Chapter 5
Port-related Logistics System

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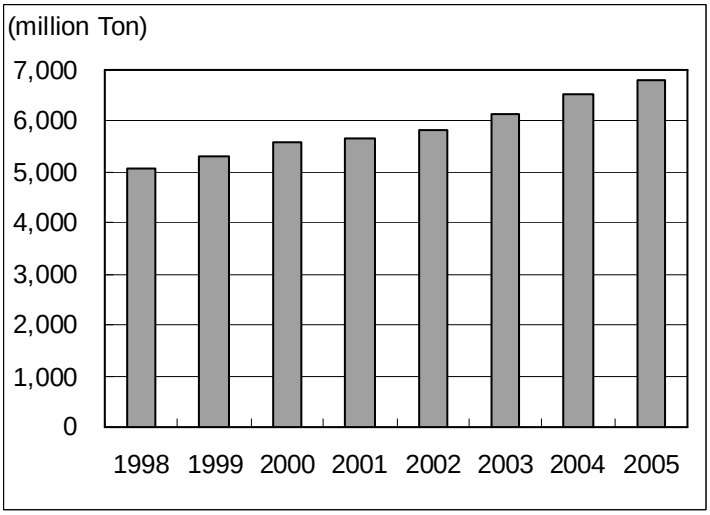
5.1 Sea Transport

5.1.1 World Sea Transport Trends

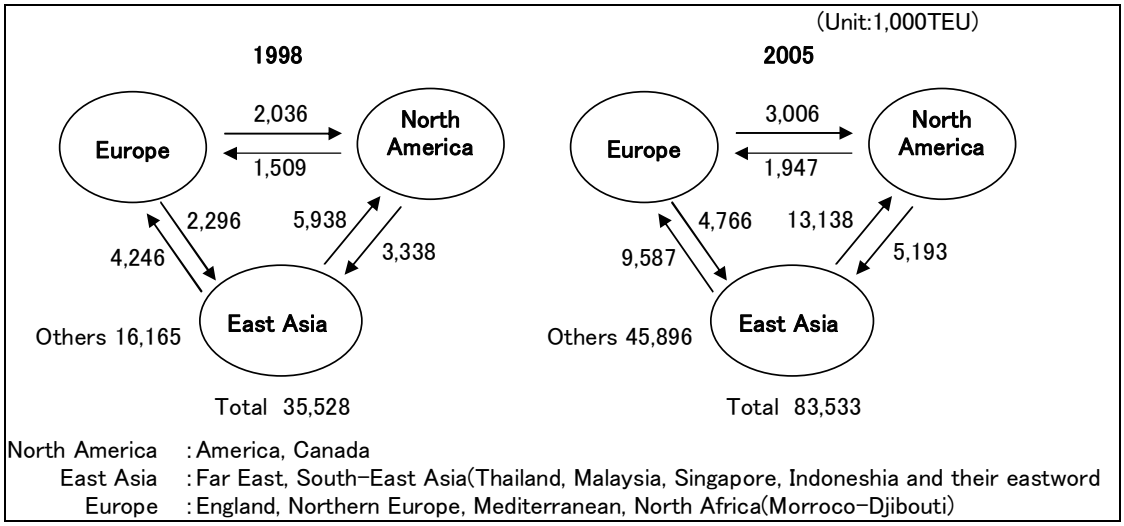
In line with economic globalization, international logistics is catching up with the needs of consignors for a functional combination of sea, land and air transports. Most cargo is transported by sea. Sea transport is generally composed of liner service by container vessels and tramp service for bulk cargo. Container vessels carry mostly consumer items and industrial products such as food, household electrical appliances, and machinery parts while bulk carriers carry crude oil, iron ore, coal, grain, vehicles, etc., generally by chartered vessels. The volume of sea transport increased at an average of 4% per year from 1998 to 2005, which is shown in Figure 5.1.1. It is said that 60% of the value of ocean cargo is carried by container vessels and this share will increase from now on. Therefore, container vessels are playing an important role in sea transport as a result of standardization for easy handling, safety and security measures.



Source: Review 2002-2005, Fernley's

Figure 5.1.1 Trend in World Sea Transport

Most highlighted trends in container transport are the cargo throughputs between East Asia, North America and Europe (including North Africa on the Mediterranean) in 1998 and 2005 as shown in Figure 5.1.2. Through economic globalization, the volume of container transport in the world has grown by be 2.4 times from 1998 to 2005. Container volume between Europe and East Asia grew to be 2.2 times and that between North America and East Asia has doubled in seven years. A part of the container movement between the East Coast of North America and East Asia is carried through the Suez Canal.



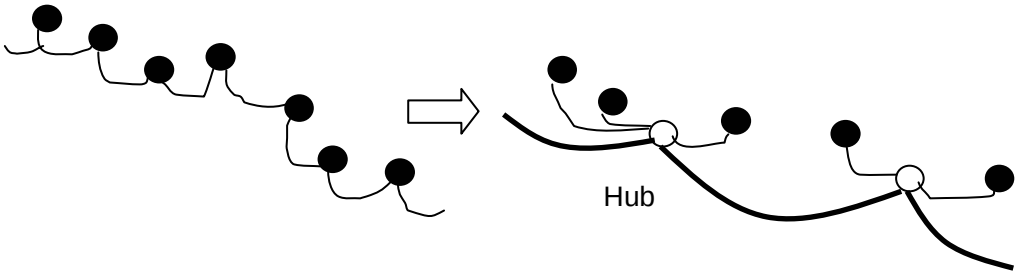
Note: Estimated Volume.
Source: Mitsui O.S.K. Lines

Figure 5.1.2 Comparison of Container Cargo Flows between Europe, North America and East Asia between 1998 and 2005

5.1.2 Operation and Performance Efficiency

(1) "Hub and Spoke" Container Transport System

Major shipping companies have organized global alliances to reduce the transport cost by scale merit. An efficient container transport system, "hub and spoke", has been formed. In other words, it is a "trunk and feeder lines" system for sea transport. Relay shipping, which was common before, has a major problem in that it takes a long time to deliver cargo as ships stop at ports one by one.



Source: JICA Study Team

Figure 5.1.3 Concept of Hub and Spoke

In order to realize the above system, shipping companies have to provide regular services not only between hub and hub but also between hub and spokes to gather and to distribute more containers. This situation forced shipping companies to organize several global alliances as shown in Table 5.1.1.

Table 5.1.1 Major Alliances and Independent Carriers

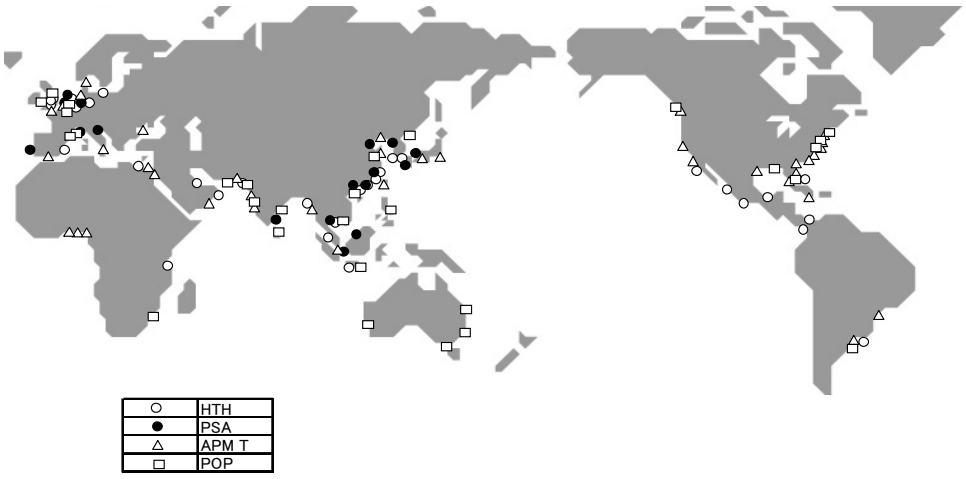
Company or Alliance	Vessels	(TEU)	Remarks
Maersk Line (Denmark)	148	734,974	Including P&O Nedlloyd.
CKYH	187	825,283	COSCO (China), "K" Line (Japan), Yang Ming Line (Taiwan), and Hanjin Shipping (Korea).
The Grand Alliance	111	579,995	NYK (Japan), OOCL (Hong Kong), Hapag Lloyd (German), and MISC (Malaysia).
The New World Alliance	91	457,599	APL (Singapore), Mitsui O.S.K. Lines (Japan), and Hyundai Merchant Marine (Korea).
MSC (Switzerland)	84	403,394	
Evergreen (Taiwan)	76	338,200	Including Lloyd Triestino (Italy), Hatsu Marine (Netherlands).
CMA CGM (France)	70	280,875	Including Australian National Line.
China Shipping (Shanghai)	50	252,877	

Note: Asia/North America, Asia/Europe, North America/Europe Service
Source: NYK Fact Book 2006 (As of January 1, 2006)

The above global alliances and independent carriers, so-called Mega Carriers, carried 50% of world container movement in 1995. In 2005 this figure turned out to be 85%. It is expected that this percentage will increase in the future.

(2) Mega Terminal Operators

There are over 20 container terminal operators in the world, and of special note are four operators referred to as "Mega Terminal Operators". They are Hutchison Port Holdings (HPH : Hong Kong), PSA Corporation Limited (PSA : Singapore), A.P. Moller Terminals (APMT : Denmark, under operation by Maersk) and P&O Ports (POP : London). The former two have evolved from stevedoring companies and the latter two have come from shipping companies. They are competing to improve their operating efficiency by close relationships with other group terminals and shipping companies. The location map of each terminal is shown in the map of Figure 5.1.4.



Source: Website of Each Terminal Operator (August 2006)

Figure 5.1.4 Container Terminals Operated by Major Four Operators

These four terminal operators handled 118 million TEU in 2004, which equates to 40% of the world container flow around the world. They are operating at 183 container terminals in the world. In 2006, Dubai Port World (DPW) completed the acquisition of POP and took the third seat in the ranking of container terminal operators.

In the Mediterranean area, eleven container terminals (including those planned and under construction) have been found. In Egypt, APMT has been operating in Port Said Port (East) from October 2004 and HPH has just started the operations in Alexandria Port in 2007.

Table 5.1.2 Container Volume Handled by Major Four Operators

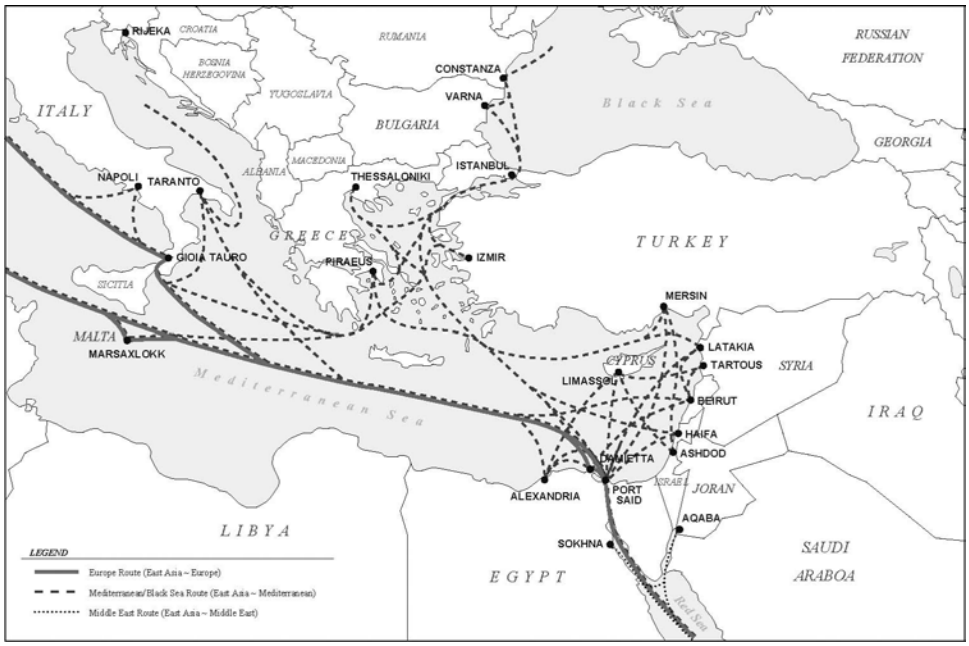
(Unit : million TEU)

	1999	2000	2001	2003	2004	2005
HPH	18	25.3	29	41.5	47.8	51.8
PSA	17.9	19.8	19.1	26	28.1	41.2
APMT	12.5	13.3	18	19	20.6	24.1
POP	6.2	8.3	9.8	15	21.9	(35.0)
Total	54.6	66.7	75.9	101.5	118.4	(152.1)

Note: The throughput of POP in 2005, 35.0 million TEU, includes POP and DPW.
Source: OCDI / Website of Each Terminal Operator

(3) Major Ports in the Eastern Mediterranean Area

In the Eastern Mediterranean area, there are Gioia Tauro and Taranto in Italy, Marsaxlokk in Malta, Piraeus in Greece, Port Said Port (West) & (East) and Damietta in Egypt, as shown in Figure 5.1.5. In accordance with the current shipping lines described in Figure 5.1.5, it is understood that the destination of transhipment containers are the Black Sea countries including Russia and also Turkey, Syria, Lebanon, Cyprus and Israel.



Source: JICA Study Team

Figure 5.1.5 Major Ports and Shipping Routes in Eastern Mediterranean Area

There are only six ports that handled more than one million TEUs in 2006, as shown in Table 5.1.3. In this table, the top four ports and Port Said Port (East) are mainly operating container transhipment operations. The growth rate of container handling in Gioia Tauro Port and Piraeus Port in 2005 and 2006 showed -3.1% and -7.1%, respectively. The container handling volume at Damietta Port had a big drop in 2006, because P & O Nedlloyd, one of the Ground Alliance members, was purchased by Maersk Sealand Group and containers being handled by P & O Nedlloyd were shifted from Damietta Port to Port Said Port (East). Also, it is said that Maersk Sealand is changing their base for the Eastern Mediterranean area from Gioia Tauro Port to Port Said Port (East). It is apparent that the development of Port Said Port (East) has had a big influence on container transhipment in the Eastern Mediterranean area.

Table 5.1.3 Container Volume of the Major Ports in the East Mediterranean

(Unit : thousand TEU)

Port	Country	Container			Terminal Operator
		2004	2005	2006	
Gioia Tauro	Italy	3,261	3,161	2,938	MCT(APMT)
Port Said (East)	Egypt	-	699	1,648	Suez Canal Container Terminal (APMT)
Marsaxlokk	Malta	1,461	1,321	1,600	Malta Freeport Terminals
Piraeus	Greece	1,542	1,395	1,403	Piraeus Port Authority S.A.
Haifa	Israel	1,033	1,107	1,053	Israel Ports Authority
Port Said (West)	Egypt	882*	823	1,013	Port Said Container & Cargo Handling Company
Taranto	Italy	763	717	892	Taranto Ports Authority
Damietta	Egypt	1,145	1,130	830	Damietta Container & Cargo Handling Company
Limassol	Cyprus	298	320	361	Cyprus Ports Authority
Sokhna	Egypt	122	264	309	Sokhna Port Development Company
Alexandria	Egypt	379	433	236	Alexandria Container & Cargo Handling Company
Dekheila	Egypt	252	301	190	Alexandria Container & Cargo Handling Company

Source: Website of Egyptian Maritime Data Bank / Containerization International Year Book 2006 / Website of Each Port Authority

On the other hand, Gioia Tauro Port has an advantage that a container railway service is available to connect to Antwerp, Belgium. Since Mega Terminal Operators have recently come to Egypt because of its strategic location, other ports are competing hard and will continue to do so in the future. In addition, the EU is increasing member countries eastward and developing roads and railways in such countries. Egypt is likely to enjoy its geographical location more than ever including its position for transhipment of containers toward countries along the Black Sea, which will be increasingly important in the future.

However, it is noted that transhipment business is easily affected by the situation of shipping companies. Shipping companies are paying attention to how to minimize the whole transport cost and which ports are suitable for hub ports in their shipping routes. Though less than 6000TEU-class container vessels are allowed to pass through the existing Bosporus Strait, the direct liner service from East Asia to the Black Sea will also

grow up in proportion to its economic growth. Thus, it is necessary for Egypt to increase export containers by enhancing export industries, and then Egyptian ports such as Port Said Port (West) & (East) and Damietta will play an important part in the transhipment operation in the Eastern Mediterranean area in the future.

As for the efficiency of major Egyptian ports, refer to Section 5.2.

(4) Liner Shipping Connectivity Index (LSCI) of Egypt

The United Nations Conference on Trade and Development (UNCTAD) is publicizing a Liner Shipping Connectivity Index (LSCI) based on the nine factors mentioned below. Every factor is standardized to have the same maximum value of 100 and minimum value of 0.

Thus a country or area with a high Index is in a competitive position to obtain frequent liner shipping service at lower cost with better service. In 2004, China was ranked in the highest position which is set as the standard value of 100.

According to the most recent LSCI publicized by UNCTAD in 2006, the position of Egypt is fairly high because of the strategic location of the Suez Canal. Judging from this fairly high index, Egypt can be said to be in a favorable position to induce foreign investment for manufacturing and assembly.

Table 5.1.4 LSCL of Egypt

Rank 2006	Country or territory	2004	2005	2006	Change 2005-6
1	China	100.0	108.3	113.1	4.8
2	Hong Kong (China)	94.4	96.8	99.3	2.5
3	Singapore	81.9	83.9	86.1	2.2
4	United States	83.3	87.6	85.8	-1.8
5	United Kingdom	81.7	79.6	81.5	1.9
6	Netherlands	78.8	80.0	81.0	1.0
7	Germany	76.6	78.4	80.7	2.3
8	Belgium	73.2	74.2	76.1	2.0
9	Rep. of Korea	68.7	73.0	71.9	-1.1
10	Malaysia	62.8	65.0	69.2	42
11	France	67.3	70.0	67.8	-2.2
12	Taiwan Prov. of	59.6	63.7	65.6	1.9
13	China	69.1	66.7	64.5	-2.2
14	Japan	54.4	58.2	62.3	4.1
15	Spain	58.1	62.2	58.1	-4.1
16	Italy	42.9	49.2	50.0	0.8
17	**Egypt**	38.1	39.2	46.7	7.5
18	United Arab Emirates	34.1	36.9	42.9	6.0
19	India	35.8	36.2	40.7	4.4
20	Saudi Arabia	34.7	33.4	37.3	4.0
21	Sri Lanka	39.7	39.8	36.3	-3.5
22	Canada	31.0	31.9	33.9	2.0
23	Thailand	25.6	31.5	31.6	0.1
24	Brazil	30.2	29.1	31.3	2.2
25	Greece	27.5	25.7	30.3	4.6
	Malta				

Source: UNCTAD Transport Newsletter No.34

United Nations Conference on Trade and Development (UNCTAD) is publicizing a Liner Shipping Connectivity Index (LSCI) based on the nine factors as follows:

- Number of container Ships,
- Number of TEU carrying capacity,
- Number of container ships per capita,
- Number of TEU carrying capacity per capita,
- Number of liner companies,
- Number of liner service,
- Maximum vessel sizes,
- Average size of vessel, and
- Average number of vessels per liner company.

(5) Suez Canal

The overall length of the Suez Canal is 195 km from Port Said to Suez. The maximum permissible draft of vessels is 53 ft, say 16.0 m, even though the depth of the Canal is 20.0

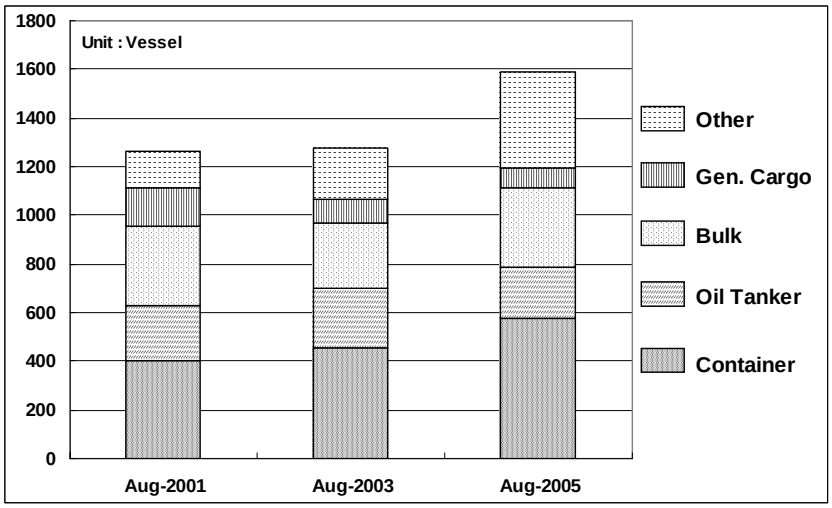
m. Pilotage is compulsory for all vessels over 300 DWT. Speed limits of 6 ~ 9 knot are applied for all vessels depending on type and tonnage of vessel. Vessels passing through the Canal are organized in convoys; 1st southbound convoy consisting of 20 vessels, 2nd southbound convoy consisting of 10 vessels and a northbound convoy consisting of 20 ~ 30 vessels. The average traveling time through the Canal is 14 hours. Vessels are normally required to gather in the anchorage area 4 ~ 6 hours before the convoy starts.

The passing charge of the Suez Canal is US$ 80 per TEU in the case of 2200 TEU container vessels and US$ 50 per TEU in the case of 8000 TEU container vessels (R.K. Johns & Associates Inc., 2005). The ancillary fees vary based on vessel size. For most Panamax and post-Panamax vessels the fee will add on average US$ 2 ~ 3 per TEU.

From this rate passing through the Suez Canal, it can be said that railway service from Sokhna to Alexandria would not be feasible in comparison between two routes, a route with passing through the Canal and a railway route from Sokhna Port to Alexandria instead of passing through the Canal. Because the transport from Sokhna Port to Alexandria is US$ 145 including loading charge at Sokhna Port and takes a long time as two handling operations are needed at Sokhna Port and Alexandria. It can be therefore judged that this route is used as an optional route for bypassing the Canal in case of emergency or for the purpose to use the existing facilities concerned, resulting in a cheaper cost in total.

As mentioned above, the passing charge per TEU by large vessels is cheaper than that by small vessels. A hub port should be located on the Mediterranean side because Sokhna Port plays the role of a hub port in the Red Sea, not in the Eastern Mediterranean area.

Although vessels need to pass through the Suez Canal by a convoy, the number of vessels passing through the Suez Canal are increasing, especially container vessels as shown in Figure 5.1.6.



Source: Suez Canal Pricing Forecast 2005 - 2025, R.K.Johns & Associates, Inc.

Figure 5.1.6 Number of Vessels Passing through Suez Canal by Vessel Type (Monthly)

According to the statistics of the Maritime Transport Sector, the number of container vessels passing through the Suez Canal was increased by 10.61% in 2005 and 6.36% in 2006 as shown in Table 5.1.5. This increment is much bigger than for other vessels.

Table 5.1.5 Number of Vessels passing through the Suez Canal (2004 – 2006)

(Unit: Vessel)

	2004	2005	2006	Increment		
				2004-2005	2005-2006	2004-2006
Container Vessels	5,928	6,557	6,974	10.61 %	6.36 %	17.65 %
Other Vessels	10,922	11,636	11,690	6.54 %	0.46 %	7.03 %
Total	16,850	18,193	18,664	7.97 %	2.59 %	10.77 %

Source: Website of Maritime Transport Sector, arranged by JICA Study Team

The container cargo volume through the Suez Canal has also increased more than other cargo as shown in Table 5.1.6. The container cargo volume from South to North has especially increased. Therefore, it can be said that container cargo from Asia, India, etc. to the Mediterranean, Europe and the Black Sea has been much increased recently.

Table 5.1.6 Cargo Volume through Suez Canal (2004 – 2006)

(Unit: Vessel)

		2004	2005	2006	Increment		
					2004-2005	2005-2006	2004-2006
Container	from North to South	108,341	119,006	126,082	9.84 %	5.95 %	16.38 %
	from South to North	112,038	128,130	150,817	14.36 %	17.71 %	34.61 %
	Sub-Total	220,379	247,136	276,899	12.14 %	12.04 %	25.65 %
Other Cargo	from North to South	103,222	125,830	126,133	21.90 %	0.24 %	22.20 %
	from South to North	197,389	198,139	225,603	0.38 %	13.86 %	14.29 %
	Sub-Total	300,611	323,969	351,736	7.77 %	8.57 %	17.01 %
Total Cargo	from North to South	211,563	244,836	252,215	15.73 %	3.01 %	19.22 %
	from South to North	309,427	326,269	376,420	5.44 %	15.37 %	21.65 %
	Grand Total	520,990	571,105	628,635	9.62 %	10.07 %	20.66 %

Source: Website of Maritime Transport Sector, arranged by JICA Study Team

(6) International Shipping Lines calling at Egyptian Ports

Most international shipping lines call at one or more Egyptian port. This means Egyptian ports are well connected with foreign ports by sea transport, especially Damietta Port and Port Said Port (West) & (East). Major shipping lines calling at Egyptian ports are listed in Table 5.1.7.

Table 5.1.7 Main Shipping Lines calling at Egyptian Ports (as of 2006)

Port	Main Shipping Lines
Alexandria and Dekheila Ports	MSC, Maersk Sealand, UASC, Norasia
Damietta Port	CMA CGM, Ground Alliance (NYK, OOCL, Hapag-Lloyd, MISC), China Shipping
Port Said West terminal (Gov.)	CYKH Alliance (COSCO, Yang Ming, K-Line, Hanjin shipping), Norasia, CMA CGM
Port Said East terminal (SCCT)	Maersk Sealand, P & O Nedlloyd, CMA CGM
Sokhna terminal (SPDC)	APL, PIL, MSC, Evergreen

Source: Port Authorities

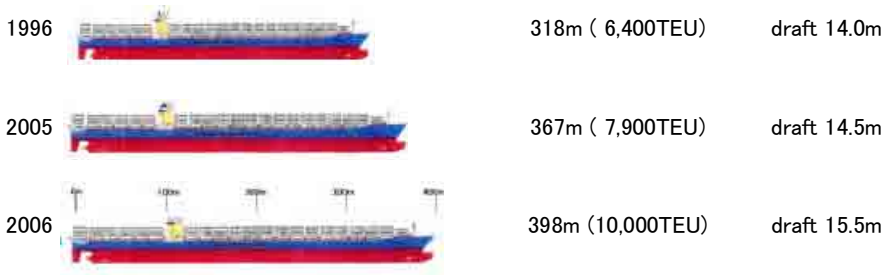
(7) Feeder Network in and around Egypt

According to the results of the interview surveys, it has been revealed that there are domestic shipping routes circling Egyptian ports in the Mediterranean Sea. The growth of Damietta Port and Port Said Port (East) as hub ports will depend on the development of a proper feeder network. It is necessary for Sokhna Port to enhance the feeder network to/from the ports in the Red Sea. An alliance will be required even in feeder lines to strengthen the power to collect more containers and improve the efficiency in accordance with container vessel enlargement.

5.1.3 Logistics Issues

(1) Enlargement of Container Vessels

To catch up with the enlargement of container vessels is an important issue especially for hub ports. Mega Carriers have introduced large container vessels into the trunk line, mainly between Europe and East Asia to improve efficiency. The maximum length of the largest type of container vessel was 318m (6,400 TEU) in 1996, 367m (7,900 TEU) in 2005 and 398m (10,000 TEU) in 2006. Over-8,000 TEU class container vessels accounted for 40% of new orders in 2006. It is said that container vessel size is nearly approaching the ceiling of current technology. However, in accordance with the progress of technology, container vessels will be enlarged later on. It is necessary for the ports, especially hub ports for transhipment, to upgrade facilities in order to receive such larger container vessels. This tendency will influence feeder (local) ports as well, because large vessels retired from trunk lines by the introduction of much larger vessels, like Post-Panamax vessels, will be deployed to feeder lines.



Source: JICA Study Team

Figure 5.1.7 Progress of Container Vessels

For reference, the dimensions and capacity of the current largest container vessel, Emma Maersk, are presented in Table 5.1.8. In order to berth this vessel in a fully loaded configuration, a depth of at least 16.5 m is required. Therefore, Port Said Port (East), Sokhna Port and the proposed container terminal at Damietta Port have depths that can accommodate the current largest container vessels.

Table 5.1.8 Dimensions of Emma Maersk

Tonnage	**156,907**	**DWT**
Overall length	397.71	m
Moulded breadth	56.4	m
Moulded depth	30.2	m
Full load draft	15.5	m
Container capacity of ship	11,000	TEU
Velocity (max)	25.5	knots

Source: Website of Maersk Line

(2) Low Containerization Ratio

It is important to grasp the current containerization in Egypt. The containerization ratio is essentially computed with container volume divided by containerizable cargo volume. It is, however, difficult to collect the related data on containerizable cargo volume., In this report, the calculation has been carried out based on the assumption that the containerizable cargo volume is general cargo volume plus container volume. The result of calculation has been 41% in 2006. The statistical data in 2006 has been applied for this calculation.

Table 5.1.9 Containerization Ratio in Egyptian Ports (2006)

Port	**(a) General Cargo (1,000 ton)**	**(b) Container (1,000 ton)**	**(c) (1,000 ton)**	**Containerization ratio b/c%**
Alexandria	3,392	2,433	5,825	42%
Dekheila	3,243	1,915	5,158	37%
Damietta	3,740	1,520	5,260	29%
Port Said West	289	2,058	2,347	88%
Port Said East	11	623	634	98%
Suez	522	0	522	0%
Sokhna	595	1772	2,367	75%
Adabiya	2,638	92	2,730	3%
Safaga	260	0	260	0%
TOTAL	14,690	10,413	25,103	41%

Source: Website of Maritime Transport Sector, arranged by JICA Study Team

The containerization ratios in Egypt in 2004 and 2005 have been also calculated at 35% and 38%, respectively. It is noted that the average of containerization ratio in developed countries is about 90% and that of whole world trade is approximately 60% currently. It is said that the containerization ratio has a close relationship with a country's economy.

In this sense, the containerization ratio in Egypt will be growing up in parallel with the Egyptian economy, even so it is necessary for the Egyptian Government to make more efforts to increase the containerization ratio. For this, the following points may be considered:

- Change from export of raw materials up to export of products,
- Introduce a new policy to attract private companies to promote the containerization such as tax reduction,
- Adopt more suitable pallet for container, for example, 1.2 m square size, and
- Set up more loading facilities such as dry ports near industrial areas, where goods are put into containers and vice versa.

(3) Third Lock Construction of Panama Canal

According to the seminar on the construction of the third lock of the Panama Canal held on 5 February 2007 in Tokyo, the project will be divided into five packages. The tender for the first package was announced officially in May 2007 and has been awarded in July 2007. The operation will start in 2015. The necessity of this project is still doubtful because most of the ports on the East Coast of USA have hard stratum at a shallow depth and it might be difficult to deepen the berths and basins. It will be very costly, if they ever try.

In measuring the distance between Asia and East Coast USA with Hong Kong as a reference point, a route through the Panama Canal is shorter for Asian ports east of Hong Kong and a route through the Suez Canal is shorter for Asian ports west of Hong Kong. There is a possibility that containers from China to the East Coast of USA could be transported by Post-Panamax container vessels through the Panama Canal.

It is necessary for the Suez Canal Authority to watch the Panama Canal expansion project and to take necessary measures to protect its established interests.

5.2 Sea Ports in Egypt

Figure 5.2.1 presents a general location layout of the major Egyptian ports.

Source : Website of Maritime Transport Sector

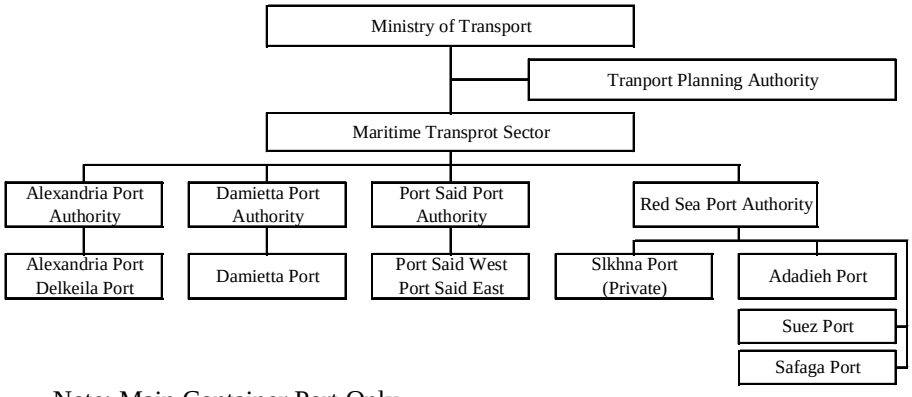
Figure 5.2.1 Egyptian Port Locations

5.2.1 Port Management and Operation in Egypt

(1) Port Management in the Egyptian Major Ports

The Maritime Transport Sector is under the Ministry of Transport and responsible for supervising overall administration of port management and controlling Port Authorities. Port Authorities are in charge of planning, construction of port facilities, securing navigation safety and marine services in the port. Each port authority controls each port as shown in Figure 5.2.2.

Port Authorities own land and facilities in their port area and lease them out to state-owned companies and private companies to operate and pay the royalties for them. Sokhna Port is managed and operated by the private sector and falls under the Red Sea Port Authority.

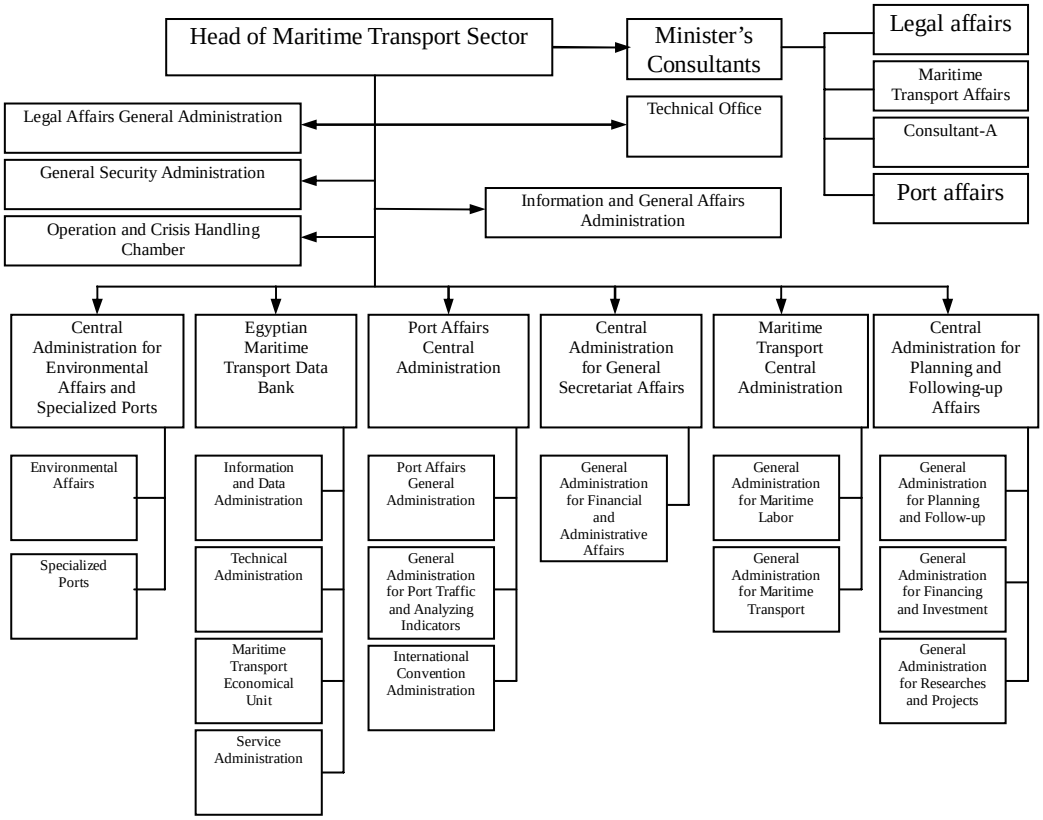


Note: Main Container Port Only
Source: Maritime Transport Sector

Figure 5.2.2 Structure of Administration of Main Container Ports in Egypt

Figure 5.2.3 shows the organization chart of Maritime Transport Sector. A staff of 350 works for the Maritime Transport Sector.

The Alexandria Port Authority and Port Said Port Authority have about 3000 and 1300 staffs, respectively.



Source: Maritime Transport Sector

Figure 5.2.3 Organization Chart of Maritime Transport Sector

(2) Port Operation in the Egyptian Major Ports

State-owned companies carry out cargo handling operations in Alexandria, Dekheila, Damietta and Port Said (West). They are under the control of the holding company for roads and maritime transport under the Ministry of Investment.

Table 5.2.1 Container Terminal Operators in Egypt

Port/Terminal		Container Terminal Operator	Remarks
Alexandria Port			
	Alexandria Terminal (Gov.)	Alexandria Container & Cargo Handling Company (ACCHC)	
	Alexandria Terminal (AICT)	Alexandria International Container Terminal (AICT)	Operation has started at Alexandria in March 2007.
Dekheila Port			
	Dekheila Terminal (Gov.)	ACCHC	
	Dekheila Terminal (AICT)	AICT	Operation will start at Dekheila in 2007.
Damietta Port			
	Damietta Terminal (Gov.)	Damietta Container & Cargo Handling Company	Including bulk cargo handling
	Damietta Terminal (KGL)	KGL Ports International	KGL Ports International will start the operation in 2009.
Port Said Port (West)			
	Port Said West Terminal (Gov.)	Port Said Container & Cargo Handling Company	Including dry bulk and general cargo handling
Port Said Port (East)			
	Port Said East Terminal (SCCT)	Suez Canal Container Terminal (SCCT)	AP Moller Terminals is in charge of operation.
Sokhna Port			
	Sokhna Terminal (SPDC)	Sokhna Port Development Company (SPDC)	Including dry bulk and general cargo handling

Source: Port Authorities, Container Handling Companies and SPDC

Before 1990, the Holding Company was under the Ministry of Transport, the same umbrella as the Port Authorities. After 1990, the Holding Company was shifted to the Ministry of Public Business Sector and shifted again to the Ministry of Investment in 2005. As a result, two governmental organizations, Port Authority and Holding Company, have been responsible for management and operation of container terminals, respectively in Alexandria Port, Dekheila Port, Damietta Port and Port Said Port (West). This formation is rare in the world and making decisions takes quite a long time. For example, the extension of container berth at Port Said Port (West) has not been decided yet, although Ministry of Transport approved this development.

The existing container terminal operators in Egypt are summarized below. AICT has 270 staff and Sokhna Port Development Company has 1300 staff at present.

(3) Current Obstacles in Port Management and Operation

a) Insufficient Control Power of Maritime Transport Sector

Each Port Authority is implementing their own development projects based on their own plans, which are not harmonized with each other. For example, Port Said Port (East) and Sokhna Port have deep berths with depths of -16.5 m and -17 m

respectively, and KGL terminal at Damietta Port will have a deep berth with a depth of -18 m. Moreover, new Alexandria International Container terminal with a depth of more than -16 m is under planning for transhipment. The JICA Study Team judges that it is necessary to confirm whether transhipment port is needed at Dekheila Port or not.

b) Rare Control System by Two Public Organizations, Port Authority and Container Handling Company

It is rare case in the world that two Ministries, Ministry of Transport and Ministry of Investment, have responsibility for the port management and operation, respectively. Making decision needs a longer time compared with the control by one Ministry because two decisions are required. It is difficult to take a prompt action when needed.

5.2.2 Current Facilities

The ports are playing an important role in the smooth connection between sea and inland transport. The main aspects of the ports related to logistics are i) berth depth, ii) berth length, iii) berth width, iv) the number and capacity of container handling equipment, v) operators' skill level, vi) port security, vii) port charge, viii) the accessibility to hinterland and ix) easiness of export/import procedure including custom clearance. The accessibility to hinterland is referred to Chapter 4 and the export/import procedure including custom clearance is to Chapter 6.

The discussion on the above aspects, especially item i) ~ vii), are continued in the following based on data/information collected.

Egypt has eight container terminals including one terminal under construction. The port facilities of each container terminal are summarized in Table 5.2.2.

Table 5.2.2 Port Facilities at Egyptian Container Terminals

Container Terminal (operator)	Berth Length (m)	Average Width (m)	Berth Depth (m)	Terminal Area (ha)	Container Gantry Crane	RTG	Operator
Alexandria Terminal (Gov.)	560	290	12.8	16.3	3	5	Holding Company*1
Alexandria Terminal (AICT)	380	260	12	10	2	3	AICT
Dekheila Terminal (Gov.)	1,040	360	12 - 14	38	5	6	Holding Company*1
Dekheila Terminal (AICT)	560	440	10 - 12	25	2	3	AICT*2
Damietta Terminal (Gov.)	1,050	950	14.5	100	8	10	Holding Company*1
Port Said West Terminal (Gov.)	970	190	12.8	18.6	7	7	Holding Company*1
Port Said East Terminal (SCCT)	1,200	500	16.5	60	12	37	SCCT
Sokhna Terminal (SPDC)	750	370	17	28	2	3	SPDC

Note: *1 Under the control of Ministry of Investment
Note: *2 under construction
Source: Website of Maritime Transport Sector and Container International 2006

The characteristics of Egyptian container terminals are as follows:

(1) Based on the discussion in the Section 5.1, the required berth depth and length are categorized by the ship size as shown in Table 5.2.3. The expected service lines are described in the column of "Remarks" for reference. Judging from the current port facilities, mother vessels over 6,000 TEU are only able to call at Port Said Port (East) and Sokhna Port.

Table 5.2.3 Required Berth Depth and Length by Ship Size

Ship	Required Berth Depth (m)	Required Berth Length (m)	Remarks
Handy-size	11 ~ 13	200 ~ 300	Domestic feeder line 2,000~3,000 TEU equivalent
Panamax	14.0	350	International feeder line (to East Mediterranean or Black Sea) Up to 5,000 TEU
Post-Panamax	15.0 ~ 16.0	400	Trunk line (East Asia ~ Europe/USA) 5,000 ~ 7,000 TEU
Super Post-Panamax	16.0 ~ 18.0	450	Trunk line (East Asia ~ Europe) Over 8,000 TEU

Source: JICA Study Team

(2) The column of "Average Width" in Table 5.2.2 indicates the physical capacity. It is evident that Port Said Port (West) and Alexandria Port are at a disadvantage compared to the others.

(3) The construction of the new container terminal in Damietta Port has been approved by the Minister's Council applying the BOT (build, operate and transfer) system. The planned depth of berth and basin is -18 m and that of the access channel is more than -18 m. It is expected that the operation will start in 2009.

(4) The expansion of the Suez Canal Container Terminal (SCCT) in Port Said Port (East) has been approved and the detailed design is now underway. It is expected that the expansion will be completed by 2009.

(5) The new container terminal in Dekheila Port is at the planning stage. The berth length is 1200 m with a depth of more than -16 m. The construction will start in 2009.

5.2.3 Operation Performance and Efficiency

The container and cargo handling volume in the Egyptian ports in 2006 are shown in Tables 5.2.4 and 5.2.5, respectively. The characteristics of operation performance and logistics efficiency are indicated for each major port.

Table 5.2.4 Container Handling Volume and Transhipment Rate in Each Major Port (2006)

	Local		Transhipment		Total (TEU)	Yearly growth rate (%)	Tran-shipment (%)
	Import	Export	Inbound	Outbound			
Alexandria	128,701	104,106	1,975	1,485	236,267	-45.4	1.5
Dekheila	99,585	87,126	1,588	1,588	189,887	-36.9	1.7
Damietta	60,843	79,691	351,531	338,282	830,347	-26.5	83.1
Port Said (West)	90,695	139,450	412,346	370,352	1,012,843	23.0	77.3
Port Said (East)	20,752	39,577	801,883	785,394	1,647,606	135.9	96.3
Suez	17	8	0	0	25	-90.3	0.0
Sokhna	105,243	151,204	52,171	204	308,822	16.9	17.0
Adabiya	3,065	3,612	0	0	6,677	62.1	0.0
Safaga	0	0	0	0	0	-	-
TOTAL	508,901	604,774	1,621,494	1,497,305	4,232,474	15.8	73.7

Source: Website of Maritime Transport Sector (www.mts.gov.eg)

Table 5.2.5 Cargo Handling Volume in Each Major Port (2006)

	General Cargo (1,000 ton)		Dry Bulk (1,000 ton)		Liquid Bulk (1,000 ton)		Container (1,000 ton)		Special Cargo (1,000 ton)		Total (1,000 ton)
	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	
Alexandria	1,993	1,399	1,336	1,187	218	1,267	1,494	939	1,755	135	11,723
Dekheila	2,803	440	4,023	1,226	145	1,001	1,312	603	38	0	11,591
Damietta	2,868	872	4,770	3,678	0	179	870	650	586	4,157	18,630
Port Said (West)	134	155	1,169	190	82	0	848	1,210	11	0	3,799
Port Said (East)	11	0	0	0	0	0	156	467	0	0	634
Suez	134	388	3	506	0	0	0	0	39	14	1,084
Sokhna	0	595	2	958	0	0	1,025	747	0	0	3,327
Adabiya	1,975	663	181	1,062	34	0	21	71	997	17	5,021
Safaga	103	157	1,316	1,095	15	6	0	0	31	4	2,727
TOTAL	10,021	4,669	12,800	9,902	494	2,453	1,046	4,687	3,457	4,327	58,536

Source: Website of Maritime Transport Sector (www.mts.gov.eg)

(1) Alexandria Port

Figure 5.2.4 shows the general layout of Alexandria port. Large vessels do not call at this port due to the lack of water depth. Nonetheless, Table 5.2.6 shows that Alexandria Port accounted for a large portion of export and import cargo in Egypt in 2006, even though the portion has been decreasing recently. The following reasons can be pointed out:

a) The access to/from Cairo is comparatively smooth through the Desert Road with four lanes each way.

b) A cargo route through Alexandria Port is a traditional one.

Alexandria Port is of a slender shape with a length of 8 km, because the city area is very

close behind the port. It can be said that the operation efficiency is not so high due to the narrow yard width. The Port Authority is making an effort to improve the logistics flow inside the port by widening the inner road, installation of direct connection from the outside to the terminal, etc.

Source: Google Earth

Figure 5.2.4 General Layout of Alexandria Port

Based on "The Study on Master Plan and Rehabilitation Scheme of the Greater Alexandria Port in the Arab Republic of Egypt (JICA, 1999)", the layout modification is going on together with developments at Dekheila Port. The existing Bulk Terminal is being shifted to Dekheila Port, the existing timber terminal is being converted to a new container terminal, a new Passenger Terminal is under construction and a new Multi-Purpose Terminal is at the planning stage. The new container terminal named Alexandria International Container Terminal (AICT) started the operation in March 2007, and its shareholders are the Port Authority and Hutchison Port Holdings (HPH).

Therefore, there are two container terminals in Alexandria Port. One is the Government terminal and the other is AICT. Container handling in the Government terminal is conducted by RTGs and reach-stackers. Its productivity of container handling is average 20 moves per hour per crane. The container handling in AICT is by RTGs and its productivity is 20 ~ 35 moves per hour per crane. As AICT has a limited yard, containers are stacked with six-tiers. Normally, containers are stacked with the maximum four-tiers,

Photo of AICT

because five- or six-tiers lower the handling efficiency.

The Port Authority has restricted the export and import cargo flow to be through Gate No. 27 shown in the following photo, to be in harmony with the installation of the EDI system. Truck and trailers have access from the coastal road to near Gate No. 27 without any congestion.

Source: TPA, MOT, Minister Hamidi El Shaib Presentation

Photo of Gate 27

The railway track is already installed into the port. However, so far the railway service for container is not available due to the delay in preparation of the marshalling area. The Team confirmed that coal, timber, fertilizer and a limited number of containers are transported by barges through the Nubariya Canal.

As for the port security, 204 cameras with related systems will be set up in the port by July 2007. The fixed X-ray inspection system has been installed already.

There are four warehouses for general cargo located near the Port Authority's building in the port area. The Port Authority is installing cooling system into two warehouses for storage of fruits.

Photo of Alexandria Port

The Port Authority has a future plan to construct a "Middle Port" between Alexandria and Dekheila Ports and make them more functional as a whole. However, it is not so effective to solve the existing problems like yard area, even though the total berth length will increase and deep berths will be available.

(2) Dekheila Port

Dekheila Port, as presented in Figure 5.2.5, plays a supplementary role to Alexandria Port and is located on the western side 5 km from Alexandria Port. Containers are also handled in Dekheila terminal (Gov.). There are five gantry cranes and six RTGs and an additional two post-Panamax gantry cranes and two RTGs delivered in 2007 and 2008.

The current productivity of container handling is average 25 moves per hour per crane.

Source: Google Earth

Figure 5.2.5 General Layout of Dekheila Port

There are wide intervals between containers stacked in the yard. If containers are put in order with suitable intervals, more containers could be stacked in the yard. Clear markings on the pavement will help the stacking operation. The railway service from Dekheila terminal (Gov.) is available and currently runs once a day with the maximum 40 TEU.

The new container terminal, now under construction, will be operated by the same holding company as Alexandria. Two post-Panamax gantry cranes and three RTGs have been already installed in the terminal.

Photo of Dekheila Port (Gov.)

Photo of Dekheila AICT
(under construction)

In addition, the coal terminal is to be shifted to this port from Alexandria Port in accordance with the improvement plan for Alexandria Port.

As for an example of the handling of bulk cargo, the loading procedure for cement is as follows:

i) Transport the cement clinker from outside to a warehouse inside the port,

ii) Put the cement clinker into a big bucket,

iii) Transport the bucket by truck to the berth, and

iv) Lift the bucket by ship gear and empty the cement clinker out of the bucket.

(3) Damietta Port

The layout of Damietta Port is presented in Figure 5.2.6. The port's existing container terminal has a 1,050 m quay, with a depth of 14.5 m, on which eight gantry cranes are in service. Six are the post-Panamax type. However, two look well worn and will be replaced by new ones in 2008. The cargo handling productivity in 2005 was 16.5 moves per hour per crane and that in 2006 was 20 moves per hour per crane. Higher container handling productivity will be required, because the shipping company will need to minimize the berthing time to keep the ships on schedule.

Source: Google Earth

Figure 5.2.6 General Layout of Damietta Port

As for the yard handling system, a RTG system is applied for half the area and a reach-stacker system is applied for another half area. Currently, pavement upgrading is under construction in the area where the reach-stacker system is applied. After completion of pavement upgrading, the RTG system will be applied for whole container yard. According to the Port Authority, the cargo volume has increased by 30% without any conflict between the loaded and the empty truck flows.

Photo of Damietta Port

A railway service is available, however there is no scheduled service. On the other hand, the river port is inside the port and waiting for the preparation of the river channel.

The infrared cameras were installed on the tower and have been playing an important role in port security around the clock.

The Port Authority has a contract with KGL (a Kuwaiti private company) on the new container development project. The dredging of the access channel is to be financed by the Egyptian Government, and the construction of the berth, dredging of the basin and the procurement of equipment are to be financed by KGL. The planned berth length is 2300 m with a depth of -17 m. 14 gantry cranes and 40 RTGs will be installed into this terminal. The development will be in progress by three phases. The total amount of finance by KGL is expected to be USD one billion. The operation will start in 2009.

(4) Port Said Port (West)

With regard to the physical efficiency, the area of the container terminal is limited with a width of less than 200 m and is dotted with a lot of warehouses for storage and private sector factories. The Port Authority and Container Handling Company are trying to shift warehouses and factories out of the port area.

Source: Google Earth

Figure 5.2.7 General Layout of Port Said Port (West)

The existing berth lengths of the container terminal are 970 m with a depth of -14 m and 350 m with a depth of -9.2 m for feeder vessels. The plan to upgrade this feeder berth into deep berth with a depth of -16 m is underway.

Photo of Port Said Port (West)

Three container gantry cranes and two rubber tired gantry cranes (RTGs) were installed 15 years ago. The old-fashioned RTGs are the 1-over-3 type whereas modern RTGs are the 1-over-6 type. It is difficult to have an efficient operation when using such unequal RTGs.

The railway is in service for containers, two or three times per week. The volume is 900 ~ 1000 TEU per month. However, the road between Cairo and Port Said is in good condition and well connected to the port with two lanes for each way.

(5) Port Said Port (East)

Port Said Port (East) as presented in Figure 5.2.6, started the operation in October 2004. The container handling volume showed a sudden rise to 700,000 TEU in 2005 and 1,650,000 TEU in 2006. Its capacity is calculated at 2.2 million TEU. The detailed planning is now underway for the terminal expansion which will double the terminal size by 2009. The location is adjacent to the Suez Canal, and therefore it is at an ideal zero deviation from the trunk line.

Source: Port Said Port Authority

Figure 5.2.8 Port Said Port (East)

Twelve super post-Panamax gantry cranes and 37 RTGs provide efficient container handling. The dimensions of the terminal are 1,200 m of berth length and 500 m of width with a depth of -16.5 m. The average productivity of container handling was 30.7 moves per hour per crane in April 2007. The record, so far, for gross vessel moves per hour is 216.5 moves per hour so far.

Photo of Port Said Port (East)

The highest performance was witnessed during the site reconnaissance. Five gantry cranes were engaged in the container handling of the Anna Maersk (6,600 TEU officially), even though only three or four gantry cranes are normally used.

The Port Authority has a 30-year concession contract with Suez Canal Container Terminal (SCCT). Main shareholder of SCCT is AP Moller Terminals (APMT), a sister company of Maersk Sealand. The Egyptian Government financed the construction of infrastructure like the quay and turning basin, and the procurement of cargo handling equipment was by APMT.

The Port Authority does not have the information on the port tariff at the Port Said Port (East), because APMT is in charge of the marketing and operation of the concession contract and the Port Authority is not, in practice, involved in the operation.

Port Said Port (East) states that it is open toward any shipping lines and is not designated just for Maersk Sealand. However, Maersk Sealand accounted for 81.5% of the container handling volume handled in 2005.

(6) Sokhna Port

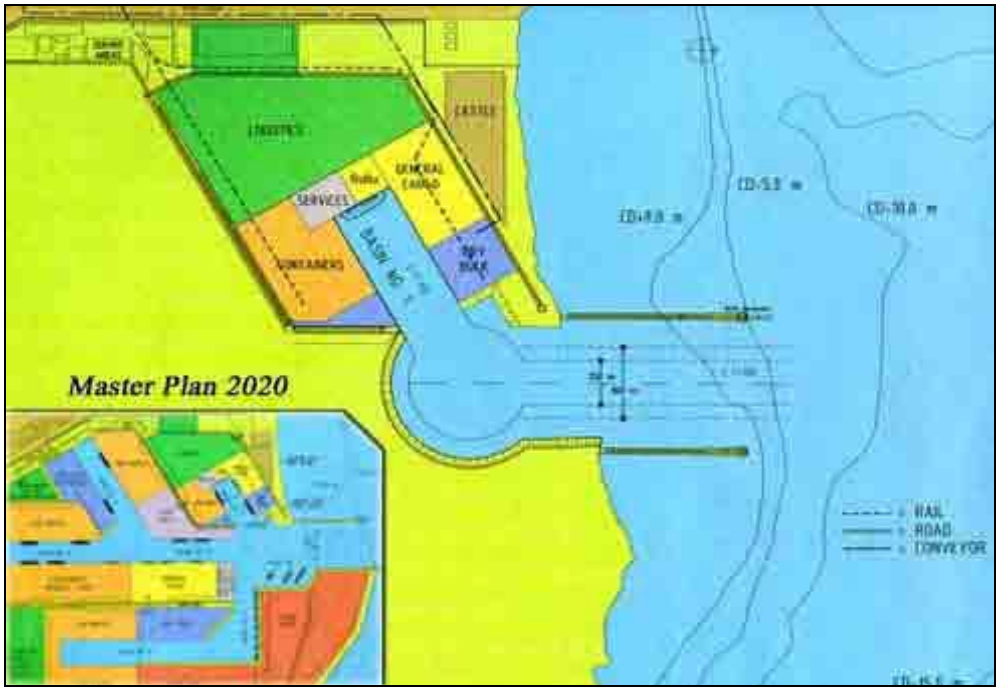
Sokhna Port started operation in 2003 and the container handling volumes were 260,000 TEU in 2005 and 309,000 TEU in 2006. The layout is shown in Figure 5.2.9. The container berth was just 450 m in 2006. The previous bulk berth has been converted into a container berth and the current container berth is 750 m. The warehouse behind the previous bulk berth is going to be moved to expand the container yard. This prompt and flexible action is worth respecting. The current obstacles are the lack of gantry cranes and RTGs. There are two gantry cranes, three RTGs and five mobile cranes working at this moment. Two more gantry cranes, five RTGs and one mobile crane will be delivered within 2007.

It is understood that a maximum of 70 container moves per hour was done by the two gantry cranes and one or two mobile cranes. Therefore, the container handling productivity by a gantry crane has been calculated at 20~25 moves per hour per crane.

Photo of Sokhna Port

During the site reconnaissance, it was found out that the containers in the yard were not oriented towards the same direction. There is a room to improve the operating efficiency by reducing the number of containers of wrong direction. However, this obstacle cannot be eliminated only by effort of Sokhna Port.

The road between Cairo and Sokhna is in good condition and well connected to the port. It is notable that railway service is available for container transport, however, limited to two container trains per day up to the vicinity of Cairo due to the lack of locomotives, even though the demand is five container trains per day. One container train is composed of 16 flat wagons, which is equivalent to 48 TEU. The railway service is calculated to have had a 12% share of the container throughput in 2005.



Source: Website of Maritime Transport Sector

Figure 5.2.9 General Layout of Sokhna Port

(7) Safaga Port

Safaga Port has a deep sea and is well sheltered by Safaga Island. At present, container is not handled in this port. The existing port facilities consist of two locations.

Terminal A has a 1 km berth with a depth of 12~14 m. As it lies between two navy bases, it is difficult for Terminal A to extend any more. 80% of calling ships to this terminal are ferries to/from Saudi Arabia and this terminal has 13 regular ferry services to/from Jeddah and Duba. Also, this terminal has silos for grain and bauxite. The storage capacities are 120,000 tons for grain and 40,000 tons for bauxite, respectively. The agricultural products in the Upper Egypt may be transported to this terminal by trucks and exported to Saudi Arabia by ferries. The distances between Safaga Port and neighboring ports are shown in Table 5.2.6.

Table 5.2.6 Distances between Safaga Port and Neighboring Ports

Neighboring Ports	Country	Distance to Safaga
Jeddah	Saudi Arabia	700 km
Duba	Saudi Arabia	180 km
Yanbu	Saudi Arabia	520 km
Sokhna	Egypt	400 km

Source: JICA Study Team

Terminal B is located to 3 km south of Terminal A. Phosphate and cement are mainly exported from this terminal. Phosphate is mined around Abu Tartur and transported to this terminal by railway. The railway track is narrower than usual.

Safaga Port has a development plan of 300 m multi-purpose terminal between two terminals. A new terminal is expected to encourage the demand to export the agricultural products in the Upper Egypt.

Source: Google Earth

Figure 5.2.10 Location Map of Safaga Port

5.2.4 Logistics Issues

(1) Alexandria Port

a) Deterioration and Lack of Cargo Handling Equipment (Government terminal)

The main obstacles are deteriorated gantry cranes and insufficient number of RTGs. There are just three deteriorated gantry cranes working. They were installed 20 years ago. The productivity of container handling mainly depends on the performance of gantry cranes. Five RTGs cannot cover the entire container yard so they only cover two blocks from the quayside. As a result, supplementary forklifts are required. Several RTGs are under maintenance.

b) Worn-out Container Yard Pavement (Government terminal)

The surface of the yard pavement has some undulations. Also, the markings such as the corner markings for each container and those for RTG lanes are not clear. The upgrading of yard pavement and clear markings is required to be able to stack containers in order.

c) Lack of Container Yard (AICT)

Empty containers were stacked not only in the container yard but also in the Ro-Ro terminal. Containers are stacked with 6-tiers in the yard at the moment. Even though Hutchison has an experience of six-tiers operation in Hong Kong, a maximum of four-tiers would be more ideal for efficient container handling. The cargo handling would operate more efficiently, if the container yard for empty containers could be located outside the port. If possible, the container freight station (CFS) should be shifted out of the container yard, because the inside of yard is a valuable area and is better used for stacking.

d) Insufficient Water Depth (AICT)

The maximum water depth of Alexandria International Container Terminal (AICT) is 12.0 m. This means only feeder vessels can stop at this port and Panamax container vessels can not call to this terminal.

e) Railway Service for container is not available

At the moment, railway service is available for general cargo, but not for container. The reason for this is the delay in the preparation of the marshalling yard. The alternative location of the marshalling yard is near Gate No. 27.

f) Interference of Access Channels

The access channel to Alexandria Port crosses the channel to Dekheila Port, which is a problem for navigational safety.

(2) Dekheila Port

a) Narrow Area of AICT Dekheila

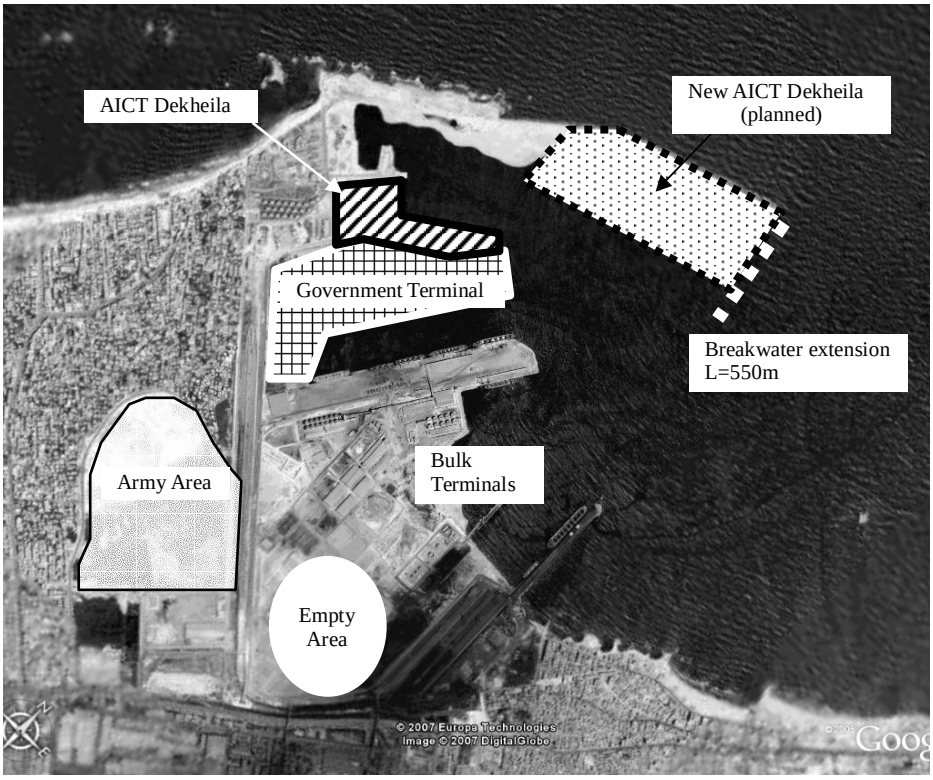
According to Hutchison Port Holdings (HPH) offered to come together with Chinese shipping lines and Port Authority agreed with them. AICT Dekheila has such narrow container yard that it might be difficult, even for HPH, to conduct an efficient

operation. In this sense, it is reasonable that the two terminals, AICT Dekheila and the government terminal, should be united into one.

b) Limited Area of Container Yard

The existing area is not enough to conduct modern container operations, and an additional container yard is required near the terminal. Two potential sites have been found out by the site reconnaissance. One is an empty area inside the port area. This area is near the coal terminal and dust will be harmful to container handling equipment. In general, container yards should be kept some distance from bulk terminals, such as a coal terminal.

Another area belongs to the army. If this area can be rented from the army, it would be useful as part of the container terminal.



Source: Google Earth

Figure 5.2.11 Government Terminal and AICT Dekheila

c) May Need Improvement of Breakwater

The JICA Study Team recognizes that Dekheila Port is closed for around 30 days in a year due to excessive wave activity. It is necessary to consider an extension of breakwater in order to ensure calm conditions for berthing and cargo handling. The Port Authority has a plan to extend the breakwater perpendicular to the existing one by 550 m. However, the JICA Study Team judges that the proposed breakwater would be effective only for the container terminals, not effective for the bulk terminals.

d) Lack of Inspection Area at Entrance Gate

During the interview with a private company in November 2006, it was pointed out that having one entrance and one exit gate for the container terminal, bulk terminal and general cargo terminal often causes a long queue. It was observed that there was no parking space for inspection around the entrance gate, while there are two lanes at the entrance gate. It is necessary to operate the gate control for entering trucks promptly by making use of the existing two lanes at the entrance gate.

(3) Damietta Port

a) Maintenance Dredging Volume

Damietta Port is suffering from having to maintain a large dredging volume, over one million m^3 per year. The dredging cost was LE 54 million in 2005. The following organizations have studied and presented various ideas so far.

- Sogreah (Dec 1981),
- Alexandria University (1996),
- Coastal Research Institute (June 1999), and
- Cairo University (2003).

The planned berth depth of KGL terminal is -18 m. The channel will be required to be more than -18 m. The above studies were conducted based on the depth of -14.5 m and various formulas were applied for the calculation of sedimentation volume. A formula that is correct under an assumed condition and does not necessarily hold correct under a different condition. To solve this problem it is necessary to conduct a numerical simulation. However, no numerical simulations have been done so far.

b) Limited Channel Capacity

The existing channel has one-way traffic with a width of 200 m in the inner channel (inside the breakwaters) and 300 m in the outer channel (outside the breakwaters) and a depth of 14.5 m. As LNG tankers have a priority over berthing to or leaving Damietta Port, container vessels sometimes need to wait for LNG tankers. Furthermore, KGL will start the operation in 2009. It is easily foreseen that the vessels berthing to or leaving Damietta Port will need to wait for quite a long time. As some vessels will pass through the Suez Canal in the same convoy, they will arrive at Damietta Port at almost same time. With this reasoning, it is inevitable that the channel will need to be widened for two-way traffic.

c) Low Cargo Handling Productivity

The container handling productivity in 1997 was 14.8 moves per hour per crane based on eight gantry cranes and no RTG. Since then, the Port Authority has made an effort to improve the productivity, and two additional gantry cranes and a RTG system have been installed. However, the cargo handling productivities in 2005 and 2006 were only 16.5 and 20 moves per hour per crane, respectively. It is still lower in comparison with an average productivity of 30 moves per hour per crane in the advanced ports. The reasons are insufficient number of RTGs installed and unskilled

operators. It is expected that a full RTG system will start as soon as possible after upgrading the pavement. A check needs to be made on whether crane operators are getting training with adequate quality and frequency.

d) X-ray Inspection System for Containers

Movable-type X-ray equipment looks through the containers from one direction, while, fixed-type X-ray equipment can do it from two directions. In addition, the latter has almost twice the resolution of the former. Once a port's security is criticized for the risk of domestic or foreign terrorism incident, the customers may switch to the other safe ports. It is advisable to install fixed- type X-ray inspection system.

e) No Convenient Road from Cairo

Two routes are available; route 1 is Cairo – Ismailia – Port Said – Damietta, and route 2 is Cairo – Tanta – Mansura – Damietta. Route 2 is shorter than route 1. However, there are so many humps between Tanta and Damietta that trucks cannot drive fast.

f) Narrow Container Yard (KGL)

Due to the available land area, the planned KGL terminal will have a narrow container yard, even though the planned water depth of the terminal is as deep as 17 m. The southern part of the terminal will be limited to 200 m and northern part will be 250 m. In order to increase stacking capacity, the stacking height will need to be five or six tiers in the yard.

Source: Google Earth

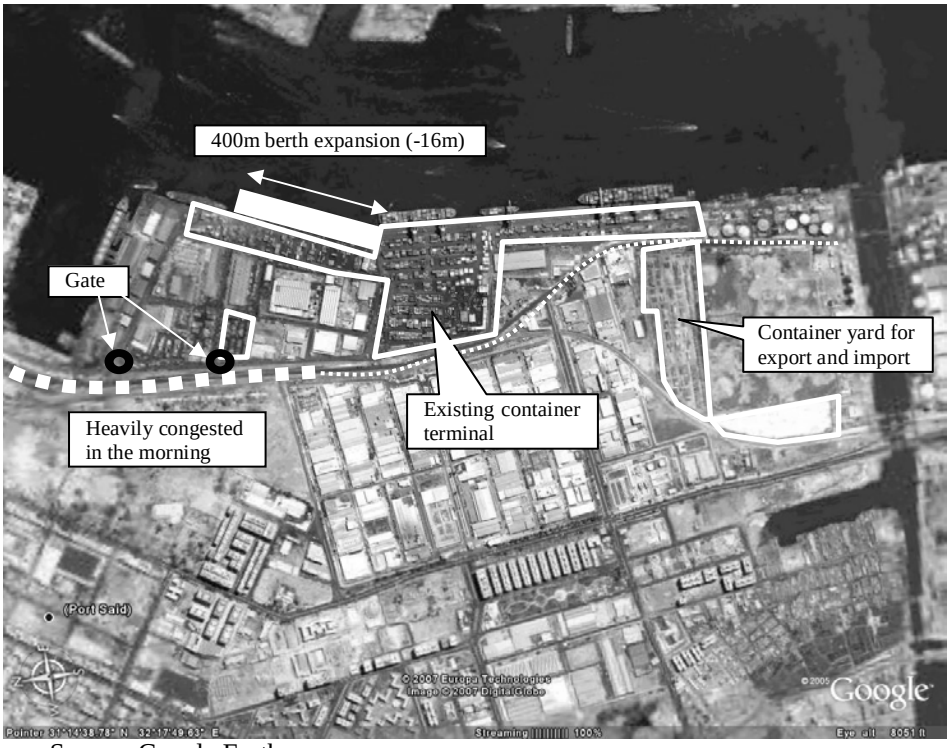
Figure 5.2.12 KGL Terminal (planned)

(4) Port Said Port (West)

a) Insufficient Area of Container Yard

The width of the container yards are quite narrow and mostly less than 200 m. They

do not meet the international standard of 350 ~ 400 m. Furthermore, the container yards are divided into three areas and are dotted with warehouses for storage and private sector factories. The Port Authority and Container Handling Company are trying to shift warehouses and factories out of the port area. After relocating such warehouses and factories out of port area, RTGs will be installed to achieve efficient handling.



Source: Google Earth

Figure 5.2.13 Port Said West Container Terminal

b) Heavy Congestion at Entry Gates for Port Area

The entry gates for the port area are choked in the morning. The reasons of this congestion are: No. 1; trucks have to turn just in front of the gate to enter the port from the public road behind the port area. This means that the gate is located at an inappropriate place. No. 2; many trucks are parking at both sides of this public road due to lack of truck parking space. No. 3; two-way traffic is allowed on this public road. According to truck drivers, they always need to wait for several hours in the morning to come into the port area. This adds to the heavy congestion of the public road in the morning. Moreover, the container yard for export and import is separated from container terminal by this public road.

c) Lack of Deep Berth

The CKYH Alliance, namely COSCO, K-Line, Yang Ming and Hanjin Shipping, is operating the East Asia – Europe service by 8000 TEU class container vessels, with a draft about 15 m. Originally, they were eager to use Port Said Port (West) as a

transhipment hub port. However, such large vessels are not allowed to call at Port Said Port (West) because of insufficient berth depth. Therefore, they stop at other Mediterranean ports. It is possible that other shipping lines or alliances will follow the CKYH Alliance and shift to other foreign ports. The JICA Study Team considers that the construction to create a new berth of 400 m long with a depth of -16 m is needed immediately.

d) Deterioration and Lack of Handling Equipment

There are seven gantry cranes and seven RTGs working in the yard. However, 15 years have passed since three of the seven gantry cranes were installed. These three gantry cranes should be used for feeder vessels after two new post-Panamax gantry cranes will be delivered. As for RTGs, two RTGs look like deteriorated and 1-over-3 type. These RTGs will be replaced by new ones of the 1-over-6 type. Yard handling is conducted mainly by reach-stackers. As the yard is divided by a public road, warehouses and factories, more reach-stackers are needed. Of course, after settling the relocation of warehouses and factories, an additional RTG system will need to be provided to improve handling efficiency.

e) Restricted Port Operation by Suez Canal Service

Port Said Port (West) lies along the Suez Canal. That branch of the canal is the present main canal and the canal in front of Port Said Port (West) is old one with the depth of -14 m. However, vessels are still passing through the old canal even now. It improves the safety of navigation to separate the route of the southbound convoy from that of the northbound convoy. Vessels passing through the Suez Canal have the priority over ones berthing to and leaving from the port. Thus, vessels berthing to and leaving from the port have to wait for the passage of others in front of the port. This means the schedule of these vessels is greatly affected by the Suez Canal service, that is, the number of vessels calling to Port Said Port (West) is restricted by the Suez Canal service. The JICA Study Team considers that the port operation needs to be well coordinated with the Suez Canal service, and in order to increase the handling volume under such port operation, it would be necessary to construct a deep berth and receive larger container vessels. In addition, as tug boats owned by the Port Authority escort vessels passing through the Suez Canal, the port is often short of tug boats.

(5) Port Said Port (East)

There is no particular logistics issue in Port Said Port (East).

(6) Sokhna Port

a) Additional Container Berth

The container handling capacity will reach the upper limit in a few years, even with the delivery of two additional gantry cranes. The demand has grown and is expected to grow from now on. In this sense, the additional berth should be developed.

b) Easily-understandable Tariff System

Tariff at Sokhna Port consists of three parts; port charge, container handling charge, terminal handling charge and no more. This tariff system is easier to understand than that at other Egyptian ports, because cargo is charged for item by item by the Port Authority and container handling company, respectively.

5.2.5 Container Handling Cost and Productivity

(1) Container Handling Cost

It was revealed that the freight tariff system applied at the Egyptian container terminals is not internationally standardized. In the international standard so-called "CY/CY" system, total freight includes a loading charge at the container yard of origin, sea transport freight and unloading charge at the container yard of destination. Generally, shipping companies calculate freight on a "CY/CY" basis. On the other hand, a system so-called "CY/FO(Free Out)" is actually applied at the Egyptian government container terminals. The "CY/FO" system includes a loading charge at origin and sea transport freight. The unloading (container handling) charge at the Egyptian government container terminals is combined into the terminal charge by the instruction of the Managerial Decrees, for example the Managerial Decree No. 156 for Port Said Port (West) in 1999. The "CY/CY" system is applied between Sokhna Port and agents. However, agents apply the "CY/FO" system to calculate charge for consignees. It is expect that the same situations occur at SCCT and AICT. This means that unloading charges are double charged on containers through the Egyptian container terminals.

There are two tariffs in these decrees; one is for foreign vessels by US Dollar, and the other is for domestic vessels by Egyptian Pound. The former is over twice higher than the latter by the current exchange rate between US$ and Egyptian Pound. Sokhna Port follows the decree, while the other Egyptian container terminals regard foreign vessels as domestic ones and do not follow this decree. The JICA Study Team considers that the situation is confusing for customers, especially foreign customers who are familiar with the "CY/CY" system.

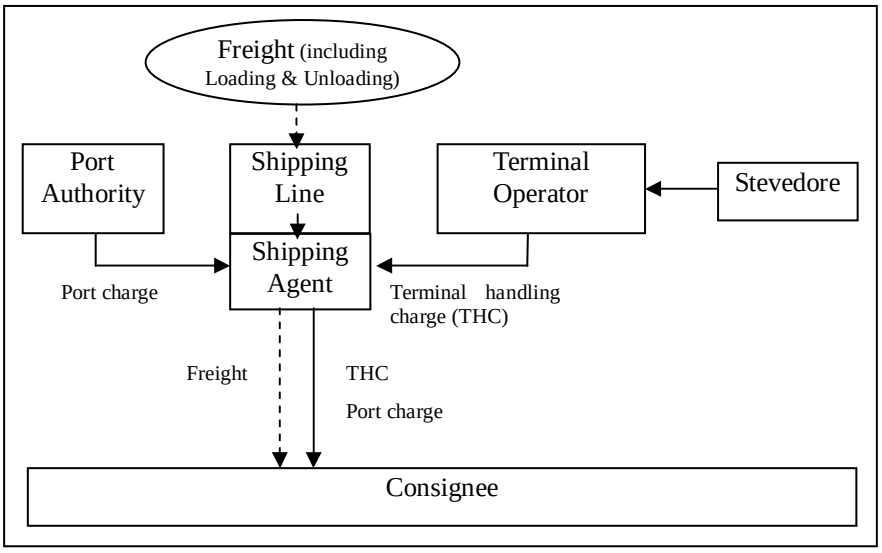
Table 5.2.7 Comparison of Tariff System between International Standard and System applied at Egyptian Government Terminals

	Loading charge at origin	Sea transport freight	Unloading charge at destination
CY/CY system (International standard)	Included	Included	Included
CY/FO system (System applied at Egyptian container terminals)	Included	Included	added

Source: JICA Study Team

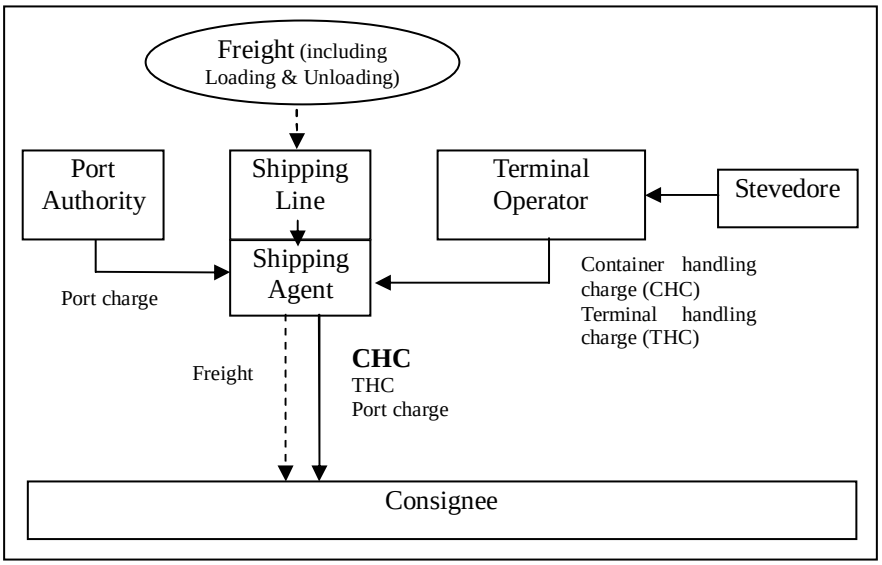
Except for freight, the charges on container vessels and containers at ports are comprised of a port charge, container handling charge and terminal handling charge. The port charge, which is collected by the Port Authorities through shipping agents, includes port dues, berthing dues, the charge of pilot service, the charge of tug boat service and so on.

The container handling charge is charged on loading/unloading by gantry cranes and the terminal handling charge is charged on the administration of containers in the container yard, and both are collected by shipping agents from consignees.



Source: JICA Study Team

Figure 5.2.14 Diagram of "CY/CY" System (International System)



Source: JICA Study Team

Figure 5.2.15 Diagram of "CY/FO" System at Egyptian Government Container Terminals

Keeping the above in mind, the JICA Study Team has tried to compute total charges per TEU at each Egyptian container terminal to compare those at other international container terminals in foreign countries, though this examination is still under preparation. In this report, the calculated charges per TEU at the Egyptian container terminals are shown below. The tariff for foreign vessels in the decree is applied for the computation, because essentially it should be charged for foreign vessels. The Egyptian government

has adopted a policy in which the handling charge for export containers of Egyptian origin is discounted by 50% to assist Egyptian export industries. To avoid any confusion, total charges per TEU have been calculated based on the assumption that 500 units of 20ft container (500 TEU) for import are discharged onto a quay when a 3,500 TEU-class container vessel (50,000 DWT) calls at port.

The container handling charges at each terminal are summarized in Table 5.2.8. Those figures are based on the collected data/information so far, and need to be updated later on. JICA Study Team understands that such charges are determined by negotiation between shipping lines and container terminals considering charges at neighboring ports. In other word, charges will not be reduced without any competition. Thus, in this report it is assumed that the same charges will be applied in the future.

Table 5.2.8 Comparison of Total Charges at Each Egyptian Container Terminal

(Unit: USD/TEU)

Container terminal	Port charge	Container handling charge	Terminal handling charge	Miscellaneous charges	Total cost
Alexandria terminal (Gov.)	55	200		50	305
Alexandria terminal (AICT)	55	84	25	12	176 *
Damietta terminal (Gov.)	33	183		50	256
Port Said West terminal (Gov.)	33	183		50	256
Port Said East terminal (SCCT)	33	70	111	0	214
Sokhna terminal (SPDC)	50	110	114	0	274
Port of Singapore (PSA)	25	-	150	0	175

Note1: Dekheila is omitted because the charges are the same as those of Alexandria.
Note2: Port charge is collected by Port Authorities.
Note3: The tariff at AICT is valid until December 2007.
Source: Port Authorities and Container Handling Companies, arranged by JICA Study Team

The break-down of each cost calculation is shown in the Appendix 4.

(2) Container Handling Productivity and Quayside Handling Capacity

The container handling productivity is an indicator of the efficiency of container handling by a gantry crane in the quay. It is very significant for shipping companies, because shipping companies are struggling to compress their running cost and keep their vessels on schedule. If loading/unloading containers take a long time, a vessel needs to speed up toward a next port and can not sail at an economical speed of 23~25 knots. That is one reason why shipping companies are interested in the container handling productivity.

As discussed in Sub-section 5.2.3, the existing quayside handling productivities at each terminal are summarized in Table 5.2.9. The handling productivities at Egyptian government container terminals do not reach the international level. In order to improve container handling efficiency, terminal operators need to install new handling equipment.

However, another two factors are more significant, namely, upskilling of crane operators and preparation of good loading plan.

As for training of operators, the Port Training Institute under the Arab Academy at Alexandria provides an operator training program including simulator training for a gantry crane. Six container terminals except for Sokhna Port and Port Said Port (East) dispatch their operators to this institute, which has five levels of training course from beginner to veteran Most trainees are beginners. Sokhna Port has its own training program and does not dispatch their operators to the institute.

Regarding the loading plan, it is necessary for both the terminal operator and shipping company to cooperate with each other. The best loading plan requires the minimum shifting of containers. Accordingly, the terminal operator has to know the destination of each container, and to consider the balance of total weight as well. As a result, if the handling operations finish earlier, vessels can stay the minimum time and terminal can receive other vessels.

The future productivity targets have been set up in Table 5.2.9.

Table 5.2.9 Summary of Container Handling Productivity and Quayside Handling Capacity at Each Terminal

Container Terminal	Productivity (moves per hour per crane)		No. of Gantry crane [No. of Mobile crane]		Total Improvement (Future/Existing)
	Existing	Future (expected)	Existing	Future (expected)	
Alexandria terminal (Gov.)	20	25	3	3	25% up
Alexandria terminal (AICT)	25	30	2	2	20% up
Dekheila terminal (Gov.)	25	30	5	6	44% up
Dekheila terminal (AICT)	-	30	3	3	20% up (expected)
Damietta terminal (Gov.)	20	25	8	8	25% up
Port Said West terminal (Gov.)	25	30	7	9	20% up
Port Said East terminal (SCCT)	30	35	12	24	130% up*1
Sokhna terminal (SPDC)	25	30	2 [5]	4 [6]	80% up*2

Note1: The Phase 2 expansion of Port Said East is considered.
Note2: It is assumed the productivity of mobile cranes is half of gantry cranes.
Source: Port Authorities and Container Handling Companies, arranged by JICA Study Team

Also, the future quayside handling capacities at each terminal have been calculated while considering the said productivities and the number of gantry cranes. Some of the existing gantry cranes at government terminals are deteriorated and need to be replaced by modern ones to improve the efficiency.

(3) Terminal Handling Capacity

The terminal handling capacity means the number of containers that can be handled in the terminal per year. It is the lowest value between quayside handling capacity and yard

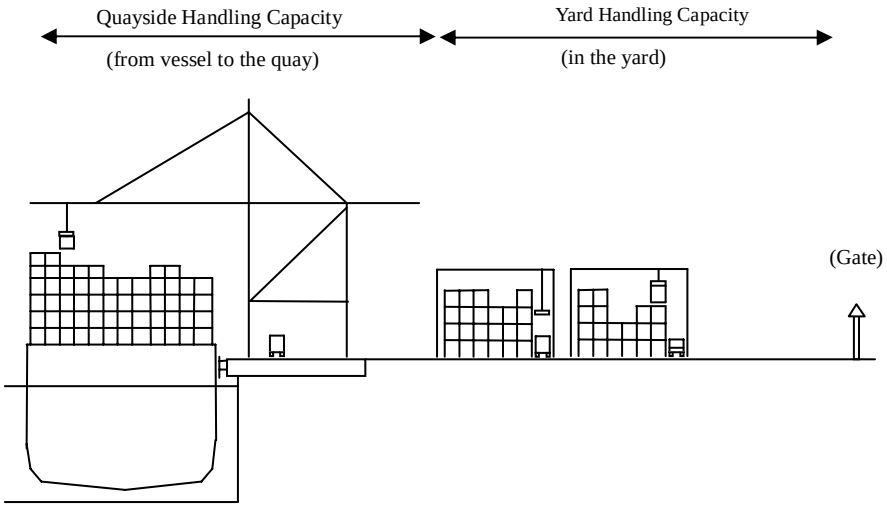
handling capacity. The quayside handling capacity has been mentioned above, and the yard handling capacity is influenced by the area of the stacking yard (number of ground slots), type of yard handling system, average dwelling time of containers in the yard.

A rectangle with a width of over 400 m from the berth line is ideal. Even if it is difficult to ensure such width, it is recommended that there is a larger container yard behind the quay by shifting warehouses out of the container yard, and to move empty containers and containers stacked for long time to the outside container yard. It is noted that the container yard behind the quay is valuable area, that is, the more rotation of containers, the more benefit to the terminal. The size of the container yard is measured by the number of ground slot.

There are several yard handling systems, mainly the forklift or reach-stacker system, straddle-carrier system, RTG system and RMG system. The most common system in the advanced container terminals around the world is the RTG system. In this system, yard cranes can stack containers up to six tiers. This system is suitable for varying degrees of automation with an IT system.

The number of RTGs in the hub container terminals like Port Said Port (East) is three times as many as the number of gantry cranes. However, it is acceptable in the export-import container terminals that the number of RTGs is twice as many as the number of gantry cranes. Containers are normally stacked to a maximum of four-tiers. Fewer tiers lead to more efficient handling, and more tiers result into inefficient handling.

In cases where the containers are stacked for a long time, few containers are handled. In cases where the containers are pulled out immediately, more containers are handled. Namely, shorter dwell times lead to a higher terminal handling capacity. Thus, container terminals try to minimize container dwell time in the yard.



Source: JICA Study Team

Figure 5.2.16 Relation between Quayside and Yard Handling Capacities

5.2.6 Existing Development Plans for Future

Port Authorities and Container Handling Companies have their own development plans for the future. They are summarized in Table 5.2.10. It is easy to find out that there are a lot of development plans on-going and for the short-term, and long-term. However, short-term plan cannot be related to long-term plan due to the lack of coordination. Long-term plans should have phase-wise plans and long-term plans and short-term plans should be coordinated with each other. In this sense, it is necessary to set up medium-term project, which connects short-term plans with long-term plans and raises the reliability of the whole project execution. Under such circumstances, it would be more appropriate for the Maritime Transport Sector to coordinate the planning of all Egyptian ports and to lead the port development in accordance with such a coordination plan. This would result in reduced investment costs.

Table 5.2.10 Summary of Future Development Plans for Ports

Items		Development Project		
		On-going and short-term (within 2010)	Medium-term (2020)	Long-term (2030)
Alexandria Port Authority		1.Cooling warehouse for fruits 2.Fly-over connecting Dekheila with the Coastal Road	1.Railway yard for container 2.Multi-purpose terminal	Middle port
	Alexandria terminal (Gov.)	Upgrading of yard pavement (under planning)		-
	Alexandria terminal (AICT)	Container yard	-	-
	Dekheila terminal (Gov.)	-	-	-
	Dekheila terminal (AICT)	Container yard (under construction)	-	-
		New terminal (L=1200m, W=500m, more than -16m)		
Damietta Port Authority		Deepening of the inner and outer channels and widening of the outer channel	Widening of the inner channel	-
	Damietta terminal (Gov.)	Expansion and upgrading the yard pavement	-	-
		Upgrading the existing berth (-14.5 to -16m) (under planning)		
		Conversion of general cargo berth to container berth for feeder vessels		
	Damietta terminal (KGL)	Berth construction - Phase 1	Phase 2 & 3	-
Port Said Port Authority		Port Said East development (Total 12km, 87ha)		
	Port Said West terminal (Gov.)	1.Yard expansion 2.400m berth expansion (-16m)	Yard expansion	-
	Port Said East terminal (SCCT)	Phase 2 (L=1200m, W=500m, -16.5m)	-	-
Sokhna terminal (SPDC)		Ammonia Terminal	Container Terminal General Cargo Terminal Bulk Terminal Methanol plant Magnesium plant	-

Source: Port Authorities, Container Handling Companies and SPDC