meet with the traffic renovation without delay.

Sixteen buildings and warehouses were constructed during the 60 years following the year 1901. regarding the degree of superannuation of these facilities, we judge that all quays, buildings and warehouses, except the corners at the extreme end of the quay No.19 (Quai de Gages), can ensure their required functions in spite of the advanced aging viewed from their physical life time.

With respect to other port facilities, we judge that they are in good operating conditions except the road leading to the quay No.23 (Quai de Havanne) and the open storage yard behind the quay No. 16 (Quai de Skikda) which are considerably damaged requiring proper maintenance and reparation.

6.2 Port-Related Industries

6.2.1 Factories Located in the Port

There is a power station at the east end of the port. A pump station for cooling water is situated at Quay No.21.

6.3 Cargo Traffic through the Port

6.3.1 Handling Volumes and Commodities

The Port of Oran also fulfills an important role as a key sea borne cargo distribution terminal serving the western region of Algeria with the city of Oran in its center.

Port traffic in 1990 was 2.97 million tons with 2.93 million tons of cargo unloaded and 42,000 tons loaded (The share of unloaded cargo in total traffic is about 99%).

The port was an important commercial port with a general cargo traffic of 0.83 million tons accounting for 10% of total general cargo traffic of the nation. Apart from general cargo traffic, the traffic of liquid bulk and solid bulk cargoes amounted to 0.60 million tons and 1.54 million tons respectively. Liquid bulk cargo consisted mainly of refined petroleum products (unloading), and solid bulk cargo consisted mainly of cereals (unloading).

The movement of cargo traffic in the past decade is shown in Table 6.3.1. Port traffic recorded its peak in 1988, reversing a downward trend that started in 1985.

Cargo traffic by category of commodity is shown in Table 6.3.2. The share of unloaded agricultural products and foodstuffs in the total traffic are 43% and 14% respectively. The cargo volume of agricultural products (cereals and so on) had shown a continuous increase reaching a peak of 1.59 million tons in 1988, an increase of 23% from 1987. Also it still remained high level of about 1.27 million tons in 1990.

As shown in Table 6.3.3, containerization of general cargo was stagnant in recent years, and container cargo traffic in 1990 was 71,025 tons, less than its peak 117,391 tons in 1985. The ratio of container cargo to general cargo was stagnant at the less than 10%.

Table 6.3.1 The movement of cargo traffic (Port of Oran)

Unloaded U: tons

	Liquid bulk	Solid bulk	G.cargo	Total
1981	406,482	290,894	966,069	1,663,445
1982	551,670	626,924	1,450,164	2,628,758
1983	545,929	746,768	1,510,283	2,802,980
1984	513,007	850,024	1,353,995	2,717,026
1985	525,633	878,555	1,060,058	2,464,246
1986	535,665	953,143	939,603	2,428,411
1987	598,571	1,267,616	793,392	2,659,579
1988	599,371	1,606,602	841,392	3,047,365
1989	610,911	1,501,551	910,002	3,022,464
1990	593,214	1,530,251	806,223	2,929,688

Loaded

	Liquid bulk	Solid bulk	G.cargo	Total
1981	104,172	14,285	31,829	150,286
1982	86,330	16,723	20,461	123,514
1983	41,618	16,186	33,482	91,286
1984	59,654	105,450	58,039	223,143
1985	53,577	125,732	45,458	224,767
1986	23,986	180,390	40,256	244,632
1987	11,389	27,903	40,021	79,313
1988	14,969	13,939	32,539	61,447
1989	50,885	3,900	28,231	83,016
1990	2,850	11,743	27,563	42,156

Total

	Liquid bulk	Solid bulk	G.cargo	Total
1981	510,654	305,179	997,898	1,813,731
1982	638,000	643,647	1,470,625	2,752,272
1983	587,547	762,954	1,543,765	2,894,266
1984	572,661	955,474	1,412,034	2,940,169
1985	579,210	1,004,287	1,105,516	2,689,013
1986	559,651	1,133,533	979,859	2,673,043
1987	609,960	1,295,519	833,413	2,738,892
1988	614,340	1,620,541	873,931	3,108,812
1989	661,796	1,505,451	938,233	3,105,480
1990	596,064	1,541,994	833,786	2,971,844

Source: E.P.OR, ANNUAIRE STATISTIQUES 1981-1990

The movement of cargo traffic
(Port of Orran)

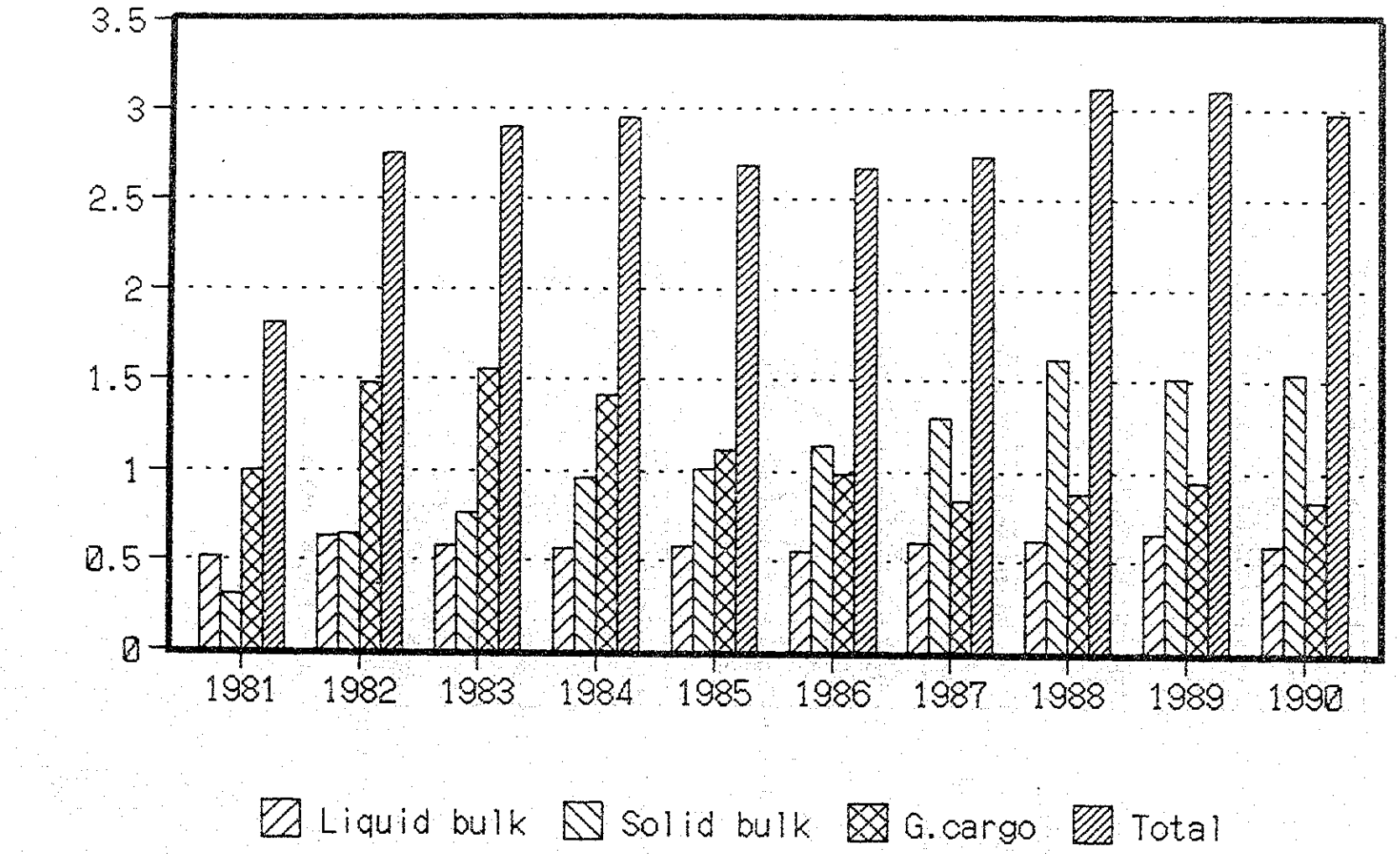


Table 6.3.2 Cargo traffic by category of commodity 1985 - 1990
(Port of Oran)

		AGRICULTURAL PRODUCT	FOODSTUFF	COMBUSTIBLE MINERAL	PETROLEUM PRODUCT	METALLURGICAL SCRAP	METAL PRODUCTS	CONSTRUCTION METERI.	FERTILIZERS	CHEMICAL PRODUCT	OTHERS	TOTAL
1985	UNLOAD	959,224	271,754		457,713		183,353	117,826	33,062	182,493	258,820	2,464,245
	LOAD	112,756	55,522			15,893	9	5		519	40,063	224,767
	TOTAL	1,071,980	327,276	0	457,713	15,893	183,362	117,831	33,062	183,012	298,883	2,689,012
	%	40%	12%	0%	17%	1%	7%	4%	1%	7%	11%	100%
1986	UNLOAD	967,957	349,814	120	464,248		152,637	98,200	46,043	162,567	186,805	2,428,391
	LOAD	159,759	33,906		760	16,774	230	1,180		175	31,848	244,632
	TOTAL	1,127,716	383,720	120	465,008	16,774	152,867	99,380	46,043	162,742	218,653	2,673,023
	%	42%	14%	0%	17%	1%	6%	4%	2%	6%	8%	100%
1987	UNLOAD	1,280,899	365,998		512,899		103,910	82,654	33,164	151,860	128,195	2,659,579
	LOAD	11,351	13,711			16,271	464	4,296		357	32,863	79,313
	TOTAL	1,292,250	379,709	0	512,899	16,271	104,374	86,950	33,164	152,217	161,058	2,738,892
	%	47%	14%	0%	19%	1%	4%	3%	1%	6%	6%	100%
1988	UNLOAD	1,586,810	443,550	398	514,574	9	140,355	72,539	20,351	140,047	128,741	3,047,374
	LOAD	2,057	16,658			13,047	21	5,254		39	24,371	61,447
	TOTAL	1,588,867	460,208	398	514,574	13,056	140,376	77,793	20,351	140,086	153,112	3,108,821
	%	51%	15%	0%	17%	0%	5%	3%	1%	5%	5%	100%
1989	UNLOAD	1,389,652	478,655		540,511	28	184,559	154,895	24,116	138,448	111,600	3,022,464
	LOAD		45,323		7,464	751	1,925	4,446		39	23,068	83,016
	TOTAL	1,389,652	523,978	0	547,975	779	186,484	159,341	24,116	138,487	134,668	3,105,480
	%	45%	17%	0%	18%	0%	6%	5%	1%	4%	4%	100%
1990	UNLOAD	1,270,520	414,932	650	524,951		147,668	305,823	12,798	117,026	135,320	2,929,688
	LOAD	20	3,780		2,850	14,286	4	236		2,888	18,092	42,156
	TOTAL	1,270,540	418,712	650	527,801	14,286	147,672	306,059	12,798	119,914	153,412	2,971,844
	%	43%	14%	0%	18%	0%	5%	10%	0%	4%	5%	100%

Source: E.P.OR, ANNAIRE STATISTIQUES 1985-1990

Table 6.3.3.1 Container Traffic (Port of Oran)

	ENTRY			DEPARTURE			TOTAL		
	1988	1989	1990	1988	1989	1990	1988	1989	1990
NUMBER	6,341	6,002	4,965	5,691	4,322	4,371	12,032	10,324	9,336
FULL	6,341	6,002	4,965				6,341	6,002	4,965
EMPTY				5,691	4,322	4,371	5,691	4,322	4,371
TONNAGE	81,992	75,258	61,409	12,520	9,508	9,616	94,512	84,766	71,025
NET	68,042	62,054	50,486				68,042	62,054	50,486
CONTAINER	13,950	13,204	10,923	12,520	9,508	9,616	26,470	22,712	20,539
N.T./NUM.	10.73	10.34	10.17	-	-	-	10.73	10.34	10.17

Source: E.P.OR, ANNUAIRE STATISTIQUES 1988-1990

Table 6.3.3.2 Movement of containerization (Port of Oran)

		1982	1983	1984	1985	1986	1987	1988	1989	1990
Container Traffic	Number	4,718	7,256	5,719	2,739	2,746	1,552	1,617	1,484	2,162
	Tonnage(1)	36,164	63,270	46,373	24,377	21,560	14,952	12,376	12,333	17,557
General Cargo(2)		1,648,791	1,737,578	1,835,585	1,651,903	1,526,779	1,168,607	1,083,781	974,698	726,843
(1)/(2)		2.2%	3.6%	2.5%	1.5%	1.4%	1.3%	1.1%	1.3%	2.4%

Source: E.P.AN, ANNUAIRE STATISTIQUES 1982-1990

6.3.2 Trading Counterparts by regions

Trading Counterparts by regions is shown in Table 6.3.4. Western Europe accounted for about 30% of the total cargo volumes, with traffic consisting mainly of unloaded foodstuffs and cereals. The share of the North America is about 37% of the total cargo traffic, and it consists mainly of unloaded cereals. The domestic coast accounts for 18% and it consists mainly of unloaded hydrocarbon products.

6.3.3 Passenger Traffic

As shown in Table 6.3.5, Passenger traffic has been fluctuating in recent years. It was decreasing from its peak of 195,363 in 1983 to 125,162 in 1985. However since 1987 it recovered and registered 177,872 in 1988, but again it has decreased to 127,254 in 1990.

Table 6.3.4 Trading Counterparts by regions 1985 - 1990

(Port of Oran)

U:tons

		DOMESTIC COAST	MEDITERRAN NATIONS	WEST, EAST AFRICA	EAST EUROPE	WEST EUROPE	NORTH AMERICA	SOUTH AMERICA	ASIA	OTHERS	TOTAL
1985	UNLOAD	451,494	51,431	4,243	91,609	1,125,119	588,248	95,773	37,930	18,399	2,464,246
	LOAD	111,668	131	1,240	55,247	56,041	440				224,767
	TOTAL	563,162	51,562	5,483	146,856	1,181,160	588,688	95,773	37,930	18,399	2,689,013
	%	21%	2%	0%	5%	44%	22%	4%	1%	1%	100%
1986	UNLOAD	457,056	150,878	8,604	133,285	702,397	653,977	243,770	59,429	19,015	2,428,411
	LOAD	169,756	104	5,600	14,217	54,335	357		263	263	244,895
	TOTAL	626,812	150,982	14,204	147,502	756,732	654,334	243,770	59,692	19,278	2,673,306
	%	23%	6%	1%	6%	28%	24%	9%	2%	1%	100%
1987	UNLOAD	523,518	57,499	4,818	94,663	712,127	1,113,650	93,890	50,338	9,076	2,659,579
	LOAD	14,081	73	1,506	20,159	42,984			510		79,313
	TOTAL	537,599	57,572	6,324	114,822	755,111	1,113,650	93,890	50,848	9,076	2,738,892
	%	20%	2%	0%	4%	28%	41%	3%	2%	0%	100%
1988	UNLOAD	526,394	63,775	5,609	124,389	786,179	1,430,267	46,914	61,441	2,406	3,047,374
	LOAD	6,945	797		15,446	34,984			3,275		61,447
	TOTAL	533,339	64,572	5,609	139,835	821,163	1,430,267	46,914	64,716	2,406	3,108,821
	%	17%	2%	0%	4%	26%	46%	2%	2%	0%	100%
1989	UNLOAD	530,024	61,046	12,166	208,475	1,073,520	1,029,836	43,949	63,448		3,022,464
	LOAD	4,235	233		46,539	29,045	607		2,357		83,016
	TOTAL	534,259	61,279	12,166	255,014	1,102,565	1,030,443	43,949	65,805	0	3,105,480
	%	17%	2%	0%	8%	36%	33%	1%	2%	0%	100%
1990	UNLOAD	522,530	28,196	1,134	340,014	862,623	1,112,475	37,795	19,180	5,741	2,929,688
	LOAD	20	260		8,310	33,202	110		254		42,156
	TOTAL	522,550	28,456	1,134	348,324	895,825	1,112,585	37,795	19,434	5,741	2,971,844
	%	18%	1%	0%	12%	30%	37%	1%	1%	0%	100%

Source: E.P.OR, ANNUAIRE STATISTIQUES 1985-1990

Table 6.3.5 Passenger Traffic (Port of Oran)

	PASSENGER		
	DISEMBARK	EMBARK	TOTAL
1973	14,014	12,804	26,818
1974	18,668	17,725	36,393
1975	24,901	23,102	48,003
1976	25,430	24,821	50,251
1977	44,463	30,202	74,665
1978	46,485	45,887	92,372
1979	56,740	51,778	108,518
1980	85,182	76,248	161,430
1981	57,036	50,322	107,358
1982	44,731	41,237	85,968
1983	99,050	96,313	195,363
1984	98,635	39,557	138,192
1985	63,689	61,473	125,162
1986	75,815	67,879	143,694
1987	89,085	81,139	170,224
1988	92,835	85,037	177,872
1989	69,250	60,986	130,236
1990	65,368	61,886	127,254

Source: E.P.OR, ANNUAIRE STATISTIQUES 1990

MOT, ANALYSE DES PRINCIPAUX RESULTATS DU TRAFFIC

6.4 Port Activities

6.4.1 Calling Vessels at the Port

The number of calling ships at port of Oran was 897 in 1990 and the total net tonnage increased in 1990 by 1.02 % from 1989.

A total of 897 ships called at port of Oran in 1990. Of these, 423 were general cargo vessels, 122 were Ro-Ro vessels, 129 were car ferries, 104 were oil carriers, 79 were cereals carriers, 30 were wine carriers and 10 were container vessels.

The distribution of ships according to their size is shown in Fig. 6.4.1.1. The size of general cargo vessels calling at the port was in the range of 1,000 - 60,000 DWT, while car ferries were 10,000 - 25,000 DWT, Ro-Ro vessels were 1,000 - 40,000 DWT, petroleum carriers were 2,000 - 20,000 DWT, and grain carriers were 10,000 - 40,000 DWT.

In terms of the handled volume of cargo at port of Oran, the general cargo vessels accounted were 39.1% of total volume, cereals carriers were 35.8%, petroleum carriers were 18.6% and Ro-Ro vessels were 3.3%.

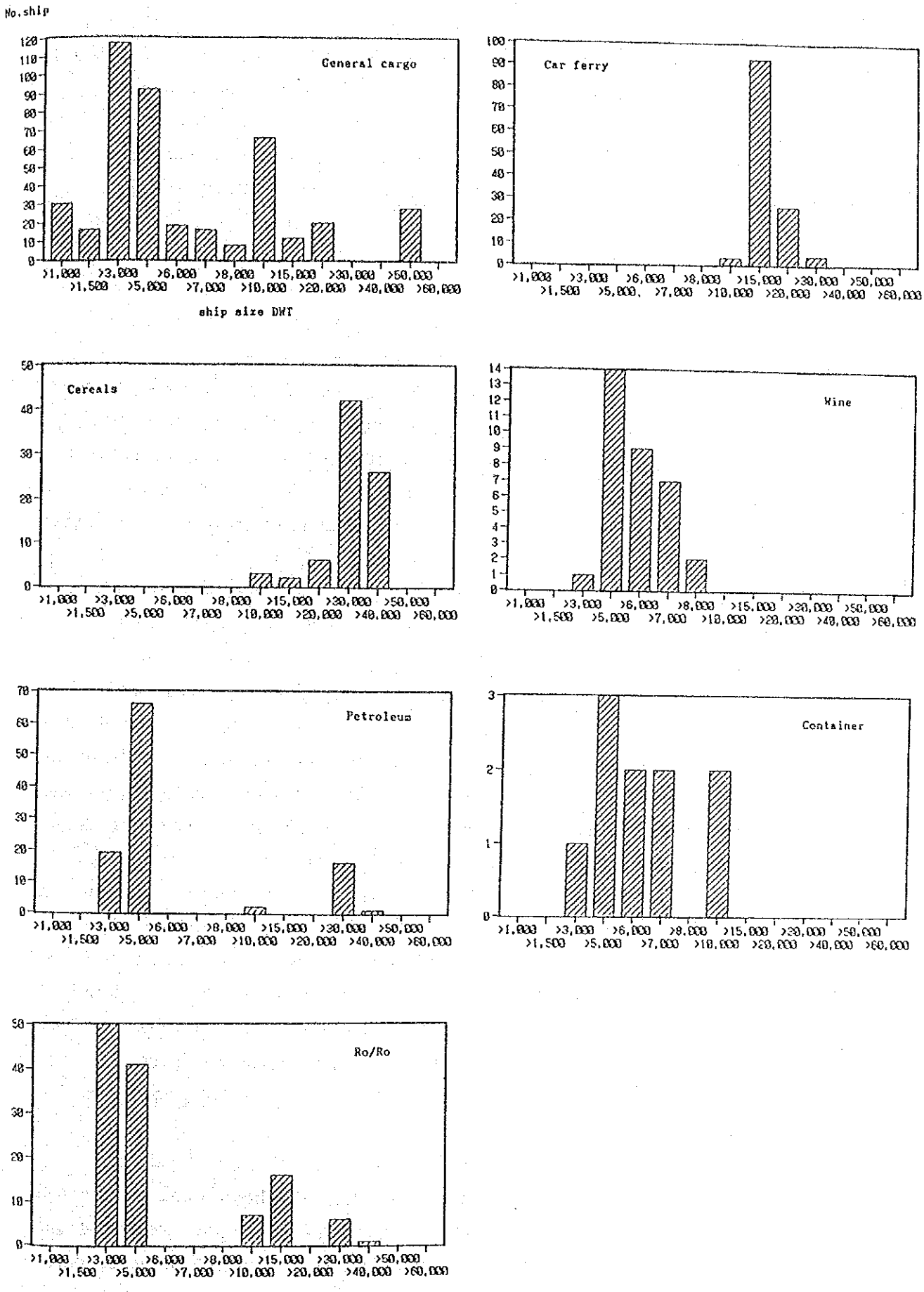


Fig. 6.4.1.1 Number of Ships by Ship Size

6.4.2 Cargo Handling System

(1) Cargo handling system

1) General cargo

a) Discharging of cargoes

General cargo vessel laden with sacked cargo

The foodstuffs in sacks are unloaded by means of quay cranes together with ship gears , and almost all of the cargoes are directly landed onto trucks arranged by consignees. Most of sugar in sacks are also landed onto trucks, however, some are loaded into rail wagons. For loading on rail wagons, the cargoes are once piled up on wooden pallets and forwarded to rail wagons from apron by means of forklifts.

General cargo vessel co-stowed with various kinds of general cargo

The unloading work is done by means of ship gears together with quay cranes and mobile cranes. Forty one per cent of total volume of the unloaded cargoes are transferred and stacked in open yards in the port by means of forklifts, and 53 % of the unloaded cargoes are directly landed onto trucks and brought out from the port at once. Only 6 % of them are stored in sheds. Almost all of the stored cargoes are delivered by trucks.

There are no berth equipped with a gantry crane for handling of containers. Therefore the containers are unloaded by means of vessel gears or mobile cranes and then almost all of the containers are transferred to the open yards designated for storage of containers by trucks and/or forklifts. All the cargo in containers is delivered by trucks without unpacking in the port.

Ro-Ro vessel

There are 4 berths for accommodating Ro-Ro vessels and all vessels are moored to the berths in head-out because vessel's stern ramp way is fitted at right stern of the vessel. Except some cargoes stowed on vessel' weather deck, all cargoes are handled by means of horizontal cargo handling equipment such as

forklifts and tractors through the vessel's stern ramp way. Some cargoes on the weather deck is discharged by quay cranes or mobile cranes.

The unloading cargo including containers are handled in a similar manner to the general cargo vessel.

b) Loading of cargo

The cargoes to be exported, such as bottled wine in cartons, textiles, paint and agricultural goods, are mainly brought into the port by rail wagons, and are loaded into vessels as usual. Loading into Ro-Ro vessels is done by means of horizontal cargo handling equipment.

Present flow of general cargo, container and trailer in the port is shown in Fig.6.4.2.(1).1,2,3, and 4.

2) Bulk solid cargo

Main bulk solid cargoes handled at the port are cereals, feed, and cement, and all the cargoes are imports from abroad.

a) Cereals

The cereals in bulk are handled at Nos.12 and 21 quays. In No.12 quay, cereals handling facility is installed with three unloaders and a belt conveyer system. In addition there is another silo near No.20 quay.

At No.12 quay, the unloading of the cargo is done by means of 3 units of unloading machines, "Traveling rail-mounted screw type unloader", "Traveling rail-mounted pneumatic unloader" and "Tire-mounted pneumatic unloader for directly landed onto trucks". Most of discharged cargo is put into silo through belt conveyer system, and some cargo is directly landed onto trucks.

At No.21 quay, the discharging is done by means of ship gears with grab buckets and portable hoppers and the cargoes are directly landed onto trucks and brought out from the port.

Some 70 % of the handling cargoes in the port is stored once in the silos

and forwarded to hinterland by trucks and rail wagons, the remained of cargo is directly landed from vessels to trucks and delivered from the port.

b) Animal feed in bulk

These cargoes are mainly unloaded at the berths Nos.14, 18, 21 or 22 by and loaded onto trucks means of ship's gear with grab buckets and movable hoppers and delivered to consignee directly.

c) Cement

The cement carriers are moored alongside the Cement Plan Barge which is moored at No.1 berth in No.19 quay and the cargo is handled in the same manner as the Port of Algiers.

Present flow of the solid cargo in bulk in the port is shown in Fig.6.4.2.(1).5.

3) Liquid cargo in bulk

There are 5 joint mouths of pipelines for handling liquid cargo in bulk, one joint mouth for bitumen at No.16 quay, three joint mouths for petroleum products at No.17 quay and one joint mouth for vegetable oil and animal fat at No.20 quay. The mouths are connected with pipelines to storage tanks within the port.

a) Bitumen

The bitumen in bulk is unloaded by rubber hose jointing vessel's pipeline and the shore mouth, and transferred to the storage tanks within the port through overhead pipeline.

b) Petroleum products

These liquid cargoes are unloaded from tankers also by rubber hoses jointing vessel's pipelines and shore joint mouths, and transferred to storage tanks through subterranean pipelines. The transportation from the storage tanks to hinterland is done by trucks and rail wagons.

These piping system is also used for loading of used engine oil to vessel.

c) Vegetable oil and animal fat

The cargoes are unloaded from vessel by rubber hoses and forwarded to shore tanks in the port.

Present flow of the liquid cargo in bulk in the Port is shown in Fig.6.4.2.(1).6.

Oran Port

Sacked Cargo

(1) Discharging

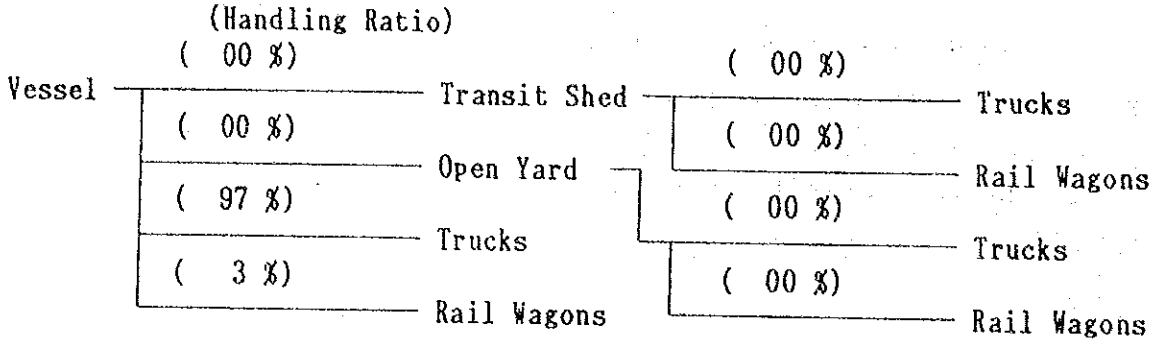
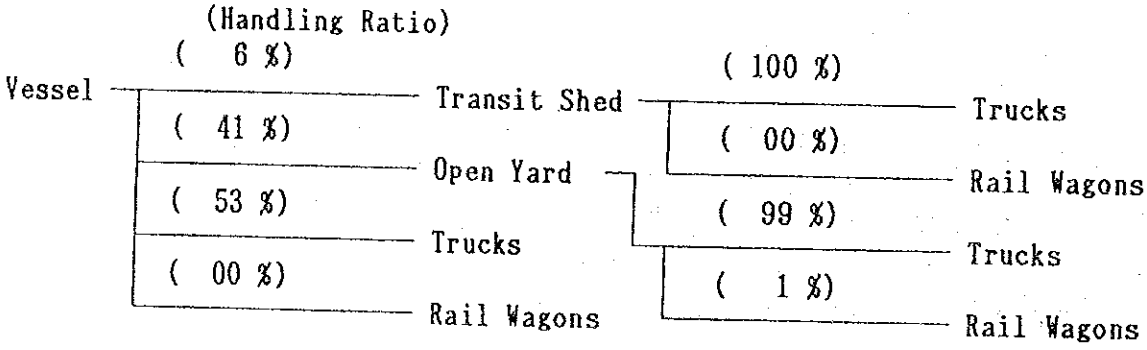


Fig. 6.4.2.(1).1 Present Cargo Flow in Port

General Cargo

(1) Discharging



(2) Loading

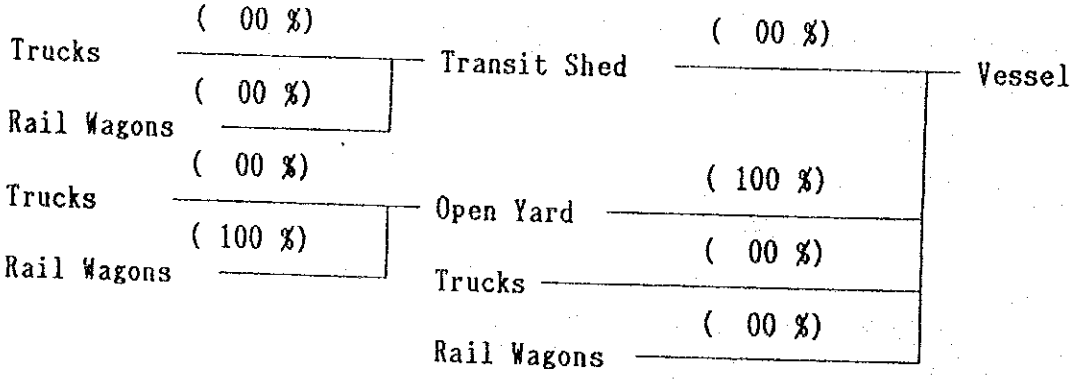


Fig. 6.4.2.(1).2 Present Cargo Flow in Port

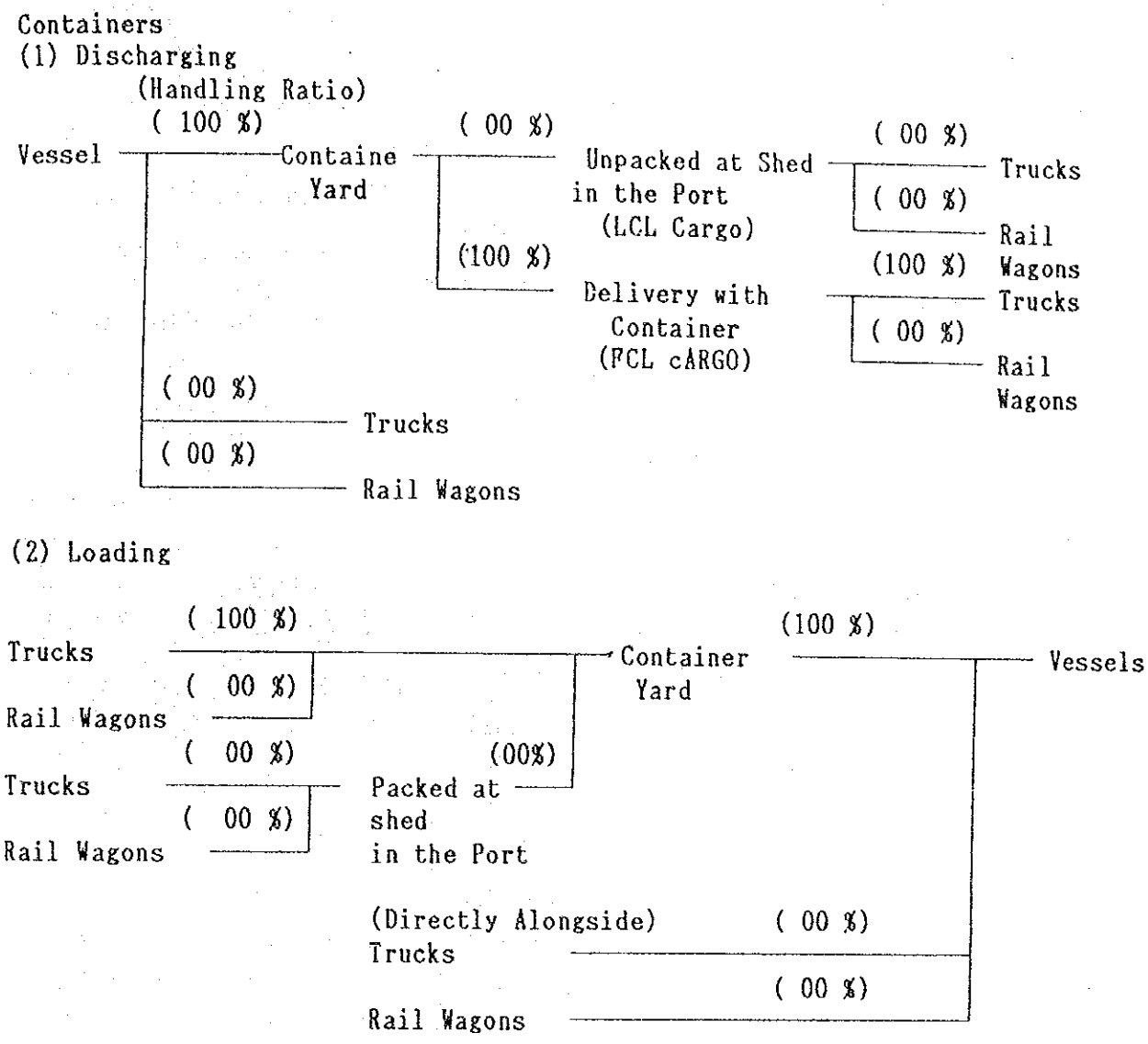


Fig. 6.4.2.(1).3 Present Cargo Flow in Port

Trailers

Discharging

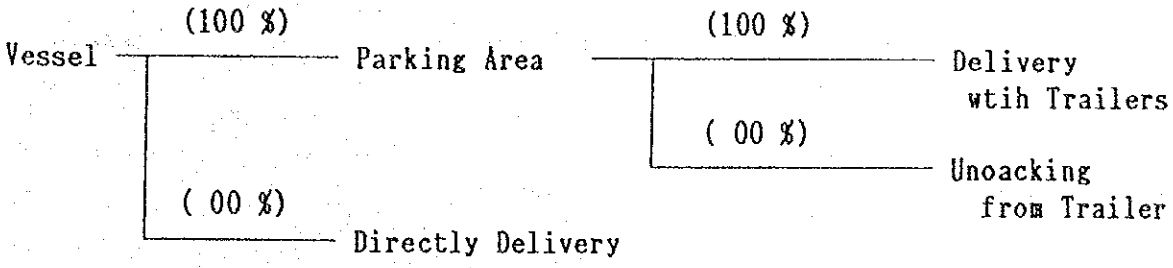
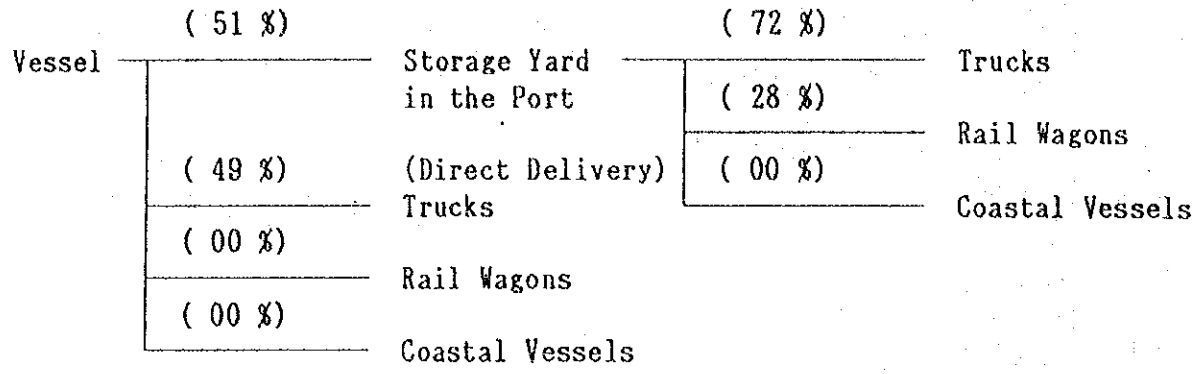


Fig. 6.4.2.(1).4 Present Cargo Flow in Port

Solid Cargo in Bulki

(1) Discharging



(2) Loading

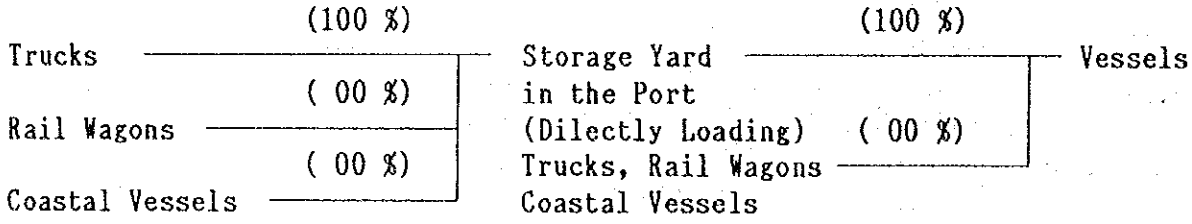
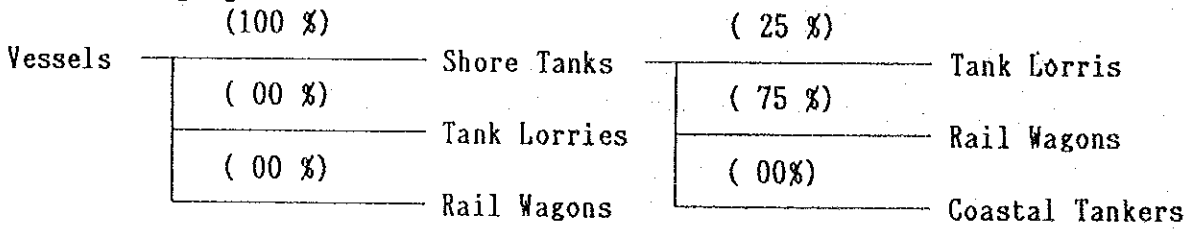


Fig. 6.4.2.(1).5 Present Cargo Flow in Port

Liquid Cargo in Bulk

(1) Discharging



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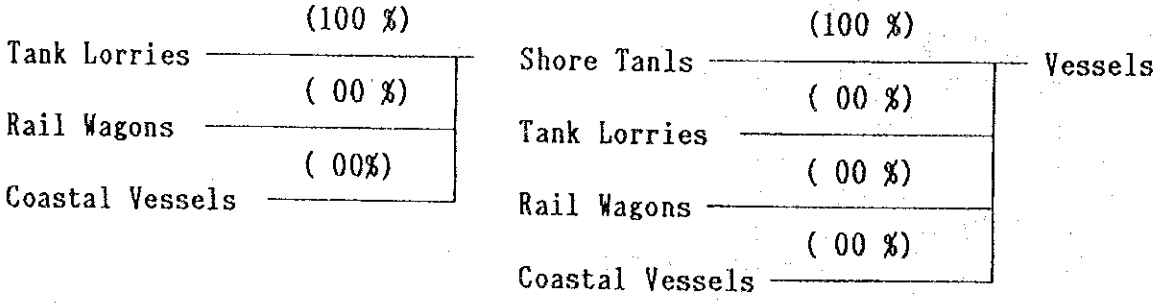


Source : The EPO

Fig. 6.4.2.(1).6 Present Cargo Flow in Port

(2) Conditions of Utilization at Each Berth

Table 6.4.2.(2).1 shows the conditions of utilization at each berth.

1) General cargo berths

The average number of ships moored annually at each berth is 25, the average ship size is 7,563 DWT, the average volume of cargoes handled per ship is about 2,370 tons, and the average mooring time per ship is 154 hours.

Fig. 6.4.2.(2).1 shows the distribution of number of ships according to length of time from entry to berthing. Fig. 6.4.2.(2).2 shows the distribution of number of ships according to mooring time. The number of ships requiring less than three hours from entry into the port until berthing represent 41% of the total. While, the number of ships that took more than three hours represented 59%. It can be presumed from these figures that waiting has already started in the case of general cargo vessels.

2) Cereals berth

The number of ships moored annually at Quay No.12 is 38, the average ship size is about 30,500 DWT, the average volume of cargoes handled per ship is about 15,316 tons and average mooring time per ship is 224 hours. Quay No.12 installed with specialized cargo handling equipment which handles about 70% of total cereals, and remaining 30% is directly dumped to trucks.

According to Fig. 6.4.2.(2).3, it can be said that cereals berth is already being use to the full extent of its capacity.

3) Petroleum berth

The number of ships moored annually at Quay No.17, Berth No. 21 is 95, the average ship size is about 7,930 DWT (however, 5,000-6,000 DWT class is 61% of total number of petroleum carriers), the average volume of cargoes handled per ship is about 5,313 tons, the average mooring time per ship is 64 hours and the average waiting time per ship is about 5 hours.

According to the mentioned above, the mooring capacity of Berth No.21 has already reached its limit.

Table 6.4.2.(2).1 Conditions of Utilization at Each Berth

Type	Name of Quay	Name of Berth	Quay Length	Water Depth	Ship Size (dwt)			Volume of Cargo Handled (tons)				Waiting Time (hours)		Mooring Time (hours)		Cargo Volume per Quay Length (t/m)	Cargo Handling Productivity (t/hr.)	Berth Occupancy Ratio (%)
					No. of Ships	Total	Average /ship	Unloaded	Loaded	Total	Average /ship	Total	Average /ship	Total	Average /ship			
Non-commercial	2	1	112.5	8.00														
		2	112.5	8.00														
	Sub-total		225.0		4	50,771	12,693	3,385	0	3,385	841	122	31	1,459	365	15	2.3	16.7
G.Cargoes	3	3	130.0	9.15	38	316,010	18,594	78,353	352	78,705	2,624	1,003	33	6,032	201	685	13.0	68.9
		4	130.0	9.15	19	87,320	4,596	23,980	348	24,326	1,280	562	30	2,935	154	187	8.3	33.5
		5	130.0	9.15	28	177,243	8,862	58,832	271	59,103	2,955	879	44	3,880	194	455	15.2	44.4
	Sub-total		390.0		69	580,573	8,414	161,165	969	162,134	2,350	2,444	35	12,856	186	416	12.6	48.9
Car Ferry	9	6	130.0	7.00	130	1,759,029	13,531	13,589	541	14,130	109	211	2	4,767	37	109	3.0	54.4
G.Cargoes		7	130.0	8.20	5	18,545	3,709	7,044	0	7,044	1,409	245	49	873	175	54	8.1	18.8
	Sub-total		260.0		135	1,777,574	13,167	20,633	541	21,174	157	456	3	5,640	42	81	3.8	32.2
G.Cargoes	10	8	140.0	8.60	39	361,389	9,264	41,667	91	41,758	1,068	1,051	27	5,533	142	298	7.5	63.2
G.Cargoes	11	9	120.0	9.20	56	247,569	4,421	51,511	2,578	54,187	968	634	11	5,432	97	452	10.0	62.8
		10	120.0	7.60	21	66,494	3,166	26,486	139	26,625	1,267	388	18	4,529	216	222	5.9	51.7
	Sub-total		240.0		77	314,063	4,079	78,077	2,715	80,792	1,049	1,022	13	9,961	129	337	8.1	56.9
G.Cargoes	12	11	50.0	7.50	16	164,456	10,279	81,650	0	81,650	5,103	1,586	99	3,227	202	1633	25.3	36.8
Cereals		12	370.0	12.00	38	1,159,018	30,500	582,019	0	582,019	15,316	7,687	202	8,493	224	1573	68.5	97.8
	Sub-total		420.0		54	1,323,474	24,509	663,669	0	663,669	12,290	9,253	171	11,720	217	1580	56.6	66.9
G.Cargoes	13	14	110.0	7.50	58	298,221	5,004	95,374	4,623	99,997	1,724	1,891	33	6,896	119	909	14.5	78.7
		15	110.0	9.00	33	122,649	3,717	37,925	121	38,046	1,153	777	24	4,699	142	346	8.1	53.6
	Sub-total		220.0		91	412,870	4,537	133,299	4,744	138,043	1,517	2,668	29	11,595	127	627	11.8	66.2
G.Cargoes	14	16	200.0	10.00	38	491,743	12,941	123,956	2,700	126,656	3,333	1,149	30	6,811	179	633	18.8	77.8
G.Cargoes	15	17	190.0	12.00														
		18	190.0	9.00														
	Sub-total		380.0		19	94,447	4,971	25,545	1,245	26,790	1,410	786	41	2,636	139	71	10.2	38.1
G.Cargoes	16	19	120.0	8.00	29	88,297	4,015	26,158	282	26,440	1,322	339	17	2,569	128	220	10.3	29.3
G.Cargoes	17	20	172.5	9.00	55	177,434	3,226	45,315	934	46,249	841	815	15	5,582	101	268	8.3	63.7
Petroleum		21	172.5	10.50	95	753,336	7,930	504,006	684	504,690	5,313	488	5	6,084	64	2926	83.0	69.5
	Sub-total		245.0		150	930,770	6,205	549,321	1,618	550,939	3,673	1,303	9	11,666	78	2249	47.2	66.6
G.Cargoes	18	22	138.0	12.00	97	382,735	10,344	76,178	1,426	77,604	2,097	1,396	38	6,716	182	597	11.6	78.7
G.Cargoes	19	23	110.0	10.50	17	401,248	23,603	207,997	0	207,997	12,235	155	9	2,791	164	1891	74.5	31.9
		24	120.0	10.50	3	40,412	13,471	26,763	0	26,763	8,921	15	5	1,574	525	223	17.8	18.8
		25	120.0	9.00	12	126,169	10,514	17,219	337	17,556	1,463	87	7	645	54	146	27.2	7.4
	Sub-total		350.0		32	567,829	17,745	251,979	337	252,316	7,885	257	8	5,011	157	721	50.4	19.1
G.Cargoes &	26	26	100.0	8.50	12	38,035	3,170	9,784	249	10,033	838	451	38	1,237	103	100	8.1	14.1
Veg. Oil		27	100.0	8.50	43	233,049	5,420	77,897	3,982	80,979	1,883	786	18	4,539	106	818	17.8	51.8
	Sub-total		200.0		55	271,084	4,929	86,881	4,131	91,012	1,655	1,237	22	5,776	105	455	15.8	33.8
G.Cargoes	21	28	133.0	9.00	11	115,614	10,456	59,789	0	59,789	5,435	490	45	2,212	201	450	27.0	25.3
Cereals		29	133.0	10.00	11	354,377	32,216	138,424	0	138,424	12,584	1,680	153	2,633	239	1041	52.6	38.1
Cereals		30	133.0	12.00	16	474,371	29,648	165,368	0	165,368	10,336	2,146	134	4,140	259	1243	39.9	47.3
	Sub-total		399.0		38	943,762	24,836	363,581	0	363,581	9,568	4,316	114	8,985	236	911	40.5	34.2
G. Cargoes	22	31	150.0	12.00	13	137,988	10,614	74,587	0	74,587	5,737	132	10	2,782	212	497	27.9	31.5
G. Cargoes	23	32	148.0	11.00														
		33	60.2	9.00														
	Sub-total		208.0		24	282,913	11,788	108,618	2,301	110,919	4,622	1,091	45	6,452	269	555	17.2	73.7
G. Cargoes	Total	22 berths	2,916		558	4,228,169	7,583	1,304,671	17,953	1,322,624	2,378	15,982	28	86,832	154	454	15.4	44.6
	Grand Total		4,369		896			2,818,133	23,880	2,833,199								

Souce: This table was made based on EPO's data by Team

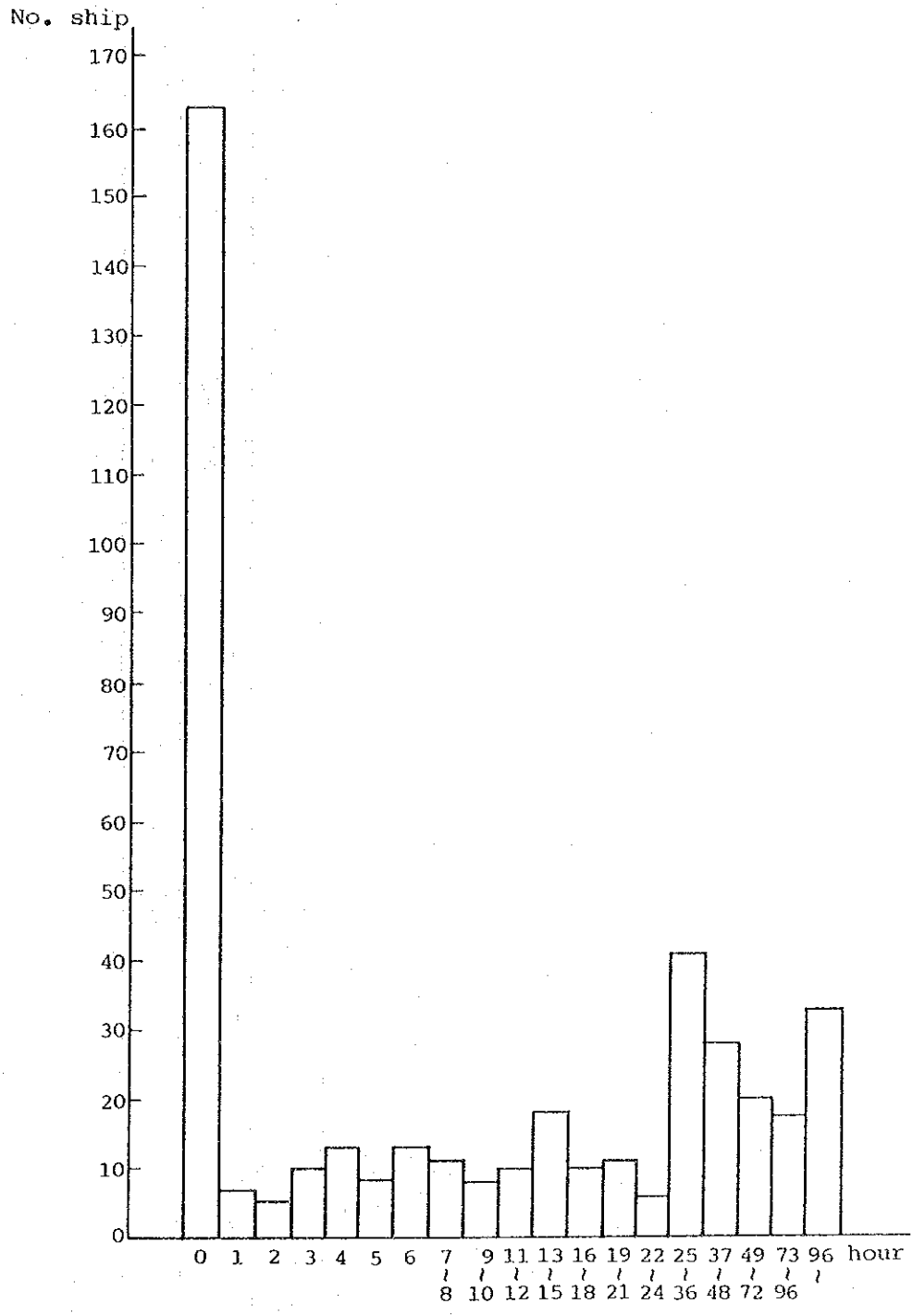


Fig. 6.4.2.(2).1 Elapsed Time between Ship's Arrival and Berthing (general cargo vessel)

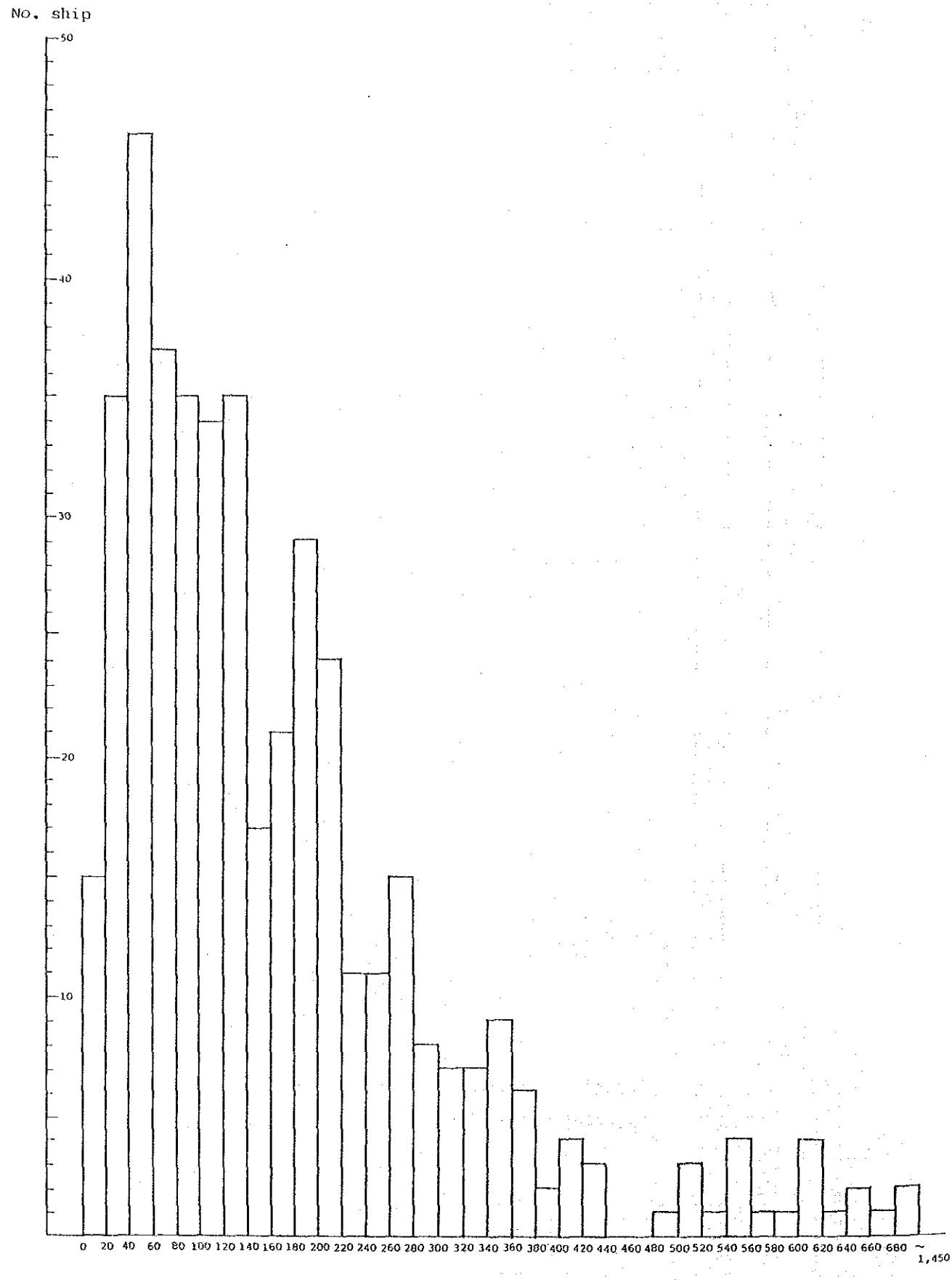


Fig. 6.4.2.(2).2 Berthing Time of General Cargo Vessels

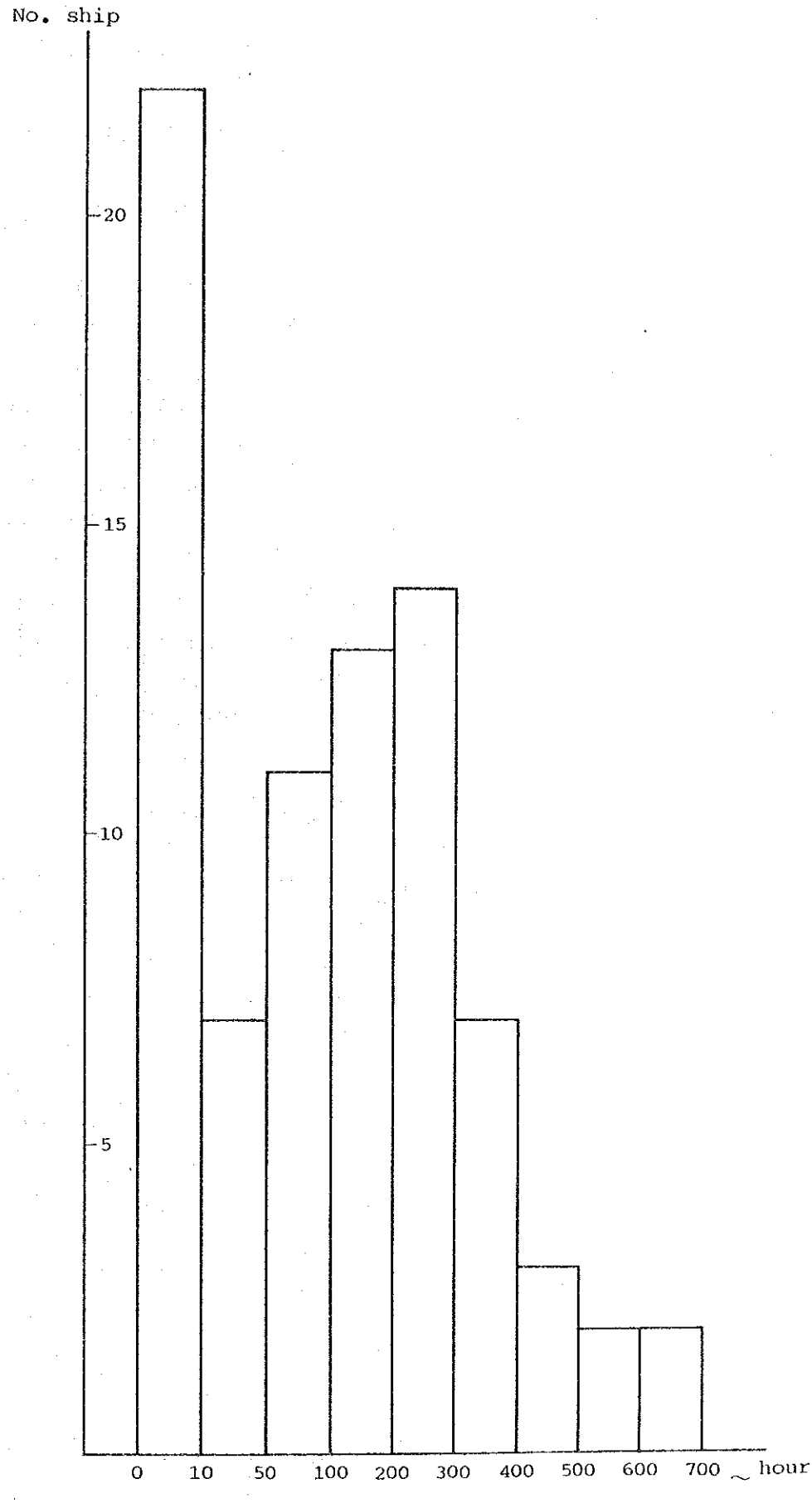


Fig. 6.4.2.(2).3 Elapsed Time between Ship's Arrival and Berthing
(cereals vessel)

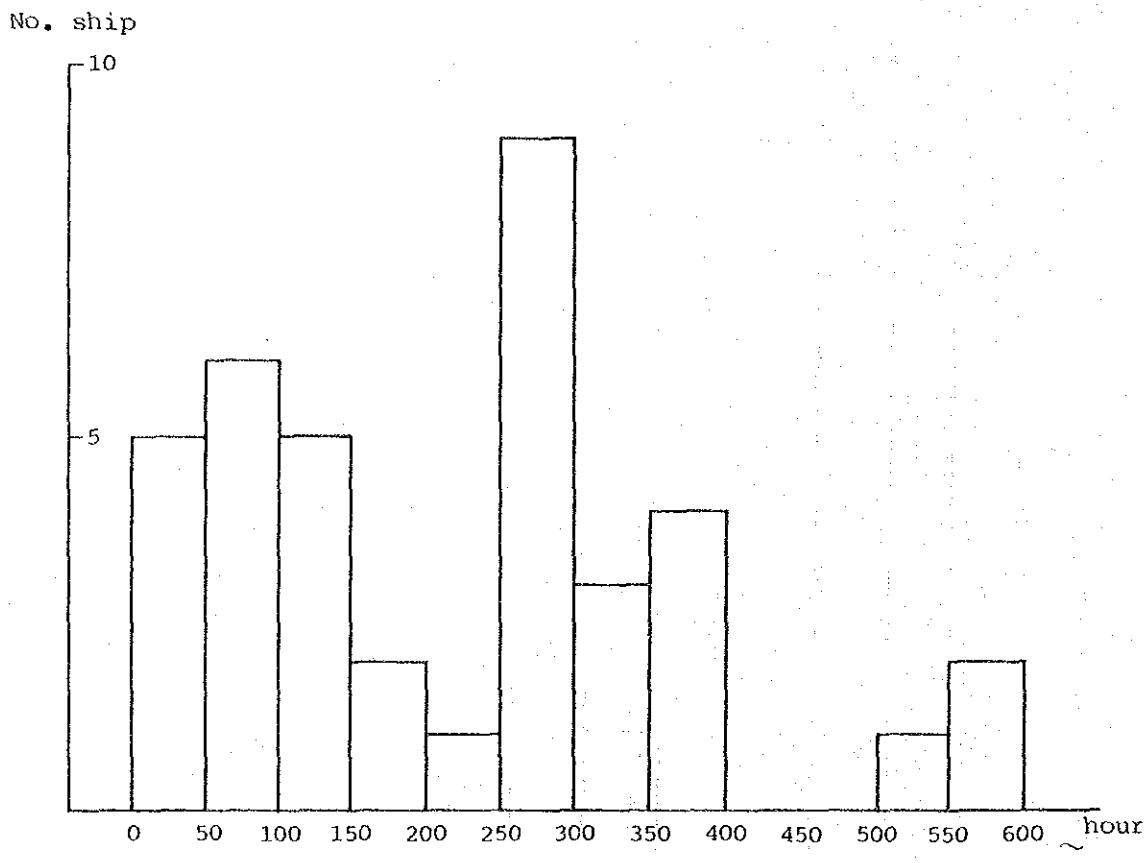


Fig. 6.4.2.(2).4 Berthing Time of Cereals Vessels

6.4.3 Storage Condition

(1) Storage Condition

a) General Cargo

Almost all of the general cargoes discharged from vessels, except for directly delivery cargoes, are transferred immediately to open yards by forklifts and stacked in tiers in blocks per type of package and per lot of cargo for smooth delivery from the Port. Some cargoes are placed in apron, but these cargoes are scheduled to be shortly brought out from the port.

b) Container

Containers discharged from vessels are planned to be transferred and stored in the container yards. However, the containers are often stacked once in open spaces in aprons, and then the containers are transferred from the berth apron to the container yards by forklifts and/or trucks, when the traffic within the port area is not so crowded, e.g. on Friday. The full load containers are stacked in 2 tiers in a line per consignee or per shipping company, and empty containers are stacked in 3 tiers in blocks.

c) Trailer

Trailers and vehicles transported by RO-RO vessels are stored in a group in a open yard.

(2) Dwelling Time within the Port

The dwelling time in storage facilities is as indicated in Table 6.4.3.(2).1.

Table 6.4.3.(2).1 Average Dwelling Time at the Storage Facilities

Unit : Days

Major commodities	Transit shed	Open yard	Silo	Tank	Peaking factor
General cargo	15 - 30	15 - 30			
Container	15 - 30	15 - 30			
Wagon trailers	15 - 20	15 - 20			
Cereals			0 - 7		
Cement	10 - 15	10 - 15			
Wood	10 - 15	10 - 15			
Petroleum	10 - 15	10 - 15			
Chenical products	10 - 15	10 - 15			

Source : EPO

6.4.4 Access to the Hinterland

There are three roads that enter to the port, and the three national roads (Route No.2, No.4 and No.11) are well connected to the port.

The railway connected to the national railway network enters the port and one station is set up in the port area. The port railway leads to Tlemcen, Saida and El Asnam.

6.5 Port Management and Operations

6.5.1 Organization Structure and Function

EPO has a authority to operate and administrate the Port of Oran such as berth allocation, pilotage, tugs, cargo handling, storage and delivery in the same way as other EPs.

Organization structure of the EPO is shown in Fig. 6.5.1 and the function of each department is almost same as EPAL's.

6.5.2 Employee Breakdown

Number of employees at the EPO is shown in table 6.5.1. In the table, employees are classified into three categories as follows:

Cardres : executives and middle managements
Maitrise : chief of workers
Execution : worker

EPO has been making effort to decrease its employees and the result is shown in table 6.5.2. Total number of employees is decreased by 27.7% from 1985 to 1990. This constant decrease has been achieved without dismissal of workers but by means of not filling up the vacancy of quit workers. Average annual wage/salary of the employee in each year is also shown in the table.

Table 6.5.2 Number of Employees of EPO 1985 - 1990

(persons, DA)

Employ/year	1985	1986	1987	1988	1989	1990
Number	2,181	2,136	2,012	1,608	1,593	1,577
Wage/Salary	52,564	56,138	58,201	74,434	99,278	102,147

The mandatory retirement age of the EPs is 60. The age structure of the EPO's employees is listed in Table 6.5.3 and Fig. 6.5.2.

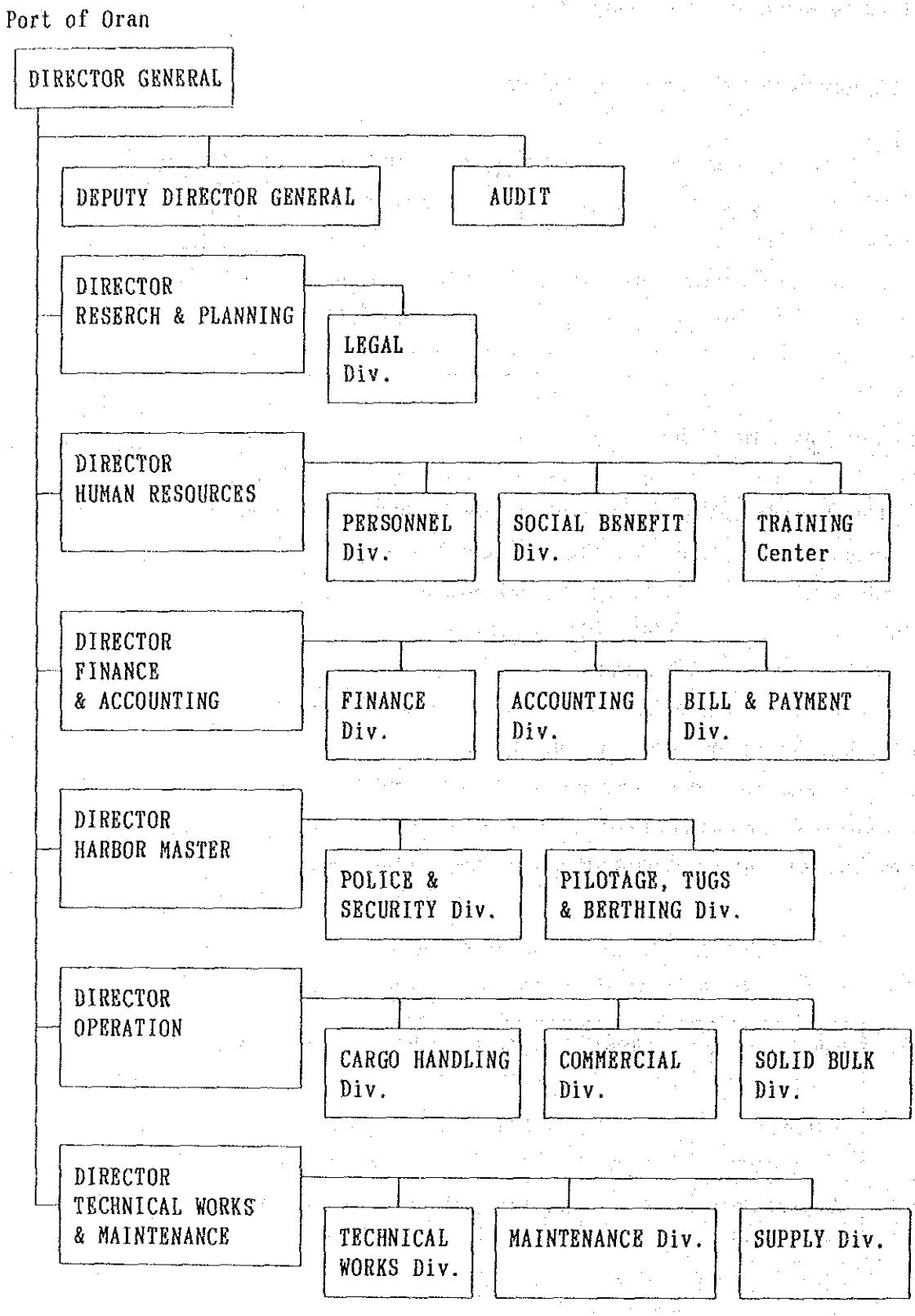


Fig. 6.5.1 Organization Chart

Table 6.5.1 Employee Breakdown of EPO

as on Sep. 1991

Dep./Class	Cadres	Maitrise	Execution	Total
DIRECTOR GENERAL	6	8	2	16
RESERCH & PLANNING	7	2	1	10
HARBOR MASTER	52	153	2	207
OPERATION	28	1,078	17	1,123
TECHNICAL WORKS & MAINTENANCE	12	58	6	76
FINANCE & ACCOUNTING	27	23	3	53
HUMAN RESOURCES	20	43	20	83
TOTAL	152	1,365	51	1,568

Table 6.5.3 Age Structure of EPO's Employee

age	20	21	22	23	24	25	26	27	28	29	total
number			1	2		2	4	8	6	9	32

age	30	31	32	33	34	35	36	37	38	39	total
number	19	19	12	21	33	45	42	72	68	103	434

age	40	41	42	43	44	45	46	47	48	49	total
number	82	67	64	67	67	50	49	54	67	53	620

age	50	51	52	53	54	55	56	57	58	59	total
number	48	62	57	63	56	57	70	65	3	1	482

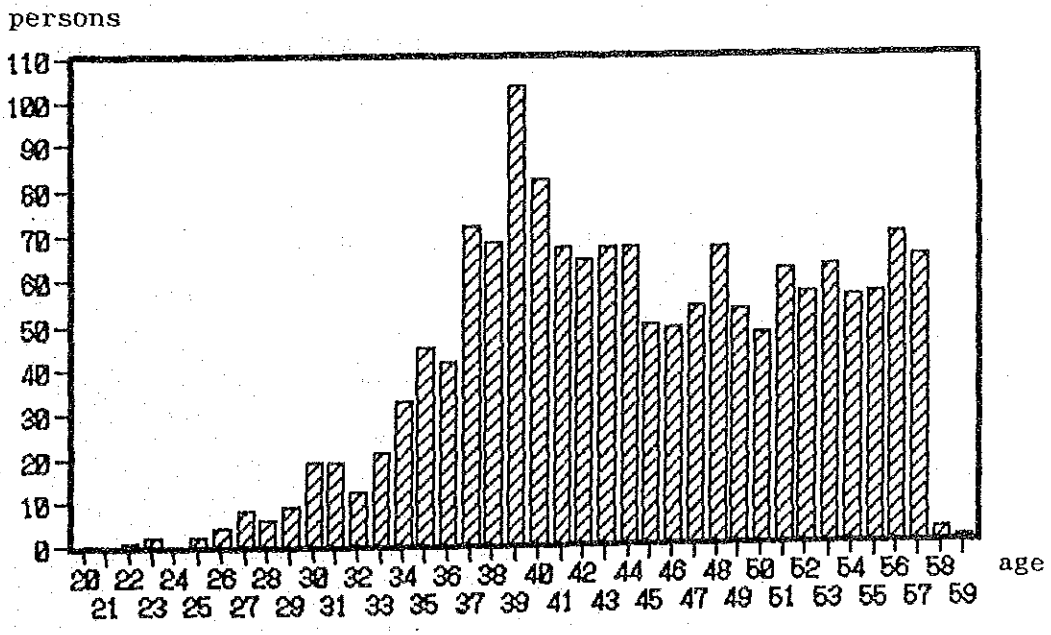


Fig. 6.5.2 Age Structure of EPO's Employee

6.5.3 Port Services Performance

Performance of the port Services in 1990, such as pilotage, tugs and water supply, are as follows.

(1) Pilotage

Number of persons in the section:	17 persons
Number of pilots:	9 persons
Pilot boats:	using exclusive boats
Number of crews on pilot boat including captain:	2 crews and 1 pilots
Total number of pilots who went out for service in last year:	1,482 persons
Purchased year and price of pilot boats:	Cued Fodda9 - 1978 500,000 DA 10 - 1981 421,930 Oued Ksob17 - 1974 545,000 21 - 1986 301,896
Average cost of fuel for a pilot boat at one service:	120 DA/h (3DA/Ltx40Lt/h)

(2) Tugs

Number of persons in the section:	87 persons
Average number of crews par boat including captain:	7 crews
Total number of tug boats which went out for service in last year:	1,835 persons

Purchased year of tug boats:	Cheliff5 - 1971 2,009,415 DA Rhumel2 - 1971 1,885,070 Isser4 - 1986 14,299,541
Average cost of fuel for a tug boat at one service:	660 DA (3DA/Ltx220Lt/h)

(3) Water supply

Number of persons in the section:	2 persons
Average number of persons par gang for water supply:	1 persons
Total number of ships which got the supply in last year:	376 ships
Actual service time:	8:00 - 17:00
Purchased price of water par m^3	5 DA

6.5.4 Financial Condition

(1) Income Statements

The EPO's Income Statements 1987-1990 are shown in Table 6.5.4. The table was prepared to check the amount of operating profit of the last four years. Every year's total revenue, total expense and net income -before tax are shown in the line chart of Fig. 6.5.3. Operating revenue, operating expense and operating profit are shown in Fig. 6.5.4.

The net income in 1989 and 1990 shows deficit but the operating profit got out of the deficit in 1990. The operation ratio in the each year was almost 1.0 or less than 1.0 except in 1989.

The number of employees and personnel expense in each year are shown by the line chart in Fig. 6.5.5. The trend, such as decrease of number of workers and increase of wages/salaries, is similar to the EPAL.

(2) Operation Revenue

The detail of EPO's operation revenue in 1990 is listed in Table 6.5.5. The percentages of four categories of revenue, such as maritime, cargo handling, storage charge and tax parafiscale, are shown in Fig. 6.5.6. Also, percentage of each major cargo is shown in Fig. 6.5.7. The table shows that the percentage of cargo handling and cargo storage revenue is about 74% of the total revenue.

Table 6.5.4 Port Enterprise of Oran - Income Statement 1987 - 1990

million DA

	1987	1988	1989	1990
Operating Revenue				
Operation	176.5	200.6	201.5	260.8
Other	0.7	0.7	0.1	0.2
Total Revenue	177.2	201.3	201.7	261.0
Operating Expenses				
Wages and salaries	95.4	99.2	122.7	123.8
Social Benefits	22.5	25.0	36.1	37.5
Subtotal staff costs	117.9	124.2	158.8	161.3
Depreciation	27.7	32.4	20.3	21.8
Maintenance and repaires	1.2	2.3	1.5	1.5
Materials and supplies	6.3	8.0	9.4	24.5
Insurance	1.1	1.3	1.3	1.3
Indirect taxation	22.2	25.9	26.6	32.2
Other	0.8	2.9	1.5	2.2
Subtotal	59.3	72.9	60.6	83.5
Total expense	177.2	197.1	219.3	244.9
Operating Profit	0.1	4.2	-17.7	16.1
Non-operating Revenue				
Financial	0.0	2.1	1.3	0.8
Other	7.7	19.4	1.0	6.9
Subtotal	7.7	21.5	2.3	7.8
Non-operating Expense				
Financial	4.7	13.0	9.1	15.0
Other	0.9	7.0	11.6	19.0
Subtotal	5.5	19.9	20.7	34.0
Net Income (before Tax)	2.3	5.8	-36.0	-10.1
Operating ratio	1.00	0.98	1.09	0.94
Working ratio	0.84	0.82	0.99	0.85
Staff cost as % of operating expenses	67	63	72	66

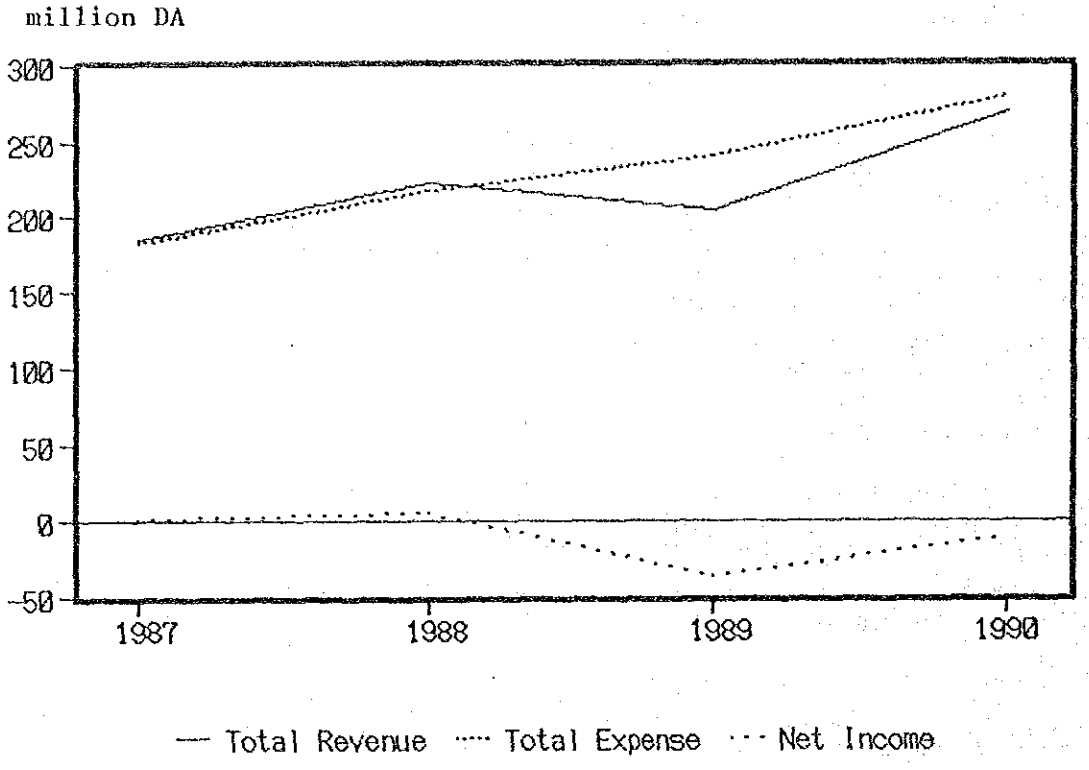


Fig. 6.5.3 Net Income (before tax)

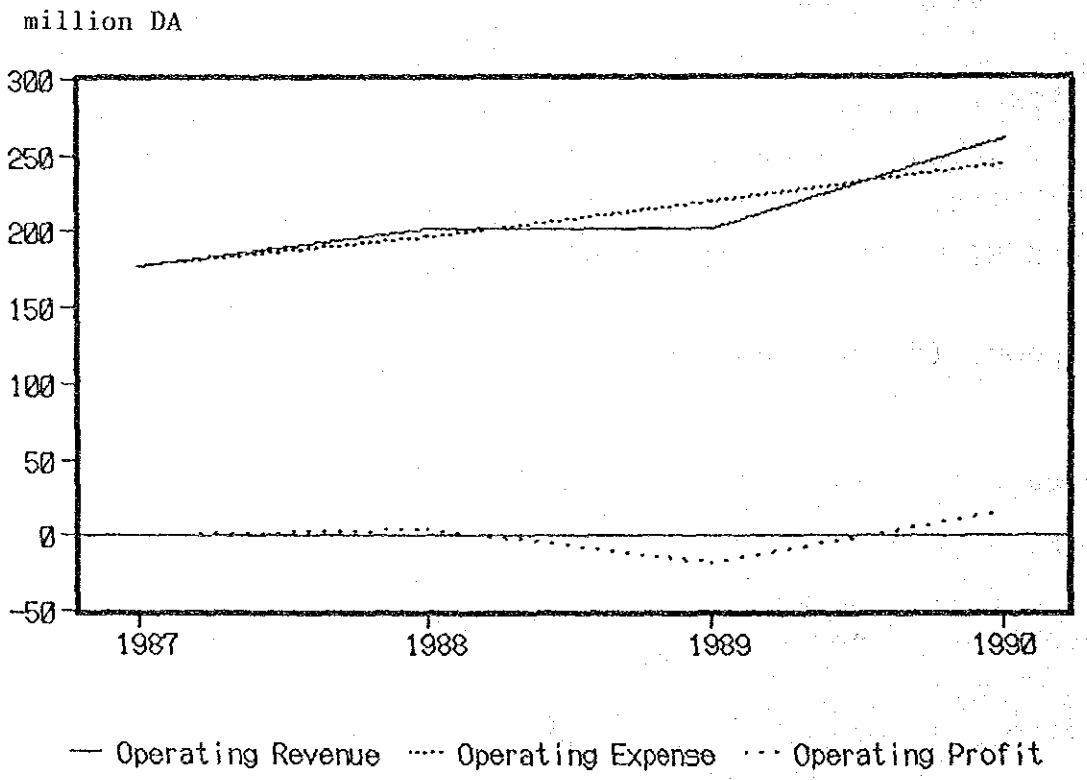


Fig. 6.5.4 Operation Profit

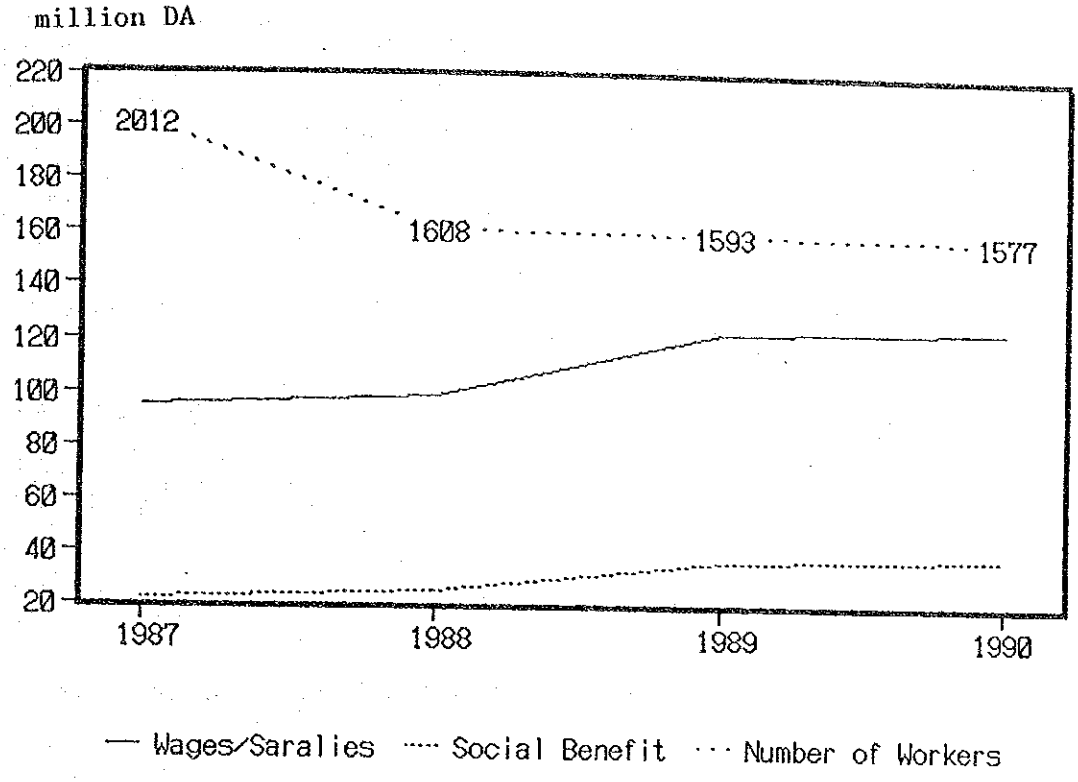


Fig. 6.5.5 Wages/Salaries

Table 6.5.5 EPO Operation Revenue in 1990

(DA)

Charge	Amount	Charge	Amount
Maritime		Cargo Hanling	
pilotage	3,122,466	unloading	50,104,973
tugs	10,979,466	unloading solid bulk	
berthing	3,598,960		15,234,032
tax for ships	2,624,273	loading	2,376,345
		equipments	33,730,773
Subtotal	20,225,165	cranes	4,285,950
		truck cranes	1,962,442
		extra charge	15,816,799
Cargo Storage		winch	8,855,763
transit tax	3,746,556		
depot tax	9,670,830	Subtotal	132,367,077
container stack	5,195,058		
silo for cereals	27,623,177		
guarding cargo	15,789,012	Tax Parafiscale	
		quay tax	11,954,474
Subtotal	61,924,633	traffic tax	10,814,284
Other Charge	23,556,822	Subtotal	22,768,758
Total Revenue	260,841,455		

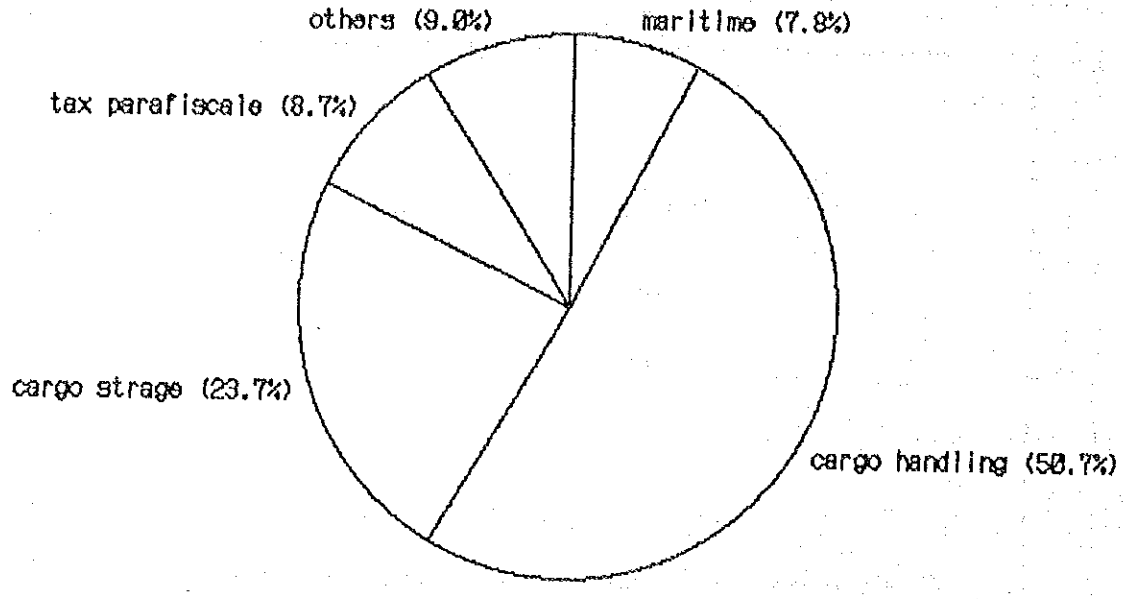


Fig. 6.5.6 Operation Revenue -1

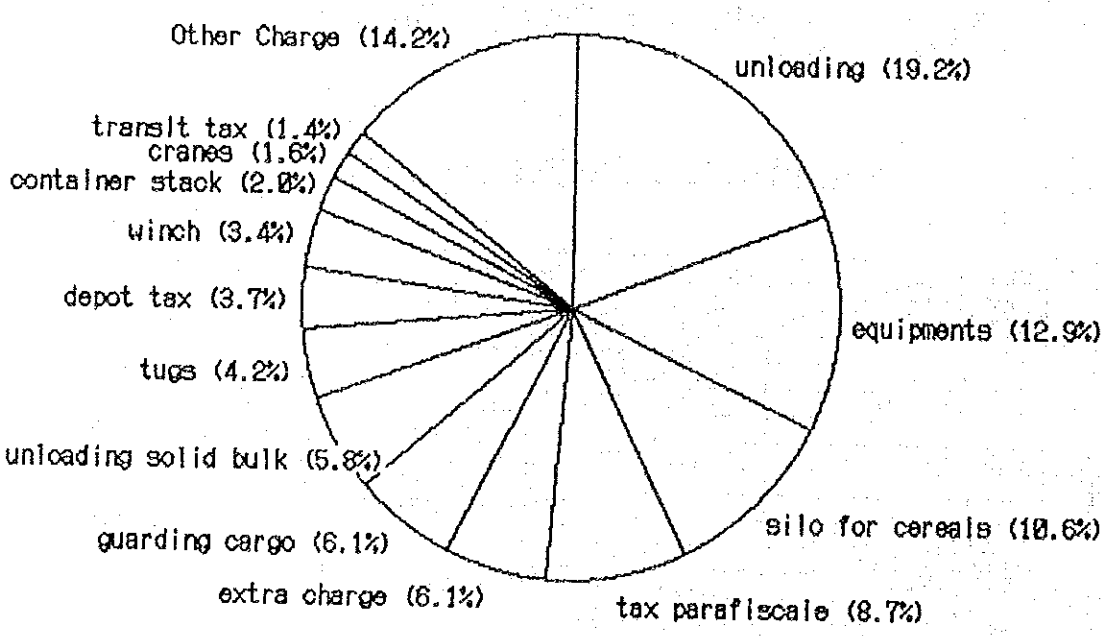


Fig. 6.5.7 Operation Revenue -2

6.6 Dredging Records

Dredging was carried out to remove the rock until -12 m at the basin of Mostaganem from 1981 to 1982, and the total dredging volume was 12,000 m^3.

6.7 Review of the Existing Plans

(1) Existing Plans

1) Medium and Long-Term Plan for the Development of the Oran Port

This development plan has been prepared by EPO and DTP of Oran considering the expected future cargo volume up to the 2000. The principal two items were examined and summarized as follows:

A) Evaluation of existing potential

The required equipments and facilities for each commodity have been proposed by EPO as follows:

a. General cargoes
- Renovation of mobile cranes (3)
- 2 cranes of 6 tons on Quay No.15
- 2 cranes of 8 tons on Quay No.20

b. Cereals
- Rehabilitation of the silo equipments
- Renewal of truck scale
- Renewal of 2300-m-long railway
- Acquisition of truck scale
- Acquisition of gantry cranes

c. Animalfeed
- An electric quay crane of 20 tons with hopper hook
- Installation of a truck scale

B) Realization of new facilities

The required infrastructure for the port development plan toward 2000 is as follows:

a. Cereal terminal
- Surface: 1 ha (including 80,000 tons silo, railways, roads etc.)
- Berth length: 300 m (minimum depth of -14.0 m)

b. Container terminal
- Surface: 9 ha
- Berth length: 300 m (minimum depth of -14.0 m)

c. Alumina project
- Surface: 1 ha (vicinity of the DTM workshop)
- Berth length: 200 m (-12.0 m to -14.0 m deep)

2) A New Container Terminal Project Financed by the World Bank

This project (Container Port Development), to be implemented during the period 1989-1994, includes the development of specialized container handling facilities in the three main ports of Algiers, Annaba and Oran.

The specific items for the Oran port are as follows:

A) Civil Works

a. Paving of 6 ha on the existing berth

b. Strengthening of a quay wall with tie rods

B) Equipments

a. Four 35 ton forklifts with spreaders

b. One 10 ton forklift with spreader

The DTP of Oran has already finished tender procedures for the above civil works, and the EPO has made budget planning for the period of 1991-1995 to purchase the necessary equipment.

CHAPTER 7 THE PORT OF ANNABA

7.1 Port Facilities

The port of Annaba is situated on the eastern seaboard and is the foremost foreign trade port in Algeria. Furthermore, the port functions not only as a commercial port but also as an industrial port where steel and fertilizer industries are located in and around the port.

The port area has 95 ha of water area and 70 ha of land area. The harbor basins are sheltered by two breakwaters as shown in Fig. 7.1.1. The water area of the port has a minimum depth of 4.0 m and a maximum depth of 12.5 m.

There are 22 berths with a total length of 3,785 m and one specialized petroleum products berth (No.26) at the northern breakwater. There is one approach channel.

7.1.1 Infrastructures and Superstructures

(1) Outer Facilities

The protective facilities consist of northern and southern breakwaters, the lengths of which are 980 m and 400 m respectively.

(2) Berthing Facilities

The berthing facilities are as indicated in Table 7.1.1.1.

The berthing facilities in this port are divided into two categories; specialized use and common use. Specialized use represents concession berths placed at the disposal of some companies. There are nine berths which are classified as concession berths; the following is a list of the companies which use these berths and the cargoes that are handled there:

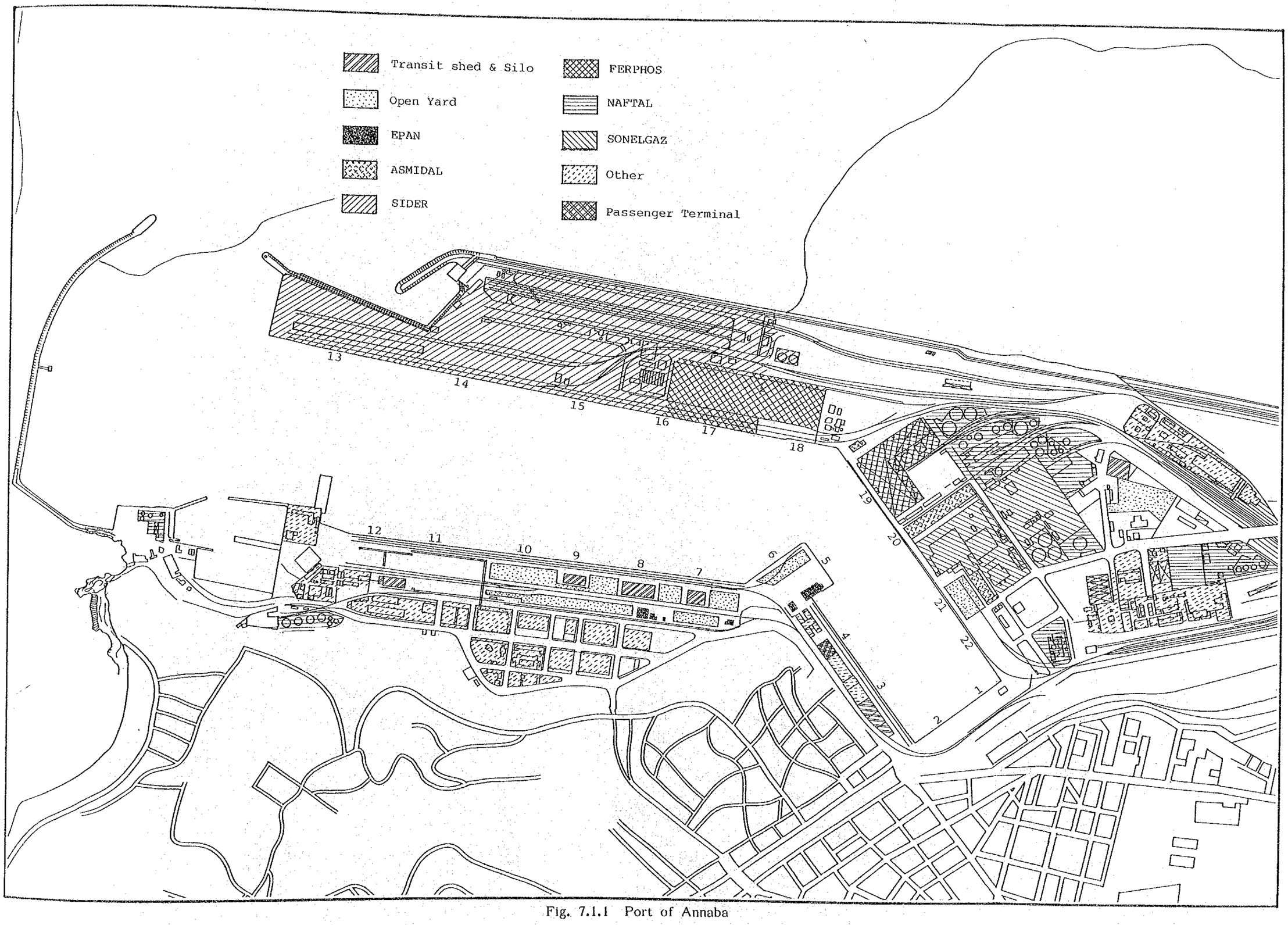


Fig. 7.1.1 Port of Annaba

Table 7.1.1 Berthing Facilities at the Port of Annaba

ANBTFA1

Name of Quay	Berth No.	Basin	Length (m)	Water depth (m)	Structure type	Year of completion
1						
	7	Gde Darse	165.0	9.80	Concrete block on pile type	1957
	8	Gde Darse	145.0	9.80	〃	1957
	9	Gde Darse	145.0	9.80	〃	1957
	10	Gde Darse	145.0	9.80	〃	1953
	11	Gde Darse	145.0	11.00	〃	1953
	12	Gde Darse	155.0	11.00	〃	1953
2						
	3	Pte Darse	180.0	7.00	Concrete block on pile type	1952
	4	Pte Darse	220.0	9.80	〃	1952
3						
	1	Pte Darse	130.0	4.00	Concrete block type	1875
	2	Pte Darse	110.0	4.00	〃	1875
4						
	19	Gde Darse	220.0	9.50	Steel sheet pile type	1976
	20	Pte Darse	135.0	8.00	〃	1976
	21	Pte Darse	130.0	7.50	〃	1918
	22	Pte Darse	140.0	7.00	Concrete block type	1918
5						
	13	Gde Darse	320.0	12.50	Concrete block on pile type	1981
	14	Gde Darse	380.0	9.75	〃	1981
	15	Gde Darse	250.0	9.75	〃	1987
	16	Gde Darse	155.0	12.50	Steel sheet pile type	1987
	17	Gde Darse	130.0	12.50	〃	1985
	18	Gde Darse	125.0	12.50	〃	1985
Mole Cigogne						
	5	Gde Darse	100.0	5.00	Concrete block type	1875
	6	Gde Darse	160.0	6.20	〃	1875
North Jetty	26	Avant-Port		12.80		1967

Source : EPAn

No.13	Coal	SIDER
No.14-15	Metallic Products	SIDER
No.16	Iron Ore	FERPHOS
No.17	Mineral	FERPHOS
No.18	Ammonia, Tar, Petroleum	ASMIDAL, SIDER, NAFTAL
No.19	Phosphate	FERPHOS
No.20	Sulphur, Potash	ASMIDAL
No.26	Petroleum Products	NAFTAL

The present condition of mooring facilities in this port is as follows;

1) Berths No.1, No.2 (Quay No.3) and No.3 are located at the far end of the basin that is temporarily being used by fishing boats. A new container terminal is planned at Quay No.3 by the World Bank finance.

2) Berth No.4 is located in front of the customs house which is used mainly by ferry boats embarking for Marseilles.

The water near No.5 is shallow and is used mainly for the mooring of service vessels.

3) Berths No.6 and No.7 are used for general cargo vessel. The apron of No.6 has only a limited width.

4) Berths No.8, No.9 and No.10 are used for general cargo vessel.

5) Berth No.11 handles imported vegetable oil and raw sugar. A bulk sugar warehouse is located at the back of the port area and connected with overhead belt lines.

6) Berth No.12 handles imported grain, and can receive a 30,000 DWT vessel. Handling capacity of the silo is 16,000 tons.

7) Berth No.13 is used for imported coal, and has a water depth of -12.5m. Imported coal is sent to the steel mill at El Hadjar for making coke which is occasionally exported when the products exceed domestic demand. Behind the coal storage berth, there is a cooling water inlet for ASMIDAL.

8) Berths No.14 and No.15 have a total quay length of 580 m and having

water depths of -9.75 m are used for the import and export of steel products.

9) Berths No.16 and No.17 have a total quay length of 285 m and a water depth of -12.5m.

Iron ore exportation ceased in 1985 in order to supply the steel mill at El Hadjar exclusively.

10) Berth No.18 is used for fuel oil supplies to coastal ships and for exporting asphalt and ammonia as a conventional berth to handle several kinds of commodities.

11) Berth No.19 has a total quay length of 220 m and a water depth of -9.5 m and is used for the export of phosphate ore.

12) Berth No.20 is used for imported potash and sulphur. A part of the space behind the berth is occupied by a power station. A cooling water inlet is located at the far end of the South Quay.

13) Berth No.21 and No.22 are owned and operated by the EPAn. They are located in the vicinity of berth No.1 and used for bagged fertilizer (No.21) and bitumen (No.22).

(3) Storage Facilities

The Port has 7,000 m^2 of transit sheds, 82,000 m^2 of open storage yards and a cereal silo with capacity of 16,000 tons as handling and storage facilities.

The transit sheds and open storage yards are as indicated in Table 7.1.1.(3).1.

Table 7.1.1(3).1 Transit Sheds and Open Storage Yards

As of November 1991

Name	Position	Area (m2)	
Transit shed	Quay No.1	1,010	
	Quay No.1	1,348	
	Quay No.1	1,005	
	Quay No.2	2,107	
	Quay No.2	883	
	Quay No.2	634	
	Sub-total	6,987	
	Quay No.4	1,625	Customs
	Quay No.4	975	ASMIDAL
	Quay No.5	32,085	FERPHOS
	Quay No.4	4,300	ASMIDAL
	Quay No.1	3,620	SUCRE
	Sub-total	42,605	
	Total	49,592	
Open storage	Quay No.4	13,200	
	Quay No.4	17,950	
	Mole Cigogne	3,520	
	Quay No.1	32,000	
	Quay No.4	15,600	Container yard
	Sub-total	82,270	
	Quay No.5	25,122	FERPHOS
	Quay No.5	21,400	SIDER
	Quay No.5	34,000	SIDER
	Sub-total	80,522	
	Total	162,792	

Source : EPAn

7.1.2 Gargo Handling Facility

(1) General

The E.P.AN has 140 cargo handling equipments, such as quay cranes, mobile cranes, unloaders, fork-lifts and others as shown in the table 7.1.2.1.

Table 7.1.2.1 Number of Cargo Handling Equipments by Purchase Year at E.P.AN

Year	Quay Crane	Mobile Crane	Unloa-der	Fork-Lift	Bucket Loader	Traile Truck	Others	Total	Remarks
1949	8							8	
1954	6							6	
1970		2					12	14	
1971						1		1	
1973				1				1	
1978						1		1	
1979	2				1		1	4	
1980				4				4	
1981		1		74	3			77	
1982									
1983						1		1	
1984			2			1	2	5	
1985		1				2		3	
1986			1			1		2	
1987									
1988				4				4	
1989		1			2		2	5	
1990									
1991					4			4	
Tital	16	4	3	83	10	7	17	140	

(2) Quay Crane, Mobile Crane and Unloader

Some quay cranes of the Annaba port were installed in 1948. Eight quay cranes have been used for 44 years, 6 quay cranes for 38 years and 2 quay cranes for 13 years. Because of their age corrosion is observed in every part including the main structure of the equipments whose effective capacity is about

25% lower than that of the nominal capacity accoding to the result of the loading test.

Table 7.1.2.1 Working Condition of Cargo Handling Facilities at E.P.AN

Name of Equipment	Rated Capacity	Year	Maker	Quay	No. Machine	Operat Condition			Used Year
						Good	Norm	Bad	
Quay Crane	3ton / 22m	1948	STOTHERT &	N2	4	1		3	44
	3ton / 22m	1948	STOTHERT &	N4	4			4	44
	6ton / 22m	1954	CAILLARD	N1	6	6			38
	5t/32m.10t/18m	1979	STOTHERT &	N1	2	2			16
	Total				16	9		7	
Mobile Crane	25 ton 3m	1970	RICHIER		2	1		1	
	20 ton 12m	1980	DEMARG		1	1			
	40 ton 3m	1981	KATO		1	1			
	120 ton 3m	1985	KATO		1	1			
	Total				5	4		1	
Grain Unloader	400 t/h Screw	1984	VIGAN	N1	1	1			
	200 t/h Pneum	1984	VIGAN	N1	1	1			
	100 t/h Bucket	1986	DEMAG	N1	1	1			
	Total				3	3		1	

(3) Fork-Lift

The E.P.AN has 83 fork-lifts (purchased mainly in 1980) whose capacity varies from 3 to 36 tons. Compared with other Algerian ports, the fork-lifts are used and mainteined comparatively in good conditions at Annaba port.

The operating condition for the fork-lift are shows in the table 7.1.2.3.

Table 7.1.2.3 Operation Condition of the Fork-Lifts at E.P.AN

Maker	Total		Loading Capacity(ton)										Remarks
	No.	%	3	4	5	6	7	8	10	18	28	36	
ENMTP	4	5	4										
TOYOTA	74	87	4	28	17		5	8	12				
HYSTER	4	5								3	1		
LANCERBOSS	1	1									1		
CLARK	2	2										2	
Total	85	100	8	28	17		5	8	12	3	2	2	
Under Operation	71	84	3	23	17		4	8	11	3	1	1	
Under Repair	14	16	5	5			1		1		1	1	

(4) Maintenance system

The organization of Direction des Travaux et Maintenance (D.T.M) is shown in the figure 7.1.2.1.

The D.T.M mainly consists of three services for cargo handling facilities, the first is infrastructure maintenance, the second is handling equipment repair and maintenance, and the thierd is special facility operation and maintenance.

In these services, the infrastructure maintenance sevice is in charge of civil and building structural maintenance, the handling equipment service is in charge of maintenance and repair for all kind of cranes and fork-lifts, and the special service is in charge of grain unloading and storage facility including unlocaders, conveyors, bucket elevators and silo.

Moreover, the handling equipment repair and maintenace service consits of three maintenance sections, in charge of fork-lifts, cranes, and other equipments.

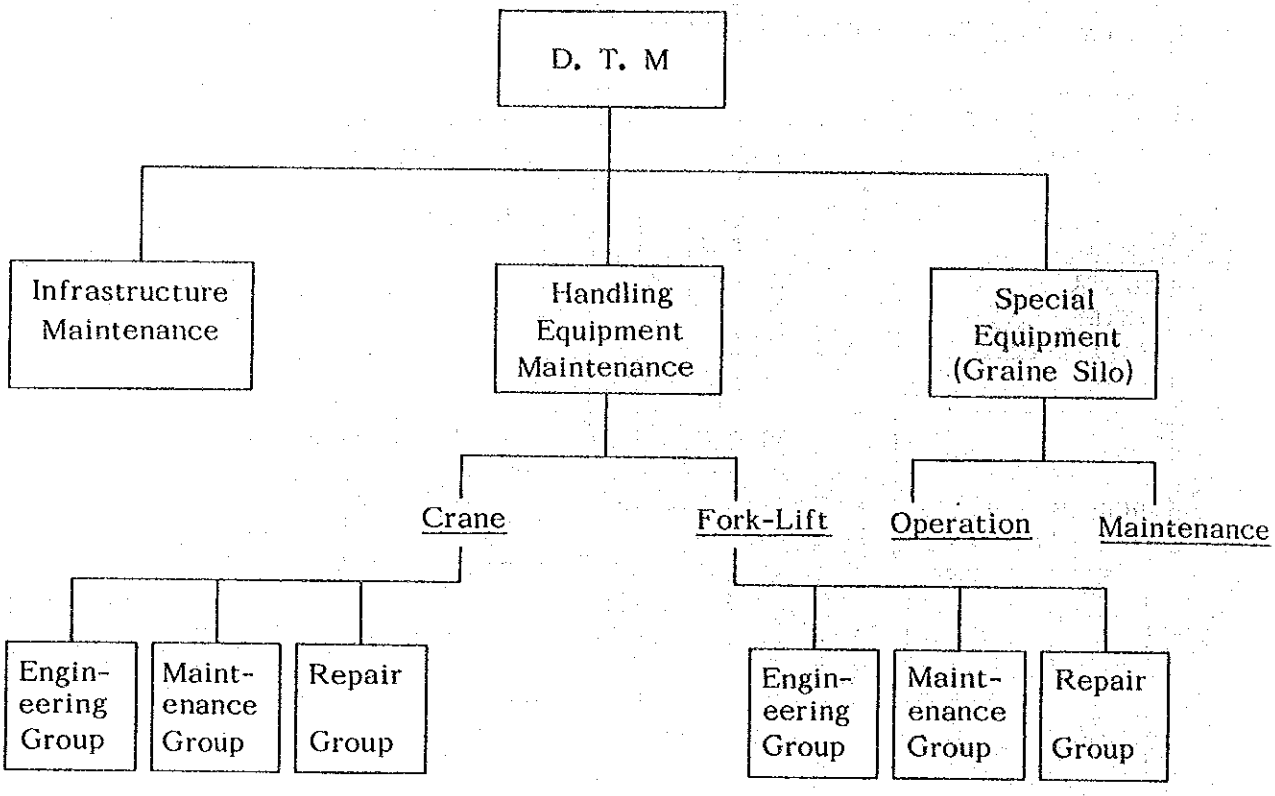


Fig 7.1.2.1 Organization chart of the direction of maintenance

7.1.3 Port Services and Utilities

The Port offers services for ships such as; pilotage, tugs, stevedores. water and oil supply and garbage disposal etc.

(1) Small Craft

The Port has two pilotboats and three tugboats.

The capacity and dimension of each tugboat is as follows;

	(i)	(ii)	(iii)
Horse power:	1,300	1,500	3,400
Length (m):	21.86	26.0	35.0
Width (m):	7.0	7.62	10.5
Draught (m):	3.5	2.82	5.0
Built :	1971	1971	1983

(2) Water and Oil Supply Facilities

Fresh water is supplied by barge and the fuel is supplied by pipeline at Quay No.18.

7.1.4 Superannuation of Port Facilities

The port of Annaba has a double character (commercial and industrial) and its history dates back to 1875. The capacity of the quay walls in the commercial port has been remarkably increased aiming at the mooring of larger type vessels (from 3,000 D/W type to 20,000 D/W type).

The construction of 11 buildings and warehouses were carried out during the period from 1937 to 1965 in a compatible manner with the increase of the quay walls' capacity.

Regarding the degree of superannuation, we judge that the port facilities are less superannuated both in the physical aging aspect and in the adaptability to the traffic renovation. The port of Annaba continues its growth utilizing the available port space with a maximum efficiency.

7.2 Port Related Industries

7.2.1 Factories Located in the Port

There is a power station of SONELGAZ behind berth No.20. The fertilizer factory of ASMIDAL is situated at out side of the port on the southern seaboard two kilometers from the port.

7.2.2 Major Industries related to the Port Traffic in the Hinterland

Major industries related to the port traffic (importation of raw materials and shipment of products) are as follows.

(1) Mining Industry

* The name of company: ENTREPRISE NATIONALE DU FER ET DU PHOS PHATE (FERPHOS)
* Iron mines: Ouenza, Boukhadra (3.5 million tons per year)
  Almost of all iron ore are consumed in El Hadjar ironworks.
* Phosphate mines: Djebel Onng, El Kouif (1.5 million tons per year)
* Volume of imports and exports in recent 5 years are shown in Table 7.2.2.1.

(2) Steelmaking Industry

* The name of company: ENTREPRISE NATIONALE DE SIDERUR (SIDER)
* Ironworks: El Hadjar (Productive capacity is 2 million tons per year)
* Volume of imports and exports in recent 5 years are shown in Table 7.2.2.1.

(3) Fertilizer Industry

* The name of company: ENTREPRISE NATIONALE DES ENGRAIS ET PRODUITS PHYTOSANITAIRES (ASMIDAL)
* Productive capacity of Annaba factory:
  Fertilizer 500,000 tons per year, Ammonia 330,000 tons per year
* Volume of imports and exports in recent 5 years are shown in Table 7.2.2.1.

Table 7.2.2.1 Volume of imports and exports (Major industries)

U: 1000tons

		1986	1987	1988	1989	1990
FERPHOS						
Phosphate	Export	837	847	906	879	747
Iron ore	Export	48	13	22	19	18
SIDER						
Coal	Import, Export	1,175	1,432	1,345	1,125	930
Metal products	Import, Export	417	603	617	451	407
Tar	Export	10	37	30	31	12
Scrap	Export	39	49	56	41	-
ASMIDAL						
Sulfur	Import	126	93	102	87	75
Potassuim	Import	87	109	67	40	66
Sulfuric acid	Import	-	14	32	-	26
Fertilizer	Export	44	67	72	127	44
Ammonia	Export	94	98	103	61	91

Source: E.P.AN.

7.3 Cargo Traffic through the Port

7.3.1 Handling Volume and Commodities

The Port of Annaba is playing an important role as a sea born cargo distribution terminal serving the eastern region of Algeria with the cities of Annaba and Constantine in its center. At the same time, the port has a character as an industrial port serving port-oriented industries in the vicinity such as a steelmaking industry and a fertilizer industry for importation of raw and intermediate materials and shipment of manufactured products.

Port traffic in 1990 was 4.33 million tons of which 3.12 million tons were unloaded and 1.21 million tons were loaded. The share of loaded cargo in total traffic is larger than at the ports of Algiers and Oran as port of Annaba has been characterized as a loading port for manufactured products.

The port was not only important commercially, witnessing general cargo traffic of 0.73 million tons which accounted for 9% of total general cargo traffic of the nation, but it was also the nation's principal industrial port with 3.04 million tons of solid bulk cargo traffic accounting for 39% of the nationwide solid bulk cargo traffic (excluding hydrocarbon related traffic).

The movement of cargo traffic in the past decade is shown in Table 7.3.1. The total port traffic increased 2%-7% during 1986-1988, and recorded its peak in 1988 as a result of the surprising increase in the volume of imported cereals. But in 1989 and 1990, it fell about 10% in each year.

Cargo traffic by category of commodity are shown in Table 7.3.2. General cargo consists mainly of loading of metal products and solid bulk cargo includes coal, cereals, raw sugar (unloading), phosphate and fertilizer (loading). The cargo volume of agricultural products (cereals and so on) continued to increase and recorded a peak of 1,030,419 tons in 1988, an increase of 74% from 1987. Also it still remained high level of about one million tons in 1989 and 1990. Liquid bulk cargo traffic of 565,188 tons consisted mainly of the unloading of refined petroleum products.

Containerization of general cargo was still in the primitive stage and the volume of container cargo remained at a low level of 17,557 tons in 1990, with a ratio of container cargo to general cargo is only 2.4% (As shown in Table 7.3.3).

Table 7.3.1 The movement of cargo traffic (Port of Annaba)

Unloaded U: tons

	Liquid bulk	Solid bulk	G.cargo	Total
1981	586,300	1,246,921	1,474,283	3,307,504
1982	546,208	1,601,865	1,499,838	3,647,911
1983	588,520	1,407,339	1,589,211	3,585,070
1984	595,227	1,694,657	1,696,531	3,986,415
1985	625,635	1,766,313	1,402,652	3,794,600
1986	620,503	1,785,668	1,223,052	3,629,223
1987	571,283	2,191,075	684,944	3,447,302
1988	503,764	2,545,434	627,651	3,676,849
1989	512,937	2,192,774	622,128	3,327,839
1990	478,841	2,020,581	622,508	3,121,930

Loaded

	Liquid bulk	Solid bulk	G.cargo	Total
1981	17,674	2,257,560	242,270	2,517,504
1982	36,654	2,214,102	148,953	2,399,709
1983	29,865	2,002,518	148,367	2,180,750
1984	27,431	1,641,786	323,057	1,992,274
1985	21,224	981,202	249,251	1,251,677
1986	42,702	970,505	303,727	1,316,934
1987	76,684	1,044,288	483,663	1,604,635
1988	129,109	1,147,181	455,329	1,731,619
1989	60,866	1,062,086	352,570	1,475,522
1990	86,347	1,021,401	104,335	1,212,083

Total

	Liquid bulk	Solid bulk	G.cargo	Total
1981	603,974	3,504,481	1,716,553	5,825,008
1982	582,862	3,815,967	1,648,791	6,047,620
1983	618,385	3,409,857	1,737,578	5,765,820
1984	622,658	3,336,443	2,019,588	5,978,689
1985	646,859	2,747,515	1,651,903	5,046,277
1986	663,205	2,756,173	1,526,779	4,946,157
1987	647,967	3,235,363	1,168,607	5,051,937
1988	632,873	3,692,615	1,082,980	5,408,468
1989	573,803	3,254,860	974,698	4,803,361
1990	565,188	3,041,982	726,843	4,334,013

Source: E.P.AN, ANNUAIRE STATISTIQUES 1981-1990

The movement of cargo traffic

U: million tons (Port of Annaba)

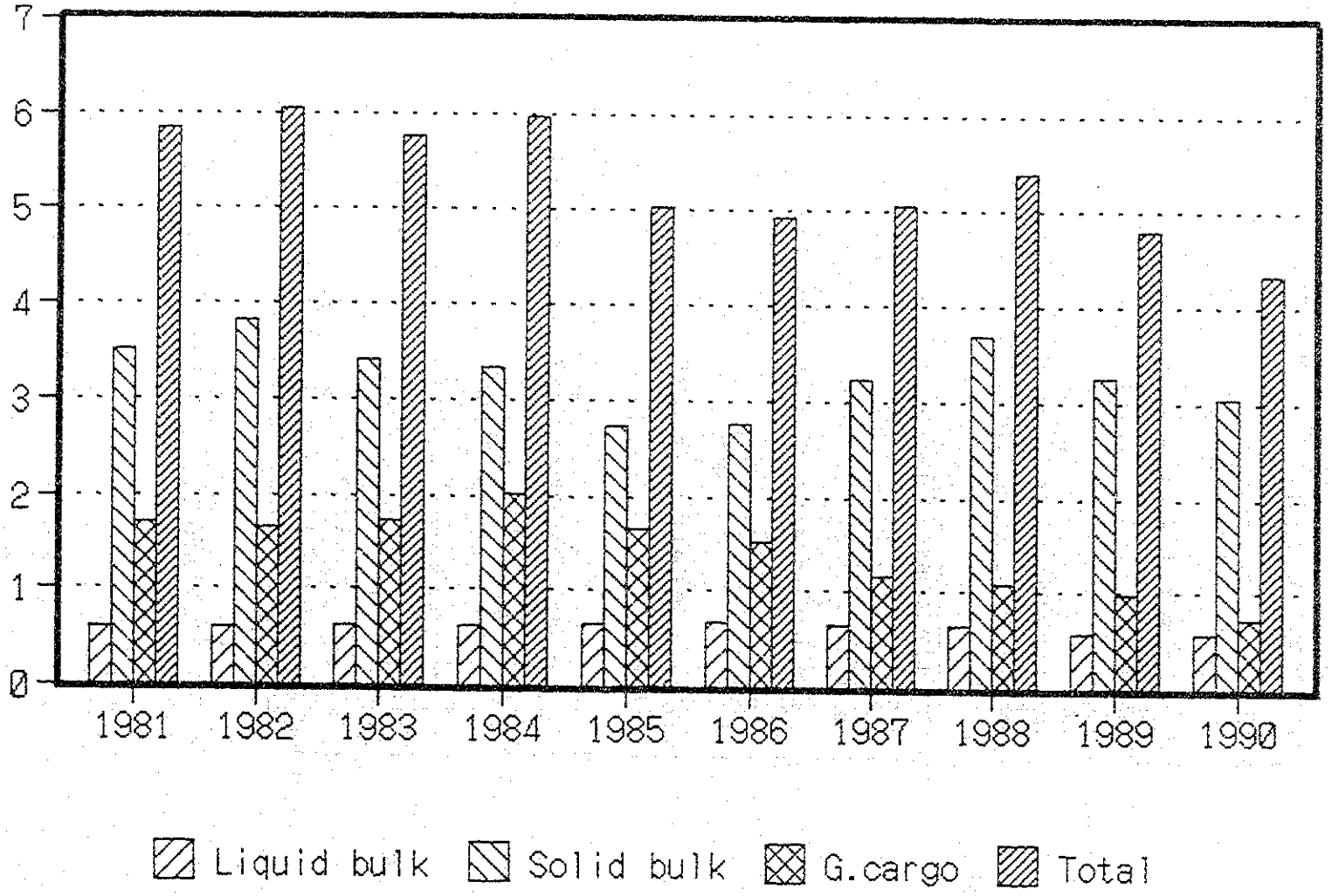


Table 7.3.2 Cargo traffic by category of commodity 1985 - 1990

(Port of Annaba)

U: Tons

		AGRICULTURAL PRODUCT	FOODSTUFF	COMBUSTIBLE MINERAL	PETROLEUM PRODUCT	METALLURGICAL SCRAP	METAL PRODUCTS	CONSTRUCTION METERI.	FERTILIZERS	CHEMICAL PRODUCT	OTHERS	TOTAL
1985	UNLOAD	466,593	382,474	1,130,624	577,134		238,137	602,721	97,498	72,140	227,349	3,794,670
	LOAD	232		41,357		11,205	336,500		825,147	21,461	15,775	1,251,677
	TOTAL	466,825	382,474	1,171,981	577,134	11,205	574,637	602,721	922,645	93,601	243,124	5,046,347
	%	9%	8%	23%	11%	0%	11%	12%	18%	2%	5%	100%
1986	UNLOAD	452,460	373,790	1,170,171	585,695		127,492	630,746	97,784	68,330	121,765	3,629,233
	LOAD	388		5,247		49,213	329,051		869,972	42,768	20,295	1,316,934
	TOTAL	452,848	373,790	1,175,418	585,695	49,213	456,543	630,746	967,756	112,098	142,060	4,946,167
	%	9%	8%	24%	12%	1%	9%	13%	20%	2%	3%	100%
1987	UNLOAD	591,464	397,141	1,396,529	521,087		83,078	195,545	119,989	63,989	78,480	3,447,302
	LOAD	188		34,578	40,065	62,976	517,547		903,369	36,722	9,230	1,604,675
	TOTAL	591,652	397,141	1,431,107	561,152	62,976	600,625	195,545	1,023,358	100,711	87,710	5,051,977
	%	12%	8%	28%	11%	1%	12%	4%	20%	2%	2%	100%
1988	UNLOAD	1,030,389	435,808	1,318,036	430,206		105,911	128,832	67,106	79,320	81,241	3,676,849
	LOAD	30		27,406	99,570	77,646	510,740	4,789	976,851	29,866	4,721	1,731,619
	TOTAL	1,030,419	435,808	1,345,442	529,776	77,646	616,651	133,621	1,043,957	109,186	85,962	5,408,468
	%	19%	8%	25%	10%	1%	11%	2%	19%	2%	2%	100%
1989	UNLOAD	966,632	372,709	1,107,667	469,418		136,390	110,229	40,345	48,804	75,645	3,327,839
	LOAD			17,498	30,087	60,149	316,909	7,690	1,005,813	30,870	6,506	1,475,522
	TOTAL	966,632	372,709	1,125,165	499,505	60,149	453,299	117,919	1,046,158	79,674	82,151	4,803,361
	%	20%	8%	23%	10%	1%	9%	2%	22%	2%	2%	100%
1990	UNLOAD	971,525	393,859	926,227	441,362		102,676	102,377	65,875	48,315	69,714	3,121,930
	LOAD			3,091	74,933	18,513	303,794	2,152	791,088	11,735	6,777	1,212,083
	TOTAL	971,525	393,859	929,318	516,295	18,513	406,470	104,529	856,963	60,050	76,491	4,334,013
	%	22%	9%	21%	12%	0%	9%	2%	20%	1%	2%	100%

Source: E.P.AN, ANNAIRE STATISTIQUES 1985-1990

Table 7.3.3.1 Container Traffic (Port of Annaba)

	ENTRY			DEPARTURE			TOTAL		
	1988	1989	1990	1988	1989	1990	1988	1989	1990
NUMBER	822	774	1,116	795	710	1,046	1,617	1,484	2,162
FULL	822	774	1,116	5	20	86	827	794	1,202
EMPTY				790	690	960	790	690	960
TONNAGE	10,544	10,373	14,166	1,835	1,962	3,391	12,379	12,335	17,557
NET	8,575	8,519	11,489	96	258	883	8,671	8,777	12,372
CONTAINER	1,969	1,854	2,677	1,739	1,704	2,508	3,708	3,558	5,185
N.T./NUM.	10.43	11.01	10.29	19.20	12.90	10.27	10.48	11.05	10.29

Source: E.P.AN, ANNUAIRE STATISTIQUES 1988-1990

Table 7.3.3.2 Movement of containerization (Port of Annaba)

		1982	1983	1984	1985	1986	1987	1988	1989	1990
Container Traffic	Number	13,903	20,131	14,960	14,734	14,801	11,360	12,032	10,324	9,336
	Tonnage(1)	55,164	70,688	113,720	117,391	118,177	85,084	94,512	84,767	71,025
General Cargo(2)		1,470,625	1,543,765	1,412,034	1,105,516	979,859	833,413	873,940	938,233	833,786
(1)/(2)		3.8%	4.6%	8.1%	10.6%	12.1%	10.2%	10.8%	9.0%	8.5%

Source: E.P.OR, ANNUAIRE STATISTIQUES 1982-1990

7.3.2 Trading Counterparts by region

Trading Counterparts by regions is as shown in Table 7.3.4. The share of West Europe is about 35% of the total cargo traffic and it consists mainly of unloaded cereals, foodstuffs, construction materials and manufactured products as well as loaded fertilizer and metal products. North America accounts for about 26% of the total cargo traffic and it includes unloaded cereals and coal.

7.3.3 Passenger Traffic

As shown in Table 7.3.5, passenger traffic has been fluctuating in recent years. It hit a record low in 1987. However, since 1988 it had been recovered and reached a peak of 51,001 in 1989, but again it has decreased to 24,144 in 1990.

Table 7.3.4 Trading Counterparts by regions 1985 - 1990

(Port of Annaba)

U:tons

		DOMESTIC COAST	MEDITERRAN NATIONS	WEST,EAST AFRICA	EAST EUROPE	WEST EUROPE	NORTH AMERICA	SOUTH AMERICA	ASIA	OTHERS	TOTAL
1985	UNLOAD	590,979	115,893	5,081	289,125	1,289,632	1,088,599	150,708	92,412	172,241	3,794,670
	LOAD	59,036	59,651		471,713	506,085	18,134		23,998	113,060	1,251,677
	TOTAL	650,015	175,544	5,081	760,838	1,795,717	1,106,733	150,708	116,410	285,301	5,046,347
	%	13%	3%	0%	15%	36%	22%	3%	2%	6%	100%
1986	UNLOAD	586,631	57,480	4,931	203,030	1,155,858	1,387,749	196,886	36,101	567	3,629,233
	LOAD	84,830	32,722		505,762	615,832	10,215	15,246	52,327		1,316,934
	TOTAL	671,461	90,202	4,931	708,792	1,771,690	1,397,964	212,132	88,428	567	4,946,167
	%	14%	2%	0%	14%	36%	28%	4%	2%	0%	100%
1987	UNLOAD	572,136	49,472	2,019	307,628	756,250	1,629,109	60,729	65,228	4,731	3,447,302
	LOAD	22,373	93,145		447,295	753,418	21,606		266,738		1,604,575
	TOTAL	594,509	142,617	2,019	754,923	1,509,668	1,650,715	60,729	331,966	4,731	5,051,877
	%	12%	3%	0%	15%	30%	33%	1%	7%	0%	100%
1988	UNLOAD	464,390	38,872	947	238,036	708,507	2,103,082	94,674	28,341		3,676,849
	LOAD	16,944	132,015	10,252	582,980	706,761	60,364		155,997	66,306	1,731,619
	TOTAL	481,334	170,887	11,199	821,016	1,415,268	2,163,446	94,674	184,338	66,306	5,408,468
	%	9%	3%	0%	15%	26%	40%	2%	3%	1%	100%
1989	UNLOAD	462,079	55,993	1,142	251,313	766,212	1,358,024	103,823	212,465	116,788	3,327,839
	LOAD	8,317	34,074		534,920	718,885	19,602	7,026	152,698		1,475,522
	TOTAL	470,396	90,067	1,142	786,233	1,485,097	1,377,626	110,849	365,163	116,788	4,803,361
	%	10%	2%	0%	16%	31%	29%	2%	8%	2%	100%
1990	UNLOAD	455,255	42,551	2,483	159,628	867,440	1,105,592	110,716	88,175	290,090	3,121,930
	LOAD	208	80,554		381,364	663,586			86,371		1,212,083
	TOTAL	455,463	123,105	2,483	540,992	1,531,026	1,105,592	110,716	174,546	290,090	4,334,013
	%	11%	3%	0%	12%	35%	26%	3%	4%	7%	100%

Source: E.P.AN, ANNUAIRE STATISTIQUES 1985-1990

Table 7.3.5 Passenger Traffic (Port of Annaba)

	PASSENGER		
	DISEMBARK	EMBARK	TOTAL
1973	69		69
1974	13,195	12,400	25,595
1975	12,302	9,869	22,171
1976	20,390	15,369	35,759
1977	20,694	15,017	35,711
1978	21,097	15,841	36,938
1979	20,489	16,447	36,936
1980	23,681	21,225	44,906
1981	22,557	21,522	44,079
1982	22,557	19,727	42,284
1983	23,206	20,639	43,845
1984	22,961	23,172	46,133
1985	24,302	23,180	47,482
1986	11,251	9,395	20,646
1987	11,142	9,200	20,342
1988	21,631	20,309	41,940
1989	27,469	23,532	51,001
1990	14,132	10,012	24,144

Source: E.P.AN, ANNUAIRE STATISTIQUES 1990

MOT, ANALYSE DES PRINCIPAUX RESULTATS DU TRAFFIC

7.4 Port Activities

7.4.1 Calling Vessels at the Port

A total of 827 ships called at Annaba Port in 1990. Of these, 420 were general cargo vessels, 106 were mineral carriers, 108 were petroleum carriers, 70 were Ro-Ro ships, 30 were car ferries, 36 were cereals carrier, 8 were container vessels and 48 were other ships.

The distribution of ships according to their size is shown in Fig. 7.4.1.1. The size of general cargo vessels calling at the port was in the range of 1,000-40,000 DWT, while mineral carriers were 1,000-60,000 DWT, petroleum carriers were 1,000-7,000 DWT, Ro-Ro vessels were 2,000-50,000 DWT, car ferries were 4,000-12,000 DWT and cereals carriers were 10,000-30,000 DWT.

In terms of the handled volume of cargo at the port of Annaba, the general cargo vessels accounted for 28.6% of the total volume, mineral carriers were 37.6%, cereals carriers were 19.3% and petroleum carriers were 10.0%.

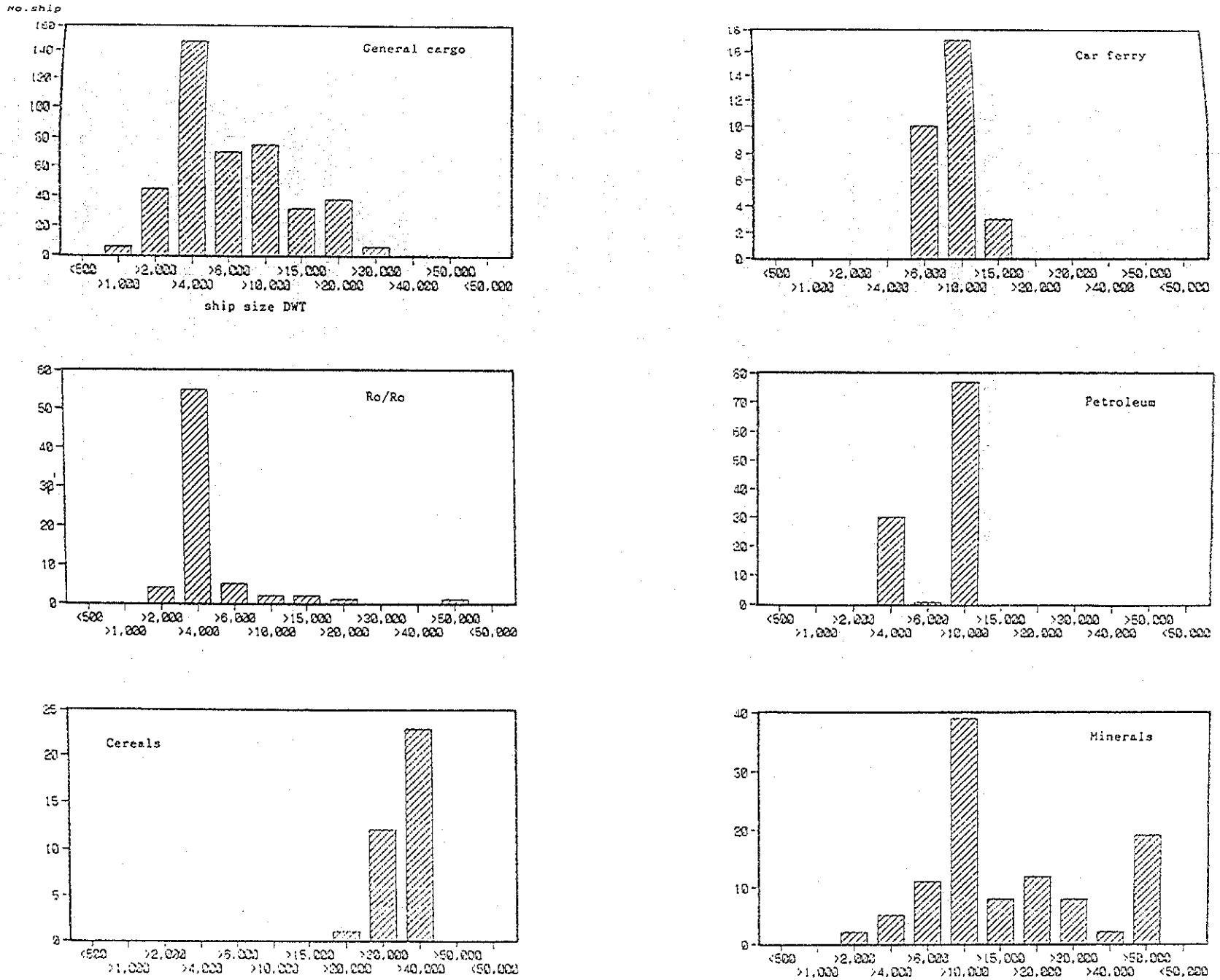


Fig. 7.4.1.1 Number of Ships by Ship Size

7.4.2 Cargo Handling System

(1) Cargo handling system

1) General Cargo

General cargo vessel laden with sacked cargo

The cargo handling work is done in a similar manner to the Port of Algiers. However, when it is waiting for trucks, the unloading is continued without awaiting trucks and cargoes are then stored in sheds.

General cargo vessel co-stowed with various kind of general cargo

The general cargoes are unloaded in a similar manner to other ports in study, and almost all of the unloaded cargoes are forwarded to open yards near berths and stacked per kind and per lot in a block.

The containers are unloaded by ship gears or mobile cranes and some unloaded containers are often placed on open yards near the berth, but most of unloaded containers are forwarded to the open yard designated for storage of containers near No.22 berth at No.4 quay by trucks or forklifts. Almost all of the containers are FCL cargoes and delivered by trucks without unpacking in the port.

Ro-Ro vessel

All of the cargoes, except some cargoes stowed on vessel's weather deck, are handled by means of horizontal cargo handling equipment such as forklifts and tractors through vessel's stern ramp way.

The unloaded cargoes including containers are handled in a similar manner to the general cargo vessel.

Present flow of general cargo, container and trailer are shown in Fig.7.4.2.(1).1,2,3 and 4.

2) Bulk solid cargo

Bulk solid cargoes carried by bulk carriers and handled at the port comprises of raw sugar, cereals, sulfur, potash, coal and coke which are imports, and iron ore, phosphate and pig iron for export. Sugar and cereals are handled by the EPAN and other cargoes are handled by other enterprises.

a) Raw sugar

The cargo is unloaded by means of quay cranes and/or ship gears with grab buckets, and directly put in storage facility through a belt conveyer system with hoppers traveled. The transportation from the port to sugar mill factory is carried out by rail wagons.

b) Cereals

The cargoes are unloaded by 2 units of unloading machines, one traveling screw type unloader and another rail-mounted traveling pneumatic unloader, and/or by means of ship gears with grab buckets at No.12 berth in No.1 quay. Most of unloaded cargoes are put into silo located behind No.12 berth through a belt conveyer system and some is directly unloaded to trucks by the pneumatic unloader and ship gears with grab buckets through portable hoppers. The transportation of the cargoes to hinterland is carried out by trucks and rail wagons.

In addition, when No.12 berth is occupied, No.17 berth at No.5 quay is used for unloading cereals. In this berth, the cargo is unloaded and directly loaded onto trucks by means of vessel gears with grab buckets and movable hoppers and delivered directly.

c) Sulfur and potash

These cargoes are handled at a berth and unloaded by means of one unit of gantry crane with grab bucket. The sulfur is directly landed onto trucks and forwarded from the port to the user's factory. The potash is transferred from quay to the storage facility within the port by belt conveyer system and then forwarded from the port to the user's factory by rail wagons.

d) Coal

The cargo is mainly carried by panamax bulk carriers and unloaded by means of two units of gantry cranes with grab buckets at No.13 berth in No.5 quay, and transferred from quay to storage yard within the port by belt conveyer systems, The forwarding from the port to user's factory is carried out by rail wagons.

e) Coke

The cargo is unloaded by means of two gantry cranes with grab buckets, and transferred from quay to storage yard by the same belt conveyer systems as handling of coal. The forwarding from the port to user's factory is carried out by rail wagons.

f) Iron ore

The cargo is transported to the port by rail wagons and stacked in storage yard by means of old transfer gantry crane. There is no loader with belt conveyer system at berth and the loading of the cargo into vessels for export is hardly done in reality.

g) Phosphate

The cargo is transported by rail wagons from the phosphate mine to the port and stored in the storage facility within the port and loaded by means of two units of traveling loader.

h) Coast Iron and Steel Goods

There is a storage yard in No.5 quay and various kinds of steel goods are also stacked there, and loaded onto vessels. Cast iron such as pig iron, etc. is loaded by quay cranes with magnetic handling equipment. And other steel goods are loaded by quay cranes or vessel gears as usual manner.

Present solid cargo flow is shown in Fig.7.4.2.(1).5.

3) Liquid cargo in bulk

There are 4 types of handling facilities for liquid cargo in bulk.

a) Tanker berth

The berth is managed and operated by the NAFTAL with piping system from the berth to shoe storage tanks and mainly used for handling of gas oil, gasoline, fuel oil transported by domestic coastal tankers. The cargoes are handled by piping systems connecting between ship pipes and shore lines.

b) Loading arms for ammonia

Liquefied ammonia is unloaded and loaded from/to vessels by two loading arms transferred from the berth to tanks in user's factory by pipelines, and vice versa.

c) Joining mouth of pipelines for bitumen and tar

There are two joining mouths of pipelines, one is at No.22 berth and used for unloading of bitumen from vessels. The cargo is unloaded through rubber hose connecting vessel's pipeline and mouth and transferred to storage tanks within the Port. The other one is at No.18 berth for loading of tar and the cargo is transferred from storage tanks near the berth through pipeline and loaded by a rubber hose.

Present cargo flow is shown in Fig.7.4.2.(1).6.

Annaba Port

Sacked Cargo

(1) Discharging

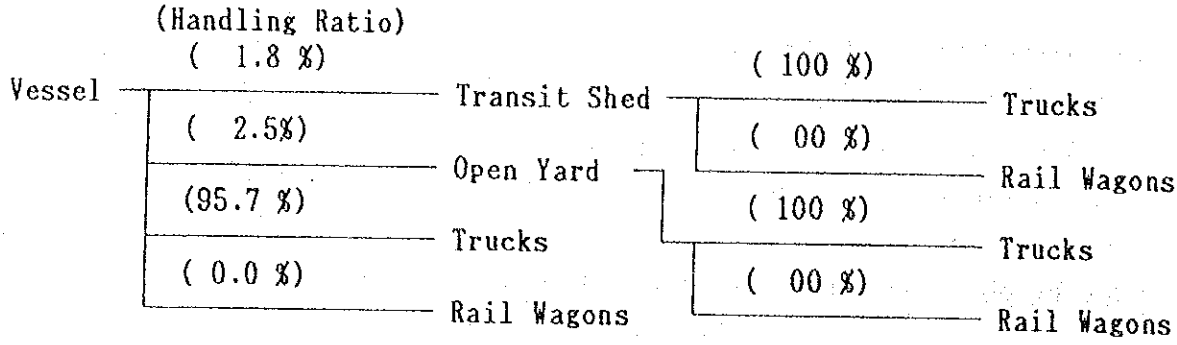
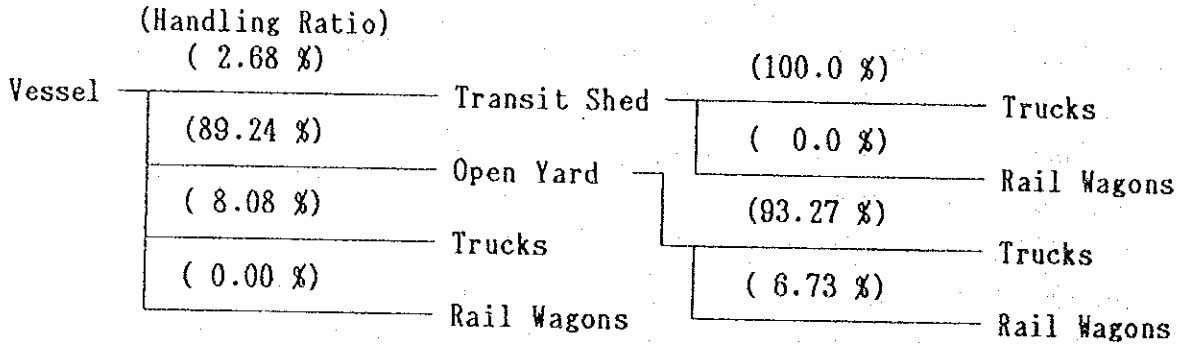


Fig. 7.4.2.(1).1 Present Cargo Flow in Port

General Cargo

(1) Discharging



(2) Loading

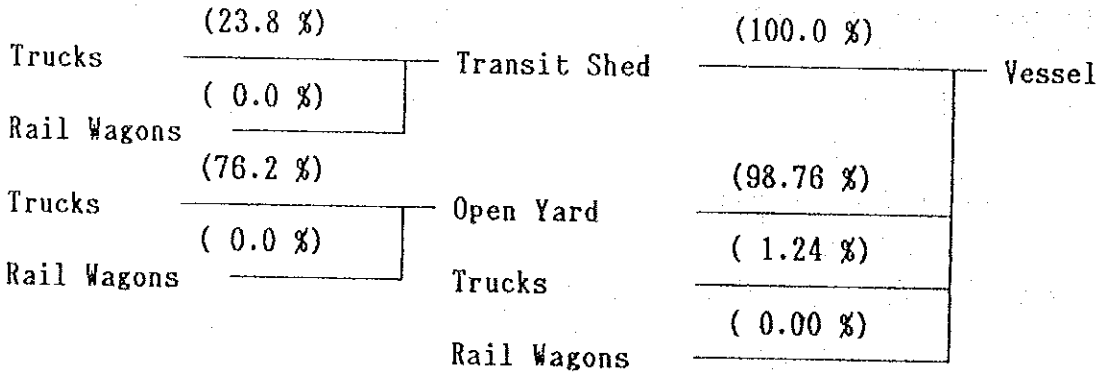
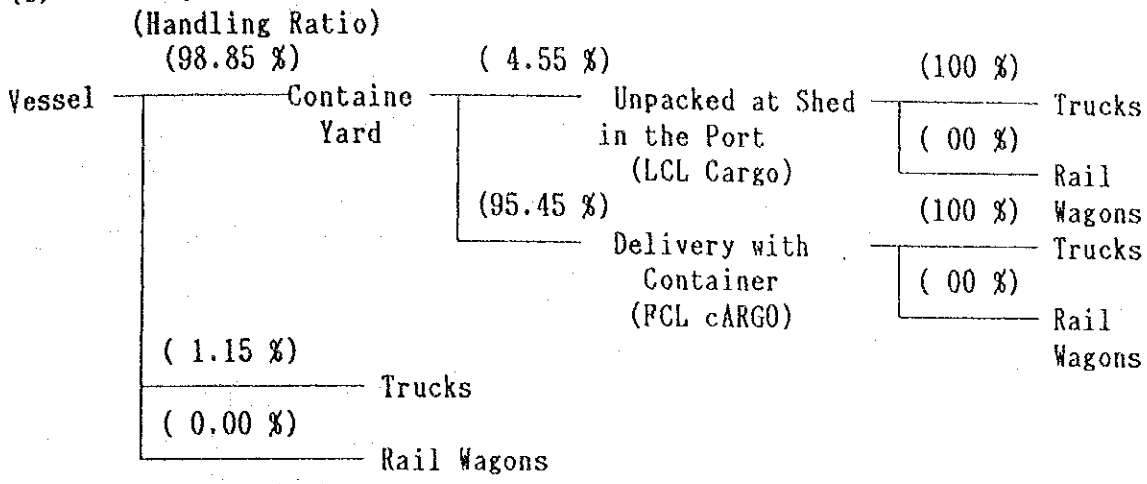


Fig. 7.4.2.(1).2 Present Cargo Flow in Port

Containers

(1) Discharging



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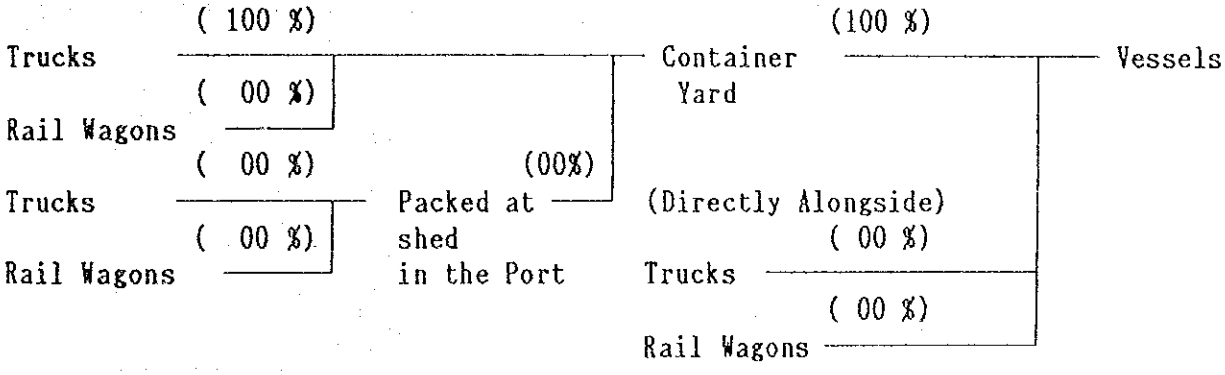


Fig. 7.4.2.(1).3 Present Cargo Flow in Port

Trailers

Discharging

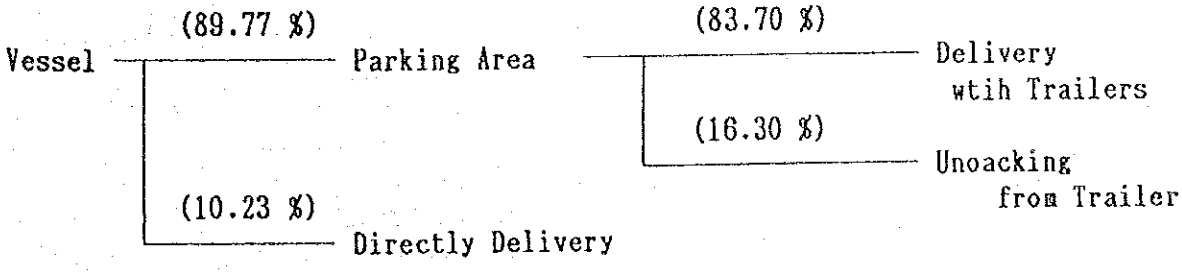
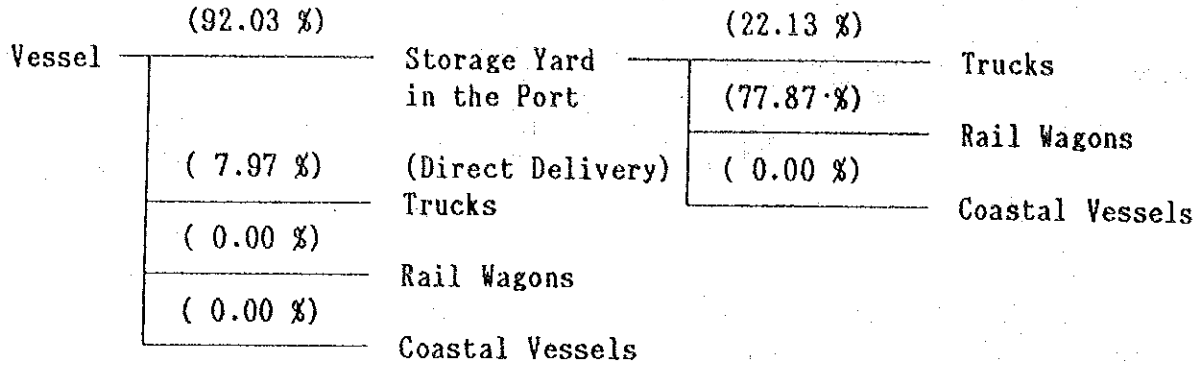


Fig. 7.4.2.(1).4 Present Cargo Flow in Port

Solid Cargo in Bulki

(1) Discharging



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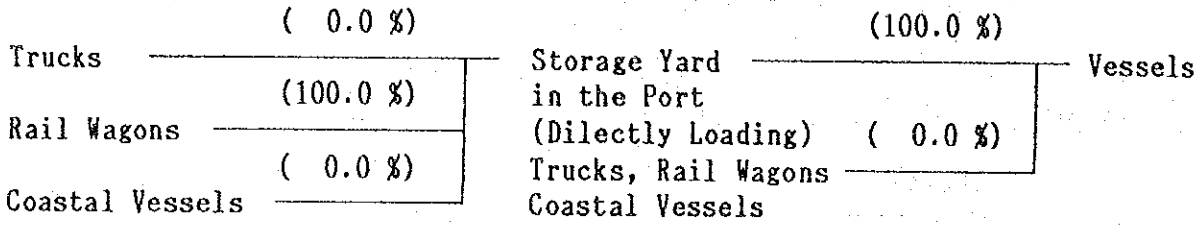
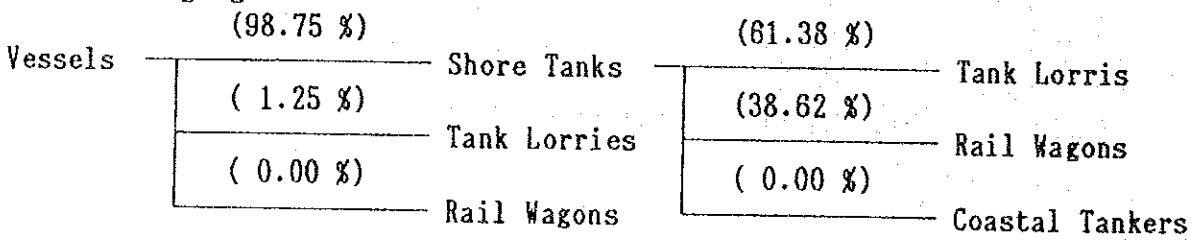


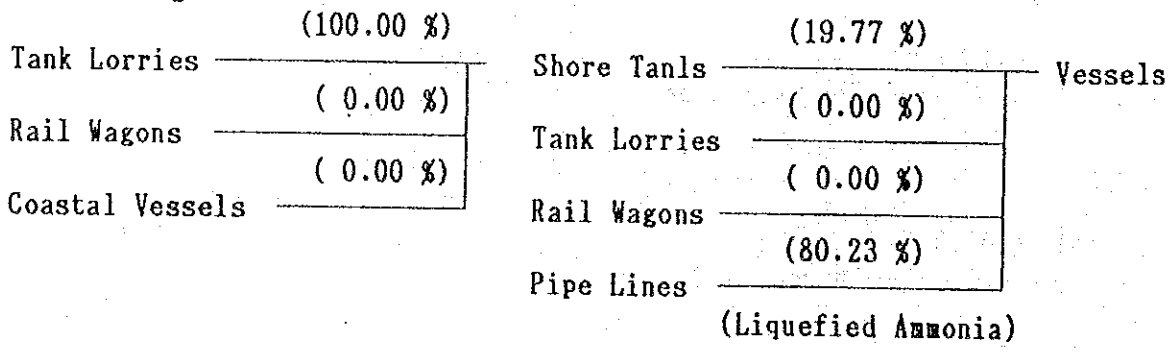
Fig. 7.4.2.(1).5 Present Cargo Flow in Port

Liquid Cargo in Bulk

(1) Discharging



(2) Loading



Source : The EPAN

Fig. 7.4.2.(1).6 Present Cargo Flow in Port

(2) Conditions of Utilization at Each Berth

Table 7.4.2.(2).1 shows the conditions of utilization at each berth.

1) General cargo berths

The average number of ships moored annually at each berth is 40, the average ship size is 5,340 DWT, the average volume of cargoes handled per ship is about 1,700 tons, and the average mooring time per ship is 122 hours.

Fig. 7.4.2.(2).1 shows the distribution of number of ships according to length of time from entry to berthing. Fig. 7.4.2.(2).2 shows the distribution of number of ships according to mooring time. The number of ships requiring less than three hours from entry into the port until berthing represent 37% of the total. While, the number of ships that took more than three hours represented 63%. It can be presumed from these figures that waiting has already started in the case of general cargo vessels.

2) Cereals berth

The number of ships moored annually at Berth No.12 is 23, the average ship size is about 30,200 DWT, the average volume of cargoes handled per ship is about 23,500 tons and the average mooring time per ship is 382 hours. Berth No.12, equipped with specialized cargo handling equipment which handles about 62% of the total cereals, and remaining 38% is directly dumped to trucks.

According to Fig. 7.4.2.(2).3, it can be said that cereals berth is already being use to the full extent of its capacity.

3) Petroleum berth

The number of ships moored annually at Berth No.26 is 75, the average ship size is about 6,000 DWT, the average volume of cargoes handled per ship is about 4,600 tons, the average mooring time per ship is 91 hours and the average waiting time per ship is about 8 hours.

According to the mentioned above, the mooring capacity of Berth No.26 has already reached its limit.

Table 7.4.2.(2).1 Conditions of Utilization at Each Berth

Type	Name	Quay Length (m)	Water Depth (m)	Ship Size (dwt)			Volume of Cargo Handled (tons)				Mooring Time (hours)		Waiting Time (hours)		Cargo Volume per Quay-Length (t/m)	Cargo Handling Productivity (t/hr)	Berth Occupancy Ratio (%)
				NO. of Ships	Total	Average /ship	Unloaded	Loaded	Total	Average /ship	Total	Average /ship	Total	Average /ship			
G. Cargoes	Berth No. 3	180.0	7.00	26	108,956	4,191	23,263	4	23,267	895	3,363	129	1,218	47	129	6.9	38.4
Car Ferry, etc.	Berth No. 4	220.0	9.80	53	378,267	7,137	36,603	16,871	53,474	1,009	4,958	94	1,617	31	243	10.8	56.6
G. Cargoes	Berth No. 5	180.0	5.00	4	9,396	2,349	6,295	1,602	7,897	1,972	1,300	325	200	50	79	6.1	14.8
G. Cargoes	Berth No. 6	168.0	6.20	48	154,722	3,223	46,872	3,250	50,122	1,044	5,324	111	1,437	30	313	9.4	68.8
G. Cargoes	Berth No. 7	165.0	9.80	34	242,921	7,145	85,917	30	85,947	2,528	6,381	188	2,243	66	521	13.5	72.8
G. Cargoes	Berth No. 8	145.0	9.80	51	257,763	5,054	63,360	1,295	64,655	1,268	5,891	100	879	17	446	12.7	58.1
G. Cargoes	Berth No. 9	145.0	9.80	45	305,984	6,798	81,755	5,482	87,237	1,939	5,388	120	1,988	44	602	16.2	61.5
G. Cargoes	Berth No.10	145.0	9.80	51	341,607	6,698	88,583	17,045	105,628	2,071	5,047	99	2,767	54	728	20.9	57.6
Sugar, V.Oil	Berth No.11	145.0	11.00	39	379,760	9,737	134,789	0	134,789	3,454	4,941	127	4,695	120	929	27.3	56.4
Cereals	Berth No.12	155.0	11.00	23	695,230	30,227	541,055	0	541,055	23,524	8,791	382	4,688	204	3,491	61.5	100.4
Coal, Coke etc.,	Berth No.13	320.0	12.50	81	1,343,338	43,333	950,977	69,055	1,020,032	32,904	4,110	133	1,223	39	3,188	248.2	46.9
	Berth No.14	380.0	9.75	49	313,968	6,408	3,171	253,848	253,848	5,181	4,164	85	645	13	668	61.0	47.5
	Berth No.15	250.0	9.75	14	71,413	5,101	7,148	25,411	32,559	2,326	1,595	114	721	52	130	20.4	18.2
	Sub-total	950.0		84	1,728,719	18,391	961,296	348,314	1,305,439	13,898	9,869	105	2,589	28	1,375	132.4	37.6
Iron Ore, Phosphat	Berth No.16	155.0	12.50	5	111,864	22,373	79,360	0	79,360	15,872	1,528	306	847	169	512	51.9	17.4
	Berth No.17	130.0	12.50	17	385,747	22,691	223,889	20,289	244,018	14,354	5,319	313	1,764	104	1,877	45.8	68.7
	Berth No.19	220.0	9.50	77	771,112	10,014	3,955	634,292	638,247	8,289	4,244	55	3,236	42	2,901	150.4	48.4
	Sub-total	505.0		99	1,268,723	12,815	307,124	654,581	961,625	9,713	11,091	112	5,847	59	1,904	86.7	42.2
Ammonia, etc.	Berth No.18	125.0	12.50	57	242,249	4,252	94,481	80,223	174,704	3,065	2,324	41	645	11	1,398	75.2	26.5
Sulphur,Potsh	Berth No.20	135.0	8.00	39	233,852	5,996	150,482	22,196	172,678	4,428	5,447	140	673	17	1,279	31.7	62.2
G. Cargoes	Berth No.21	130.0	7.50	52	241,523	4,645	107,116	9,157	116,273	2,236	6,439	124	4,118	79	894	18.1	73.5
G. Cargoes	Berth No.22	148.8	7.00	37	100,305	2,711	65,582	7,620	73,122	1,976	5,765	156	6,283	170	522	12.7	65.8
Petroleum Prod.	Berth No.26	-	12.80	75	453,384	6,045	350,380	0	350,380	4,672	6,813	91	609	8		51.4	77.8
G.Cargoes	Sub-total	1,538.0	10 berths	401	2,141,385	5,340	685,256	82,356.0	667,612	1,665	49,856	122	22,758	56.7	436	13.6	56.0
	Grand Total	3,545.0		827	7,143,392		3,144,783	1,164,419	4,309,202								

Source : This table was made based on EPA's data by Team

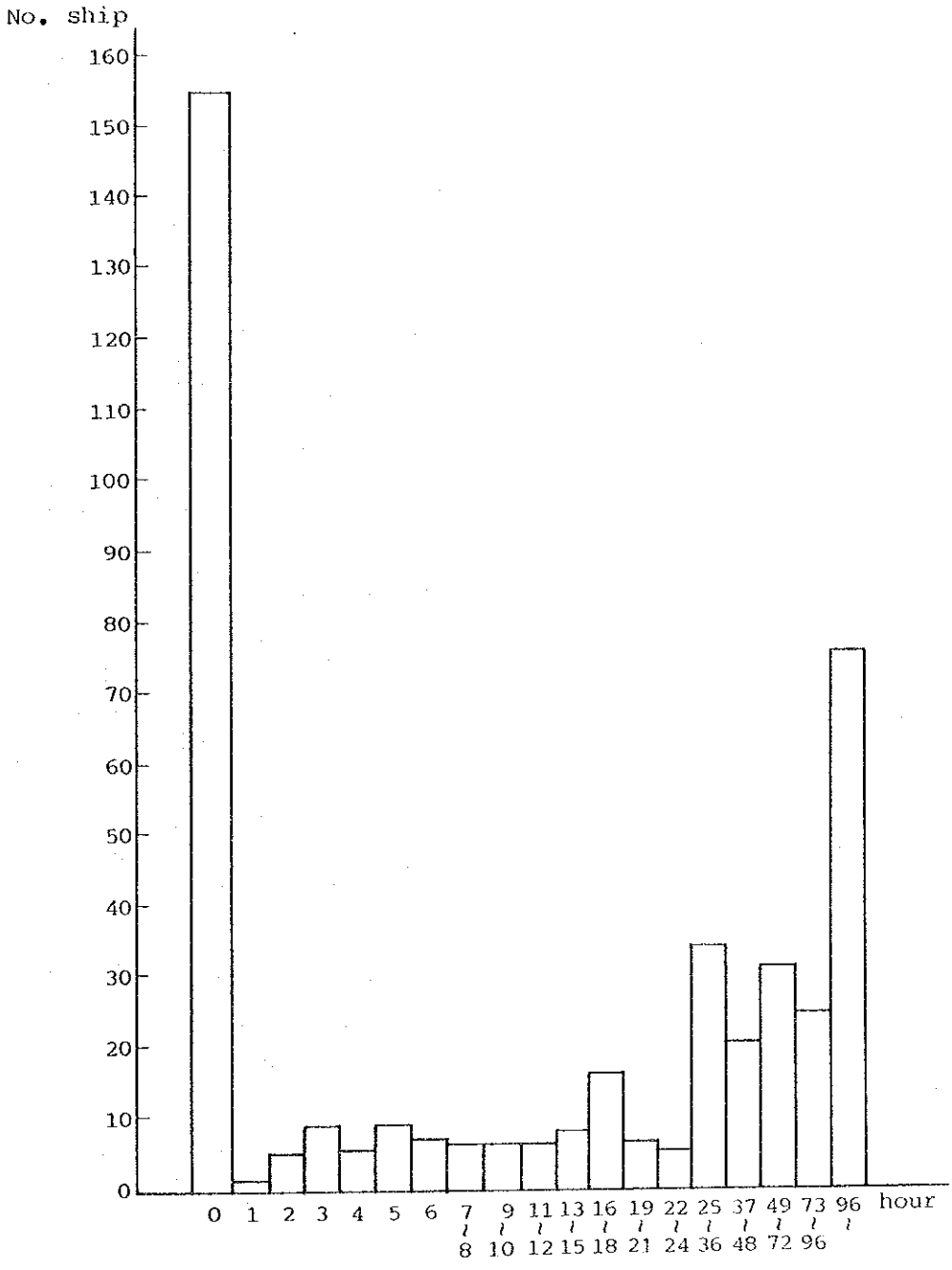


Fig. 7.4.2.(2).1 Elapsed Time between Ship's Arrival and Berthing (general cargo vessels)

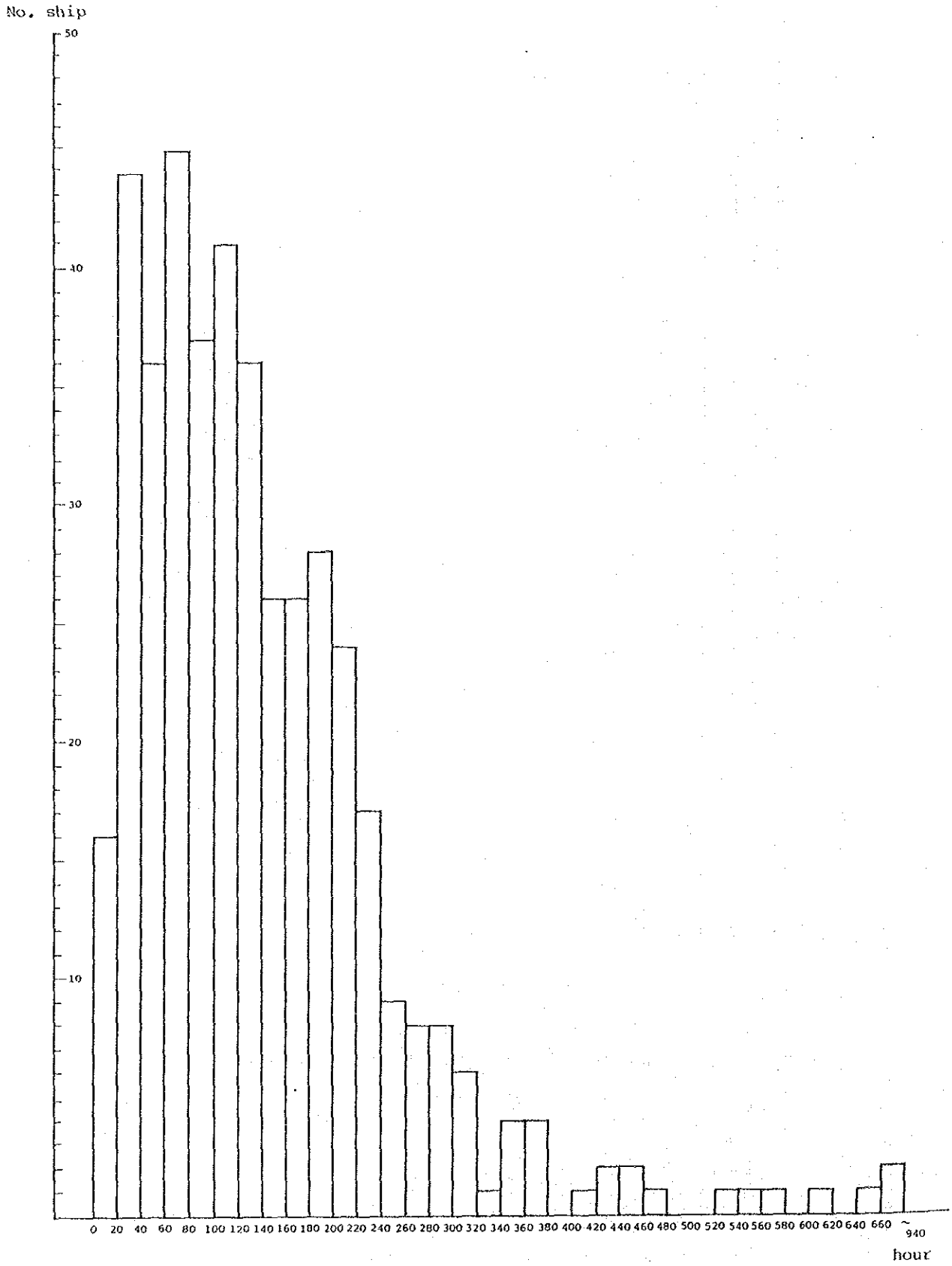


Fig. 7.4.2.(2).2 Berthing Time of General Cargo Vessels

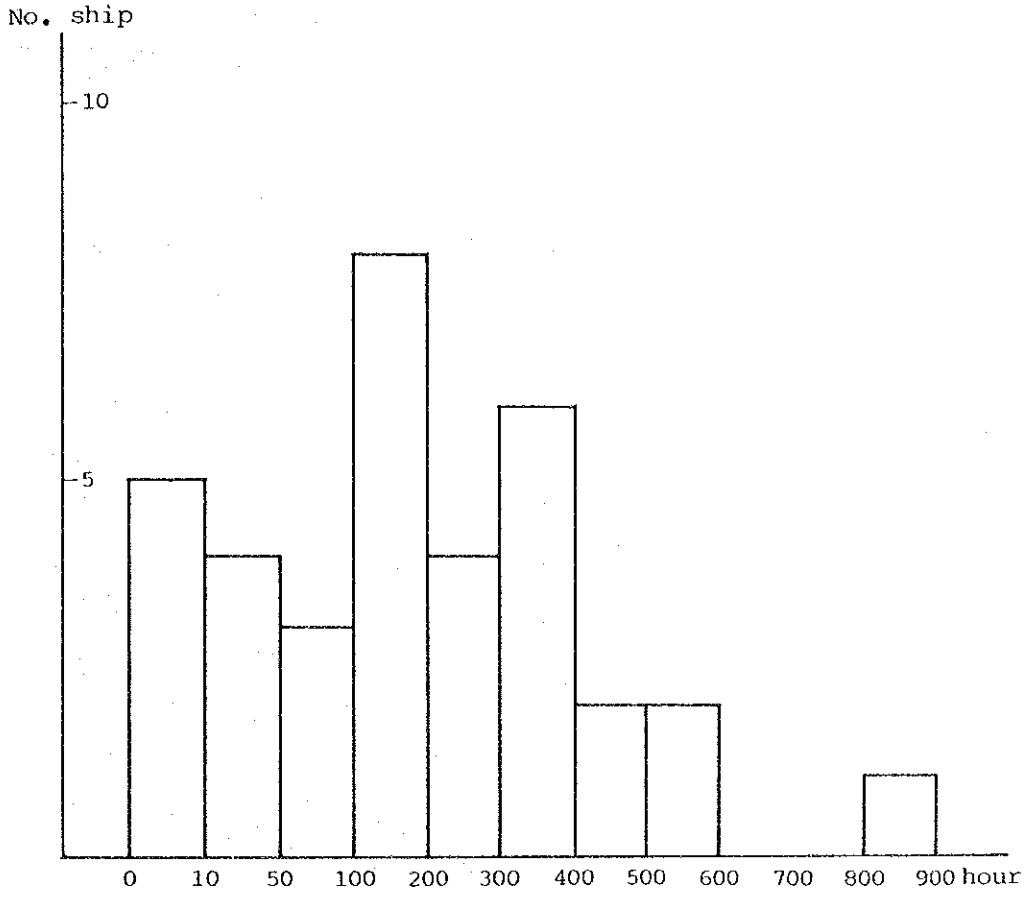


Fig. 7.4.2.(2).3 Elapsed Time between Ship's Arrival and Berthing (cereals vessels)

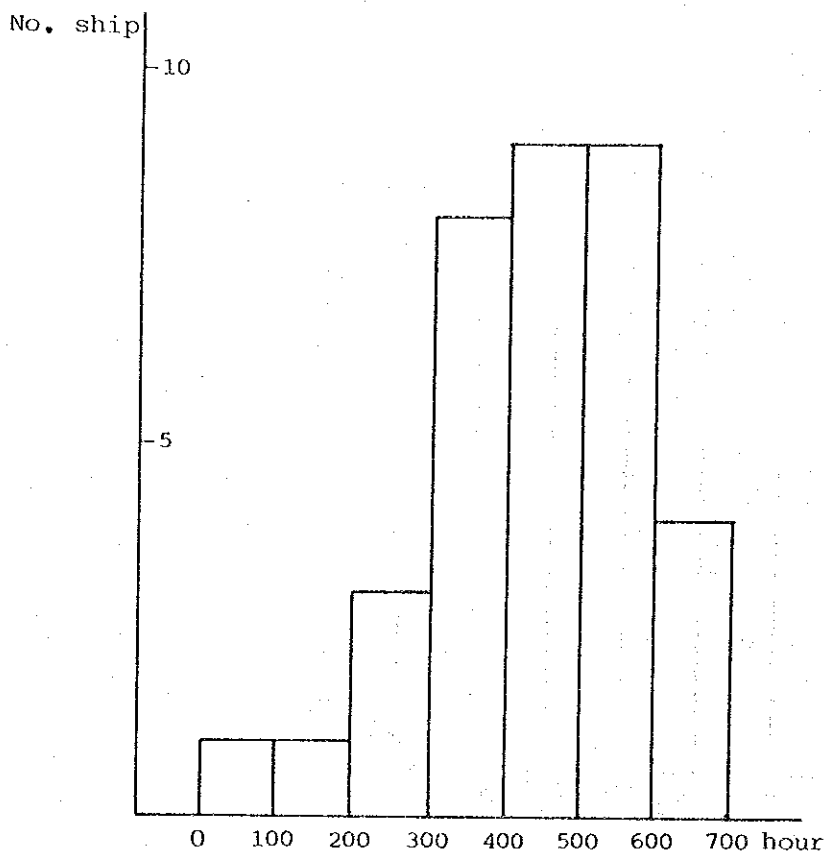


Fig. 7.4.2.(2).4 Berthing Time of Cereals Vessels

7.4.3 Storage Condition

(1) Storage Condition

The planing and the procedure of the storage of general cargoes discharged from carrying vessels is similar to the above-mentioned two ports. The cargoes are compactly stored in blocks per kind of cargo in the open yards which are controlled by the EPAN.

(2) Dwelling Time within the Port

The dwelling time in storage facilities is as indicated in Table 7.4.3(2).1.

7.4.4 Access to the Hinterland

The road connected with the two national main roads of Route No.16 and No.44 enters the port area via three entrances. Route No.44 leads to Constantine, and No.16 to Djebel Onk through Tebessa.

The total railway length of the port area belonging to EPAn is 6,200 m, and makes a connection with the grain silo, the sugar handling facility, berth No.1 and No.3. The port railway connects with the national railway which leads to Djebel Onk and Constatine.

Table 7.4.3.(2).1 Average Dwelling Time at the Storage Facilities

Unit : Days

Major commodities	Transit shed	Open yard	Silo	Tank	Peaking factor
General cargo	20	15			
Container		8			
Wagon trailers		2			
Cereals			8		
Cement					
Wood		10			
Petroleum					
Chenical products	5	18			
Medicine	3				
Wire	20				
Wood-pulp		13			
Steel bar		5			
Brick		2			
Agricultural machine		8			
Drum		20			
Beam		10			
Ingot		17			
Packing case	8				
Spare part case	25				

Source : EPAn

7.5 Port Management and Operations

7.5.1 Organization Structure and Function

EPAN has a authority to operate and administrate the Port of Annaba such as berth allocation, pilotage, tugs, cargo handling, storage and delivery in the same way as other EPs.

Organization structure of the EPAN is shown in Fig. 7.5.1 and the function of each department is almost same as EPAL's.

7.5.2 Employee Breakdown

Number of employees at the EPAN is shown in table 7.5.1. In the table, employees are classified into three categories as follows:

Cardres : executives and middle managements
Maitrise : chief of workers
Execution : worker

EPAN has been making effort to decrease its employee and the result is shown in table 7.5.2. Total number of employee is decrease 27.4% from 1985 to 1990.

Table 7.5.2 Number of Employee of EPAN 1985 - 1990

(persons)

Employ/year	1985	1986	1987	1988	1989	1990
Cadre	98	85	92	83	83	82
Maitrise	468	291	270	221	229	220
Execution	1,052	1,191	1,094	873	874	872
Total	1,618	1,567	1,456	1,177	1,186	1,174

The age structure of the EPAN's employees is listed in Table 7.5.3 and Fig. 7.5.2. Also, the average wages/salaries of each categories in 1990 is:

cadre	87,117 DA/person/year
maitrise	73,813
execution	64,544

Port of Annaba

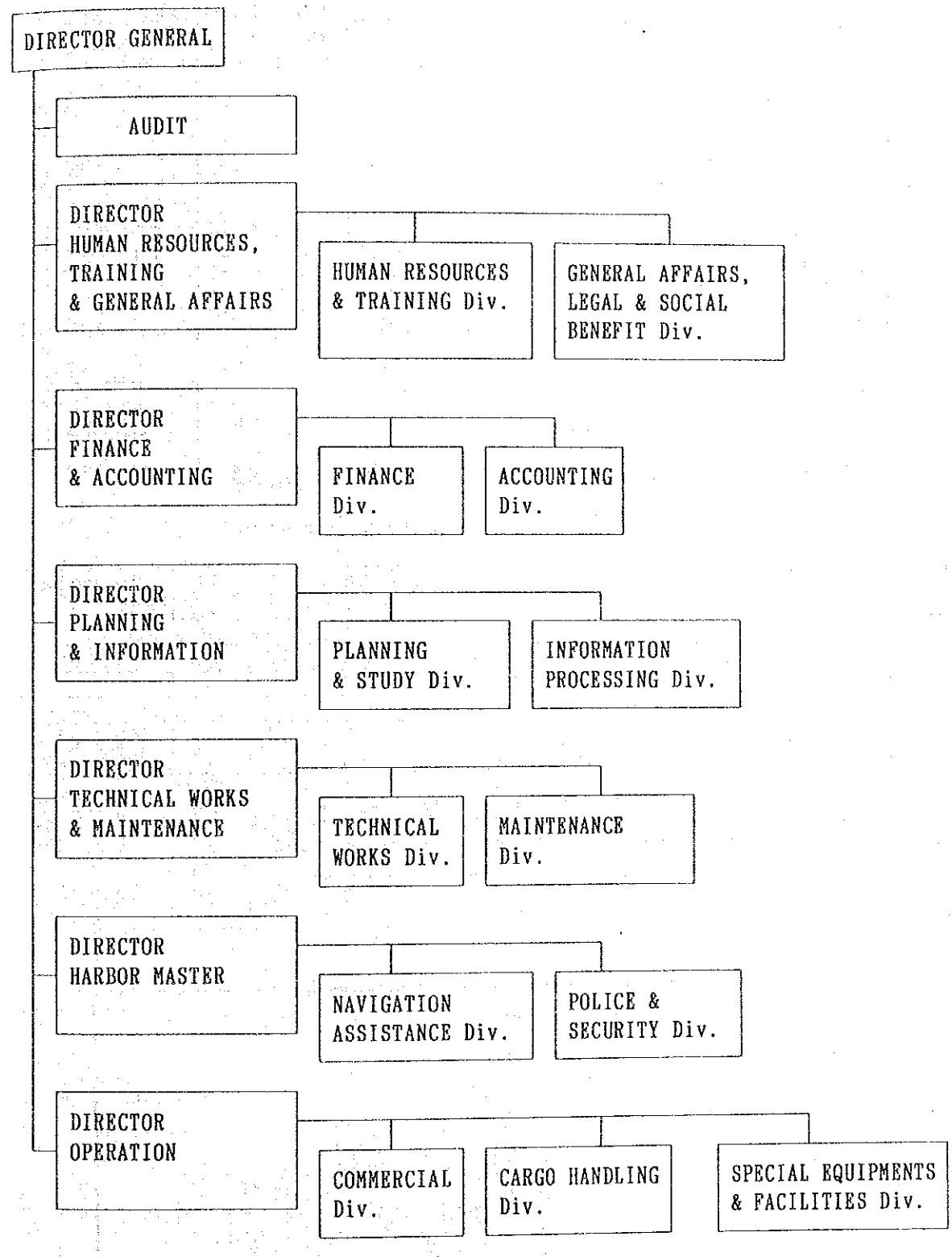


Fig. 7.5.1 Organization Chart

Table 7.5.1 Employee Breakdown of EPAN

as on Sep. 1991

Dep./Class	Executive	Skilled	Worker	Total
DIRECTOR GENERAL	4	1	2	7
HUMAN RESOURCES, Training & GENERAL AFFAIRS	14	31	47	92
FINANCE & ACCOUNTING	11	8	2	21
PLANNING & INFORMATION	8	3	3	14
TECHNICAL WORKS & MAINTENANCE	13	57	68	138
HARBOR MASTER	24	39	74	137
OPERATION	9	91	653	753
TOTAL	83	230	849	1,162

Table 7.5.3 Age Structure of EPAN's Employee

age	20	21	22	23	24	25	26	27	28	29	total
number		1					1	3	10	2	17

age	30	31	32	33	34	35	36	37	38	39	total
number	10	4	13	8	14	26	44	55	52	76	302

age	40	41	42	43	44	45	46	47	48	49	total
number	56	73	67	52	51	54	33	41	48	48	523

age	50	51	52	53	54	55	56	57	58	59	total
number	53	28	39	24	43	31	41	36	20	1	316

age	60	61	62	63	64	65	66	67	68	69	total
number			2	1		1					4

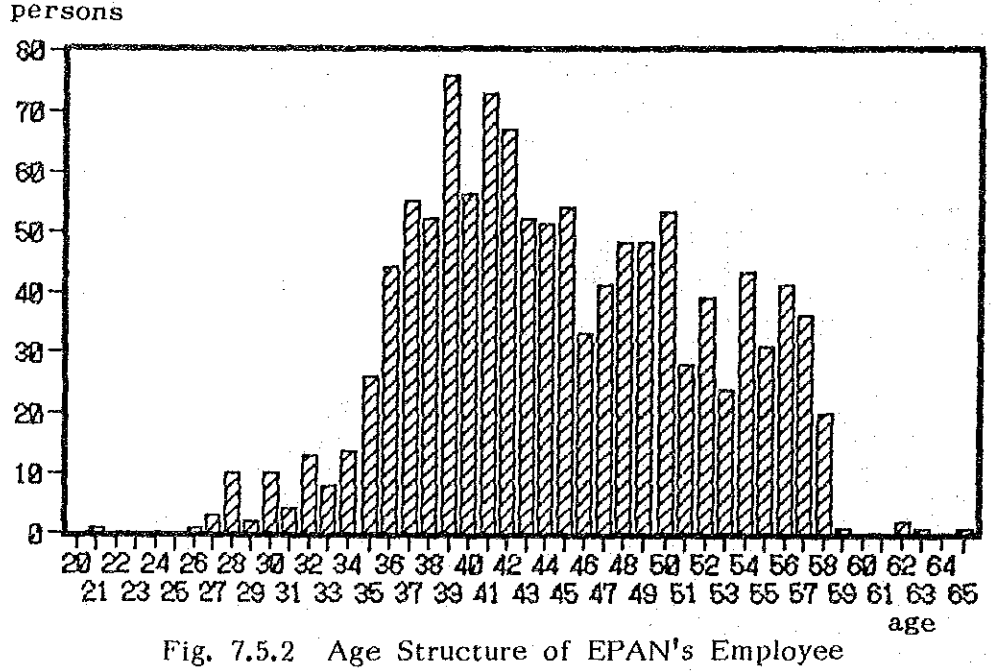


Fig. 7.5.2 Age Structure of EPAN's Employee

7.5.3 Port Services Performance

Performance of the port Services in 1990, such as pilotage, tugs and water supply, are as follows.

(1) Pilotage

Number of persons in the section:	29 persons
Number of pilots:	8 persons
Pilot boats:	using exclusive boats
Number of crews on pilot boat including captain:	3 crews
Total number of pilots who went out for service in last year:	1,736 persons
Purchased year and price of pilot boats:	1978 300,000 DA 1986 2,264,000 DA
Average cost of fuel for a pilot boat at one service:	723 DA/ per 24h service

(2) Tugs

Number of persons in the section:	62 persons
Average number of crews par boat including captain:	7 crews
Total number of tug boats which went out for service in last year:	1,942 persons
Purchased year of tug boats:	1971 840,426 DA 1971 891,036 DA 1983 20,702,803 DA

Average cost of fuel for a tug boat at one service:	7,000 DA/ per 6h service

(3) Water supply

This service is provided by another company based on the contract with EPAN.

Number of persons in the section:	4 persons
Average number of persons par gang for water supply:	2 persons
Total number of ships which got the supply in last year:	285 ships
Actual service time:	7:00 - 17:00
Purchased price of water par m^3	4.65 DA/ton
Revenue by water supply in last year	50,368 DA

(4) Garbage service

Number of persons in the section:	4 persons
Average number of persons par gang for garbage disposal:	4 persons
Total number of ships which took the service in last year:	600 ships
Number of garbage cars:	1
Actual service time:	8H
Purchased price and year of	

garbage car	May 1991 700,000 DA
Average cost of fuel for a garbage car at one service:	10 l/service
Revenue by garbage service in last year	300,000 DA

(5) Ship's guard

This service is provided by the Gema.

Number of persons in the section:	12 persons
Average number of persons par gang for ship's guard:	1 persons
Total number of ships which took the service in last year:	600 ships
Actual service time:	24H 8h x 3 shift
Revenue by ship's guard in last year	2,400,000 DA

7.5.4 Financial Condition

(1) Income Statements

The EPAN's Income Statements 1987-1990 are shown in Table 7.5.4. The table was prepared to check the amount of the operating profit of the last four years. Every year's total revenue, total expense and net income -before tax are shown in the line chart of Fig. 7.5.3. Operating revenue, operating expense and operating profit are shown in Fig. 7.5.4. The net income and the operation profit in 1987 through 1990 keep surplus of about 20 million DA per year in the average.

The operation ratio in each year was mostly less than 0.91 and 'staff cost as % of operating expenses' in the each year was 69% (maximum) and 61% (minimum).

The number of employees and personnel expense in each year are shown in the line chart of Fig. 7.5.5. The trend, such as decrease of number of workers and increase of wages/salaries, is similar to the other two ports.

(2) Operation Revenue

The detail of EPAN's operation revenue in 1990 is listed in Table 7.5.5. The percentages of four categories of revenue, such as maritime, cargo handling, storage charge and land rent, are shown in Fig. 7.5.6. Also, percentage of each major cargo is shown in Fig. 7.5.7. The table shows that the percentage of cargo handling and cargo storage revenue is about 83.2% of the total revenue.

Table 7.5.4 Port Enterprise of Annaba - Income Statement 1987-1990

million DA

	1987	1988	1989	1990
Operating Revenue				
Operation	134.6	165.3	171.7	203.6
Other	1.8	0.0	0.1	0.1
Total Revenue	136.4	165.4	171.8	203.7
Operating Expenses				
Wages and salaries	62.1	69.0	86.6	86.9
Social Benefits	14.2	22.9	20.9	23.7
Subtotal staff costs	76.2	91.8	107.5	110.5
Depreciation	12.2	12.2	14.8	20.6
Maintenance and repaires	3.5	2.0	1.6	2.2
Materials and supplies	5.4	6.8	7.3	7.6
Insurance	3.0	2.3	1.9	1.8
Indirect taxation	18.9	27.5	22.4	25.3
Other	1.1	7.3	1.3	2.6
Subtotal	44.1	58.0	49.3	60.0
Total expense	120.3	149.8	156.7	170.5
Operating Profit	16.0	15.5	15.0	33.2
Non-operating Revenue				
Financial	0.0	0.1	0.2	0.1
Other	31.6	25.6	14.3	4.5
Subtotal	31.6	25.6	14.5	4.6
Non-operating Expense				
Financial	6.1	6.2	6.7	9.5
Other	23.1	10.5	10.1	7.3
Subtotal	29.2	16.7	16.8	16.8
Net Income (before Tax)	18.4	24.5	12.7	21.0
Operating ratio	0.88	0.91	0.91	0.84
Working ratio	0.79	0.83	0.83	0.74
Staff cost as % of operating expenses	63	61	69	65

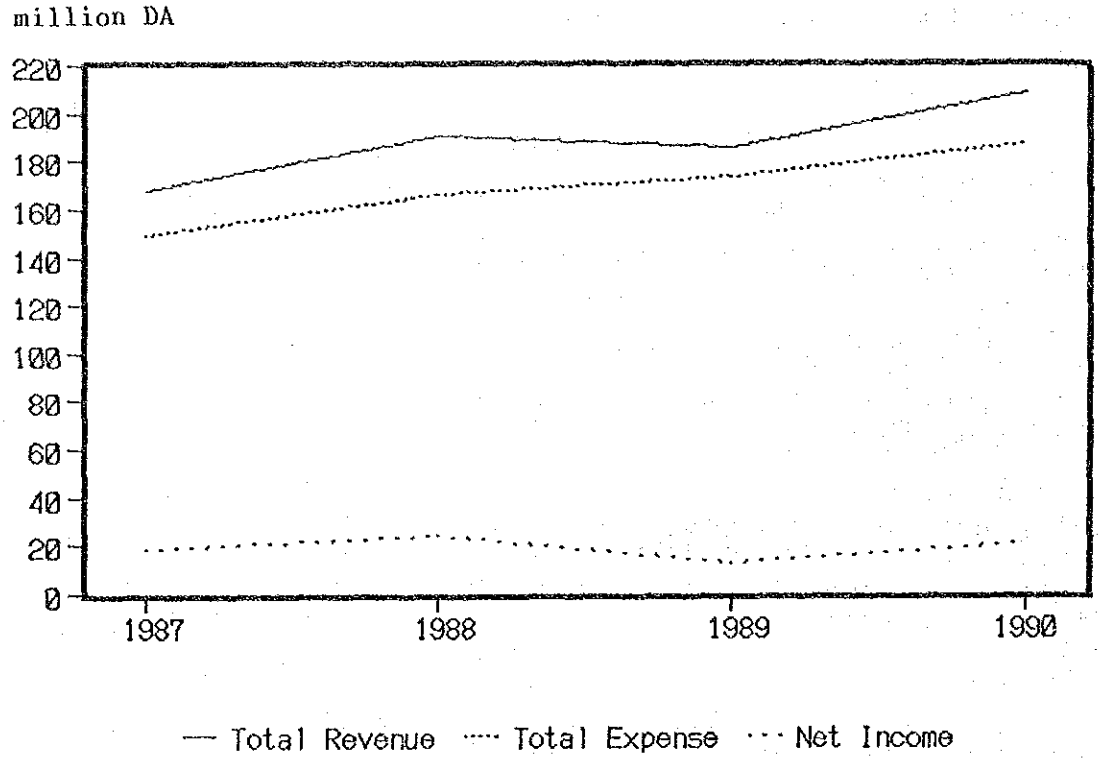


Fig. 7.5.3 Net Income (before tax)

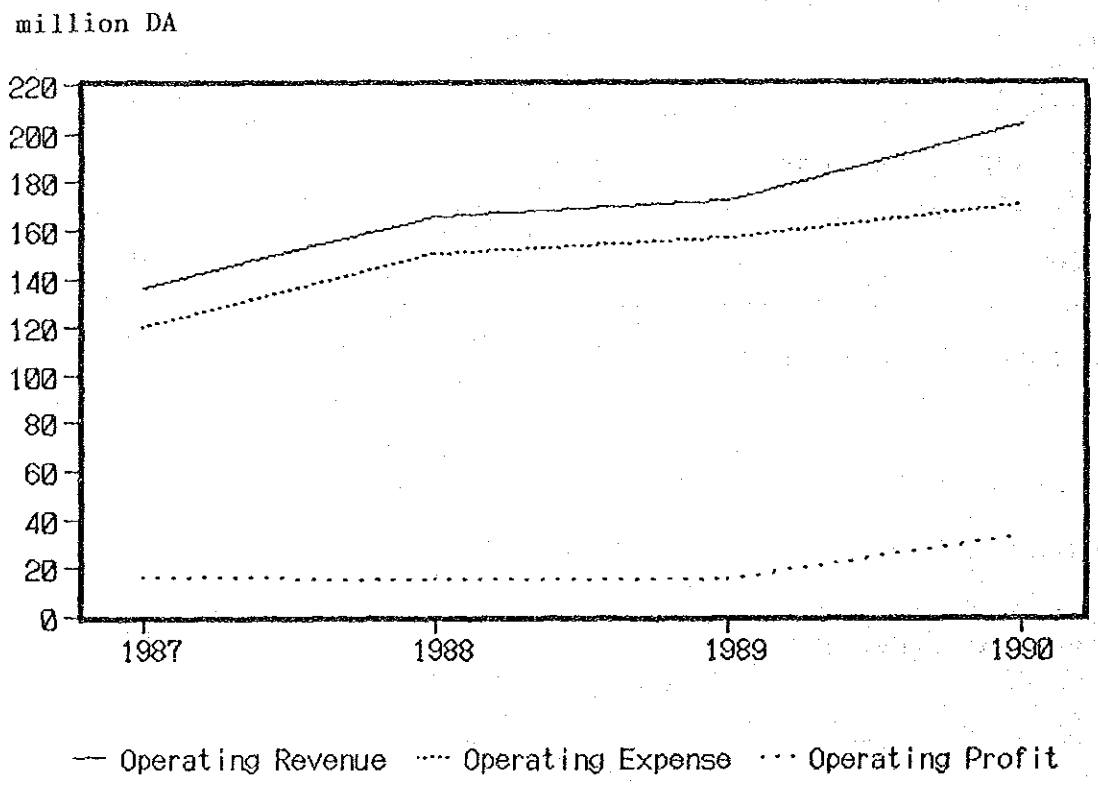


Fig. 7.5.4 Operation Profit

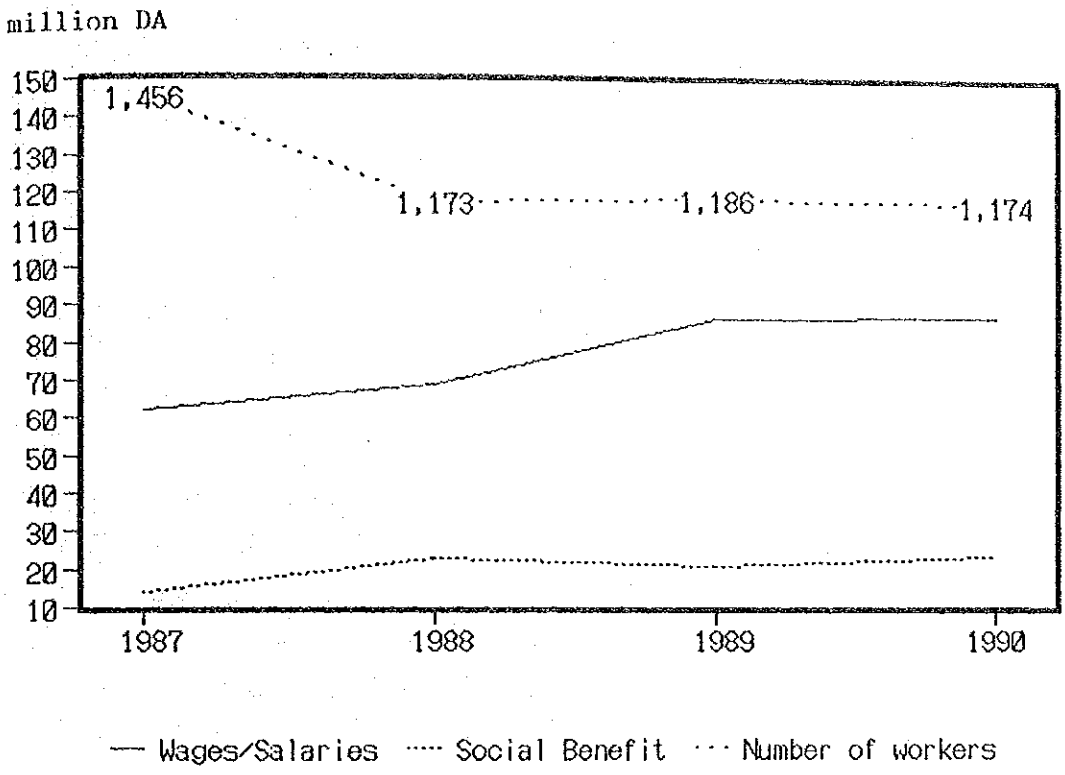


Fig. 7.5.5 Wage/Salaries

Table 7.5.5 EPAN Operation Revenue in 1990

(DA)

Charge	Amount	Charge	Amount
Maritime		Cargo Hanling	
pilotage	2,259,000	loading	45,750,000
tugs	10,318,000	equipments	38,461,000
berthing	2,000,000	extra charge	14,633,000
tax for ships	2,415,000	others	1,353,000
Defeender	796,000		
Subtotal	17,788,000	Subtotal	100,197,000
Cargo Storage		Services	
transit tax	1,702,000	water supply	5,000
depot tax	3,283,000	energy electric	1,000
container stack	1,606,000	gabage	3,734,000
'silo for cereals	34,601,000		
cargo guarding	7,351,000	Subtotal	3,740,000
covering	905,000		
Subtotal	49,448,000	land rent	8,332,000
		Others	475,000
Total Revenue	179,980,000		

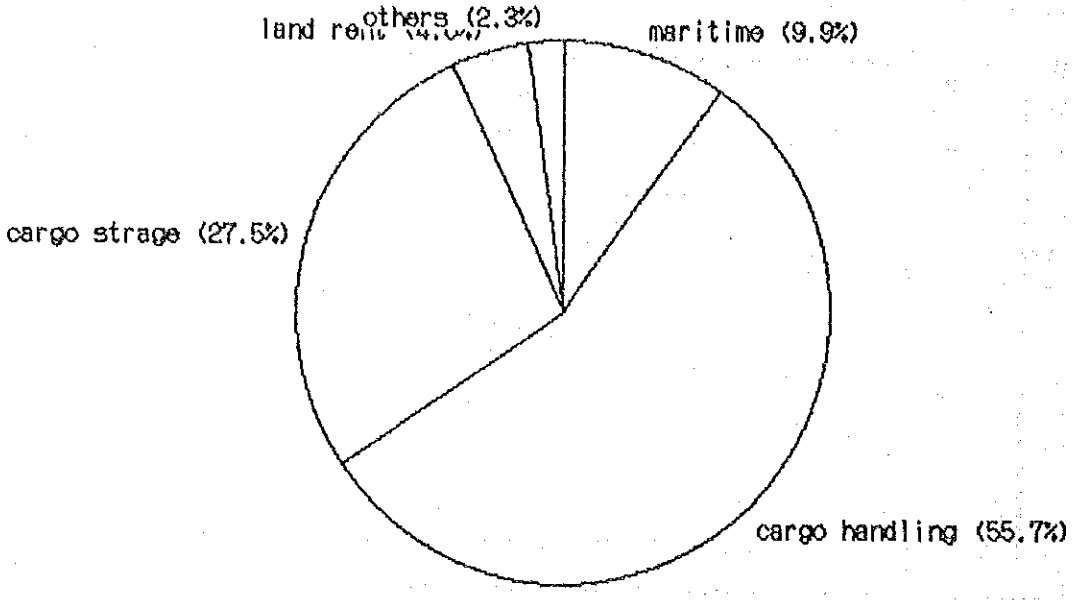


Fig. 7.5.6 Operation Revenue -1

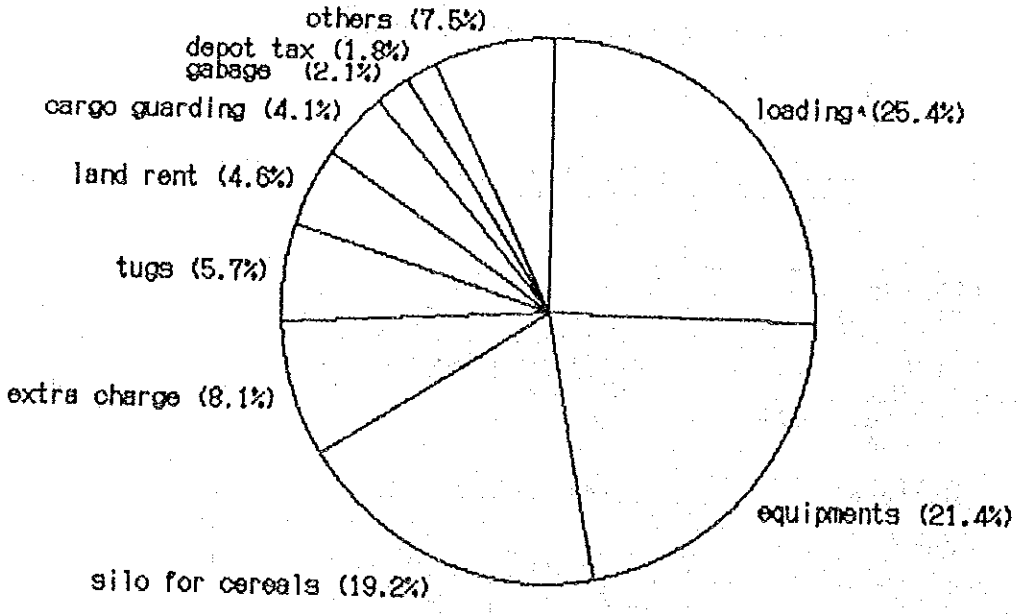


Fig. 7.5.7 Operation Revenue -2

7.6 Dredging records

The only instance of dredging occurred in the Avant-Port area in 1978 to increase the water depth to -13.5 m.

7.7 Review of the Existing Plans

(1) Existing Plans

1) A New Container Terminal Project Finance by the World Bank

This project (Container Port Development), to be implemented during the period 1989-1994, includes the development of specialized container handling facilities in the three main Algerian ports (Algiers, Annaba and Oran).

The specific items for the Annaba port are as follows:

A) Civil Works

a. Relocation seaward of an existing berth (51 m)

b. Container berth with a water depth of -10.0 m

c. Paving of the storage area

B) Equipment

a. Four 35 ton forklifts with spreaders

b. Three 10 ton forklifts with spreaders

c. Six towing units and trailers

CHAPTER 8 DEMAND FORECAST

8.1 Hinterland of the Ports

The hinterland of major commodities, such as cereals, cement, and animal feed, are determined by the interviews with their consignees, because these commodities are handled by their own specified consignees such as OAIC, ERCC, and ONAB.

In addition to these interviews, the hinterland of the study Ports is determined from the data on the origin and destination of cargoes by railway transports in 1990, the road distance kilometers and the analysis on manifests of April and October in 1990.

(1) The hinterland of commodities determined by interviews.

1) Cereals

According to the interview with OAIC, the hinterland of the three ports are as follows.

A. The port of Algiers;
Medea, Ain-defla, M'sila, Tipaza, Laghout, Illizi, Ghardia, Blida, Tizi-Ouzou, Tamnraset, Alger, Chlef, Boumerdes, Bouira, Djelfa. (Other port in the hinterland of the Algiers port; Tenes)

B. The port of Oran;
Mostaganem, Saida, Tindouf, Naama, El-Byadh, Temouchent, Mascara, Tiaret, Sidibelabbes, Relizane, Oran, Tissemsilt, Adrar, Tlemcen, Bechar.
(Other ports in the hinterland of the Oran port; Ghazaouet, Mostaganem)

C. The port of Annaba;
Skikda, Tebessa, Setif, Souk-Ahras, Batna, Ouargla, Annaba, Khenchela, Constantine.
(Other ports in the hinterland of the Annaba port; Bejaia, Skikda, Djen Djen)

2) Cements

According to the interview with ERCC, the hinterland of the three ports are determined as follows.

A. The port of Algiers (Consignee is ERCC);
Medea, Bouira, Tizi-ouzou, Tamenrasset, Boumerdes, Alger, Chlef, Laghouat, Tipaza, Blida, Djelfa, Ghardia,

(Major port for unloaded cements in the central area is the port of Algiers only)

B. The port of Oran (Consignee is EROC);

Mostaganem, Saida, Tindouf, Naama, El-Byadh, Temouchent, Mascara, Tiaret, Sidibelabbes, Relizane, Oran, Tissemsilt, Adrar, Tlemcen, Bechar.

(Other ports in the hinterland of the Oran port; Mostaganem, Arzew)

C. The port of Annaba

The imports of cements for the eastern area of Algeria are handled mainly at the ports of Bejaia and Jijel.

3) Animal feed

According to the interview with ONAB, the hinterland of the three ports are determined as follows.

A. The port of Algiers

Medea, Aln-Defla, Laghouat, Tipaza, Ghardia, Boumerdes, Tizi-ouzou, Blida, Alger, Tamenrasset, Djelfa, Bejaia, Jijel, Bouira, Chlef, B.Bou-Arreridj, M'sila

(Major port for unloaded animal feed in the central area is the port of Algiers only)

B. The port of Oran

Mostaganem, Saida, Tindouf, Naama, El-Byadh, Temouchent, Mascara, Tiaret, Sidibelabbes, Relizane, Oran, Tissemsilt, Adrar, Tlemcen, Bechar.

(Other port in the hinterland of the Oran port; Ghazaouet)

C. The port of Annaba

The imports of animal feed for the eastern area of Algeria are handled mainly at the ports of Skikda and Bejaia.

(2) Railway transports

The origin and destination of cargoes by railway transports in 1990 are as shown in Table A.4.1. Also, the hinterland of the three ports by railway mass transports (more than 10,000 t.) are as shown in figure 8.1.1.

(3) Road distance

The road distance (kilometers) from Algeir, Oran and Annaba is as shown in Table 8.1.1. Also, the hinterland determined by road distance is as shown in Figure 8.1.1.

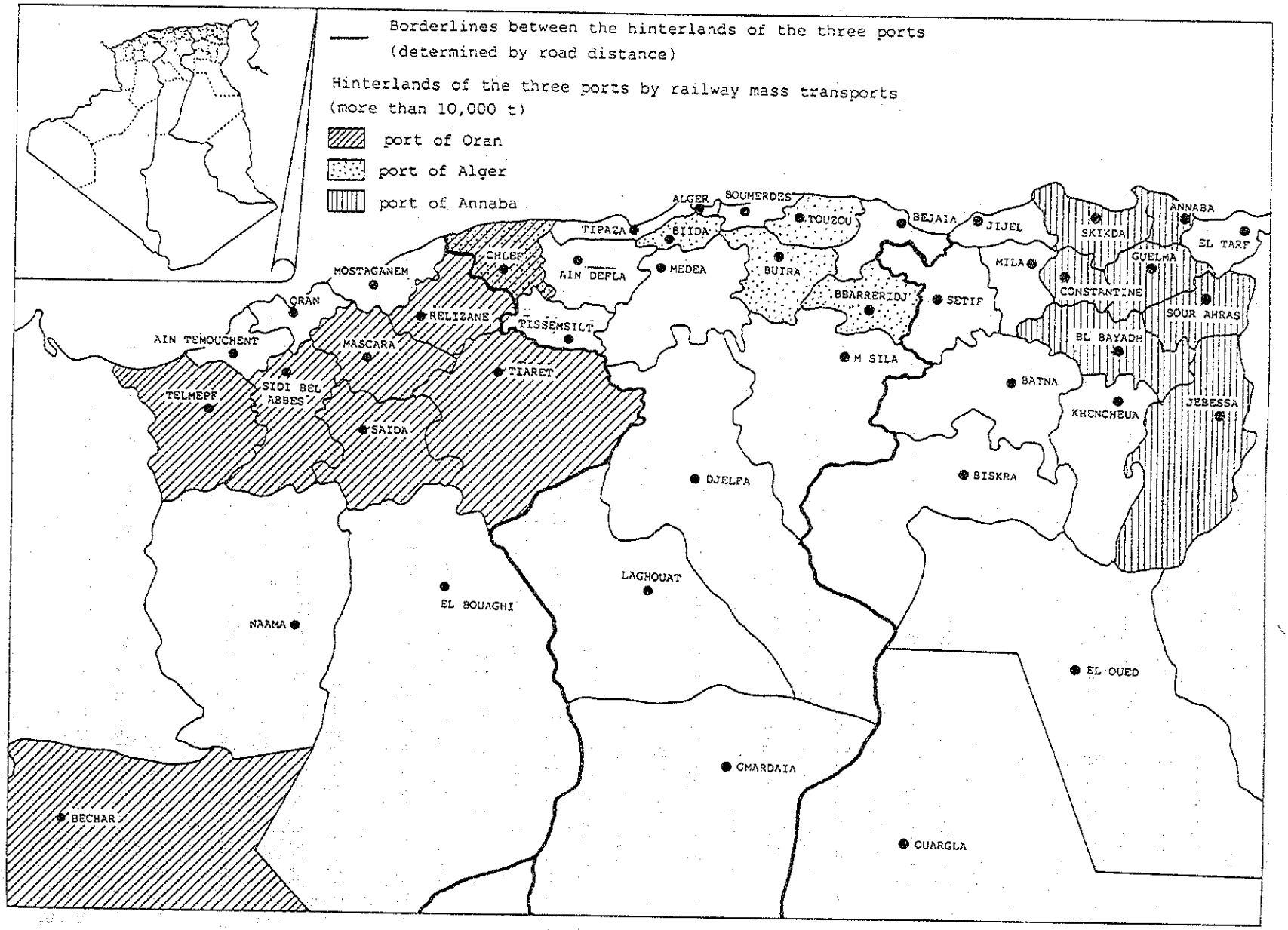


Figure 8.1.1 Hinterland of the Study Ports

Table 8.1.1 Road Distance (Kilometer)

	Alger	Oran	Annaba
Adrar	1,543	1,275	1,758
Ech-cheliff	208	223	747
Laghout	400	634	795
O.El.Bouaghi	500	903	225
Batna	435	770	275
Bejaia	263	619	351
Biskra	425	757	398
Bechar	965	693	1,558
Blida	50	382	606
Bouira	122	520	470
Tamanraset	1,970	2,076	1,974
Tebessa	634	442	227
Tlemcen	540	141	1,080
Tiaret	340	219	738
Tizi.ouzou	103	550	484
Alger		432	600
Djelfa	275	441	611
Juel	359	715	255
Setif	300	703	287
Saida	437	182	897
Skikda	510	866	104
Sidi bel abbes	440	83	1,009
Annaba	600	970	
Guelma	537	963	64
Constantine	431	834	156
Medea	91	373	600
Mostaganem	355	90	894
M'sila	248	549	412
Mascara	361	102	900
Oualgla	800	905	768
Oran	432		970

Source: Institut national de cartographie,
Carte touristique

(4) Analysis of manifests

According to the result of the analysis on the manifests in April and October in 1990, the hinterland determined by road distance covers more than 80% of cargo in the Algiers port and more than 90% of cargo in the Oran and Annaba ports, as shown in Table A.4.2.

In conclusion, when considering the results of (1), (2), (3) and (4), we can formulate the following conception of the hinterlands for the three ports.

A. The port of Algiers

Major hinterlands directly connected to the port of Algiers are the wilaya of Alger, Tipaza, Boumerdes, Blida, Medea, Touzou, Bejaia, Bouira, B B Arreridj, M'sila, Ain Defla, Chlef, Tissemsilt, Djelfa, Laghouat, Gharadaia and Tamanghasset. For general cargo, however, because the port of Algiers is located in the capital city, so the influenced area includes almost all of Algeria.

B. The port of Oran

Major hinterlands directly connected to the port of Oran are the wilaya of Oran, Mostaganem, Ain temouchent, Tlemcen, Sidi bel Abbes, Mascara, Relizane, Tiaret, Saida, El bayadh, Naama, Bechar, Adrar and Tindouf, and the influenced area is the wilaya of Chlef, Tissemsilt and Laghouat.

C. The port of Annaba

Major hinterlands directly connected to the port of Annaba are the wilaya of Annaba, Skikda, El tarf, Guelma, Constantine, Souk ahras, O El Bouaghi, Khenchela, Tebessa, Jijel, Mila, Setif, Batna, Biskra, Ouargla and Illizi, and Bejaia and Gharadla are the influenced areas of the ports of Annaba.

8.2 Socioeconomic Frame for the Target Years

8.2.1 Population

As mentioned in chapter 1, the United Nations estimates that the population of Algeria will reach 33 million in 2000 and 40.7million in 2010 and this corresponds to the projection by Conseil National de la Planification. As these numbers seem to be accurate, these data for future population are used for the estimates.

8.2.2 Economy

According to the future target values of gross domestic product (GDP) by Conseil National de la Planification, the average growth rate of GDP during 1990-1995 is about 4.7%, and that in the sector of Manufacturing industry and Agriculture is 5.7% and 5% respectively. Taking into account that the growth rate for the past 15 years prior to the economic recession averaged over 5% (1970-1975;5.8%, 1975-1980;6.2%, 1980-1985;5.2%), and that socioeconomic reforms in Algeria are proceeding now, and that GDP growth rate has begun to recover in a recent few years (3.4% in 1989, 3% in 1990), the target values of GDP by C.N.P. are assumed to be adequate. Thus it is also assumed that the trend of GDP growth rate predicted by C.N.P. would continue until the target year of 2010.

Based on these assumptions, the forecasted growth rate of GDP in 1997 and 2010 is given in Table 8.2.2.

Table 8.2.1 Population Forecast

	1990	1997	2010
Population (1000 persons)	24,697	30,500	40,700
Increase over the base year (times)		1.23 (1997/1990)	1.65 (2010/1990)

Table 8.2.2 GDP Forecast

U; Billions of 1987 Algerian Dinars

	annual growth rate	1990	1997	2010
GDP	4.7%	326.19	449.88	817.34
Agricultural sector	5.0%	34.64	48.74	91.91
Manufacturing sector	5.7%	26.63	39.25	80.69

8.3 Methodology for Demand Forecast

Two methods are used to forecast the commercial cargo volume handled at the ports of Algiers, Oran and Annaba. One is a macro forecast which estimates the cargo volume as a group including many commodities, regardless of the volume of each commodity. The other is a micro forecast, which estimates the cargo volume of each commodity individually.

For the macro forecast, two methods are used. One is to grasp the trend of cargo handling volume from the past data and forecast the future volume by a time series analysis. The other is to relate the past cargo handling volume to national social or economic indices such as GDP or population, and to forecast the future cargo volume using future estimates of these national figures.

For the micro forecast, the following two methods are mainly used:

A. For cargoes which are handled at the ports in significant quantities, such as cereals, cement and animal feeds, separate forecasts are made for each individual commodity.

First the supply and demand of the entire nation are forecasted for the target years. The deficit in volume between production and consumption is assumed to be equal to the total import volume.

Then, the cargo volume that will be handled at the ports is estimated based on the rate of population in the hinterland, past data on the cargo handling rate and other relevant factors (for example, the capacity of silo or factory).

B. For other cargoes, the volume is forecasted based on the correlation between the volume handled at the Ports and the past and forecast national indices such as GDP and population. This is the same method as is used for the macro forecast.