Lome, Cotonou, and Apapa. FEW 1 is provided by 10 ships with an average capacity of 3,000 TEU (10 x 3,000 TEU); the largest has a capacity of 3,500 TEU. These are the largest ships calling Tema on a regular basis; they also are gearless.

In addition to its direct service, Maersk (Safmarine) offers Asian services through the Gibraltar hubs, using the European services to connect with them. This pattern involves longer sailing distance as well as transshipment, so services are mostly for African countries west and north of Ghana.

South American Service: One biweekly service, SAWA, directly connects South America and West Africa. The service is provided by five 500 TEU ships. It also calls Namibia, but not Nigeria.

North American Service: Maersk does not have direct service between West Africa and North America. The trade can be served either by using the European services via Mediterranean hubs or the Asian services using South Africa. Safmarine has services between South Africa and North America. The main service, AMEX, is a joint operation with MSC; it is provided by eight ships, the newest and largest of which are 2,500 TEU.

Port Operations: APM Terminals (APTMT), Maersk's sister company, is the world's fifth-largest port operator and in West Africa has full or partial control of terminals in Tema, Ghana; Luanda, Angola; and Lagos and Harcourt, Nigeria.[5] In each port, Maersk accounts for a large portion of throughput. In Ghana, APMT owns about 30 percent of Millennium Port Services (MPS) and has invested 30 percent of the $80 million so far invested in this terminal.

This is a relatively small investment considering that APMT invested $235 million in its Nigerian port concessions, including $140 million in upgrading Apapa, Lagos, and

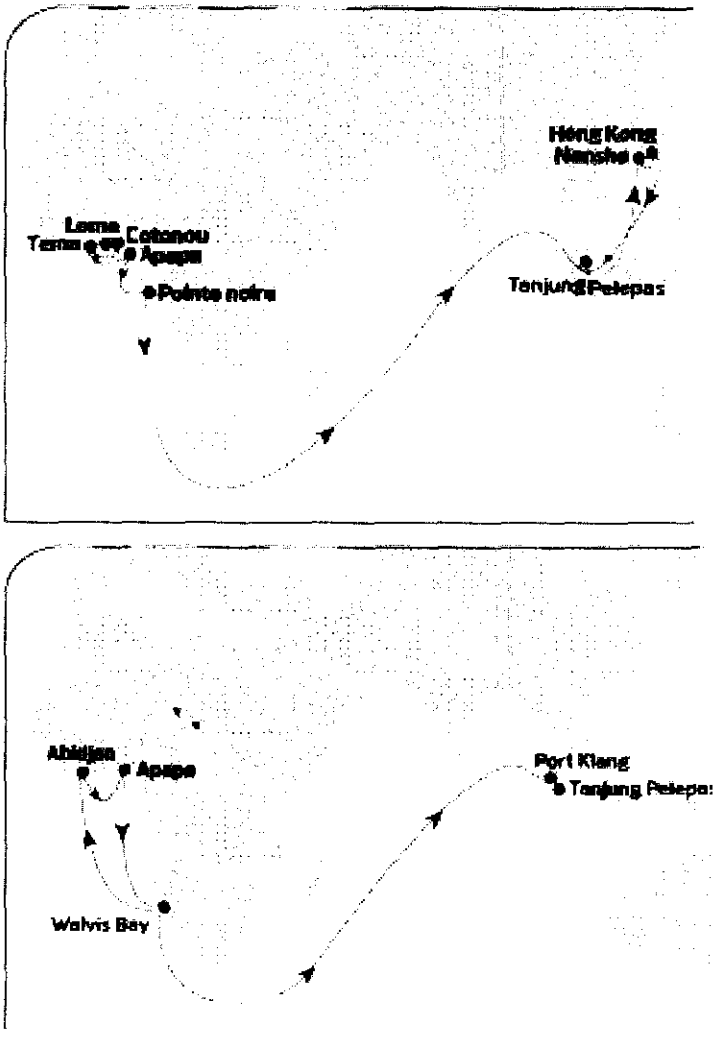
[5] APMT handled 31.4 million TEU in 2007. The top ranked port operator was HPH with 66.3 million TEU, followed by PSA (58.9 million), DPW (43.3 million), and Cosco Pacific (39.8 million).

$90 million at Onne, Port Harcourt. (The latter lies in the heart of the politically unstable Niger Delta.) Another $5 million has been spent on an off-dock terminal at Lilypond, Lagos.

CMA CGM

European and Mediterranean Services. CMA CGM deepened its involvement in West Africa at the end of 2006 when it purchased OTAL and Delmas from the Bolloré group, which also owns 30 percent of MPS. OTAL and Delmas have long served the Europe–West Africa trade lane, and CMA CGM retained both names for its West African services, though "OTAL" is used only for bill of lading purposes.

Figure 3-1
Service Rotations for Maersk Far East-West Africa, 1 and 2

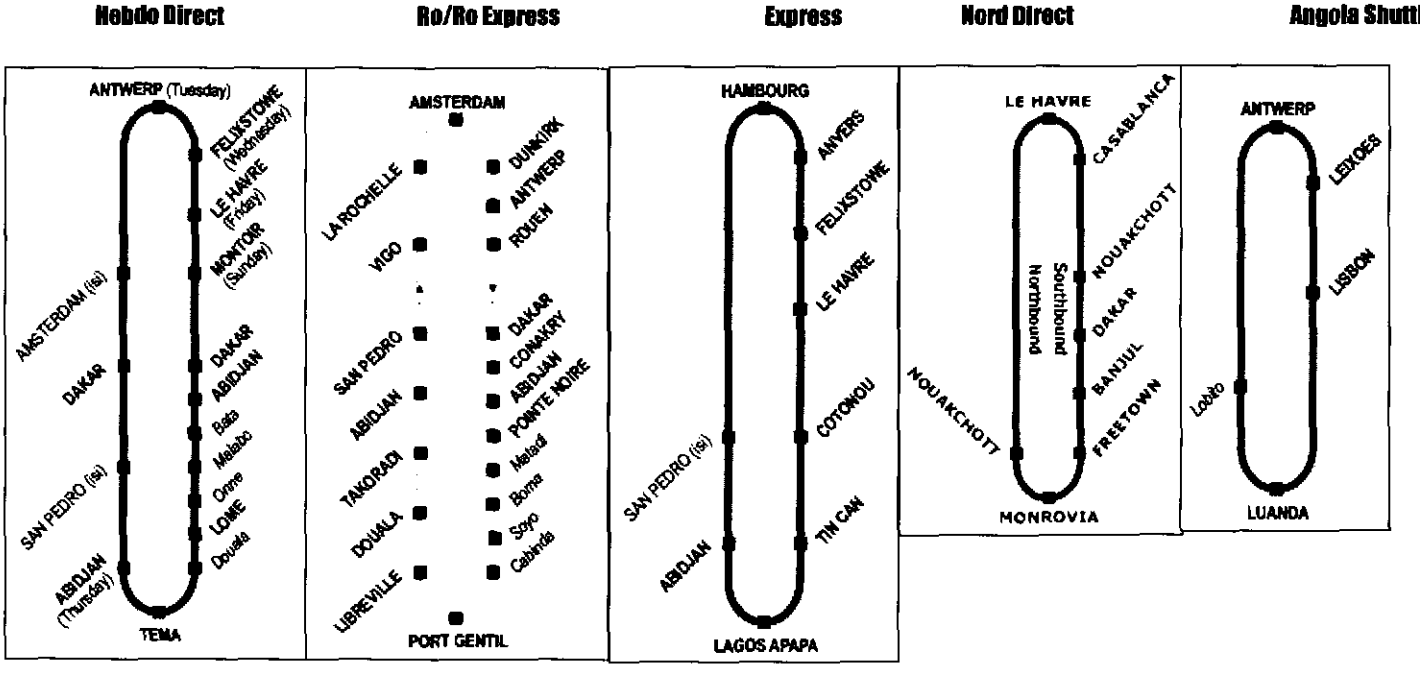


Delmas has seven container services on the Europe-West Africa route. Table 3-1 presents the characteristics of ships deployed on these services, and Figure 3-2 presents the rotations of the five main services. The largest, Hebdo, provides weekly service by five 2,200 TEU geared container ships. The more modern ships have automatic spreaders on their cranes, resulting in much higher productivity. In West Africa, the service has direct calls at Dakar, Abidjan, and Tema, with remaining ports called via feeders through Abidjan or Dakar (the ports marked in smaller letters in Figure 3-2 are served by feeders). The ro/ro service has an eight-day frequency provided by nine 1,300 TEU ro/lo ships. This service directly calls at Takoradi, but not Tema. Abidjan, the only port called by three services, is the main transshipment hub for the line in West Africa. Three other services focus on a particular port area: Lagos, Monrovia, and Luanda.

Table 3-1
Ships Deployed on Delmas European Services

Service Name	Hebdo Direct	Ro/Ro	Express	Nord Direct	Angola Shuttle
Number of ships	5	9	5	2	6
Service frequency (days)	7	8	9	14	10
Ship characteristics					
Ship name	Marie	Roland	Azteca	Filato	Lisaboa
Type	PC	Ro/Ro	PC	PC	
Year built	2002	1980	1998	2006	2002
DWT	30,450	24,223	23,040	13,760	17,183
TEU	2,207	1,327	1,730	1,118	1,157
LOA	195.6	186.6	185.0	148.0	155.0
Beam	30.2	32.2	25.3	23.3	24.5
Max. draft	11.0	12.0	9.9	8.5	11.4
Max speed	22.6	17.5	20.0	19.5	19.0
Cranes	3 x 45 ton		3 x 40 ton	2 x 45 ton	3 x 45 ton

Figure 3-2
Delmas European Services



Note: There are two additional services: Agadir, a weekly shuttle between Agadir and a long list of West African ports, provided by two ships; and Conbulk service, a combination bulk and containers on deck, with frequency of 25 days, which also calls Takoradi.

Delmas has two Mediterranean services, New Sirius and Diams. Neither calls Ghana but both call Dakar, which can serve as a transfer port for Ghana. Alternatively, the Diams service calls Abidjan, which can also be used as a transfer port for Ghana.

With all services having long overlapping routes, Delmas's service pattern is inefficient but perhaps the only reasonable one considering port problems in Africa. A rationalized service system would consolidate all five European services into a single service provided by larger ships calling only major hubs. A consolidated service would require that the selected regional hub ports provide fast and reliable terminal service. Such terminals are not available, but judging by the expansion plans for West Africa's main ports, could be developed. Another obstacle is finding suitable employment for the fleet now providing these services.

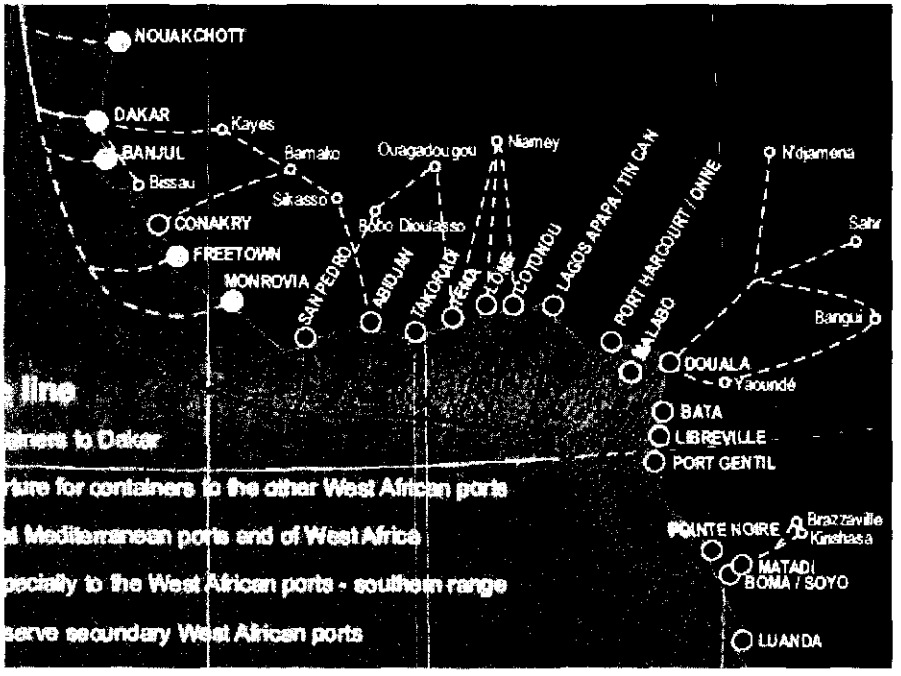
Asian Services: Delmas has three Far East services and one Middle East–India service. The Far East services are WAX, with eight-day frequency, provided by nine 1,700-TEU ships; and AFEX, with 11- day frequency, provided by seven 2,200 TEU. AFEX calls Tema. Takoradi has no direct service to the Far East.

South American Services: While Maersk's South American service combines South and West Africa and calls on four West African ports, Delmas has a dedicated service that calls only West Africa. The service calls at Pointe Noire, Congo Brazaville and Luanda, Angola, which both serve as hubs for a regional network of feeders covering 10 West African ports: eight through Pointe Noire and two through Luanda. Both Tema and Takoradi are served through Pointe Noire. Tema's westbound service to South America involves two transshipments, first in Abidjan and then in Pointe Noire. The resulting westbound transit time is 42 days (Tema–Santos), while the eastbound time (Santos–Tema) is 26 days.

North American Services. Delmas has no direct North America–West Africa services. Hence, the service is provided by a combination of transatlantic and European services, with transshipment in Antwerp or La Havre.

Through Bill Of Lading. Delmas offers through bill of lading (B/L) to landlocked countries (Figure 3-3 below). Tema is an optional port of call for Burkina Faso and Niger; however, three other ports can serve Ouagadougou. Nigeria's ports are not selected for any hinterland point. Presumably, this indicates problems with congestion or customs there.

Figure 3-3
Delmas Hinterland Service



Port Operations: CMA CGM, the parent company of Delmas, does not have a separate port operating company like Maersk. But like all major lines it is heavily involved in terminal operations, holding shares in 16 container terminals in various regions and investing aggressively in additional ports. For example, it is signing a strategic cooperation agreement with Chinese and Hong Kong investors to develop a new deepwater terminal in Xiamen, China; is acquiring a 12 percent share in Busan New Port, South Korea; and is taking 50 percent of a $520 million investment in a deepwater port in Vietnam.

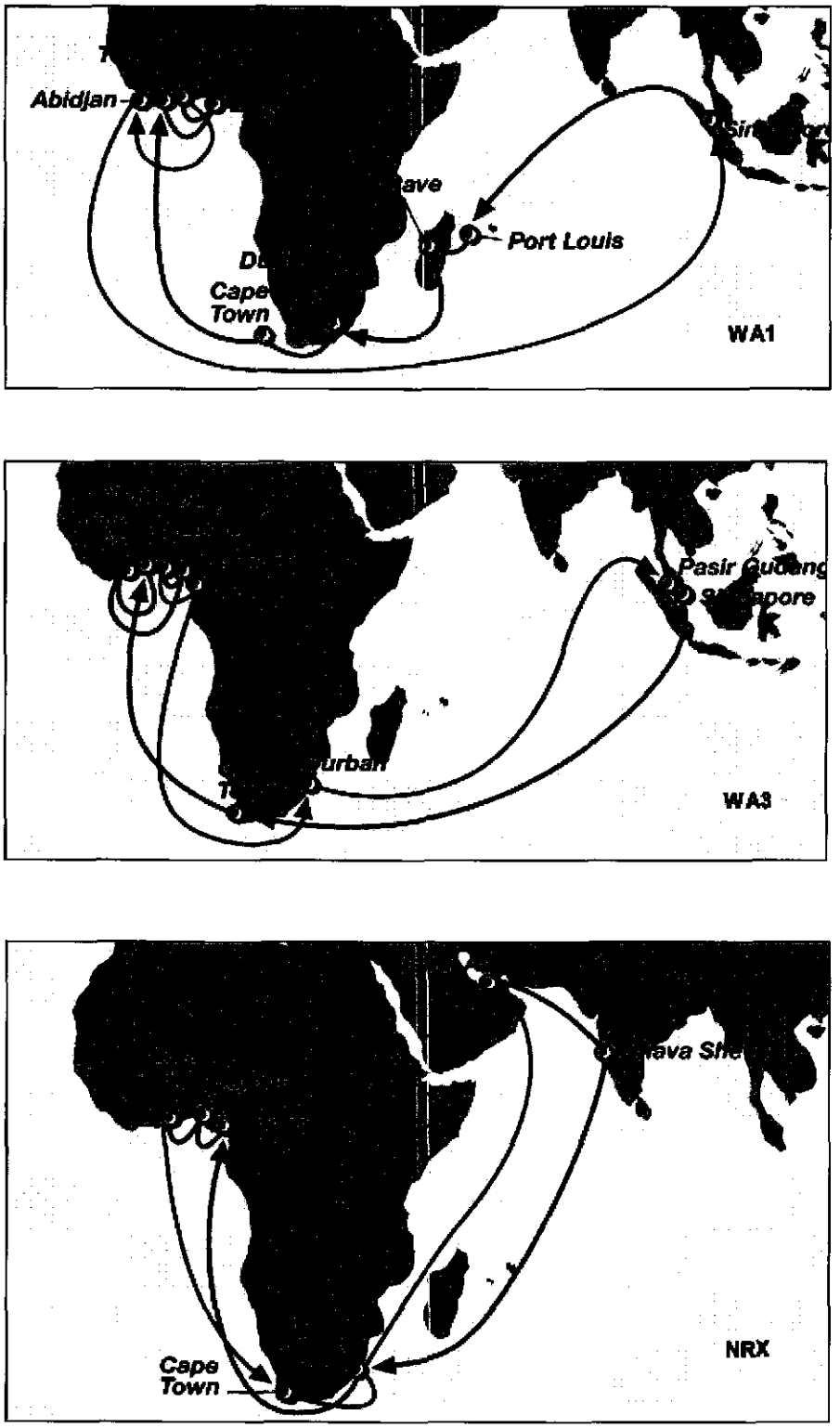
Plans: CMA CGM recently divulged that it intends to increase investment in Delmas and through it, its West African services. The line contemplates introducing a series of ten 3,500 TEU lo/lo ships on the Asian trade lane and 1,730-TEU ro/ro, multipurpose ships on the European one. As noted, the present lo/lo fleet on the Asian trade comprises ships in the 2,200 TEU range, while the present ro/ros are 1,300 TEU.

The four ro/ro (or con/ro) order totals Euro 116.5 million, or about $43 million per unit. These ships are essentially multipurpose (see Grimaldi below). The large investment in such ships indicates that unlike other world trade lines, wherein ro/ro has almost disappeared, this segment of shipping will continue thriving in Africa. The dimensions of these ships are 208 x 32.2 x 11 m (LOA x beam x draft). The weather deck will be equipped with 40-ton cranes.

Mediterranean Shipping Corporation

MSC has two services on this trade lane, one to North Europe (Continent) and the other to the Mediterranean. The North European service employs five 1,500 TEU ships and calls only Tema. Some of the ships on this service are gearless, with dimensions of 215 x 32 (LOA x beam x draft). The North European service also stops south and northbound in Las Palmas, where MSC has a global hub. The Mediterranean service employs five 1,200 TEU, all geared, and calls at Takoradi, but not at Tema. Both services call at Lagos (Apapa). MSC does not have Asian services to West Africa.

Figure 3-4
MOL Asian Services



Mitsui OSK Line

The involvement of Asian lines in West Africa is limited, although trade with Asia is becoming dominant. MOL, a Japanese line, was the first Asian line to establish services to West Africa. It entered the market by purchasing P and O Nedlloyd service from Maersk after the latter was forced to shed out following the purchase of P and O Nedlloyd. At present, MOL has two services to/from Asia in West Africa; it uses slots chartered on a third service of PIL. All three services—MRX, WA1, and WA3—call Tema, but none calls Takoradi (see Figure 3-4). All are direct, with the mother ship calling at all three or four West African ports, with no feedering. On the Asian side, the two Asian services call at Singapore, a major hub, from which MOL provides connection to Far East ports.

The MRX service is a weekly service to the Middle East and India provided by five 1,200 TEU. WA1 calls only Singapore in the Far East, from which MOL provides onward connections. It also has weekly frequency provided by nine 2,200 TEU. Ships are mainly chartered, with a wide range of capacity. This "heterogeneity" shows the instability of West African services, for which dedicated loops of new buildings cannot yet be justified. This may soon change with the development of Asian trade.

The MOL service pattern, like Maersk's Asian service pattern, is a "marriage" of the West African and South African with Asian. This may change as both trades grow. For example, separate services could be established for each region, or both regions could be incorporated into a global service system. MOL does not have European services but uses slots chartered on Delmas services to Europe.

Zim Integrated Shipping / CSCL

Zim and CSCL operate a joint service from North Europe called NAF, employing four 1,300 TEU with 10-day frequency. The service calls only three European and three West African ports, including Tema. It is understood that Hapag Lloyd is space sharing on this service after terminating its own fortnightly service.

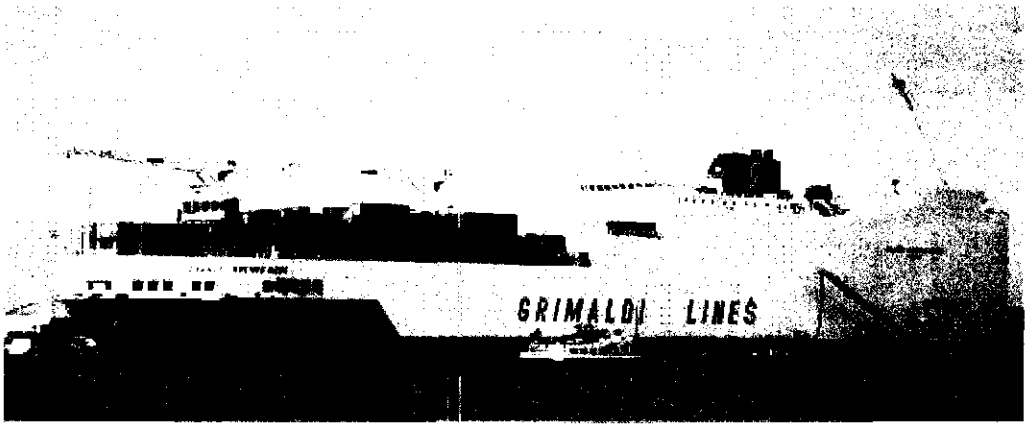
Grimaldi

European Services. Grimaldi is a large Italian carrier involved in car-ferry services in Europe and ro/ro services in Europe and between Europe, North America, South America, and West Africa. The line has three West African weekly services: Northern Express, Central Express, and Southern Express. The Central Express calls Tema and the Southern Express calls Takoradi. All services call Dakar, which serves as a regional and a global hub. In Dakar the West African services can connect with North American and South American services (see Figure 3-5 below).

Figure 3-5
Grimaldi's Global Service System

The Central Express service is provided by five ships of the Grande Class with dimensions of 214 x 32 x 9.7 m (LOA x beam x draft) and capacity of 2,500 lane-m (11 decks) and 800 TEU (see Figure 3-6 below). Additional container capacity can be obtained by stacking containers in the lower decks. The Grande Class ship is totally self-sustained in terms of port handling. It carries its own fleet of Mafi trucks, trailers, and forklifts and the weather deck is equipped with 2 x 40 ton cranes. The ship's "quarter ramp" can carry 250 tons, can land on a marginal pier, and does not require a shore-based Ro/Ro arrangement

Figure 3-6
Grimaldi's Grande Class Ship



Grimaldi ships, which the line refers to as "conro" (container and ro/ro), are true multipurpose ships designed for African trade and ports: they can carry almost any cargo including rolling, heavy, breakbulk (palletized), and containers. They can also call at nearly any port since they are relatively shallow and self-sustained. The success of the ConRo concept is proven by Grimaldi's recent announcement of an order of 10 more ships of similar design, at about $80 million per ship.

North American: Grimaldi is the only line offering direct service between West Africa and North America. The service has a 17-day frequency and is operated by the Republica class ConRo, with deck capacity of 650 TEU. The service also calls Tema.

Port Operator: Grimaldi is involved in port operations, though on a much smaller scale than the Lo/Lo lines. For example, it recently acquired 49 percent of HHLA stake in Unikai terminal (Hamburg) at O'swaldkai, a multipurpose Ro/Ro facility. Grimaldi invested $60 million in Lagos' Tin Can Island. The terminal includes a 500-meter berth, a 21-hectare yard, of which 9 hectares are paved to serve as a car park. It is operated through a subsidiary, Port and Terminal Multiservice Limited (PTML).

Messina Line

Messina Line is another, smaller operator of ro/ro ships. It has a four-ship service to the Mediterranean that calls both Tema and Takoradi every 12 days. The largest ships are 239 x 30.5 x 12.24 m (LOA x beam x maximum draft), with capacity of 1,450 TEU and 1,250 lane-m.

3.3 FUTURE SHIPPING SCENARIOS

Global Trends in Liner Container Shipping

Worldwide Market Consolidation

Container shipping is capital intensive, with inherent economies of scale and scope. Larger shipping lines can employ larger ships with lower unit costs; they also have better access to capital and, in turn, can obtain better return on it. Likewise, a larger network of services can generate the traffic volume required to better utilize the larger ships and better attend to the needs of global shippers. As a result, liner shipping has been transforming itself through many rounds of consolidation and rationalization. It seems that this trend still has a way to go before reaching the critical stage of antitrust legislation. For example, Hapag Lloyd, the world's fifth-largest line, is rumored to be a candidate for merger or acquisition.

Table 3-2 below shows the ship slots controlled by the world's largest lines. Ship slots are considered an indication of the size of shipping lines. The three largest independents—Maersk Line, MSC, and CMA CGM—control about 30 percent of the market; the largest 10 lines control about 60 percent.

African services is at Mediterranean or Asian hubs, where Maersk provides connections to final destinations worldwide. In contrast, other services sail all the way from West Africa to gateway ports in Europe and Asia. It is logical to assume that Maersk and other global carriers will also attempt to rationalize the service system in West Africa by applying the hub-and-spoke concept when the West African ports can support it.

Increase in Ship Size

A related trend in containerized shipping, already alluded to, is the increase in ship size, usually measured in carrying capacities (TEU). Table 3-3 below presents a sample of container ships and their dimensions. A typical Panamax ship, the largest container ship that can transit the canal locks, has an average carrying capacity of 4,500 TEU and the following dimensions: 295 x 32.3 x 12 m (LOA x beam x draft). The capacity of the newest Panamax can reach 5,000 TEU, but not while transiting the canal, due to draft limitation.

The present Panamax are only one third of the largest ships in operation, Maersk's E-class, with 14,500 TEU. These ships are deployed on the Far East–North Europe AE-7 service (eight ships). It seems, however, that Maersk decided not to continue with this series for the time being. Only a few ports can handle ships of such dimensions (397 x 56.4 x 15.5 m) and only a few trade lanes have the traffic density sufficient to fill them.

Table 3-3
Container ship Characteristics

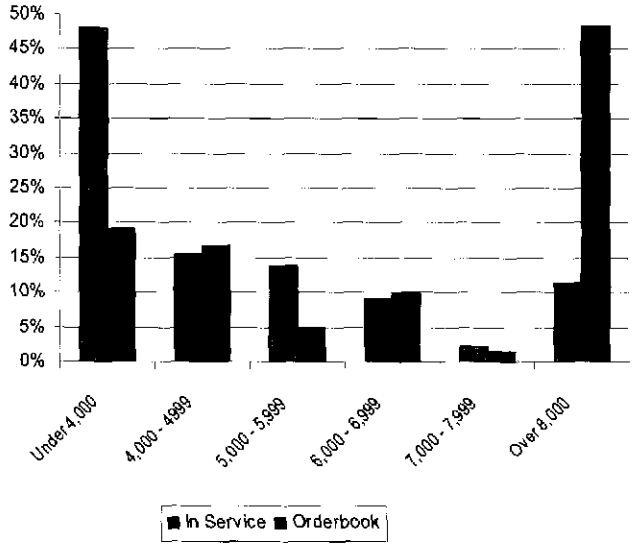
Design	Capacity (TEU)	Length x Beam x Draft (m)	Arrangement (rows): Under, Above, Across
Panamax	4,500	295 x 32.3 x 12	8-5-13
Sovereign Maersk	7,500	347 x 42.8 x 14.5	9-6-17
NSC Hanjin	12,850	365 x 48.4 x 14.5	10-6-19
Emma Maersk	14,500	397 x 56.4 x 15.5	10-6-22
Malacca-Max	18,000	396 x 68 x 21	13-8-23
New Panamax (NPX)	12,500	366 x 49 x 15.5	9/10-6-20

Fleet Composition

While no additional E-class ships are expected in the near future, container ship size has been undertaken tremendous growth in recent years. This growth is evident in changes in fleet composition. Figure 3-7 presents a breakdown by size of the present fleet along with the order book. Forty-eight percent of new buildings are in the largest size category (8,000 + TEU) for a total capacity of 3.1 million TEU, almost three times the present capacity of 1.2 million TEU.

Figure 3-7
Present and Future Fleet Composition, by TEU Range

Ship Size and Transshipment



	In Service		Orderbook	
Range (TEU)	No.	%	No.	%
Under 4,000	5,133	48	1,216	19
4,000–4999	1,662	16	1,068	17
5,000–5,999	1,478	14	308	5
6,000–6,999	966	9	633	10
7,000–7,999	231	2	90	1
Over 8,000	1,215	11	3,086	48
Total	10,685	100	6,400	100

The increase in ship size tends to increase transshipment for two reasons. First, there is a tendency to reduce the number of calls to save on the number of the larger and more expensive ships. Second, some ports do not have facilities to handle such large ships. But the deployment of larger ships instead of smaller ones on major trade lanes triggers a counter trend of increasing direct services at the expense of feeder calls. This is due to the "cascade effect" whereby ships replaced by larger new buildings are employed in new direct services calling ports previously served by feeder services. Because of these two opposite trends, the share of transshipment in worldwide traffic has not changed much in recent years.

Transformation of Shipping System and Related Scenarios

Our assumptions regarding the transformation of the West Africa shipping system are "unconstrained." That is, future shipping and port scenarios are based purely on total system optimization, assuming that port capacity can be introduced as necessary to allow realization of various shipping scenarios. This assumption is critical because at present West African ports cannot accommodate large ships as well as the large traffic volumes that may be generated by shipping systems related to transshipment. Hence, an implicit assumption of an unconstrained scenario is that no physical barrier exists to West African port expansion. In fact, the reality is that ports in West Africa can be expanded and new ones developed in response to changes in the shipping system, as shown by the recent spate of port projects, one of them being MPS in Tema.

Future West African Port Scenarios

We have discussed the shipping system and its possible transformations. For the sake of analysis, we identify three simple alternative shipping systems for West Africa:

Direct Calls. Continuation of the present system of shipping services based on multiport rotations, with each service directly calling a different West African region (Figure 3-8).

Regional Hubs. Transformation of West Africa service system based on mainlines expanding to encompass several regions but only calling directly at regional transshipment hubs (Figure 3-9).

Global Hubs. Transformation of the world system of services based on emergence of global transshipment hubs (Figure 3-10).

Not all lines will necessarily follow one shipping system, as is the case at present. Accordingly, the future system will most likely be a combination of direct services and some form of transshipment. But to facilitate analysis we depict the future system by scenario.

Direct Calls at Gateway Ports

This shipping system is the least efficient for ship costs. The inefficiency is evident in the many parallel red (Asian) and blue (European) lines in Figure 3-8, each representing the route of a single service. Since each single service handles a relatively limited range of ports and traffic volume, the service employs relatively small and expensive container ships. The advantage of this system is simplicity. Because the various services are independent, problems in one do not affect the entire network. Likewise, smaller ships are more suitable to the shallow, congested, and ill-equipped West African ports.

At present, the larger ships calling West African ports are about 3,500 TEU. The main assumption of this scenario is that the present shipping system continues, but with some modifications, especially in response to growing trade with Asia. These modifications might involve introducing larger ships and eliminating smaller ports of call through limited feedering. Accordingly, we assume that ship size on the longer Asian services will increase, reaching large Panamax or small post-Panamax of 6,000 TEU. Limited transshipment, somewhat larger than the existing one, is also expected, probably ranging from 10 percent to 20 percent of domestic traffic. The estimated volume of transshipment performed at Abidjan and Dakar is already 350,000 TEU.

Regional Hubs

West Africa's many small countries have their own ports. This multiplicity of ports arises from the lack of good coastal roads for efficiently moving boxes between adjacent ports as well as longstanding issues of Customs and national pride. Therefore, lines desiring to serve all these ports have to call at all of them directly. Calling more than three or four in one region, however, results in long transit times. Hence, lines typically have several, parallel West African services, each covering a different range of ports (Figure 3-8).

Figure 3-8
Direct Call Shipping Scenario

Figure 3-9
Regional Hubs Scenario

The regional hub scenario (Figure 3-9) attempts to resolve the inefficiency inherent in direct services by introducing the hub and spoke system common elsewhere (e.g., Mediterranean, Caribbean). Under this system, a dominant West African port assumes the role of regional hub, while the rest are served by feeders through the hub. In parallel, the mainline service is extended to several regions, calling only the regional hubs there. In addition to mother-to-feeder transshipment, these regional hubs will be involved in mother-to-mother transshipment, sometimes referred to as interline transshipment.

Figure 3-10
Global Hubs Scenario

As seen in Figure 3-10, this is likely to happen in the regional hub where the European mainline (blue) meets the Asian (red) one and the two lines exchange boxes. For example, a European box destined for Angola will be transferred from the European to the Asian mainline and later to a regional feeder, undergoing two transshipments.

Consolidating the traffic of several West African regions into one service would generate large volumes of traffic for this service, which in turn would justify deployment of larger ships, probably 7,000-9,000 TEUs. At present, this ship size dominates the major east-west trade lanes. The traffic volumes at regional hubs will also be large due to the added transshipment, both mother-feeder and mother-mother. As noted, the number of box handlings generated by transshipment is twice the traffic volume transferred between ships. It is difficult to estimate

the volume of the transshipment traffic since it may vary according to the range of ports served through the hub. It seems, though, that the order of magnitude estimate of this traffic could be equivalent to the domestic volume.

Global Hubs

This scenario assumes worldwide transformation in service patterns after consolidation of the main east–west services (Asia–Europe, Asia–North America, Asia–South America) and the emergence of global hub ports, where these services are expected to call. Such hubs have already emerged in the Gibraltar region, while smaller hubs are being developed in South Africa. From these hubs, feeder services will distribute boxes to local West African ports. Hence, most West African boxes related to deep sea trades will be transshipped, with transshipment performed in global hubs outside the region. In fact, Maersk already uses hubs in the Gibraltar region to transship all of its European and some of its Asian traffic to/from West Africa. Ships on the global services may reach New Panamax size (12,500 TEUs) or an even larger size. Because the regional feeders in this scenario have relatively long rotations, they are expected to deploy ships in the 3,000–4,000 TEU range. The traffic volume in this scenario will be similar to that of the direct service scenario (due to very limited transshipment) since the projected feeder services from/to global hubs may call directly at more ports than the deep sea services in the direct service scenario.

3.4 Lo/Lo and Ro/Ro Shipping

The shipping scenarios just described are all related to the Lo/Lo shipping system, which is different than Ro/Ro shipping. At present, Ro/Ro shipping is an important segment of the West African shipping system amounting, in the case of Tema, to about 10 percent of container traffic. Ro/Ro shipping is expected to continue to thrive in West Africa, mainly due to the need to import autos and rolling equipment for the mining and construction industries. However, the Ro/Ro market share is expected to dwindle, following a similar trend worldwide. Shipping containers on Ro/Ro ships, even if stacked on the weather deck (not inside), is much more expensive than Lo/Lo ships, especially when the Lo/Lo are large and gearless and are handled at modern terminals. Also, specialized container terminals are not geared to handle rolling equipment. Hence, we expect no major changes in shipping systems of Ro/Ro, except perhaps for limited growth in ship size and greater focus on the noncontainer cargo segment.

3.5 GHANA PORT SCENARIOS

With or Without Large Scale Transshipment

As Table 3-4 shows, there is little difference between the gateway and global hub scenarios in ship size and traffic volume, but a marked difference between these scenarios and the regional hub scenario, which involves much larger ships and a doubling of traffic volume in Tema. Accordingly, for planning purposes, the three scenarios can be collapsed into two:

Gateway Port—serves mainly Ghana and transit traffic with limited transshipment.
Regional Hub Port—serves the above, plus, via transshipment, neighboring countries.

Table 3-4
Tema's Shipping System Scenarios

			Dominant Ship Size		
Scenario	**Tema's Traffic**	**Dominant Service Pattern**	**Present**	**2013**	**2028**
Gateway port	Ghana + transit traffic	Deep-sea services calling major West African ports directly	3,500	4,500	6,000
Regional hub	Ghana + transit + transshipment	Deep-sea services calling only West African hubs	n.a.	6,000	8,000
Global hub	Ghana + transit traffic	Regional feeder services through global hubs	2,000	3,500	4,500

Regional Hubs

Perhaps of greatest relevance to Ghana is the regional hub port scenario, which also involves far-reaching changes. Hub selection usually involves location, traffic volume, physical constraints, and cost. There is no compelling geographical reason to assume that shipping lines would prefer Tema or any other port over others for a regional hub. A West African hub will involve European and Asian services, each coming from a different direction, so the hub can be anywhere between Abidjan and Libreville.[6]

If location is not a factor, hub selection will likely focus on traffic volume, physical constraints, and construction costs. Lines usually prefer to have their hub in the largest regional ports to save on transshipment handling. If size were the deciding factor, Lagos, the largest port, would be the regional hub. This hub, however, cannot be developed in Nigeria's existing terminals, which are understood to be fully utilized and too shallow to accommodate the large ships serving the transshipment trades. Recent news indicates an initiative to develop "the deepest port in Africa with a draft of 17 meters, to be constructed by Lagos Port LFTZ Enterprises along the Atlantic coast at Ibeju-Lekki area of Lagos by the first quarter of

[6] If mainline services are in one direction, the first major regional port is often selected as a hub. This transshipment pattern is dubbed "tail cutting" and is typical of a long range of ports, such as that on South America's west coast.

2009....with total investment of $700 million, and designed to handle 8,000-TEU ships".[7] No further details are available on this project.

The second-largest regional port, Abidjan, is already a transshipment hub. Like Lagos, Abidjan recently announced plans to invest in port expansion, including deepening the access channel from 11.5 meters to 14 meters. No further details are available on this project.

In discussions with shipping line representatives in Tema, we found that in selecting a regional hub in West Africa, political stability should also be taken into consideration, particularly for large investments. While Nigeria and Ivory Coast have political problems, Ghana has a long history of political stability. Another consideration for regional hub status relates to market structure. Because of the vulnerability of transshipment operations, which involve making connections between services, many lines insist on controlling their transshipment hubs. Accordingly, each major line could have its own transshipment hub in a different port according to its own network of shipping services. Tema therefore has a fair chance of becoming a regional hub, assuming adequate port facilities can be developed there at a reasonable cost. Transshipment traffic therefore is expected to be handled at a dedicated terminal for which investment is provided primarily by the terminal operator.

Transshipment Traffic

The assumption underlying the transshipment scenario is that a global line decides to transform its service pattern into a hub-and-spoke pattern, with Tema Port the regional hub for direct calling at multiple regional ports. In this scenario, Tema Port becomes the meeting point of the line's European and Asian services, which by then, will employ post-Panamx ships of 7,000–9,000 TEU. The line also will develop a system of regional feeder services, operating ships of, say, 500–1,000 TEU, to connect the Tema hub with other West African regional ports.

Each weekly feeder service employing 500-TEU ships generates about 100,000 TEU of transshipment annually, including loading and unloading of both mother and feeder ships (500 x 4 x 52 weeks). This traffic volume is assumed to be the initial transshipment volume. A related assumption is that within a year, a second, similar service will be added, resulting in total traffic of 200,000 TEU annually, considered the minimum required for establishing such a hub. When this hub has been established, it is assumed that the transshipment traffic will grow at the same growth rate as that of the regional cargo. Projections as they are affected by these scenarios are presented in the next section.

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[7] *The Vanguard*, Lagos, April 8, 2008.

3.6 Economic Evaluation and Forecast for Ghanaian Port Cargo Traffic

Since 2000, Ghana has had a democratically elected government and has improved its macroeconomic management and economic performance significantly. Consequently, it receives multilateral and bilateral aid amounting to about US$1 billion annually. This represents substantial additional resources, continuation of which is important to poverty alleviation, agricultural productivity and investor confidence.

3.6.1 TRENDS IN IMPORTS AND EXPORTS

Ghana's containerized imports substantially exceed containerized exports, and this is forecast to continue for the forecast period. Therefore, the total number of containers handled will be determined by import volumes. The volume of containerized imports has been growing at 12–14 percent per year (more than double the growth rate of real GDP, which averaged 5.3 percent from 2001 to 2005 and reached 6 percent in 2005–2006). The shift from breakbulk cargo to containerization has contributed to this unusually high growth in import container traffic. Container cargo imports consist mostly of consumer goods but increasingly of semiprocessed materials (e.g., plastics and construction materials) and supplies for mining industries.

Recent growth in containerized exports is driven largely by more containerization of cocoa beans, which used to be shipped breakbulk. Nontraditional exports are growing in significance. These exports include cashew nuts and shea nuts, together accounting for about 50,000 tons of mostly containerized exports. Additional imports and exports from new businesses in the free trade zone (FTZ) add to containerized traffic. In 2001, the export of logs was prohibited, and processed wood products, veneer, and plywood began to be exported in greater quantity, adding to containerized and ro-ro export volumes. Furthermore, some cocoa bean is now processed into cocoa paste and cocoa butter for export in containers. Canned tuna shipped in containers is also a major nontraditional export.

At Tema, throughput is driven by imports, which are substantially greater than exports. In 2007, there were 211,000 TEUs of full imported containers and only 60,000 TEUs of full exported containers, a ratio of 3.3:1 In Takoradi, however, the volume of containerized imports trails that of exports by a ratio of 1:2; TEU throughput in Takoradi is therefore driven by exports. This is because Takoradi serves a relatively small imported consumer goods market but exports large volumes of cocoa and timber products.

The largest bulk imports at both ports are petroleum products, clinker and limestone for cement, and wheat. Bulk exports, which are delivered mostly to Takoradi port by rail, are manganese and bauxite. Cocoa beans are exported in bulk, breakbulk, and containers and are delivered to the ports by road. Wood products are delivered to Takoradi by road and rail and are shipped mostly in containers or on Ro-Ro vessels.

Figure 3-11 shows the volume throughput for all cargo types at Takoradi and Tema during the period 1998–2006, and Figure 3-12 show the volume of container traffic at both ports for the same time period, which includes empty movements. Table A-1 of the Appendix provides more detail on historic traffic trends.

Figure 3-11

Trends in Total Traffic Volume at Tema and Takoradi Ports, 1998–2006 (metric tons)

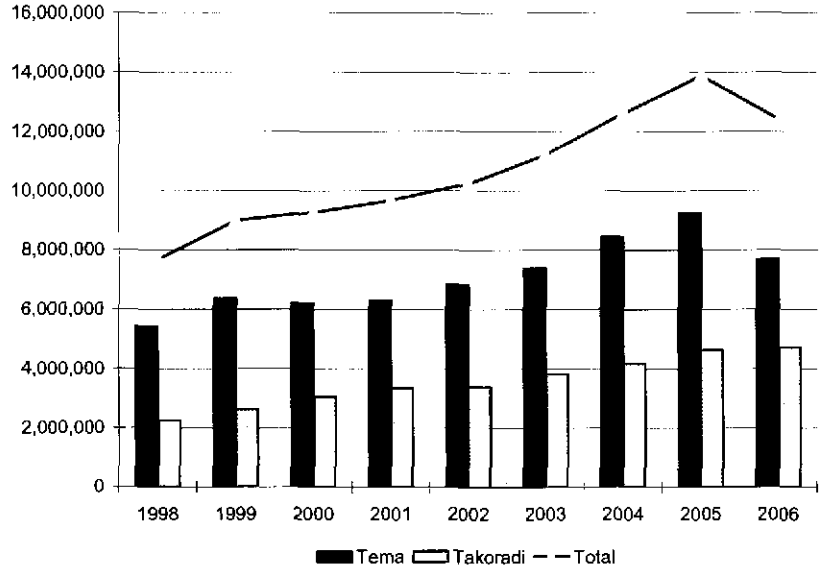
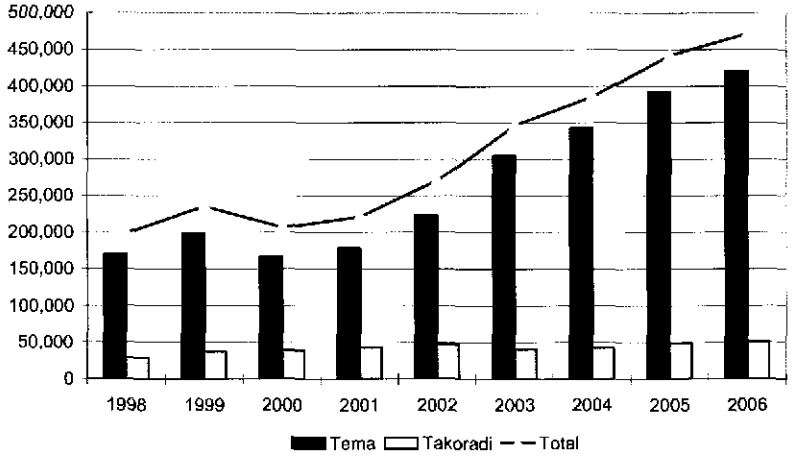


Figure 3-12

Trends in Container Traffic Volume at Tema and Takoradi Ports, 1998–2006 (TEUs)



not retained when security in Côte d'Ivoire was restored. Although port charges at Tema and road haulage distances are competitive, other commercial considerations remain paramount in marketing transit cargo, including language, the hard currency to which the local currency is pegged (Euro or dollar), and commercial laws and practices. Important considerations include the need for large warehouses dedicated to the storage and fumigation of cotton, which is the major export backhaul for import containers. Without this backhaul to both ports, trucking costs through Ghana are uncompetitive. Tema is used mainly for imports of used vehicles, machinery, and high-value consumer goods in transit.

It is unlikely that an ICD will be installed in Kumasi or that it would substantially increase the transit market. The costs of installing and operating infrastructure support facilities would be substantial. The investment cost for Phase 1, an area of 10 ha., was estimated in 2003 to be $ 13.3 million by a study prepared by GPHA and the Ghana Shippers' Council. Transfer of cargo to break bulk trucking for the Kumasi-final destination transit delivery distance would add costs and delays. The study did not include an economic/financial feasibility evaluation. We expect that transit traffic will not exceed 10 percent of total import container volume (see discussion of port catchment areas and transit traffic potential below).

3.6.4 REGIONAL MANUFACTURING AND COMMERCIAL BASE

Products manufactured in Ghana are gaining markets throughout ECOWAS countries. Containerized manufactured products are produced largely in the Accra/Tema metro area and are exported through the port at Tema or by road to Mali, Burkina Faso, and Niger. This export traffic seems likely to increase because Ghana is considered one of the best locations for the manufacturing of goods for this region, where the markets of individual countries, except Nigeria, are too small to support large-scale manufacturing plants. Ghana has less political risk and greater macroeconomic stability than other ECOWAS countries and is embracing a relatively pro-private enterprise development strategy. Adopted in 2007, the ECOWAS Strategic Vision seeks to convert West Africa into an economically borderless region and thereby progress toward the goal of subregional free trade.

Ghana has positioned itself as a preferred destination for domestic and foreign direct investment in Africa. The Ghana Investment Promotion Center, in the first three months of 2008, registered 92 new projects with an estimated value of $37 million, 61 percent of them fully owned foreign enterprises and the rest joint ventures between Ghanaians and foreign partners. Significant numbers of investors come from India, China, and the United Arab Emirates. Ghana raised $750 million in international capital on a sovereign bond issue that was oversubscribed with U.S., U.K., and European investors. In 2006, the AfDB issued a bond denominated in Ghanaian cedis worth $45 million.

With an overall urban literacy rate of about 70 percent, and for urban males and urban youth (ages 15–24) of about 82 percent, Ghana has a good, trainable labor base. Employment generation through skills development is a key development policy objective.

consequence of associated growth in manufacturing and service enterprises located there. The Ghana Free Trade Zones Board would like to operate a new zone in Takoradi by 2015 and has obtained land for this purpose. If the FTZ comes to pass, the zone's factories will boost both import and export container volume.

Tema

The Tema catchment area is the entire country of Ghana, plus the landlocked countries to the north, especially Burkina Faso for the bulk of transit traffic (discussed in the Transit Cargo section below). Tema has advantages over Takoradi: more liner vessel calls, greater container berth draft, and modern container handling facilities, storage, and management. Accra/Tema metro area has the largest population concentration and highest per capita consumption capacity in Ghana. Most factories and commercial establishments are located nearby the port. The cost of shipping from Tema to other parts of Ghana is about the same as the cost of shipping from Takoradi, but the supply of road transporters is greater and not as seasonally constrained by cocoa bean transport as is Takoradi.

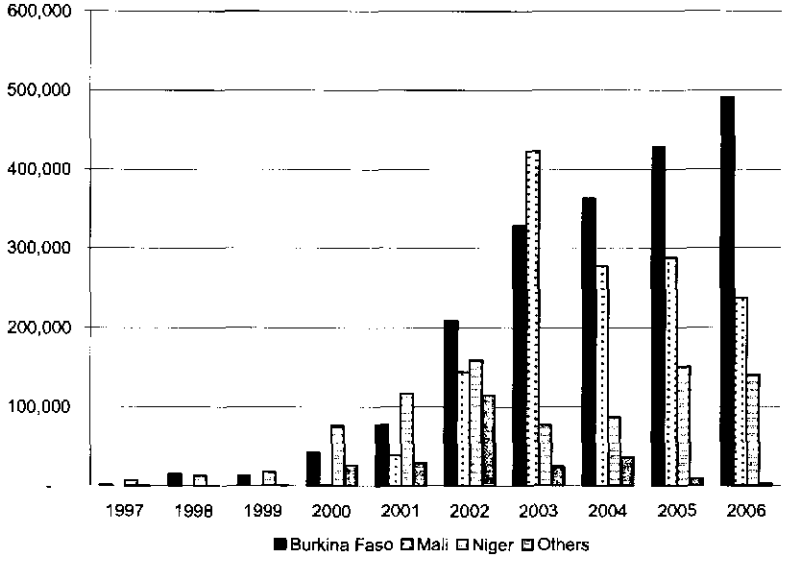
3.6.7 TRANSIT CARGO

About 85 percent of transit cargo is received through Tema and is transported to/from Mali, Burkina Faso, and Niger. Cargo is mostly breakbulk, and 65-70 percent consists of bulk foods, such as wheat, rice, and sugar. Machinery, construction materials, and vehicles are also imported. Total volume has remained constant over the past few years at about 1 million tons, or about 8 percent of Ghanaian nonbulk port traffic, and is largely imports.

Figure 3-13 shows the historical volumes of transit traffic through both ports by country. Burkina Faso accounts for about half the volume, which has been rising steadily. Flows to Mali have remained about constant (2004 to 2006), and flows to Niger have declined.

Figure 3-13

Tema Transit Traffic (metric tons) by Country



Cargo received in containers is usually unstuffed in Ghanaian ports for onward shipment by road to landlocked countries. To discourage the movement of containers to inland destinations, owners charge consignees high deposits and then delay returning the deposits.

Ghanaian ports compete for transit cargo with ports in Senegal, Côte d'Ivoire, Benin, and Togo, all of which are Francophone countries, as are all of Ghana's landlocked neighbors. Longstanding commercial and linguistic links between Francophone regional nations put Ghana at a competitive disadvantage. Moreover, the only reliable export product is raw and processed cotton, for which large processing and storage facilities have been built in Abidjan, which has both road and rail service to Burkina Faso. This cargo is backhaul for transporters carrying import goods, which enables the transporters to offer more competitive rates than transporters moving only import goods inland.

For high-value imports, Ghanaian ports are somewhat preferred because, both in port and on the highways, security and unauthorized charges are perceived as less risky and costly. The travel distance to Ouagadougou from Tema, Cotonou, and Lome ports is about equal, at 1,000 km. The distance from Abidjan to western Burkina Faso, however, is about 20 percent shorter than the distance from Ghana and the road corridor is in better condition. There is rail service as well. According to interviews with shippers and the JAPTU (Joint Association of Port Transport Union), the cost for trucking 2 TEUs between Tema and Ouagadougou is about $3,250 (FCFA 1.4 million). Costs include temporary import tax and road user fees paid at the Burkina Faso border. The cost for breakbulk trucking is normally about $70 per ton, or for a 35-ton load about $2,500. This is a larger cargo load than is normally carried in 2 TEUs. Seasonally, when trucking capacity is in high demand, rates climb.

During the civil unrest in Côte d'Ivoire from 2002 to 2004, when road and rail transport was interrupted and risky and unreliable at best, significant transit traffic was diverted to other ports, principally Lome, but also to Ghanaian ports. Since security has improved in Côte d'Ivoire, however, the traffic diverted to Ghana has generally returned to Abidjan. Transit container traffic at Tema in 2007 was about 42,000 TEUs, including empty returns, which represents only about 4 percent of container volume, largely imports destined for Burkina Faso. At Takoradi, transit volume was about 5,000 TEUs, with about 50 percent destined for Niger. Assuming that import volumes of food are closely linked to growth in real GDP and that these countries are forecast to have modest growth, relying largely on subsistence agriculture and foreign aid, the share of transit cargo throughput in total Ghanaian port activity will decline.

Container transit volume could increase at 3–5 percent per year. Assuming a containerization rate of 40 percent, a volume of 60,000–80,000 TEUs of imports per year can be forecast for 2020. Including outbound, mostly empty, movements, total movements would be 120,000-160,000 TEUs per year. This excludes any transshipment traffic, presently insignificant, that

Ghana may gain in the future, as a hub port for regional feeder services to Togo, Benin, and Cameroon, for example.

Total transit trade for both ports ranged between 1.0 million tons and 1.1 million tons in 2003–2006, with 43–48 percent with Burkina Faso, and with Mali second and Niger third in importance. Ghanaian ports have a 30 percent share of transit traffic to these countries, about equal to that of Cotonou and greater than that of Abidjan and Lome.

Ghana Ports and Harbours Authority (GPHA) has invested a lot in promoting transit trade—conducting marketing campaigns in the landlocked countries, opening an office in Burkina Faso, leasing port land to these countries to develop their own storage facilities, and developing transit sheds and truck parking facilities in both ports.

In addition to stiff competition from neighboring ports, the many actors involved in the logistics chain—the GPHA, Customs, the Excise and Preventative Service, shipping lines, clearing and forwarding agencies, haulage companies, police services, and the landlocked countries themselves—are presenting difficulties for Ghana. Among these are:

- Customs requires the physical inspection of transit goods more often than other countries, which causes delays and often additional cost.
- There is little incentive for private inspection services to perform efficiently. Customs designates the company that shippers must use according to the destination of the cargo, and the rates are fixed. Therefore, there is no competition for quality of service or cost.
- Police checkpoints are frequent, causing delays that can be mitigated by informal payments.
- Carriers require a guarantee deposit for containers in transit of $1,000–4,000 per TEU, and delays in the release of these deposits are frequent; such deposits are not imposed in competing ports.
- The free rental period allowed by carriers for containers in transit is 9-15 days from the date the vessel berths or from the date discharged from a vessel. This is seldom sufficient, so carriers are likely to collect demurrage on the containers when used for cargos in transit.
- The risks to cargo in transit fall on the shipper.
- Some agents are unable to make prior arrangements for funds to clear transit cargo and dispatch the trucks as and when they are loaded at the port.
- During the cocoa harvest season, trucks are in scarce supply and rates rise erratically.
- Customs documentation processing facilities and staff for transit cargo are not separated from those for domestic cargo.
- Consequently, ESMAF, the biggest breakbulk cargo importer in Burkina Faso, stopped using Ghanaian ports at the end of 2004.

- Four key importers in Burkina Faso that were using Takoradi withdrew in 2005 and went to Lome.
- In spite of the unstable security situation in Côte d'Ivoire, most transit shippers in Burkina Faso and Mali have left Ghana and returned to Abidjan.

In preparing the transit forecasts, we use two variables: growth in the size of the total transit market (3.7 million tons in 2005) and the share captured by Ghanaian ports. We assume that the total market will grow at 4–6 percent per year and that Ghana's share will range from 30 percent to 40 percent. For 2020, therefore, the total market calculates to 6.0 million to 7.5 million tons, with Ghana's share ranging from 1.8 million to 3.0 million tons.

3.6.8 FORECAST ASSUMPTIONS FOR ALL CARGO TYPES IN TEMA AND TAKORADI

Table 3-5 summarizes the basic growth assumptions for Tema's and Takoradi's cargoes for the Optimistic, Best Estimate, and Pessimistic growth scenarios. Additional factors affecting growth rates as well as the forecasts generated from these assumptions and factors are described below.

Table 3-5
Forecast Scenarios for Port Traffic (Excluding Transit Cargo)

	Optimistic	Best Estimate	Pessimistic
GROWTH IN GDP (PERCENT PER YEAR)			
2008–2013	7.0	6.5	6.0
2014–2028	8.0	7.0	6.5
CONTAINER TRAFFIC IMPORT MULTIPLIER			
Container traffic import multiplier (x GDP)	1.9	1.6	1.3
CONTAINER TRAFFIC GROWTH RATE (TEU)			
TEMA			
2008–2013	13.3	10.4	7.8
2014–2028	Gradual decrease from 12.6 - 5.2	Gradual decrease from 9.9 – 4.0	Gradual decrease from 7.4 – 3.0
TAKORADI			
2008-2014	7.0	7.0	2.0
2014-2028	11.0	8.0	3.0
TAKORADI IMPORTS (PERCENT CHANGE)			
Clinker/limestone	10.0	8.5	6.0
Wheat	8.0	7.0	5.5
Sugar and Rice	7.0	5.5	4.0
TAKORADI EXPORTS (PERCENT CHANGE)			
Timber products	2.0	-1.0	-2.0
Bauxite	3.0	0	-3.0
Manganese[a]	5.0	2.0	0
Cocoa	9.0	7.0	5.0.

[a]Manganese capped at 1.8 million tons per year

3.6.9 FORECAST SCENARIO PROBABILITIES

Traffic forecasts for both ports are based on three estimates: the pessimistic or lowest, the best estimate, and the optimistic or highest. The pessimistic scenario has a 10 percent probability—that is, is highly unlikely; the optimistic scenario is based on reasonable expectations for good prospects, and is thus assigned a 30 percent probability; and the best estimate is less speculative, based on economic activities already documented or plans well advanced in the near term. The estimates should be reviewed and updated frequently. For this purpose, the assumptions that have been made in forecasting are more important than the volumes

projected. The container throughput forecasts use a range of multiplier factors of GDP growth that are more conservative than the recent experience for Ghana and regional ports.

Master plans have at least a 15-year horizon; the further into the future one forecasts, the less certain the projections. But adding capacity in transport infrastructure, especially for ports and airports, requires large capital expenditure to meet the anticipated needs as much as 10 years in advance of full use of the additional capacity. Staying ahead of the demand curve is prudent, especially for a country as dependent on maritime trade for its economic survival, growth in per capita income, and wellbeing of its citizenry.

For the most part, the SWOT analysis threats relative to markets that are addressed later in this report are not considered likely to happen, given the information available at this time. The opportunities are reasonably achievable, if not all at least several, within the next 5 years, and probably all within 10 years. The weaknesses are generally correctable, and the strengths clearly evident.

3.6.10 Factors Affecting Container Forecasts

For both ports, container import traffic is driven largely by demand for consumer goods, especially food products, electronics, hardware, and household/office consumables and durables. Second in importance are products imported by mining and manufacturing enterprises such as semifinished products and machinery needed in the manufacture of finished goods. The need to import responds to growth in GDP. Rate of growth is a function of GDP growth and a multiplier factor, which in Ghana has been about 2.3 for the past several years. Ghana's economy, which was nearly stagnant before 2001, has seen a growth spike subsequently and a rapid shift from delivery breakbulk to containerization of products. It is therefore prudent to assume that the multiplier factor for the next 20 years will settle in at a lower rate than the 2.3 percent of recent years.

There is no reason to expect that the basic determinants of containerized import growth would be different for the two ports. However, in Tema, imports drive the volume of container traffic, with loaded import containers triple the number of loaded export containers. Conversely, in Takoradi, export containers drive total throughput. Therefore, while import growth may respond to the same economic parameters at both ports, in Takoradi additional import growth can be achieved by filling containers that arrive empty. As a result, growth in TEUs handled should be less than growth in containerized imports. Special circumstances could affect the range of estimates for Takoradi; these are discussed below.

In Takoradi, containerized exports consist largely of timber products and cocoa beans. No substantial increase may occur because timber exports are not forecast to increase and additional cocoa bean exports are likely to be bulk shipments. If a free trade zone opens in Takoradi, it is unlikely to generate more than 10,000 TEUs yearly. Containerized imports are largely consumer goods and materials for mining enterprises. As will be discussed later in

this report, mining is expected to expand at modest rates for manganese and possibly not at all for bauxite. The best-estimate forecast for consumer product containerized imports is for an increase of 10–11 percent yearly. This will tend to bring greater balance between import and export volumes, reducing the need to import empties, and consequently, growth of throughput will be slower at Takoradi than at Tema.

3.6.11 CONTAINER GROWTH RATE SCENARIOS

Forecasting values can seldom be precise, especially for a 20-year projection. Therefore, it is prudent to estimate a range of values, explaining the assumptions underlying these. Below we present a best estimate, a pessimistic (lowest) estimate, and an optimistic (highest) one.

The optimistic forecast assumes that government policies will continue to encourage private investment; the electricity supply will no longer constrain growth; the production of aluminum will resume by 2015; oil production will yield at least 150 million barrels a year by 2015, which at $80 per barrel will produce gross revenue of $12 billion, assuming 15 percent or 1.8 billion accrues as taxes and royalties to the government and additional royalties accrue from natural gas production; these revenues and new revenue enhancement measures are dedicated to infrastructure, especially Western rail rehabilitation and roads, and social services; and the trade deficit decreases and debt service is reduced, especially if crude oil and gold prices stabilize at least 70 percent of current prices. With these assumptions, a maximum containerization ratio of about 80 percent of nonbulk import cargo will be reached by 2010 both in Tema and Takoradi.

The best-estimate forecast assumes that the power supply shortage is overcome by 2020, aluminum production does not resume, oil production royalties yields about $600 million per year by 2015, the rail and road infrastructure improves, but water supply continues to constrain certain industries, and exports of nontraditional products continue to grow at 12–15 percent per year, Ghana achieves all Millennium Development Goals for water supply, education, and health services, the Western region rail is rehabilitated, and the trade deficit stabilizes at current levels. In this scenario, the containerization rate reaches 80 percent by 2015.

The pessimistic forecast assumes that a power shortage continues through the forecast period; oil revenues are $200 million by 2015; the deficit in public services and infrastructure upgrading continues, limiting mineral export capacity and export growth; and the trade deficit widens. On the basis of these assumptions, the containerization rate of imports will be 70 percent by 2015. Inflation will rise and taxation will increase, consequently slowing the demand for imports.

These represent the range within which future volumes are likely to fall. Applying the range of forecast GDP and container volume multipliers specified in Table 3-5 above yields a volume of about 1 million TEUs at Tema by 2013 at the earliest and 2016 at the latest.

At Takoradi, where container volumes are small (at 50,000 TEUs—only 10 percent of Tema's container volume), recent growth has been slower, with exports of cocoa and timber at greater volumes than imports. The unknown factor is the amount of new traffic generated by the exploitation of the oil field, which is located offshore near Takoradi. Presumably all liner-delivered containers for this industry will have to be handled in Takoradi, even if project goods and supply vessels are handled at a new, dedicated port. If the planned FTZ comes on line in the 2010–2015 period, it will also generate both inbound and outbound containerized cargo.

Figure 3-14

Tema Port Container Traffic Forecasts, 2008–2028, for Three Scenarios (TEUs)

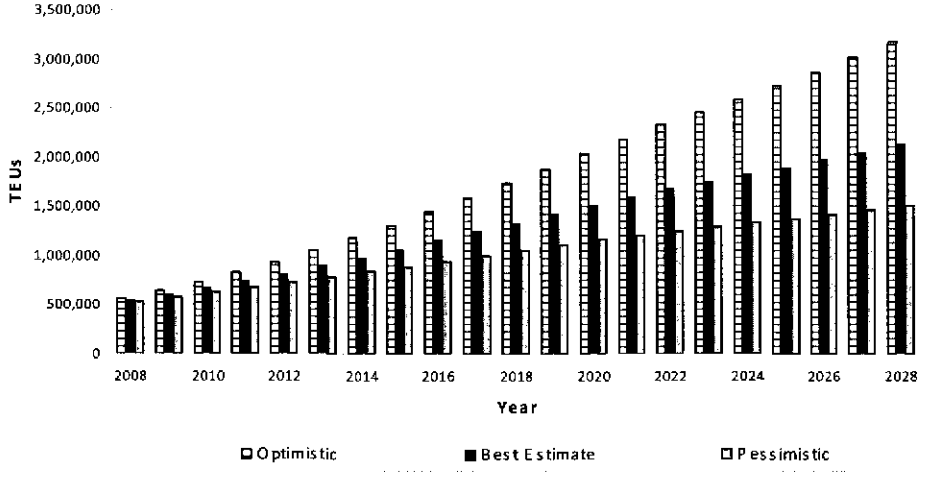


Figure 3-14 summarizes Tema port container traffic forecasts until 2028 for the three scenarios described above.

Figure 3-15

Takoradi Port Container Traffic Forecasts, 2008–2028, for Three Scenarios (TEUs)

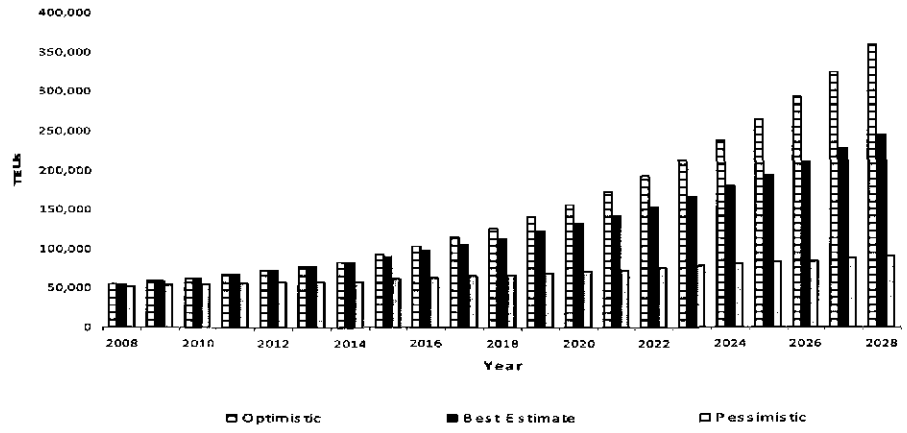


Figure 3-15 summarizes the same forecast range for Takoradi throughput.

3.6.12 CONTAINER TRANSSHIPMENT

This shipping service pattern system, an alternative to the gateway (direct call) port system for some container services, was discussed in more detail in a previous section of this report. It has the potential to fundamentally change the regional shipping system, as well as facility requirements for Tema port. Presently, transshipment box movements at Tema are about 30,000 TEUs, or about 5% of total volume.

It is logical that a global carrier and/or port operations company will build one or more regional container transshipment hubs, linked to feeder services, to serve West African countries in the next 20 years. The choice will be made by a private enterprise on the basis of its assessment of liner service routing patterns, traffic volume, incentives offered by the host country, physical constraints, construction costs, and relative political and economic risks of investing and operating, among other factors. Tema will probably be considered, in competition with perhaps Lagos and Abidjan. There is no way to forecast when a decision will occur. Assuming a minimum lead time of four years to plan, finance, and build a regional container hub port facility, new volume would not come on stream before 2013.

This facility would probably have a first-phase capacity to handle box movements (in and out) of 1 million TEUs and berth depths consistent with vessels of 7,000–9,000 TEU capacity. Transshipment, already performed at Abidjan and Dakar, is estimated at about 350,000 TEUs

annually. Presently, Tema can handle Panamax-class vessels in the 4,000–5,000 TEU capacity range. The largest vessels presently calling regularly at Tema have 3,500 TEU capacities.

This would create economies of scale that would make Tema increasingly attractive relative to Takoradi and may divert some direct-call container traffic from Takoradi to Tema. The trade-off would be the costs of moving containers or their contents by road between Tema and Takoradi. But because Takoradi's share of container traffic is only 10 percent, diversion would apply to a rather small volume of TEUs. We account for this possibility in our earlier pessimistic forecast for Takoradi.

As earlier noted, the likely transshipment scenario would entail a global line that decides to transform its service pattern into a hub-and-spoke system, with Tema serving as the regional hub serving the nexus of European and Asian services. Accordingly, Figure 3-16 and Table 3-6 present projections for this port scenario in which Tema is established as a regional hub. We provide in the figure projections for transshipment and combine transshipment with the "best estimate" to generate projections for the transshipment hub scenario.

3.6.13 TIMBER PRODUCTS IN TAKORADI

Timber products account for 22 percent of the value of Ghana's exports. The exploited forests are largely in western regions, processing mills are near harvested areas, and Takoradi therefore has been the principal port used. Since 2000, the government has limited the export of logs, instituting an aggressive and successful policy to promote the production of processed wood products, especially hardwood veneers and plywood. Through licensing, government controls logging area and cutting, to conserve the resources and protect the natural environment. Illegal operations remain a problem, however, and the government is taking measures to identify and stop this practice. An increase in logging volume is therefore not desired. Instead, in the coming years, log *imports* can be expected to increase, as policies are put in place to facilitate imports to supplement dwindling local supplies for the manufacture of timber products.

Historic trends and the forecast for timber exports are shown in Figure 3-17. According to the Ghana forestry commission, Timber Industry Development Division, no significant increase in the volume of exports—about 500 cu meters or 350,000 tons—is foreseen. Log exports, which resumed in 2006, are mainly teak poles and other plantation timber unsuitable for processing. Production will shift to more plywood and less of other products. Therefore our forecast assumes that plywood and veneer exports after 2015 will increase by 4 percent yearly, while logs will decline by 5 percent, and other products will show no growth.

The principal factors on which future export volume depends include availability of wood raw material, government policy objectives for the timber industry, the ability of industry operators to respond to changing consumer demands, and environmental restrictions on harvesting.

Figure 3-16

Tema Port Container Traffic Forecasts, 2008-2028, for Regional Transshipment Hub and Three Demand Scenarios (TEUs)

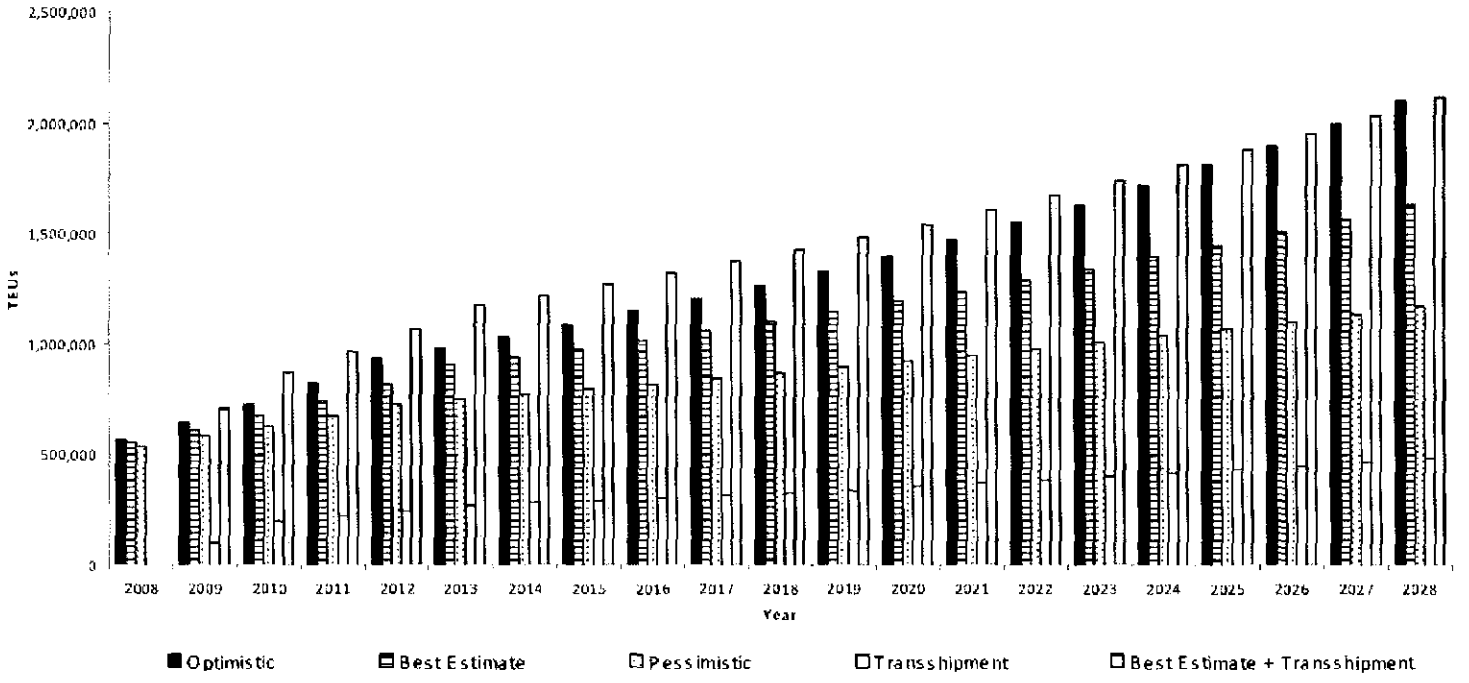


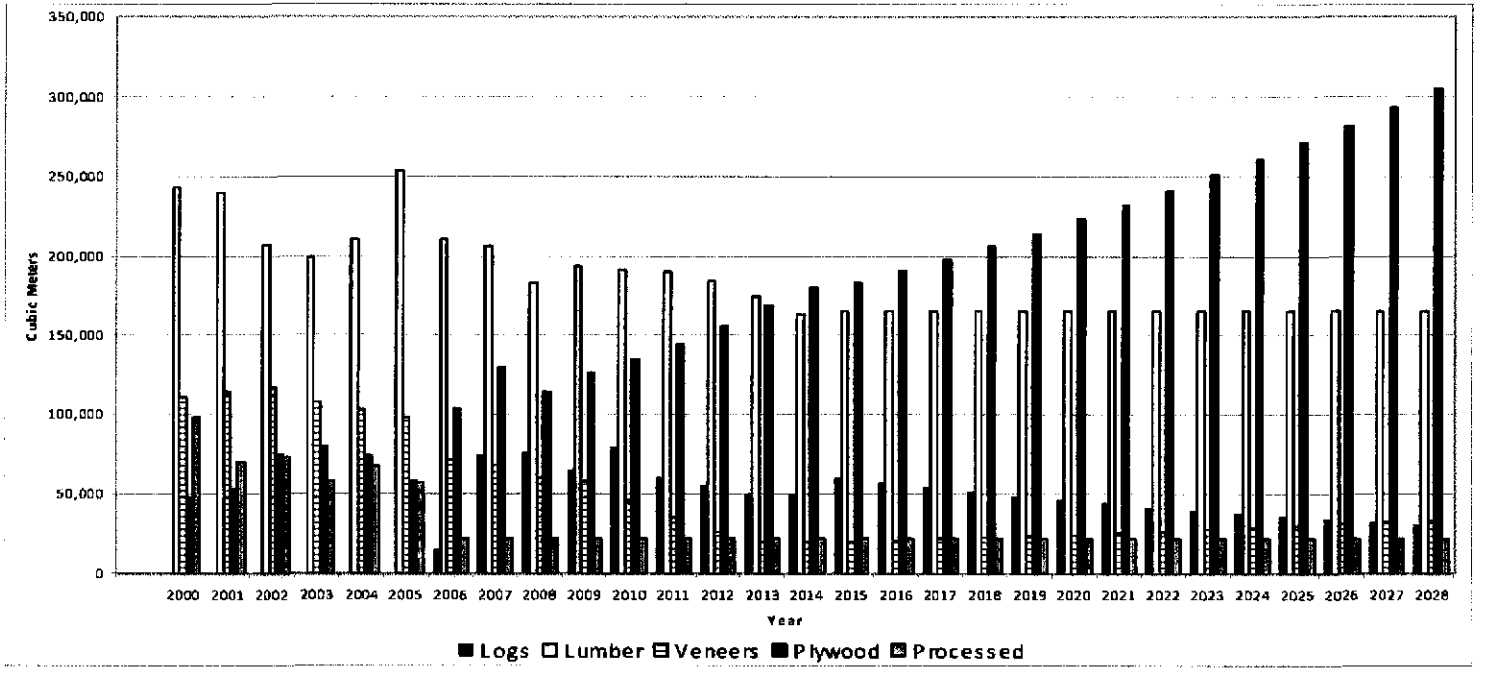
Table 3-6

Tema Port Container Traffic Forecasts, 2008–2028, for Regional Transshipment Hub and Three Demand Scenarios (TEUs)

Year	Gateway Port			Regional Hub	
	Optimistic	Best Estimate	Pessimistic	Transshipment	Best Estimate + Transshipment
2008	566,500	552,000	539,000		
2009	641,845	609,408	581,042	100,000	709,408
2010	727,210	672,786	626,363	200,000	872,786
2011	823,929	742,756	675,220	220,800	963,556
2012	933,511	820,003	727,887	243,763	1,063,766
2013	1,051,367	900,910	781,750	267,815	1,168,724
2014	1,177,005	984,995	836,473	292,811	1,277,805
2015	1,309,713	1,071,674	891,680	318,578	1,390,252
2016	1,448,542	1,160,266	946,964	344,914	1,505,180
2017	1,592,310	1,249,993	1,001,888	371,587	1,621,580
2018	1,739,599	1,339,993	1,055,990	398,341	1,738,334
2019	1,888,769	1,429,326	1,108,790	424,897	1,854,223
2020	2,037,982	1,516,991	1,159,794	450,958	1,967,949
2021	2,185,226	1,601,942	1,208,505	476,211	2,078,154
2022	2,328,359	1,683,107	1,254,429	500,339	2,183,447
2023	2,465,150	1,759,408	1,297,079	523,021	2,282,430
2024	2,593,338	1,829,785	1,335,991	543,942	2,373,727
2025	2,728,191	1,902,976	1,376,071	565,700	2,468,676
2026	2,870,057	1,979,095	1,417,353	588,328	2,567,423
2027	3,019,300	2,058,259	1,459,874	611,861	2,670,120
2028	3,176,304	2,140,589	1,503,670	636,335	2,776,925

Figure 3-17

Timber Products Historic Trends and Forecast (including containerized)



Note: Total volume is allocated among the two ports according to a 70/30 ratio, with 70% tied to Takoradi and 30% to Tema; 1.4m³ = 1 ton.

The ratio of timber exports through Takoradi and Tema ports is estimated at 70:30, respectively, or 330:140 thousand cubic meters. An estimated 70 percent of containerized timber cargo is handled at Tema.

Improvements at the ports that will enhance timber product exports should be mainly in equipment and facilities, including log-handling equipment such as loading cranes, container-handling vehicles, and facilities such as warehouses and container storage yards.

Rail service was historically the most significant means of transporting timber from up-country to the Takoradi port. Until the late 1990s rail cargo accounted for about 60 percent of all the transportation of timber and wood products to the port. The share of timber transported by rail is now insignificant because of the unreliability of rail and the reduction of log exports replaced by value added products, which trucks transport efficiently.

3.6.14 TAKORADI NONTRANSIT DRY BULK TRAFFIC

Bauxite and Manganese Exports

Bauxite and manganese are the largest exports shipped from Takoradi in terms of volume, together accounting for nearly 2 million tons of a total of 2.5 million tons in 2007. The remainder is cocoa beans and logs. The Ghana Manganese Company is owned by a Ukrainian company, which ships the manganese to Ukraine to be used in steel production there. The bauxite mines are owned and operated by Alcan; the bauxite is shipped to Canada for use in aluminum manufacturing. In both cases, the amount produced is linked to the vertically integrated production needs of the companies that own the mines. The ownership of both mines has changed recently, and the new owners' production plans are linked to the needs of their steel and aluminum manufacturing (vertically integrated industries). There are adequate reserves to meet production plans for the 20-year forecast period.

The main export constraint for both minerals is the capacity of Ghana Railways to deliver product from mines to port. The mines are linked by rail to the port by the Western Single Line, which lacks the financial capacity to maintain the line properly. Government subsidies ceased in 1994, and the railroad has relied on revenue and assistance from the mining companies for wagon replacements and spare parts. Trains derail six to 12 times a month, and accidents exceed 100 a year. Communication facilities are also unreliable.

Manganese trains make a 20-hour turnaround when service is uninterrupted. A train carries 30 wagons with 26-tons for a total capacity of 780 tons. Moving the average 3,000 tons per day e therefore requires four trains. Ten years ago rail moved *twice this volume.*

Because the bauxite mines are farther inland than the manganese mines, bauxite trains require a two-day turnaround under good operating conditions. Their wagons have a 43-ton capacity, and a train can carry up to 1,000 tons. Moving 2,000 tons a day requires four trains. The manganese mines ship about 20 percent of their product by road at about twice the cost of rail. The trucks are loaded up to 50 tons, far exceeding weight limits for the roads. The hauling distance for bauxite is too great to make road transport a feasible alternative.

Manganese production in 2007 was 1.17 million tons and may increase to 1.3 million in 2008. The mine's deputy managing director explained that the mine would like to raise annual production gradually to the 1.6 million tons achieved under previous ownership, but would need depths alongside berth of 11 meters, in place of 8.6 meters presently, so that the practice of lightering products to top off vessels at buoys can be avoided. This depth would permit vessels loading bauxite to do likewise.

Cocoa Exports

Cocoa beans and processed cocoa products are the most important cash crop exported from Ghana, accounting for $1.2 billion annual revenue and employing about 1 million people. The products account for increasing container volume, as breakbulk is replaced by containerization and processed product exports increase faster than bean exports. Cocoa beans and products currently account for about 10% of total dry bulk and 10% of containerized cargo activity. Ghana is the world's second-largest producer of cocoa, with about 20 percent of the market, about 75 percent of which is purchased in Europe and North America. The largest producer is neighboring Côte d'Ivoire, with about 39 percent of the world market. Year-to-year production varies widely, depending mostly on rainfall patterns, which are similar for both countries. Ghana's 2003/04 and 2005/06 crops reached record-high levels of about 740,000 tons—annual production is normally in the 600,000–650,000 ton range. Because demand is relatively inelastic, Ghana's state cocoa regulator and monopoly purchasing board, Cocobod, maintains substantial storage capacity to balance supply and demand.

Growth Prospects

Cocobod has outlined an ambitious program to increase annual output to 1 million tons by 2010. The program includes increased fertilizer use and the reintroduction of services to help farmers implement recommended agronomic practices. World demand has been increasing at about 3 percent per year. Although this rate may rise a bit as immature Asian and Near East markets grow faster than 3 percent per year, growth of more than 9 percent per year is hard to imagine. Seven percent is a more reasonable but still aggressive growth target, and it includes the assumption that Ghana increases its world market share by 3 percent. Ghana export cocoa is of excellent quality and commands about a 10 percent price premium, which has exceeded $2,000 per ton recently. Producer prices in 2006/07 represented an unprecedented 72.2 percent of the world price, exceeding the government's 70 percent target.

Cocoa Bean Products

It is encouraging to see that Ghana is grinding more cocoa into processed cocoa powder, butter, and paste, thus adding value, especially using lower-quality, cheaper (light crop) beans that are not of export quality. All of these products are exported in containers. About 20 percent of the crop is processed locally at present. The U.S. agribusiness giant Cargill is building a processing plant in Tema that will produce cocoa liquor, butter, and powder by

end-2008. It will process 60,000 tons per year initially but will have the potential to expand to an annual processing capacity of 120,000 tons. Cargill began processing in Abidjan in 2000, but given political instability there, will be able to hedge risk with processing capacity in Ghana. Cocobod's own processing plant is being expanded to handle 50,000 tons per year. Other international firms are also looking to establish processing in Ghana.

Cocobod expects world prices to remain strong for Ghana's high-quality beans. As explained earlier, Cocobod aims to increase cocoa production substantially using a combination of more irrigated trees, better farm practices, and fertilizer use. Although some of the increase will be in processed products, bean export volumes will also increase substantially. Takoradi is expected to handle the increased bulk exports; off-port warehouses and portside loading facilities are to be upgraded by CocoBod, accordingly. Containerized exports for customers buying relatively small quantities will remain, but containerized beans will be exported largely from Tema, where stuffing capacity is greater and where there is a surplus of otherwise empty export containers. In Takoradi empty containers for export are in such short supply that empties are left by inbound vessels or moved by road from Tema.

Bulk Export Forecasts

The 20-year forecast for three growth scenarios is presented in the following figures and tables. Table 3-7 and Figure 3-18 present the Best Estimate Scenario projections, Table 3-8 and Figure 3-19 present the Optimistic Scenario projections, and Table 3-9 and Figure 3-20 present the Pessimistic Scenario projections. The growth rates used in these calculations are shown in Table 3-1 above.

Table 3-7

Best Estimate Projections for Bulk Exports, Takoradi Port (thousand tons)

Year	Cocoa Beans	Bauxite	Manganese	Total
2008	300	550	1,300	2,150
2009	321	550	1,326	2,197
2010	343	550	1,353	2,246
2011	368	550	1,380	2,297
2012	393	550	1,407	2,350
2013	421	550	1,435	2,406
2014	450	550	1,464	2,464
2015	482	550	1,493	2,525
2016	515	550	1,523	2,589
2017	552	550	1,554	2,655
2018	590	550	1,585	2,725
2019	631	550	1,616	2,798
2020	676	550	1,649	2,874
2021	723	550	1,682	2,955
2022	774	550	1,715	3,039
2023	800	550	1,750	3,100
2024	800	550	1,785	3,135
2025	800	550	1,820	3,170
2026	800	550	1,820	3,170
2027	800	550	1,820	3,170
2028	800	550	1,820	3,170

Note: Growth rate assumptions: for cocoa beans – 0.07, bauxite – none, and manganese – 0.02.

Figure 3-18

Best-Estimate Projections, Bulk Exports, Takoradi Port, to 2028

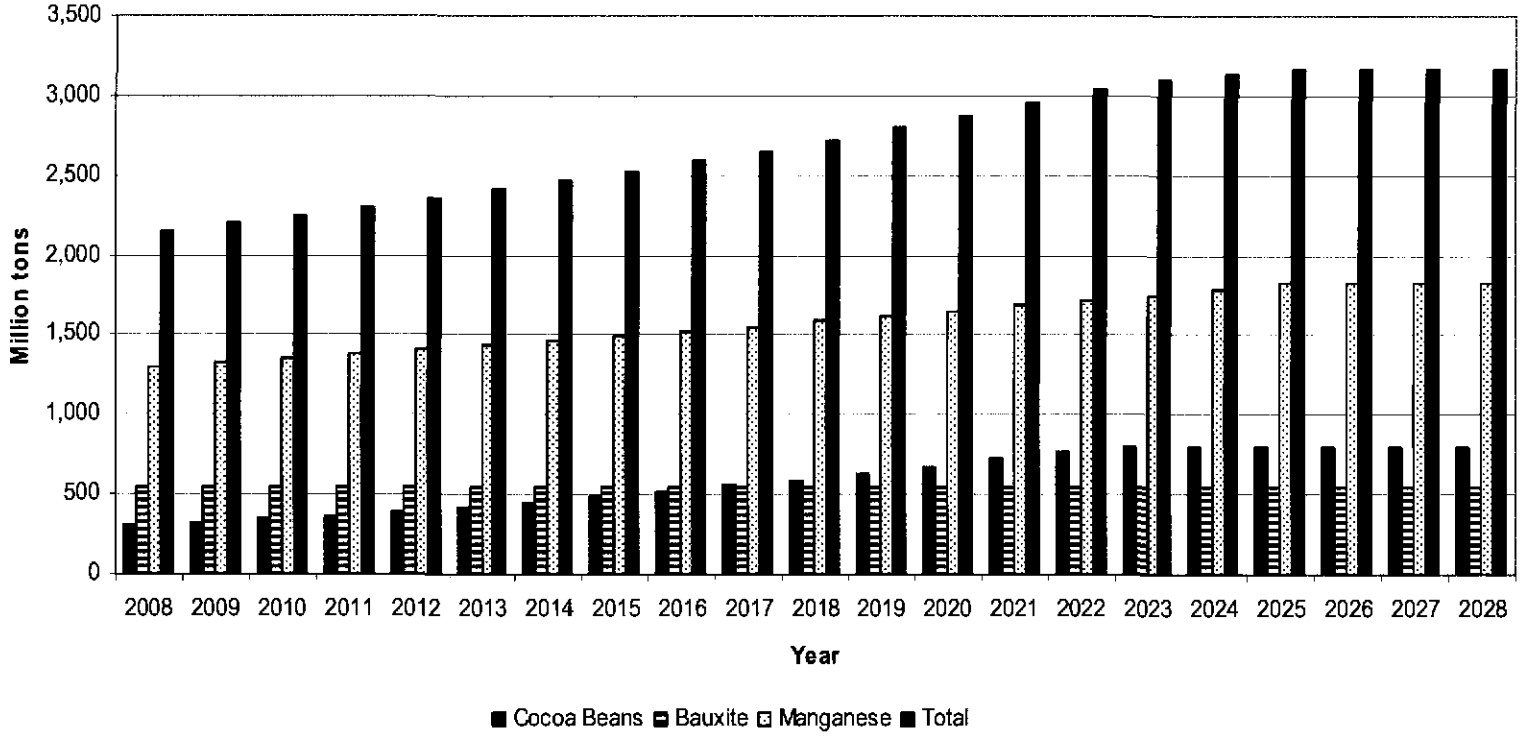


Table 3-8
Optimistic Projections for Bulk Exports, Takoradi Port

Year	Cocoa Bean	Bauxite	Manganese	Total
2008	300	550	1300	2150
2009	324	567	1365	2256
2010	350	583	1433	2367
2011	378	601	1505	2484
2012	408	619	1580	2607
2013	441	638	1659	2738
2014	476	657	1742	2875
2015	514	676	1800	2991
2016	555	697	1800	3052
2017	600	718	1800	3117
2018	648	739	1800	3187
2019	699	761	1800	3261
2020	755	784	1800	3340
2021	800	808	1800	3408
2022	800	832	1800	3432
2023	800	857	1800	3457
2024	800	883	1800	3483
2025	800	909	1800	3509
2026	800	936	1800	3536
2027	800	964	1800	3564
2028	800	993	1800	3593

Figure 3-19
Optimistic Projections for Bulk Exports, Takoradi Port

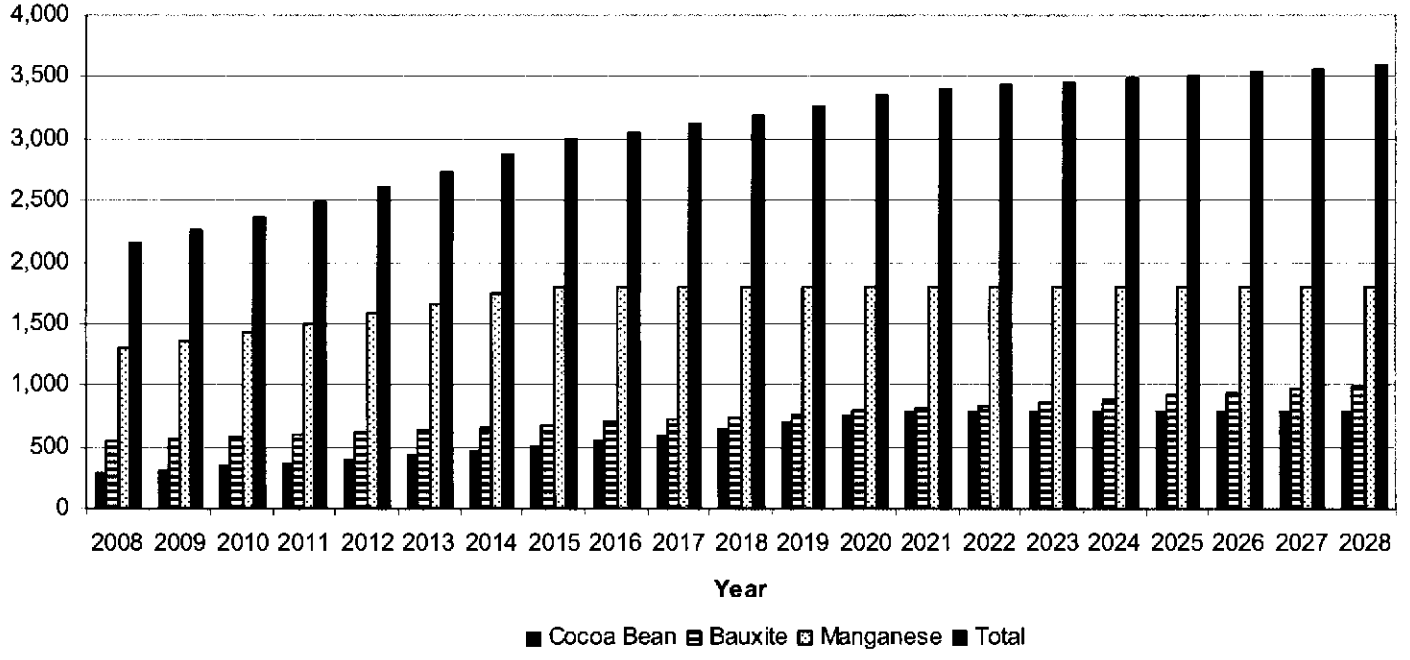


Table 3-9

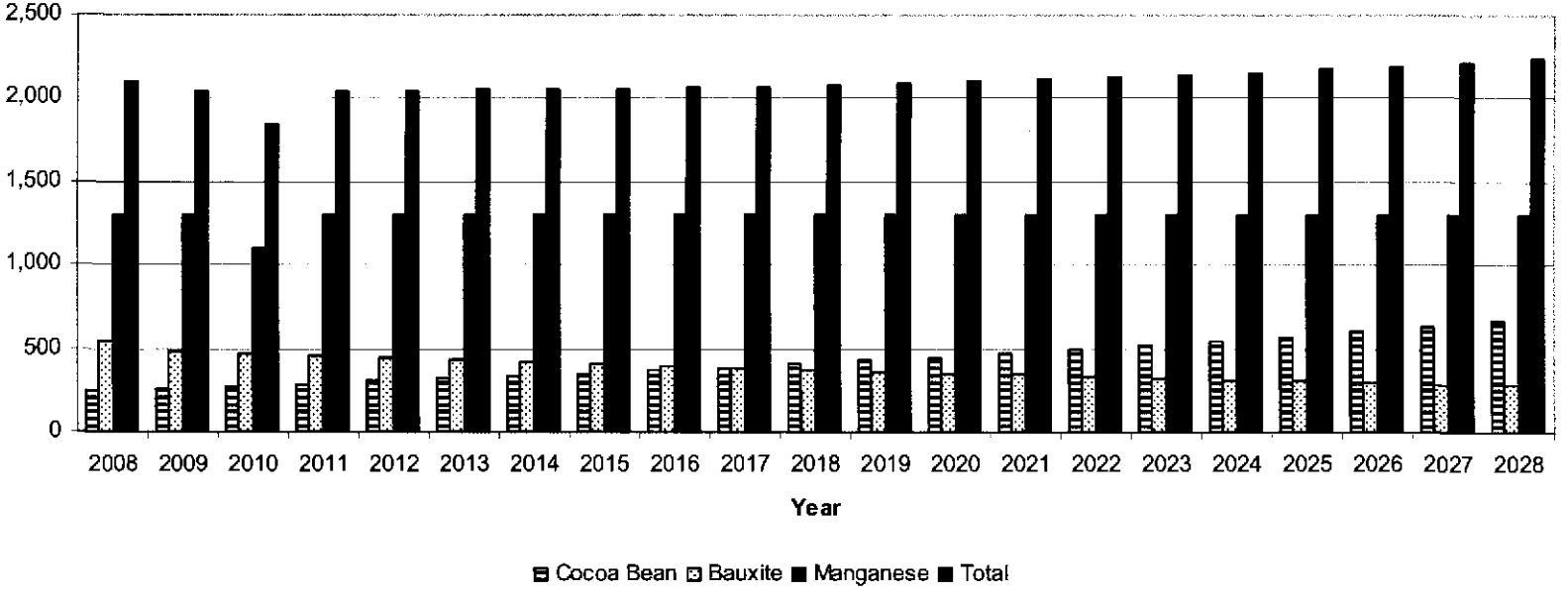
Pessimistic Projections for Bulk Exports, Takoradi Port

Year	Cocoa Bear	Bauxite	Manganese	Total
2008	250	550	1300	2100
2009	263	485	1300	2048
2010	276	470	1100	1846
2011	289	456	1300	2045
2012	304	443	1300	2047
2013	319	430	1300	2049
2014	335	418	1300	2053
2015	352	406	1300	2058
2016	369	394	1300	2063
2017	388	383	1300	2071
2018	407	372	1300	2079
2019	428	361	1300	2089
2020	449	351	1300	2100
2021	471	341	1300	2112
2022	495	331	1300	2126
2023	520	322	1300	2142
2024	546	313	1300	2159
2025	573	304	1300	2177
2026	602	295	1300	2197
2027	632	287	1300	2219
2028	663	279	1300	2242

Note: Growth rates assumed for cocoa bean – 0.0, bauxite – 0.03, and manganese – none.

Figure 3-20

Pessimistic Projections for Bulk Exports, Takoradi Port (Low Growth Rate)



3.6.15 BULK IMPORTS

Takoradi receives two major bulk imports: wheat and clinker. For both there are dedicated berths and storage. Both the flour mill and the cement plant are located in the port. The quantities imported supply the factories, which supply the Western region and Kumasi in part, and from distribution centers there to northern Ghana.

The flour mill processes about 120,000 tons per year, but has produced as much as 15,000 a month; it therefore has the capacity to produce up to 170,000 tons annually. Wheat is delivered 20,000 tons at a time. Silos can hold 34,000 tons and sheds 6,000 bags (300 tons) of flour. About 4,000 tons of 40 percent is shipped by truck by Kumasi. Rail is considered too unreliable, except when truck capacity is scarce. One may assume that imports will increase somewhat faster than GDP, because as disposable income increases, households consume more wheat products. A rise in the relative cost of rice could further cause substitution for greater consumption of wheat flour. Takoradi's population and incomes should grow as the economic stimulus from oil and gas production takes hold. Therefore, expected growth will be in the range of 6.5-8 percent per year.

Cement production is likely to increase somewhat faster than GDP, when resources for infrastructure public works projects accelerate as expected. If a new FTZ is opened in Takoradi and oil and gas development spurs development in Takoradi, the demand for cement will jump. We therefore forecast a growth scenario in the range of 6-10 percent per year. Table 3-10 and Figure 3-21 below present the best-estimate projections for bulk imports. Note that only nominal deviations are expected for both pessimistic and optimistic projection scenarios; as a result, the best-estimate projections will be sued for the preparation of the master plan.

Table 3-10

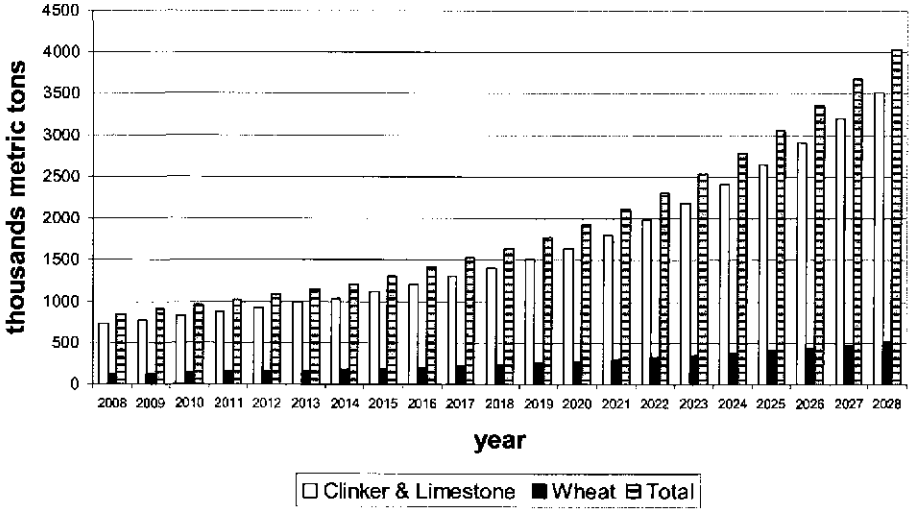
Best-Estimate Projections for Bulk Imports, Takoradi Port (in thousands)

Year	Clinker and Limestone	Wheat	Total
2008	730	120	850
2009	774	128	902
2010	820	136	956
2011	869	145	1014
2012	922	154	1076
2013	977	164	1141
2014	1036	175	1211
2015	1118	189	1307
2016	1208	204	1412
2017	1304	221	1525
2018	1409	238	1647
2019	1522	257	1779
2020	1643	278	1921
2021	1808	300	2108
2022	1988	324	2312
2023	2187	350	2537
2024	2406	378	2784
2025	2646	408	3055
2026	2911	441	3352
2027	3202	476	3678
2028	3522	514	4037

Note: Annual growth rate assumptions: Clinker, 2008-2015 = 6%; 2016-2020 = 8%; 2021-2028= 10%; Wheat, 2008-2014= 6.5%; 2015-2028= 8%

Figure 3-21

Best-Estimate Projections for Bulk Imports, Takoradi Port (thousands of metric tons)



3.7 SWOT Analysis

This section presents a Strengths, Weaknesses, Opportunities, and Threats analysis for the Ghana ports master planning process. It is divided into four sub-sections corresponding to the span of control available to the GPHA and other port stakeholders over the variables affecting the port in the future, as follows:

- Given Situation ("Global") Factors – No Control: This includes such factors as geography, climate, world economic situation, world shipping technology and trends, external perceptions of Ghana, etc. which are determined externally to Ghana and consequently over which no control can be exercised by port stakeholders.
- Macro (National) Factors – Minimal Control: This includes factors inside Ghana but not directly pertaining to the ports, such as the Ghana's economy and laws, the Ghanaian political situation, Ghana's foreign trade, the state of road and rail networks, the cost of labor, etc., over which port stakeholders can at times exercise some, but at best only very minimal, influence.
- Mid-level (Local) Factors – Some Degree of Control: This includes issues pertaining to the ports such as the applicable port laws, real estate that is available for port development, financial capability of the port and other stakeholders, the business organizations involved in ports, etc., over which port interests have some level of, but not complete, control, sometimes sharing it with non-port entities.
- Micro Level (Port Planning and Operating) Factors – High Level of Control: This includes those aspects of port operations and development that are directly under the authority of GPHA and/or other port stakeholders.

3.8 Given Situation ("Global") Factors

Strengths

Ghana's port locations are good in view of the origin/destination locations for the majority of the tonnage. Tema is close to Accra, which accounts for the final origins and destinations of most containerized cargo passing through the port. Takoradi is well located relative to the mines and the areas of intensive cocoa production.

- Oil and gas discoveries just off the coast are expected to provide a significant boost to the national economy which will help boost foreign trade, as well as require extensive direct port services.
- Ghana has a well educated and skilled workforce available.
- Ghana has a well-developed external reputation for a culture of entrepreneurship, good governance, the Rule of Law, reliable and transparent legal processes, and political stability.

Weaknesses

- Products that form the core of Ghana's exports are subject to world market fluctuations, price instability, and volume variations.
- There is a major imbalance in the directions of trade flows, with bulk items outbound and containerized/breakbulk cargo inbound.
- Climatic factors may pose significant concerns for Ghana's power supplies in the immediate and mid-term future.
- Ghana does not have a strong locational advantage for most of the transit cargo it processes.
- Offshore subsurface conditions make deep water berths very difficult and expensive to construct.

Opportunities

- The newly discovered oil fields provide an opportunity for accelerating economic growth.
- With respect to the potential need for a regional hub port, Ghana is well located relative to the West African port range, and compared to other locations has the political stability and respect for the rule of law that international investors seek.
- Historically, container cargo volume increases faster than GDP, as countries continue to specialize in the globalization framework; Ghana appears to be only starting up the curve in this process, which may augur well for future container volumes.
- World demand for commodities has been increasing rapidly in recent years, which may further propel Ghana's bulk exports.
- The continued tendency toward larger container ships will cause larger vessels to call in West Africa and provide a basis to develop to a regional hub system.
- The large network container operators have become increasingly involved in the West African trades, bringing in a greater emphasis on business strategies common around the world rather than specialized approaches geared to the unique features of the trades.

Threats

- Climate factors, such as rainfall shortages, may negatively affect some export flows, including cocoa, and the ability of the inland nations to afford some imports. It can also affect power availability in the short term.
- New income from oil wealth could be misspent and lead to political and social issues as has happened elsewhere.

3.9 MACRO (NATIONAL) LEVEL FACTORS

Strengths

- Ghana's government is stable and has made numerous reforms, such as in the areas of monetary and fiscal policy, that is necessary for supporting increased private enterprise and business development.
- Ghana has shown itself capable of attracting significant private foreign investment.
- Important infrastructure is improving, such as in the power sector.
- Ghana has an internationally acceptable legal system in which disputes can be resolved in accordance with transparent rules and processes.
- Recent economic gains have been spread widely among national economic sectors, indicating a well-organized national economic framework.
- International aid agencies have shown they are attracted to Ghana due to its relatively well-managed aid programs.

Weaknesses

- Ghana's rail system is decrepit and nearly defunct. This raises concerns about the connectivity between the ports on one hand and production locations of key exports, particularly the mines, on the other.
- The road system suffers from deferred maintenance which leads to high motor carrier transport costs.
- Power and water shortages are currently leading to unnecessarily high costs and constraining growth.
- While workarounds have been found when needed, the port privatization law still has not been passed and implemented after many years.
- Ghana's importers, as well as those in the inland countries, are small and highly fragmented and to an important extent not able to process their cargo through the ports in an efficient manner.

Opportunities

- Ghana's political stability combined with its location give it a relative advantage for consideration as a regional hub port location.
- If sufficient improvements can be brought to infrastructural areas, such as power, new or revived industrial activity (e.g. aluminum smelting) may lead to new cargo flow opportunities.
- The creation of free trade zones (FTZ's) in Takodadi and/or Kumasi could lead to the development of additional throughput for the ports.

Threats

- Continued deterioration in the roads and especially railroads may cause increasing costs and lack of capacity for port connectivity to inland origins and destinations. This may particularly constrain mineral exports from Takoradi.
- Potential shortages of power may jeopardize industrial development
- Continued interest in hub port development by other ports in the West African range may result in such a facility being developed elsewhere first, thus reducing or closing out the opportunity for Ghana
- If port laws are not brought up to date the continued development of needed facilities and processes, particularly to the extent they rely on private investment, may be delayed.
- A relative change in the quality of internal transport infrastructure, between Ghana's ports and its competitors elsewhere in the West Africa port range, could lead to a shift of transit cargo away from Tema and Takoradi.

3.10 MIDLEVEL (LOCAL) FACTORS

Strengths

- The concept of significant private investment in Ghanaian port facilities by international firms is established--private capital is available for investment in Ghanaian ports provided that the risk/return relationship is acceptable.
- There is real estate available in Tema and particularly Takoradi that can be utilized for port expansion.
- GPHA has solid finances and earnings, which will help it to participate as needed in new port facility developments.

Weaknesses

- While the port's operations are largely privatized, the normal working of the free market has not yet been successfully introduced, since the private operators' market shares and pricing are still dictated by the port authority.
- While there is real estate available in the port areas, close-in areas have in many cases been taken up and may be difficult to convert to new uses.
- Providing new deep water access is difficult and expensive due to sub-surface conditions in the area of both ports. This will make new facilities at both ports, which will eventually be needed, expensive by international standards.
- Dwell times in the port, for most cargo types, remain excessive for reasons other than inefficiencies in port operations as such.

Opportunities

- The private sector is available and ready, under the right circumstances, to finance, construct, and operate needed new facilities in the ports.
- In Takoradi, the need for oil-related facilities may provide a significant boost to port activity in coming years.

Threats

- Due to the small size and fragmented nature of Ghana's importers, and their generally precarious finances, inefficiencies in the clearance and delivery of import cargo may persist and continue to be a drag on port performance.
- Customs clearance problems and inefficiencies will continue to act as a drag on port performance and the modernization of port processes and procedures.
- Similar to the above, due to problems endemic to transit cargo clearance and delivery, problems with such cargo, particularly excessive use of the port as a storage location, may persist and continue to be a drag on port performance.

3.11 MICRO (PORT PLANNING AND OPERATING) LEVEL FACTORS

Strengths

GPHA has started and is well along in the process of, privatizing the activity in the port, and has good relationships with various private operators

GPHA has shown creativity in developing new approaches to overcoming problems facing the port, e.g. development of private modalities including ICDs, development of Jubilee Terminal, etc.

There is a lively private sector in Ghana that is willing and able to provide port services if and when called upon to do so.

Weaknesses

The MPS concession contract contains clauses that constrain the future development path of container facilities in Tema.

Dwell time in the ports remains high, for reasons not originating from GPHA or other port businesses. If GPHA cannot get this problem under control through the development and application of strong policies, misallocation and misuse of available port space will continue, and will eventually lead to more expensive "solutions", i.e. expensive expansion of port facilities that would not have been needed had stronger measures to utilize the existing space been implemented.

Customs procedures in the ports are extensive and use significant time and space, detracting from port efficiency, particularly in Tema.

Some facilities are in very poor shape--for example, the wharf where the manganese loading facility is located in Takoradi is beyond its life and in very poor physical condition to the point that collapse cannot be ruled out.

Opportunities

With further improvements in GPHA's overseeing of operations in the ports by private operators, port efficiencies and attractiveness can be further improved.

Significant additional port space can be "created," and as a corollary significant investment be reduced/postponed, by improving space utilization within the current port walls by better management of dwell time and of truck flow.

Threats

A potential upsurge in the cargo being handling via the ports, combined with some persistent and fundamental weaknesses in port operations, could potentially lead to a systematic breakdown with severe consequences for the port's ability to move cargo. The long lines at scanning stations while not yet in this category, exemplify the potential for such breakdowns.

Difficulties with getting a handle on endemic port operational problems, such as the habitual and excessive use of port property by truckers as a waiting area, may continue to drain port resources.

Chapter 4 - Highlights of GPHA Financial Position (2005-2006)

4.1 Introduction

The most recent published GPHA's accounts ("Reports and Accounts for the Year Ended 31st December 2006," James Quagraine and Company, Chartered Accountants) have been examined, with the goal of assessing the port authority's overall financial health and its ability to go forward with new projects. Key data for 2006 (the most recent year for which financial results are available) and 2005 is presented in Table 4-1. Data are given in old cedis, as they appear in the accounts, and are converted to US$ at the prevailing rate for the period, as reported in the accounts. In the discussion below, the figures cited are in U.S. dollars.

Table 4-1
GPHA, Selected Financial Data (2005-2006)

	2006	2005	2006	2005	
	Cedi 000 000		$US 000 000		Change (%)
BALANCE SHEET					
Current Assets	621,460	593,705	67.48	64.46	4.7
Curent Liabs.	243,735	244,884	26.46	26.59	-0.5
Net	377,725	348,821	41.01	37.87	8.3
Long-term assets	1,401,688	1,337,791	152.19	145.25	4.8
Long-term loan	653,601	641,275	70.97	69.63	1.9
Government funds, cap grant	195,855	164,672	21.27	17.88	18.9
Net	552,232	531,844	59.96	57.75	3.8
Surplus	929,957	880,664	100.97	95.62	5.6
INCOME/CASH FLOW					
REVENUE					
Vessel Service	230,899	200,911	25.07	21.81	14.9
Vessel Facilities	258,790	268,977	28.10	29.20	-3.8
Cargo Service	161,415	170,424	17.53	18.50	-5.3
Cargo Facilities	125,383	114,513	13.61	12.43	9.5
Royalties	105,113	91,090	11.41	9.89	15.4
Misc/Other	77,723	120,415	8.44	13.07	-35.5
Total	959,323	966,330	104.16	104.92	-0.7
COSTS					
Personnel	396,465	298,194	43.05	32.38	33.0
Maintenance	102,438	117,845	11.12	12.80	-13.1
Administrative	143,232	81,543	15.55	8.85	75.7
Depreciation	112,305	97,530	12.19	10.59	15.1
Interest	19,185	19,185	2.08	2.08	0.0
Other	72,820	56,240	7.91	6.11	29.5
Total	846,445	670,537	91.90	72.81	26.2
Net Income/CF	112,878	295,793	12.26	32.12	-61.8
Income plus Depreciation	225,183	393,323	24.45	42.71	-42.7
Other CF Items	129,379	9,378	14.05	1.02	1279.6
Operating CF	354,562	402,701	38.50	43.72	-12.0

Note: 9210 cedi: US$1
Source: GPHA Reports and Accounts for the Year Ending 31st December 2006; the accounts for 2007 are not expected to be available until late August.

4.2 Income and Cash Flow

GPHA's annual revenues are running slightly over $100 million per year. The largest part of the revenue relates to vessel services and facilities (together just over half of the total). Cargo service and facilities account for about 1/3, and royalties (11 percent) account for most of the remainder. These proportions reflect the fact that GPHA has become primarily a landlord port, with most of the revenues for cargo handling in the port flowing to various private firms who provide those services directly to customers and whose financial results are not part of GPHA's accounts.

GPHA's operating expenses are reasonable within the framework of its revenues. In 2005, total cash operating expenses were about $63 million, with depreciation adding about 10 million, for a total of about $73 million, leaving an operating profit of 32 million and cash income of about $43 million. In 2006, increases in personnel and administrative costs lowered operating profit to about $12 million, and cash income to $24.5 million. However, large other CF items in 2006 provided an offset, raising the operating CF to $38.5, compared to $43.7 in 2005. These are reasonable levels of cash generation for a public agency such as GPHA, proportionate to the base revenue involved. On the whole, these results provide good evidence that GPHA is operating in such a manner as to assure satisfactory financial operating performance in future years.

4.3 Balance Sheet

GPHA has current assets, largely cash and near-cash securities, of about $65 million. Its current liabilities are about $26.5 million, for a net current asset base in the vicinity of $40 million, and a current ratio well in excess of 2:1. These are consistent with a good financial condition from the short-term standpoint.

GPHA's fixed installations, i.e. its real estate and equipment, account for nearly all its long-term assets. They are generally carried on its books at historical cost [Accounts Note 2 (b) [i)]. Currently (2006), the value of the installations is shown to be about $152 million. Supporting the construction/acquisition of these assets are long-term loans and government grants totaling about $92 million, leaving a surplus in the long-term accounts of $60 million. Interest expense supporting this debt is a bit over $2 million per year.

4.4 Overall Conclusion

Review of GPHA's most recently available accounts shows the organization is in good condition both from the standpoint of its net asset base and its annual income/cash generation. As such, it should be able to carry out its portion of whatever new projects may be needed for the future development of Ghana's port system, either through application of its

existing internal resources or through its participation in whatever project financings may be appropriate to such developments.

These issues will be re-examined when more recent financial results become available, and when more detailed accounts can be reviewed and specific financial results can be correlated with specific cargo flows and other activities in the ports.

TASK 2:

Chapter 5 - Realignment of Ghana Ports and Harbours Authority's Goals and Strategies

Noted management expert Peter Drucker has said that one of the greatest challenges facing companies is "to bring the outside in" -- in effect, to see ourselves as others see us. Always good advice, this is particularly appropriate as a basis for contemporary port management. How does GPHA convince the international trading community that the port will be responsive to customers, that the port will turn a vessel around faster, that consignees will get their cargoes sooner, that exporters will get their cargo out faster, and all of this will be done with greater productivity and lower costs?

GPHA has seen the challenge from a customer perspective, with the inclusion in the development of its master planning a process for realigning goals and strategies in accord with market outlook. Strategic realignment normally means a company-wide call-to-action to dramatically enhance productivity: proactive engagement with port stakeholders regarding operational and facility constraints, targeted improvements in investments, improvements in operational practices via private sector participation, a carefully planned capital improvements program with some emphasis on contingency planning to minimize investment risk, a change in its organization to be more responsive in view of strategic opportunities, and all guided by a properly formulated mission statement designed to establish the direction GPHA should follow to enhance overall port performance.

Extensive interviews were undertaken, effectively relying on a collaborative process to derive a strategic direction for GPHA. This report reflects this strategic direction and best judgment on how to respond to the challenges that confront the port. Like the master plan, this report is not intended to be the final word on the future of Ghana's port sector; rather, it is a resource that should be used as a guide for strategic decisions and be modified as market, financial, and economic conditions dictate.

In addition to interviews, the report draws from the results of our research on trends and issues affecting Ghana's port sector outlook and setting the direction for improved port performance and readiness for meeting upcoming challenges. The Task 1 report included a SWOT analysis, identifying the challenges and opportunities facing Ghana's port sector. To capitalize on these opportunities while minimizing the risk from threats requires a certain realignment of Ghana Ports and Harbours Authority's (GPHA) strategic thinking and positioning its port organization to respond to the strategic drivers that affect the port sector's outlook.

What are these drivers? GPHA is participating in an unprecedented dynamic environment. Just as Ghana is benefiting from the fruits of economic growth, increased fuel charges, the global financial crisis, the expansion of the Panama Canal and the emerging capacity surplus of container vessels, the expected growth of Ghana's oil sector, and impending security protocols are among a myriad of factors that that will affect port sector growth, scale and scope of facility expansion, and timing of investments.

Taken together, these drivers have important implications for the scale and scope of the master plans and future capital development decisions. GPHA is appropriately concerned about its competitive position in view of these drivers and the strategies it may undertake to capitalize on its opportunities. We hope GPHA finds this report useful as it continues the process of devising, reviewing, and deciding about its port development options. They should all be evaluated against the end goal of establishing a highly competitive port in the context of the opportunities identified in the SWOT analysis.

In this report, we first briefly describe the strategic drivers that shape the GPHA organizational response to emerging challenges. We then address the port's mission statement, the result of a mission formulation workshop where our stakeholder analysis method was applied. The mission reflects the work of workshop participants as well as interviews with key staff and stakeholders. We then define strategic goals and strategies for attaining these goals.

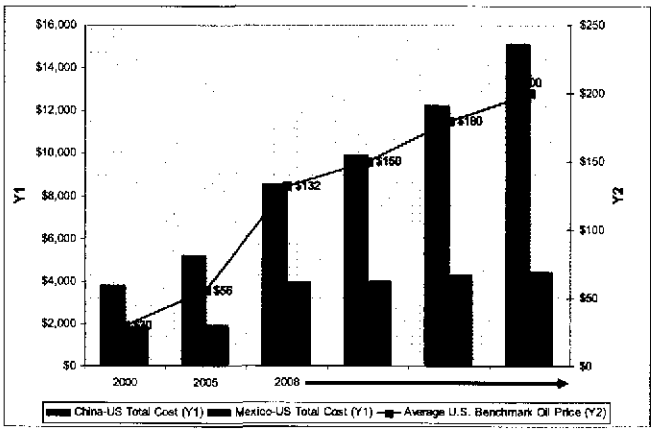
5.1 Strategic Drivers

The impact of the global financial crisis on trade is not yet fully understood. But the international financial crisis affects trade financing in two chief ways: 1) the crisis exacerbates a shortage of liquidity to finance trade credit; the gap between supply and demand in trade financing is currently estimated at about US $25 billion; 2) the credit crunch and economic slowdown have made banks averse to financial risk. So this has constrained the ability for shippers to obtain financing unless a premium is paid on financing terms. But affordable access to trade financing is critical for assuring that international trade can help absorb the shock of a global economic slump. Over 90 percent of all trade transactions involve some sort of short-term credit, and the liquidity that such loans provide has underpinned recent growth

in world trade. So currently it appears that trade flows will slow, obviously affecting some markets that Ghana's ports serve.

Another challenge that Ghana's ports face relates to the impact of higher fuel charges on trade. Our own analysis reveals the potential impact that rising fuel charges will have on shipping. In a comparison of shipping costs between China and the U.S. and between Mexico and the U.S., we find that the cost impact increases disproportionately with distance, meaning the unit costs of transport increase with longer distances (Figure 5-1). This means that buyers are likely to source their purchases from countries in closer proximity to buyer markets unless Ghana can mitigate the disadvantage of the higher costs with reductions in logistics costs. These reductions can occur from improving port and hinterland transport services as well as reducing costs in the ports to enhance competitiveness relative to other options that buyers have.

Figure 5-1
Impact of Higher Fuel Costs on Shipping

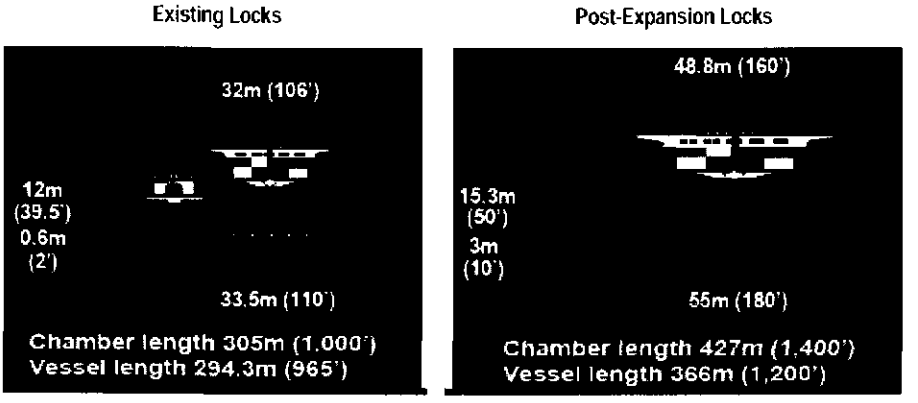


Source: U.S. Crude Benchmark Prices, U.S. Department of Energy; Shipping Costs – estimated averages from sample data from shipper manifests/carriers and phone quotes from freightforwarders; projected costs calculated by Nathan Associates Inc.

The Panama Canal's expansion program will undoubtedly have an impact on container vessel deployments and shipping patterns. The expanded Canal will allow the transiting of 12,500-TEU vessels (Figure 5-2). These ships constitute the third generation container carrier ("Post III carrier"), roughly three times the capacity of the current Panamax ship (4,500 TEU capacity). The expansion itself will induce a cascading effect on vessel deployments, where vessels supplanted by the much larger new-Panamax vessels will be relegated to smaller trades. The smaller trades will thus likely see an increase in vessel size. The ongoing financial crisis combined with higher fuel charges has resulted in lower capacity utilization rates.

Figure 5-2
Lock Dimensions and Vessel Size for the Expanded Panama Canal

Source: Panama Canal Authority



This situation will be exacerbated by an expected 16% increase in fleet capacity by the end of the year, with additional capacity increasing to about 13% for 2009 and just over 14% for 2010 based on ship orders.[8] So carriers will attempt to rationalize their services with likely fewer port calls but with larger vessels. They will continue to be very price sensitive and thus will expect higher-than-normal performance at the ports they call. This has strong implications for ports vying for regional hub status, which demand faster vessel turnaround times.

In June 2008 the Kosmos/Tullow/Anadarko oil consortium discovered oil in commercial quantity in the West Cape Three Point concession area. While oil production is expected to start in commercial quantities in 2010, producing 120,000 barrels/day, this is expected to rise to about 250,000 barrels/day in 2012. The growing oil production sector will need to be supported by an oil services port facility. Takoradi is well positioned to play this role if it can be developed in the very near term future. Doing so will dissuade other potential investors from seeking concessions outside Takoradi to develop an oil services port. will execute a market-based expansion program, we thought it would be useful to first describe the key strategic drivers we identified in the course of our research and analysis that will affect the outlook for Ghana's ports.

While logistics costs will need to decrease and port performance improved to remain competitive in the face of rising fuel costs and vessel rationalization, new security protocols pose challenges to the objective of seamless cargo flows in transport logistics systems. Ghana's ports have complied with the International Maritime Organization's ISPS (International Ship and Port Facility Security Code) protocols, but Ghana's exporters are now facing security guidelines that some of their foreign country trading partners are imposing on them. The U.S.'s C-TPAT program (Customs-Trade Partnership Against Terrorism) places the onus of

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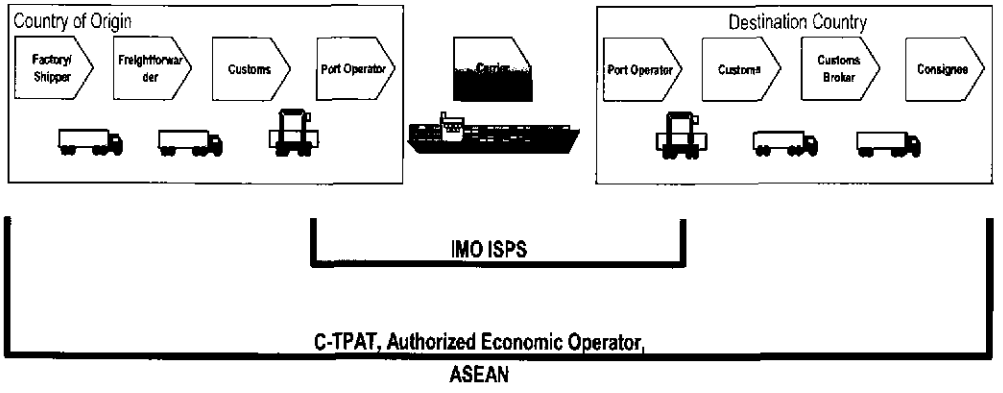
[8] "A Gloomy Outlook", *Containerization International*, October 2008, p. 46.

providing security in the logistics chain on shippers (Figure 5-3). Europe is now executing a similar program (Authorized Economic Operator Program) while the ASEAN community is now considering the merits of a similar approach towards logistics chain security. So Ghana's exporters need to secure their logistics chains if they hope to avoid delays caused from inspections in the countries of many of their trading partners. To not abide by these protocols means higher costs of trade in Ghana and hence reducing trade competitiveness.

Figure 5-3
Jurisdictional Coverage of Security Requirements



Source: Kent, Paul E., Foro Internacional Portuario, Eventos emergentes y su impacto en los puertos Colombianos (Emerging events and their impact on Colombian ports), Conference Proceedings, Bogotá, Colombia, November 2003; updated by Nathan Associates Inc.

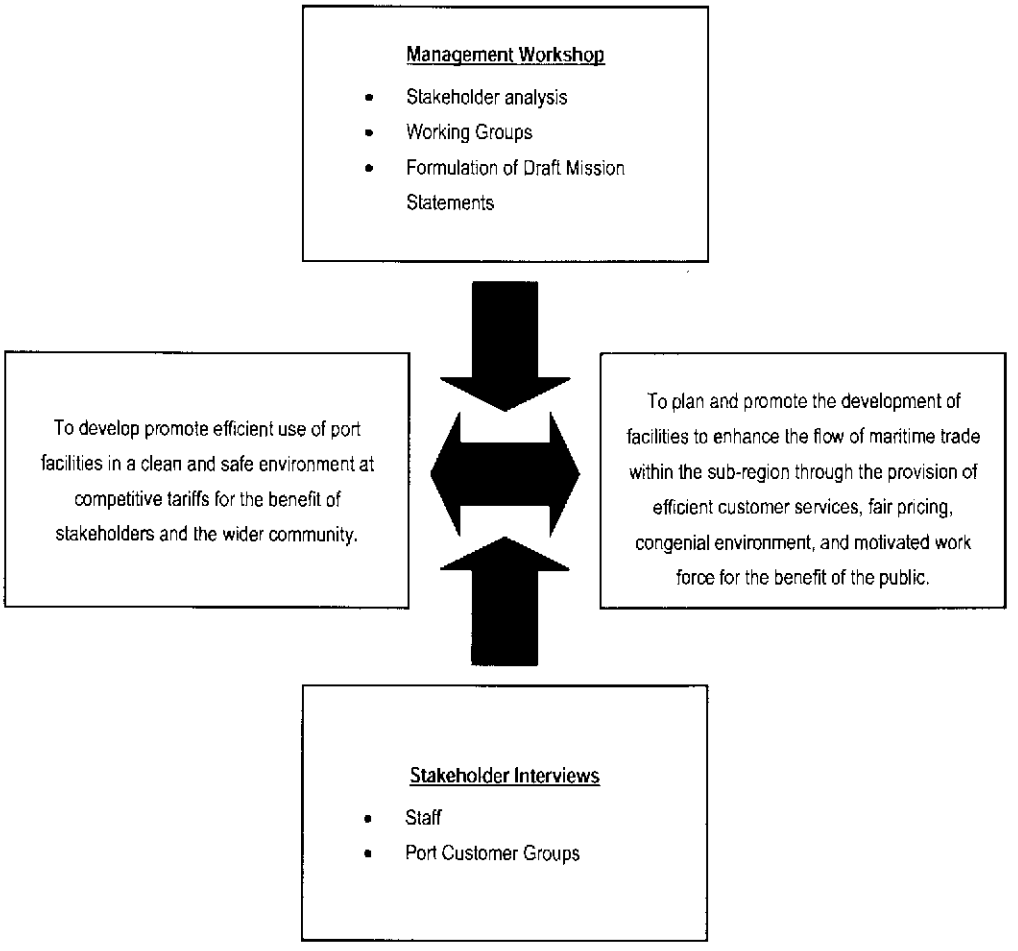
5.2 Meeting the Challenge: GPHA's Mission

The strategic drivers and concerns about the port's competitiveness give rise to a need to focus GPHA's mission towards its core business – cargo handling – and GPHA's customers. GPHA must adjust its organization and its workforce in accord with the type and extent of current and expected business activity, as suggested by the cargo projections and the transformation to a landlord form of port administration. GPHA must have the ability to respond competitively and prudently to the challenges it is facing. GPHA requires a major shift of emphasis and outlook to deal with these issues successfully. It has pursued a course as a landlord port, essentially transferring much of its operational responsibility to the private sector. GPHA must recognize competitive realities of serving customer wants and needs. As a landlord port, it must play a role in facilitating the development of cargo handling facilities and the timely and consistent maintenance of its assets. As a landlord port, it must enable customers to enjoy the efficiencies and productivity associated with private investment and provision of port services.

A workshop was held with key staff of GPHA headquarters and management of both Takoradi and Tema ports (Figure 5-4 illustrates the process used to generate a final mission statement). GPHA's current mission statement echoed the requisite strategic themes, but

needed to be "tightened" so as to present a greater central focus for GPHA's strategic direction. Additionally, the existing mission statement did not have the benefit of the ongoing master plan work, which as earlier noted included a SWOT analysis.

Figure 5-4
Mission Formulation Process



Workshop participants were divided into two groups, each charged with the responsibility of formulating a mission statement that echoes the stakeholder mix defined through the workshop's stakeholder analysis exercise. The strategic themes of the two mission statements were discussed with other GPHA employees and various representatives of the stakeholder community. The result is a more streamlined mission statement reflecting emphasis in the areas deemed most important by workshop participants.

Figure 5-5
GPHA Mission Statement

To meet the needs of international shippers and carriers by ensuring the availability of secure, productive, and financially and environmentally sound facilities that spur national economic growth and attain the status of regional hub.

The terms employed in the resultant mission statement (Figure 5-5) have been carefully chosen for the guidance they provide. The mission statement broadly reflects GPHA's role in society ("spur national economic growth"), its intent to continue its course of self sufficiency ("financially . . . sound"), sensitivities to its customer base ("secure and highly productive facilities"), conveys a recognition of who the port's customers are ("international shippers and carriers"), appreciation for its impact on the environment ("environmentally sound"), and a realistic (and achievable) vision of regional hub status ("attain the status of regional hub").

A PLEDGE TO STAKEHOLDERS

The workshop and subsequent interviews indicate recognition of the private citizens, businesses, public officials, agencies, organizations, and GPHA employees who have a stake in the long-term success of the port. These stakeholders expect that the port will be governed, managed, and operated in a responsible, intelligent, and businesslike manner. Of importance to all stakeholders is the port's contribution to the nation's economic development, competitiveness, and welfare. Hence, a mission statement can be accompanied by a pledge to stakeholders to pursue certain achievements: GPHA pledges its commitment to the efforts required to increase the positive impact of the port on the nation's economy and competitiveness by facilitating trade and providing directly or indirectly highly productive facilities. Therefore, to

The Citizens of Ghana, GPHA will promote their economic welfare by increasing international waterborne trade and commerce through its ports;

Ghana's Port Users, GPHA will be user friendly and customer oriented by assuring the provision of convenient, quality assured, efficient, secure, and competitive terminal facilities and services required by the user community to conduct international waterborne trade and commerce; GPHA will also seek and be receptive to advice from user groups;

GPHA Employees, GPHA will ensure that sound, competent, qualified, and experienced leadership and management are provided; that opportunities are provided to earn fair and reasonable compensation consistent with GPHA's overall financial performance; that each employee is motivated to reach his or her potential;

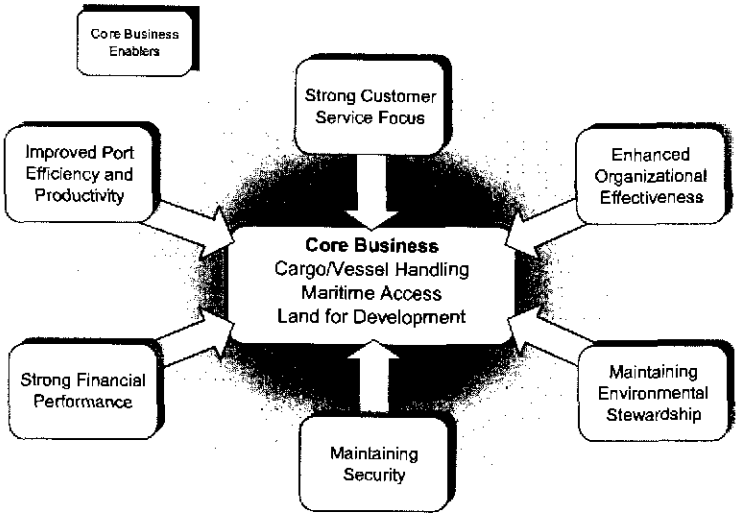
Elected and Government Officials, GPHA will collaborate to provide competent, responsible, and disciplined policy direction with due regard to using the port assets and funds to enhance Ghana's economy, trade, and competitiveness; and to create relationships to the extent that results required by the GPHA in furtherance of its mission are obtained as efficiently as possible, and that the orderly administration of government is promoted by basing GPHA actions on sound reason, solid judgment, and compliance with all lawful rules, regulations, and procedures.

5.3 Meeting the Challenge: A Six-Part Strategy

Effectively confronting the opportunities and countering the threats outlined in the Task 1 report requires GPHA to address its major challenges: improving operational efficiency, expanding capacity, preserving the harbor, and securing the port. This will require that GPHA take action on several fronts simultaneously. We therefore propose a six-part strategy for GPHA to achieve its mission.

The six-part strategy consists of the critical few elements that significantly affect the ability of the GPHA to achieve its mission and require senior management attention. The critical elements are illustrated in Figure 5-6, which identifies GPHA's core business as well as the "enablers" of this core business. Management should orient efforts and resources toward achieving results which assure the success of GPHA's core business. In the discussion that follows, we describe the each part of the strategy, define its goal, and outline the strategies needed to attain the goals.

Figure 5-6
Core Business and its Enablers



5.3.1 IMPROVING PORT EFFICIENCY AND PRODUCTIVITY

The most effective way to increase Ghana's overall port capacity is to maximize opportunities for increasing productivity of the existing infrastructure. Reconfiguration of terminals and layouts will allow more efficient use of the ports' limited land resources, but productivity increases alone will not be enough to accommodate the expected long-term increases in cargo volumes and likely increases in vessel sizes. In fact, channel access deepening could induce larger vessels, particularly in the bulk trades in Takoradi.

Expansion of terminal facilities can take several forms: waterfront property that is underutilized can be converted to marine terminal use; existing terminals can be extended; new land can be created. The GPHA master plan considers all of these options.

GPHA's first response to the challenges it faces will be to improve significantly the productivity of port operations. The operational productivity at the MPS terminal is far below international standards and not competitively sufficient to achieve regional hub status. The terminal's equipment and physical configurations hamper efficiency, but as MPS experience evolves, productivity is expected to improve. However, the lack of serious competition from the existing stevedoring companies constrains the incentive for MPS to improve productivity to the extent that it meets global standards. Meanwhile, shippers and carriers are contending with slow berth productivity and extended vessel waiting times.

GPHA has sought novel solutions in the past to alleviate congestion at the gate, particularly at Tema. While this has had observable significant positive effect in the past three years, GPHA's truck staging area solution outside the port area may need to be complemented with other strategies given expected growth. Takoradi can also expect to see substantial growth in truck traffic, particularly given the upstart oil exploration and production activity in the region.

GPHA has introduced private sector participation in a variety of areas not directly involved in cargo and vessel handling. To this degree, it appears GPHA has exhausted opportunities to further transfer functions to the private sector until the private sector market has developed to provide other services (e.g. payroll processing). The ability to engage greater private sector participation in the existing harbor for container handling is greatly hampered by the concession agreement. Future expansion outside the existing harbor area appears to offer the only opportunity to introduce additional competition for container operations.

Goal

Provide efficient and modern port complexes and promote innovative solutions to promote operational efficiency.

Strategies

Promote responsible port development that accommodates changes in trade volume and vessel size

Identify and implement technology applications for port operational improvements, such as vessel window systems, as more berths become available for container handling

Identify incentives for existing concessionaires to improve operational efficiency and consider re-negotiating the terms of the existing container concession (e.g. rights to adjacent berths in exchange for the right for GPHA to develop a small container terminal in the existing harbor) to promote competition within the existing harbor

Promote and develop safe and efficient vehicular transport in the port area

5.3.2 PURSUING PORT PARTNERSHIPS

Members of the port community generally act in their own self interest. This is understandable and rational. But effecting major changes - such as reducing costs and improving efficiency to attain a competitive edge over other ports vying for regional hub status, preserving and growing the transit business, and to fend off potential competitors for the oil services business - will require cooperation among the parties if GPHA is to transform possibilities to realities. This unity of direction has not always been forthcoming in the past. Achieving the level of support required from all port partners - including shipping companies, terminal operators, shippers, trucking firms, labor unions, and Customs, among others - to the port sector's competitive position means addressing past constraints.

GPHA should analyze transport system costs carefully to pursue with its partners a strategy in which all parties agree to reduce their rates/charges to attract business from specifically targeted markets (e.g. transit cargoes and transshipment carriers). Tug service providers, hinterland transport companies, cargo handling operators, and GPHA should consider offering a "package" rate, particularly for container ships and shippers, which effectively reduces costs relative to rival ports of other countries for calling Ghana's ports.

Clearly, the partnership strategy needs to go beyond rate reductions. Though more competitive charges through the transport logistics chain will be a key element for attracting more cargo, eliminating constraints to seamless cargo flows, particularly in hinterland transit cargoes, need to be addressed.

GPHA will need to exercise greater leadership over the near term in bringing port service providers to a shared perspective. The GPHA should explore the possibility of establishing, in partnership with other logistics, transport, and maritime interests, a regular forum for exchanging views on maritime issues particularly as they relate to port competitiveness.

Goal

Enhance port sector competitiveness by integrating stakeholders into strategy development and implementation.

Strategies

Develop partnerships with government entities, business associations, shippers, trucking companies, logistics service providers, terminal operators, tug operators, stevedoring companies, and other maritime sector interests

Analyze total transport system costs and performance carefully to pursue with partners a strategy in which all parties agree to establish competitive standards relative to cost and performance

Play a leadership role in leveraging government assistance and collaboration for improving hinterland transport systems

Exercise leadership in bringing all port, trucking, and logistics service providers to a shared perspective

Conduct regular forums, in association with partners, for exchanging views on logistics, maritime, and transportation issues as they relate to port competitiveness

Identify and implement technology applications for port operational improvements, such as vessel window and truck appointment systems

Promote and develop safe and efficient vehicular transport in the port area

Identify incentives for existing concessionaires to improve operational efficiency

5.3.3 MAINTAINING STRONG FINANCIAL HEALTH

As a public entity dedicated to providing facilities to accommodate trade, GPHA is responsible for generating and expending public funds. As GPHA does not receive tax revenues, it must be financially self sufficient. The vast majority of port revenues come from tariffs and concession payments. As competitive pressures mount from the development of other ports in the region, the port's ability to generate funds at the current capital per ton/per TEU basis will be challenged in an environment of coming pricing pressures. This raises the importance of maintaining a competitive edge while increasing revenues to cover future investment costs, even with private sector participation. The ability to increase per capita revenues means GPHA, in cooperation with other stakeholders, will need to improve efficiencies that have the effect of decreasing the costs to port users. In order to maintain the port as a valuable public asset, GPHA must continue to manage its funds strategically and with long-term goals in mind.

Goal

Ensure that GPHA continues to be financially self-sustaining and fiscally strong.

Strategies

Maintain a positive net cash flow and establish adequate reserves

Maintain a fair return on investment policy for all port land and improvements

Provide for a financial reporting system that facilitates financial analysis and sound management decision making

Promote the availability of government funding for capital projects outside the port area that contribute to port and logistics efficiency

Continue to leverage public-private partnerships for cost-sharing opportunities

Effectively manage and minimize risk exposures through a comprehensive, centralized risk management program

Align annual budgeted expenditures with strategic goals through the use of performance-based budgeting

Manage port and department operations within annual budget allocations

5.3.4. MAINTAINING ENVIRONMENTAL STEWARDSHIP ROLE

In addition to the economic benefits associated with port operations, there is recognition that the movement of goods has other less desirable impacts on the surrounding community and its natural environment. Air, water, and habitat quality, ambient noise, and traffic are the most significant areas affected by port operations. GPHA has shown some progress towards addressing these impacts, but should begin to integrate the ethic of environmental protection and sustainability into all aspects of GPHA decision making and operations. GHPA has shown that solutions for improving logistics efficiency, such as the installation of a truck staging area, can also mitigate environmental impact.

Goal

Implement practices that minimize or eliminate environmental impacts and health risks of port operations and development on employees, workers, and communities.

Strategies

Reduce air emissions from port-related activities through changes in policy

Implement lease or concession arrangements that promote a green port policy in new and renewed lease agreement

Assure the implementation of sustainable practices in terminal design, development, and operations, and to promote the ethic of sustainability throughout the port community

Assure continued compliance with IMO environmental protocols

Prepare environmental response and contingency plan

Collaborate with government in formulating a strategy for reducing axle load and height standards violations on trucks using the ports

5.3.5 MAINTAINING SECURITY

Safety and security are of paramount concern to port administrations. The IMO's ISPS guidelines underscore the importance of maintaining a safe and secure environment for all port users and the communities in which ports are located. As earlier noted, security concerns have gone outside the port gates as exporters must strive to adhere to the security protocols of other countries. At the same time, transit country cargoes are subjected to an inordinate amount of inspections on their routes to other countries. It is important that GPHA concern itself not only with security within the port areas, but also to assist in the development of strategies for easier compliance with international security protocols to make it easier for shippers to use Ghanaian ports and to enhance the competitiveness of Ghanaian exports.

Goal

Ensure a safe and secure environment for people, property, and cargo.

Strategies

Maintain updated security and emergency management plans

Apply effective and proven technologies to improve security operations

Ensure continued compliance with port security and regulatory requirements

Collaborate with shippers to facilitate conformity with international security protocols

Collaborate with Customs and law enforcement agencies to eliminate undue inspections on transit routes

5.3.6 IMPROVING ORGANIZATIONAL EFFECTIVENESS

It is often said that an organization's most important asset is its people. GPHA has a skilled and highly valued staff and should continue to recruit talented new staff in the years to come. Still, the need to improve organizational effectiveness is a management task that remains continuous. GPHA's organizational structure has been assessed in view of upcoming challenges and opportunities, and the results of this assessment are discussed later in this report. However, a change in structure is not the panacea for effective organizational performance. Just as GPHA must provide excellent service to its customers, it must also provide a positive work environment for its employees. This environment is created both from the top down through the management and board leadership and from the bottom up through the effort and input of every member of GPHA staff. When employees are empowered to realize their full potential and have access to the tools and resources they need to do their jobs, they are more motivated, and therefore more effective. Similarly, when the GPHA professional culture is rooted in two-way communication and a strong team identity, all members of the staff better understand how their role supports the GPHA mission.

Goal

Operate a safe, effective, and efficient organization that fosters an inclusive, open, and team oriented culture.

Strategies

Provide a safe work environment for all employees

Promote a strong team identity across the organization by encouraging collaboration and interdivisional work teams

Improve communication channels between all GPHA staff

Reduce management span of control in local port administrations (discussed below) to strengthen reporting relationships and to provide more time to senior management to address issues of strategy and customer service

Invest in the development and continuing education of GPHA staff

Monitor competitiveness of salaries/compensation/benefits to retain and attract high quality staff

Maintain a highly qualified and motivated work force

Support the coordinated use of updated technology to improve productivity, automate manual processes, and support operation

5.4 Reshaping the GPHA Organization

To support its mission as a landlord operation, concentrating on customer service and focused marketing, GPHA will need to adapt internally through changes in its organizational structure, functional responsibilities, and ultimately staffing. Employees may be needed to establish GPHA's focus on marketing, strategic planning, customer relations, and property management in accord with the mission emphasis on customer service and business growth. Additionally, there is a need to have a proper "fit" between strategy and organizational structure ("strategic alignment") if strategy is to succeed.

Much of the discussion re organizational issues is directed towards the two port administrations at Tema and Takoradi. The current structure at these ports typically demands inordinate amount of attention from the port directors, distracting the needed focus on marketing and customer service. The headquarters office reflects a very similar structure and equivalent span of control; however, interviews with the Director General and other staff indicated comfort with the existing organizational structure. Nevertheless, the emphasis on customer service and marketing should also reside at headquarters.

Figure 5-7
A Conceptual Blueprint for a Streamlined Strategic-oriented Port Organization

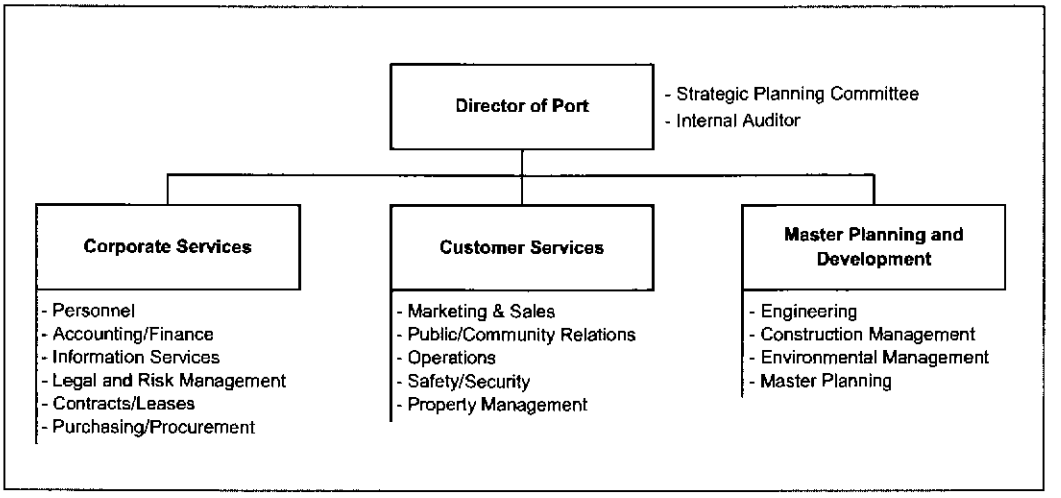


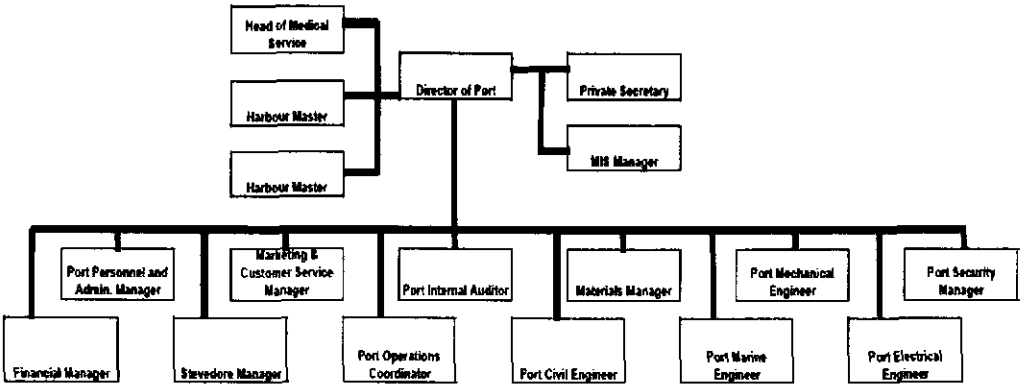
Figure 5-7 presents a conceptual organizational structure. It should be emphasized that this is a blueprint for a future organizational structure. The ultimate structure will obviously be shaped by management style, philosophy, preferred reporting relationships, and management's level of comfort, among other factors. Major changes in organizational structure include:

Reduce management span of control and center activities in three basic functional areas. The current structure places great administrative demands on the port managers, with no less than ten staff and line functional responsibilities reporting to the port managers (see Figure 5-8 for the organizational structure for Tema). This is beyond the norm of 5-7 functional areas in modernized landlord port organizations reporting to the general manager, thus encroaching on the time that should be available to addressing issues of strategy, business development, and customer service. A revised overall structure would focus on areas that will be key to the success of the ports' core business (e.g. cargo handling) in the coming years; these areas include Customer Services, Master Planning and Development, and Corporate Services. Each of these areas has distinct responsibilities (see Figures 5- 9 through 5-11 on the accompanying pages) and implementing them effectively sets the course for meeting GPHA's desire to establish the two port organizations as independent cost units.

Establish strategic marketing. Marketing is a critical success factor in today's competitive port environment and is a centerpiece of the proposed overall strategy to become customer-service oriented by attracting and maintaining selected strategic market segments. The new Customer Services Division at the two ports should be structured around five major activities, including Marketing and Sales, Public/Community Relations, Operations, Safety and Security, and Property Management. Several highly experienced specialists will be needed, particularly in the areas of marketing and sales, property management, leasing, and operations.

Strengthen finance and budget planning. Budgeting and financial planning and reporting should be expanded to address executive management responsibilities for monitoring overall GPHA performance and providing the basis for sound management decision making. GPHA's financial reporting system should have the ability to generate a "dashboard" of indicators related to both operational and financial performance on a near real-time basis. This would enable management to easily monitor port performance and take corrective action as financial, strategic, and operational events warrant.

Figure 5-8
Tema Port Organizational Structure



Source: Ghana Ports and Harbours Authority

Figure 5-9
Functional Profile for Customer Services Division

Primary Division Objectives:

- To identify market opportunities and design strategies for capturing and retaining port customers
- To provide services oriented towards the port customers, including carriers, shippers, concessionaires, licensed operators, and other entities whose businesses depend on acceptable performance levels at the ports
- To raise the level of community, government, and customer awareness of the importance of Ghana's ports, its service offerings, and performance and achievements

Functional Areas	Description
Marketing and Sales	Focuses on detailed market and competitiveness analyses, identifying maritime trends and commercial opportunities for the ports as well as their customers, initiates new business and lease development, and provides general customer advocacy, port promotion to customer groups, and identifies specific targets for sales and promotion efforts.
Operations	Assumes responsibility for lease and concession compliance relative to operations and port property management activities, issues licenses to port service providers, monitors business activities of port tenants, provides general supervision of services to vessels (assures vessels services are being provided on a timely basis) and cargoes, manages berth assignments, collects the necessary data to monitor overall operational performance at the berth and terminal area, and generates operational performance reports and shares them with the Marketing and Sales unit.
Property Management	Assures lease/concession compliance relative to facilities maintenance and repairs and serves as the direct point of contact through field offices and the central office in Tema in the event that a lessee has a problem with its facility; makes certain that port properties are being inspected as necessary for periodic maintenance requirements and for assuring no damages are incurred by the customer's use and/or management; serves as the interface between the customer and the Master Planning and Development Division unit responsible for facility inspection.
Safety and Security	Manages ISPS compliance, develops contingency plans for emergency and environmental incidences, assures security service provider is complying with contractual terms, coordinates responses to emergencies, handles vessel arrival and departure documentation, and escorts official port visitors.
Public/Community Relations	Organizes internal and external communications functions, including media and public relations, advertising, editorial supervision of GPHA publications, promotional relations with government and community stakeholder groups, and organizing and conducting tours for port visitors.

Figure 5-10
Functional Profile for Corporate Services Division

Primary Division Objective:

- To provide services to support the efficient management of the port organization
- To promote the use of information technologies to facilitate information needs, data exchange, and communications among port staff
- To develop a diverse investment portfolio to provide for the port entity's financial security
- To assure that the port entity can recruit and retain highly qualified personnel

Functional Areas	Description
Finance/Asset Management	Conducts all financial functions, including financial analysis and reporting, capital and operating budget preparation, management of the budget cycle, and preparation of the port entity's annual report.
Accounting	Addresses all of the accounting functions for the port's administration, including billing, collections, disbursements, payroll processing, and investment management.
Purchasing/Procurement	Responsible for assuring sufficient inventory of supplies for port entity activities and executing the purchasing/procurement function.
Contracts, Leases, and Licenses	Manages the contracting, leasing, and licensing process for facility leases, concessions, service contracts, and construction/maintenance contracts, managing the tendering process and lease execution (in concert with the legal function).
Personnel	Responsible for employee training and career development, employee grievances, employment application processing and recruitment, formulation of job descriptions, and management of a merit system.
Legal	Provides legal counsel to port entity management, legal research and opinions, legislation and regulatory review, outside counsel management for litigation support and other legal services, supports contracts and leasing (including compliance), bid tendering, initiates collection actions in the event of non-payment of bills, represents the corporate seal, and assures adequate insurance coverage for liability.
Information Services	Addresses the development, management, and maintenance of computer support services to meet the information generation and exchange requirements for all of the port entity's divisions.

Figure 5-11
Functional Profile for Master Planning and Development Division

Primary Division Objective: To assure a high degree of facility readiness to satisfy customer requirements	
Functional Areas	**Description**
National Port Development and Master Planning	Prepares national port development plan and updates for submission to appropriate central government agencies, prepares and updates the master development plans of the ports, reviews and interprets market data and analyses generated by the Customer Services Division, identifies potential land-banking, facilities/infrastructure, and dredging requirements for the short- and long-term future improvement and development plans based on the demand and operational implications associated with the market data and analyses.
Engineering	Interfacing with Customer Services Division, conducts maintenance inspections of both leased and common use properties of the ports, provides engineering analysis and expertise with reference to the master plan, maintains archives of technical information on port facilities and properties, develops (or contracts for) conceptual designs for proposed new facilities or modifications to existing ones, develops/recommends engineering solutions to enhance operational performance, develops cost estimates for the capital budget and associated construction and maintenance projects, and prepares bid specifications for tender documents in coordination with legal services.
Construction Management	Supervises construction projects and monitors contract compliance for construction of facilities or their improvements.
Environmental Management	Satisfies all of the environmental/civil works permitting requirements related to construction projects, and that contractors adhere to permit specifications.

Appendix Historic Trends in Cargo and Vessel Traffic, 1998–2006

Table A-1 *Total Port Traffic 1998 to 2006*

Parameters	1998	1999	2000	2001	2002	2003	2004	2005	2006
				NUMBER OF VESSELS					
Tema	1,093	1,190	1,163	1,169	1,272	1,172	1,381	1,643	1,994
Takoradi	480	512	485	493	463	494	465	699	610
Total Vessel Traffic	1,573	1,702	1,648	1,662	1,735	1,666	1,846	2,342	2,604
				CONTAINER TRAFFIC (TEU)					
Tema	169,687	197,900	166,963	178,342	223,377	305,868	342,882	392,761	420,326
Takoradi	29,341	37,843	39,805	43,126	47,501	41,113	43,020	49,321	51,042
Total Container Traffic	199,028	235,743	206,768	221,468	270,878	346,981	385,902	442,082	471,368
				CONTAINERIZED TRAFFIC (TON)					
Tema	1,220,779	1,362,969	1,266,375	1,292,268	1,769,955	2,477,468	2,845,621	3,386,954	3,693,526
Takoradi	252,167	308,348	333,991	351,722	364,764	334,590	382,487	407,268	404,841
Total Containerized Traffic	1,472,946	1,671,317	1,600,366	1,643,990	2,134,719	2,812,058	3,228,108	3,794,222	4,098,367
				CARGO TRAFFIC (TON)					
Tema	5,417,012	6,368,539	6,219,517	6,312,544	6,841,313	7,391,268	8,442,791	9,249,920	7,678,062
Takoradi	2,248,838	2,623,323	3,056,516	3,356,670	3,400,904	3,825,276	4,184,384	4,635,733	4,719,617
Total Cargo Traffic	7,665,850	8,991,862	9,276,033	9,669,214	10,242,217	11,216,544	12,627,175	13,885,653	12,397,679
				TRANSIT TRAFFIC (TON)					
Tema	29,060	29,893	144,973	261,251	627,773	855,093	764,128	875,272	870,322
Takoradi					16,912	157,152	169,258	246,825	256,122
Total Transit Traffic	29,060	29,893	144,973	261,251	644,685	1,012,245	933,386	1,122,097	1,126,444