

**4. FORECAST OF CARGO
TRANSPORTATION / SHIP
TRAFFIC**

CHAPTER 4. FORECAST OF CARGO TRANSPORTATION / SHIP TRAFFIC

4.1 General

The purpose of this chapter is to forecast the cargo throughput of the ports located in the study area up to the target year; 2020 and estimate the ship traffic. Future water transportation system of the Orinoco River in Matanzas - Atlantic Ocean section is studied based on the estimated ship traffic.

4.2 Methodology

Two methods, a macro forecast and a micro forecast are generally used to forecast the future cargo volume. The macro forecast is based on the assumption that the cargo volume handled by the port reflects the economic activities in the port's hinterland. The total cargo volume is forecast using a statistical correlation between the cargo volume and economic indices. On the other hand, the micro forecast estimates each commodity individually.

Almost all cargo handled in Puerto Ordaz district is heavy industrial cargo such as iron ore, direct reduced iron, steel products, bauxite, alumina, aluminum, clinker, petroleum, while the volume of general cargo such as consumer products, agriculture products and foodstuff is negligible at present.

The macro forecast is not suitable for the industrial cargo forecast because its demand has no correlation with the economic activities in the port's hinterland. Thus, in this study, the micro (commodity-wise) forecast, based on each enterprise's production/sales plan, demand-supply balance, market condition and past cargo throughput trend, is adopted.

Furthermore, the future ship traffic volume is estimated taking into consideration the forecast result of the future cargo volume and the examination of future ship size.

4.3 Economics and Development Plans

4.3.1 Economic Framework

Main economic indices in the past and future are given in Table 4.3.1. It shows that the Venezuelan economy is forecast to start recovering in 2001, on the back of higher oil prices, export earnings and investment. As to the long term economic forecast, Organization for Economic Cooperation and Development (OECD) has forecast the GDP growth rate of Latin America including Venezuela. According to the report "The World in 2020/September, 1997" by OECD, the GDP growth rate will be 5.3% in the high growth case and 3.1% in the low growth case from 1995 to 2020.

Table 4.3.1 Past and Future Economic Framework in Venezuela

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Population (Mill.)	21.2	21.8	22.3	22.8	23.2	23.7	24.1	24.5	25.0	25.4
GDP (Bill.US\$) ^{*1)}	58.4	77.3	70.3	87.5	103.8	110.8	109.0	119.0	131.7	149.3
GDP per Capita (US\$) ^{*1)}	2,760	3,540	3,150	3,840	4,470	4,680	4,520	4,850	5,270	5,880

Note; Actual (1994~1997), Estimate(1998), Forecast(1999~2003)

^{*1)} at market exchange rate

Source; EIU Country Forecast 1st Quarter 1999

4.3.2 Trade Agreement

Main multilateral trade agreements in Latin America are CARICOM, CACM, G3, CAN and MERCOSUR shown in Table 4.3.2, of which Venezuela has joined G3 and CAN.

Table 4.3.2 Main Multilateral Trade Agreements in Latin America

Name of Agreements	Establishment Year	Member Countries
CARICOM	1968	Belize, Montserrat, ST. Christopher & Nevis, Antigua & Barbuda, Saint Lucia, Barbados, Grenada, Jamaica, Trinidad & Tobago, Guyana, Dominica, ST. Vincent & The Grenadines,
CACM	1960	Guatemala, Honduras, Nicaragua, El Salvador, Costa Rica, Panama ^{*1)} , Belize ^{*1)}
G3	1995	Venezuela, Colombia, Mexico
CAN	1969	Venezuela, Colombia, Peru, Ecuador, Bolivia
MERCOSUR	1995	Brazil, Argentine, Paraguay, Uruguay

Note; ^{*1)} Observer Member

(1) G3 (Group 3)

“G3 Free Trade Zone Agreement” comprising Venezuela, Colombia and Mexico became effective on January 1st, 1996. The agreement regulates investment, trade service, intellectual ownership rights, management system for trade disputes and government procurement not only for customs abolition/reduction in member countries.

The total trade amount in G3 countries increased after conclusion of the agreement as shown in Table 4.3.3. While Venezuelan exports to Mexico decreased, exports to Colombia and imports from Mexico/Colombia increased. Venezuela exports metal products, chemical products and automobiles to Colombia, while Colombia exports light industrial products like textile and garment, agricultural products. Thus Venezuela and Colombia complements each other in terms of trade.

Table 4.3.3 Trade Trend among G3 Countries

(Unit: Mill.US\$)

		Import	Venezuela	Colombia	Mexico	(Total)
Export	Venezuela	1993		890.0	333.9	1,223.9
		1994		1,062.5	386.4	1,448.9
		1995		1,317.9	274.9	1,592.8
		1996		1,305.0	234.0	1,539.0
	Colombia	1993	692.6		80.0	772.6
		1994	532.8		108.3	641.1
		1995	935.3		90.3	1,025.6
		1996	778.0		97.0	875.0
	Mexico	1993	227.4	235.9		463.3
		1994	173.8	306.0		479.8
		1995	379.6	453.4		833.0
		1996	423.6	438.2		861.8
	(Total)	1993	920.0	1,125.9	413.9	2,459.8
		1994	706.6	1,368.5	494.7	2,569.8
		1995	1,314.9	1,771.3	365.2	3,451.4
		1996	1,201.6	1,743.2	331.0	3,275.8

Note; Account by FOB

Estimate in 1996

Source; OCEI, INEGI, Mexico Central Bank, ANALDEX, DIAN

(2) **CAN (*Comunidad Andina de Naciones*)**

CAN comprising Venezuela, Colombia, Peru, Ecuador and Bolivia became effective in 1969. The content of the agreement is customs reduction in member countries, establishment of common customs rate against out-regional countries, macro policy cooperation, liberalization of capital movement, protection of intellectual ownership rights.

The agreement was first stagnant due to political disorder and disagreement over economic policy among member countries, but in the 1990's regional trade expanded rapidly. Common customs rate against out-regional countries was effected in February 1995 and gradual customs reduction was concluded with MERCOSUR in July 1995. Future development of the agreement depends on interest coordination of member countries.

4.3.3 Development Plan/Program Related to Orinoco River

(1) Orinoco Belt Tar Development Program

Orinoco tar lies under the ground in the north side of the middle/lower reaches of the Orinoco River. The total deposit is approximately 190 billion tons, of which 43 billion tons can be mined. Orinoco tar has two kinds of uses, fuel for thermal power station and raw materials for oil refinery. The former is called "Orimulsion" composed of Orinoco tar (70%) and water (30%). Total exportation volume of Orimulsion is estimated at approximately 5 million tons in 1998. Japan imported 716 thousand tons in 1997 and Canada, Denmark, Lithuania and China are examining the use of Orimulsion. The development program of the latter is making progress due to the PDVSA-four consortium joint enterprises as shown in Table 4.3.4. Exploited Orinoco tar is transported to Jose which faces the Caribbean Sea by pipeline and exported by crude carrier after being chemically treated at plant.

Table 4.3.4 Outline of Orinoco Belt Tar Development Program

Project Name	Petrozuata	Sincruos de Oriente	Hamaca	Cerro Negro I
District	Zuata	Zuata	Hamaca El Pao	Cerro Negro
Investor (Share)	Conoco (50.1%) PDVSA 49.9%	Total (47%) Statoil (15%) PDVSA (38%)	Arco (30%) Phillips (20%) Texaco (20%) PDVSA (30%)	Mobil (41.67%) Aeba Oel (16.67%) PDVSA (41.67%)
Investment Amount	US\$ 2.4 billion	US\$ 5.0 billion	US\$ 4.3 billion	US\$ 1.9 billion
Shipment Schedule	August, 2000	Middle of 2002	Middle of 2002	August, 2000

Source; PDVSA

(2) Integrated Development Plan of the Orinoco/Meta River Basin

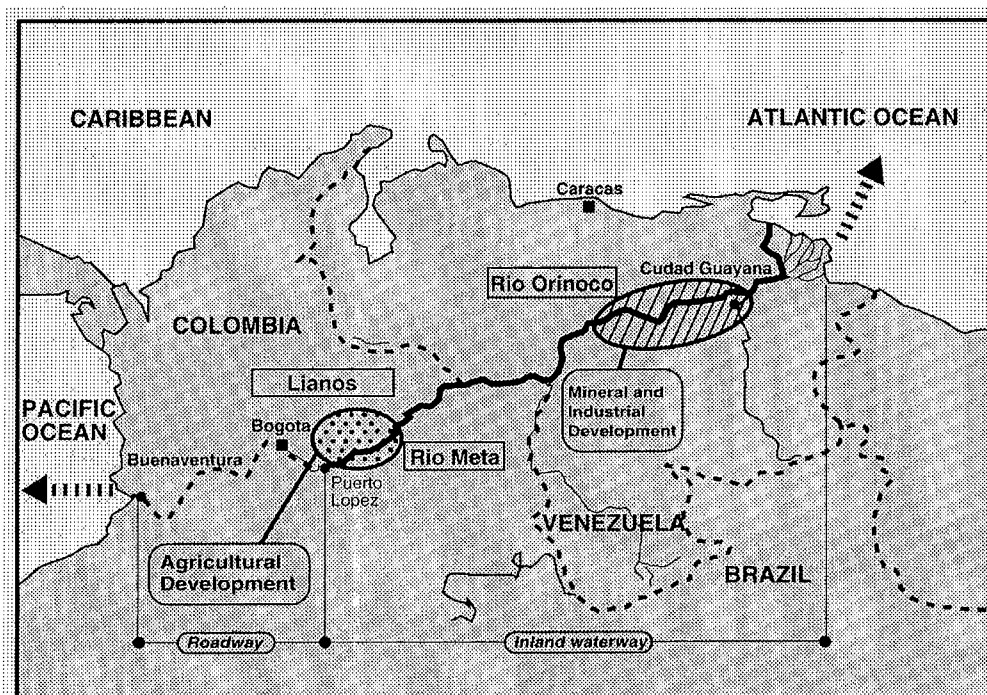
Orinoco River which has several tributaries, namely Meta, Apure, Caura, Paragua, Caroni, is a great river (length; 2,000km, area of basin; 990 thousand km²). But it has not been sufficiently utilized in spite of its huge development potential from the view point of natural/mineral resources and agriculture.

In this background, "Integrated Development Plan of the Orinoco/Meta River Basin" is planned with a view to construct/renew transportation infrastructure between Buenaventura in Colombia which faces the Pacific Ocean and Pedernales in Venezuela which faces the Caribbean Sea,

develop the regional economy and expand trade between Venezuela and Colombia (see Fig. 4-3-1). Concrete projects are as follows.

- Dredging at Buenaventura Port
- Construction or renewal of roads and railways from Buenaventura to Bogota and other main cities
- Construction of lock gate at Meta River (18 points) and Orinoco River (3 points)
- Improvement of agricultural infrastructure at Meta River basin
- Construction of three multi-purpose dams at Meta River for hydraulic generation, irrigation and upkeep of water level.

The project was introduced to the members attending the 9th Conference of Venezuela-Japan Economic Committee in 1993. This project is principal to promote the economic activities between Venezuela and Colombia and both governments have great interest. In 1997 the Inter-American Development Bank expressed support for this project and its willingness to provide financing for further study.



Source; Global Infrastructure Fund Research Foundation Japan

Fig. 4-3-1 Integrated Development Plan of the Orinoco/Meta River Basin

(3) Free Trade Zone Program (provisional name)

Free trade zone is planned at Sta. Elena de Uairén near Brazil border to promote the trade activities between Venezuela and Brazil. Some of produced/transited commodities at the free

trade zone are transported to/from Puerto Ordaz through the Trunk Road No.10. Puerto Ordaz is expected to function as the gateway to foreign countries.

4. 4 Ports in the Study Area

4.4.1 Cargo Throughput and Characteristic

There are about sixty ports along the Orinoco River, Caroni River and Apure River presently as shown in Table 4.4.1. Among these ports, ten ports in Bolivar State namely, (1) Ferrominera (Palua) Port, (2) Ferrominera (Puerto Ordaz) Port, (3) SIDOR Port, (4) El Jobal Port, (5) INTERALUMINA Port, (6) ALCASA Port, (7) VENALUM Port, (8) San Felix Port, (9) Cementos Guayana Port and (10) Corpoven Port, one port in Monagas State namely, (11) Veneston Port are related to waterway transport downstream of Orinoco River. Present cargo handling situation and characteristics of these ports are as follows.

(1) Ferrominera (Palua) Port

(2) Ferrominera (Puerto Ordaz) Port

Ferrominera (Palua) Port and Ferrominera (Puerto Ordaz) Port are special port for CVG-Ferrominera. Iron ore (fine/lump) and pellet are exported from these ports. Export volume of these ports was 9,320 thousand tons in 1997. Repair materials for plants and port facilities are irregularly imported and its volume is negligible compared to iron ore.

The capacity of the screening plant at Puerto Ordaz is 20,000 thousand tons per year. The stockpiling capacity is about 600 thousand tons at blending yard, 700~1,000 thousand tons at the main raw material yard, about 600 thousand tons at the product yard.

(3) SIDOR Port

SIDOR Port is a special port for SIDOR, although FESILVEN, ALCASA, SIDETUR and other enterprises use this port. The handling volume share of these enterprises was 21.7%. Cargo throughput was 2,905,579 tons in 1997 (see Table 4.4.2).

Table 4.4.1 Ports Locate at Orinoco/Caroni/Apure/Portuguesa River

(Unit; Miles)

	Name of Port	Distance ¹⁾		Name of Port	Distance ²⁾
	ORINOCO RIVER		33	Varadero Moitaco	304.5
1	Estacion piloto Barima	27.5	34	Mapire	351.6
2	Campamento Amacuro F.A.C	30.0	35	Las Majadas	361.2
3	Atracadero Curiapo	60.5	36	Las Bonitas	419.7
4	Baradero El Toro	96.0	37	Caicara Muelle I.N.C	460.0
5	Rampa Barrancas	143.1	38	Cabruta Paso De Ferry	463.0
6	Atracadero Los Castillos	160.8	39	Muell Venalum	494.5
7	Muelle Atracadero Lagove	176.5	40	La Urbana	524.1
8	Tanques Lagoven	177.0	41	PTO. Gumilla Bauxilum	544.5
9	Pto. De San Felix	179.2	42	Zona De Amarre PTO. Gumilla	545.0
10	Terminal Ferry San Felix	179.7		CARONI RIVER	
11	Terminal Ferry Los Barrancos	180.4	43	Ferrominera PTO. Ordaz	184.0
12	Puerto Palua Ferrominera	181.9	44	Muelle Angosturita	184.2
13	Instituto Nacional De Canalizaciones	183.7	45	Guayana Marine Service	184.3
14	PTO. Cardonal	185.7	46	PTO. Dalla Costa	185.6
15	Oleoducto Corpoven PTA. Cuchillo	191.5	47	Club Nautico	185.6
16	ACBL Base De Operaciones Y Dique	192.0			
17	Base Tepuy Marine	192.3		Name of Port	Distance ²⁾
18	Base Remorca	192.4		APURE RIVER	
19	Muelle Lagoven	192.5	48	Atracadero Arichuna	68.0
20	Muelle Bauxilum	192.8	49	Puerto Luis Morales Padilla	95.5
21	Muelle Alcasa	193.0	50	Paso Apurito (San Antonio)	178.3
22	Zona De Amarre ACBL	193.5	51	Rampa El Saman	195.0
23	Muelle Vencemos	193.5	52	Puerto De PTO. De Nutrias	246.0
24	Sidor PTO. De Matanzas	195.0	53	Atracadero Palmarito	316.4
25	Sidor Muelle Florante Provicional	196.0	54	Puerto Santos Luzardo	377.3
26	Muelle Corpoven	236.5			
27	Muelle Flotante Club Nautico	240.7			
28	Muelle De La Armada	241.2			
29	Terminal De Lancha Soledad	242.3			
30	Puente Angostura	245.0		Name of Port	Distance ²⁾
31	Terminal De Lancha	242.0		PORTUGUESA RIVER	
32	Varadero El Almacen	263.7	55	PTO. General Jose Laurencio Silva	138.0

Note; ¹⁾ from zero mile point, ²⁾ from confluence of Orinoco and Apure, ³⁾ from confluence of Apure and Portuguesa

Source; Port Map by ACBL

Table 4.4.2 Cargo Throughput of SIDOR Port in 1997

	Consignor	Commodity	Volume (Tons)
Export	SIDOR	Coil, Plate, Laminate, etc.	1,439,031
	Other Enterprises	Steel Bar, Direct Reduced Iron	558,568
Import	SIDOR	Lime Stone, Dolomite, etc.	495,102
	Other Enterprises	Coke, etc.	73,379
Domestic(Out)	SIDOR	n.a.	339,499
(Total)			2,905,579

Source; SIDOR

(4) El Jobal Port

El Jobal Port is a special port for CVG- BAUXILUM and exclusive for bauxite loading. Two shipping companies, ACBL and REMOLCA transport bauxite from here to INTERALUMINA Port by a connected fleet train (15~25 barges per fleet). Forwarding volume was 4,907,364 tons in 1997.

(5) INTERALUMINA Port

INTERALUMINA Port is a special port for CVG- BAUXILUM. Cargo throughput was 5,852,287 tons in 1997 (see Table 4.4.3).

Table 4.4.3 Cargo Throughput of INTERALUMINA Port in 1997

	Commodity	Volume (Tons)
Export	Bauxite	217,364
	Alumina	479,816
Import	Caustic Soda	247,743
Domestic (In)	Bauxite	4,907,364
(Total)		5,852,287

Source; Group of Aluminum Industry

(6) ALCASA Port

ALCASA Port is a special import port for CVG-ALCASA although VENALUM, CARBONORCA and other enterprises use this port for material import, while aluminum which is the product of ALCASA is exported from VENALUM Port, San Felix Port, Guanta Port, Puerto Cabello and La Guaira Port. Cargo throughput was 459,329 tons in 1997 (see Table 4.4.4).

Table 4.4.4 Cargo Throughput of ALCASA Port in 1997

	Consignor	Commodity	Volume (Tons)
Export	ALCASA	Coke	80,708
		Tar	19,512
		Others	1,481
	VENALUM CARBONORCA Others	Coke	274,394
		Tar	47,973
		Carbon	33,902
		Others	1,359
Import	-	-	-
(Total)			459,329

Source; Group of Aluminum Industry

(7) VENALUM Port

VENALUM Port is a special port for CVG-VENALUM although ALCASA and CEMEX use this port. Cargo throughput excluding clinker (produced by CEMEX) was 396,199 tons in 1997 (see Table 4.4.5).

Table 4.4.5 Cargo Throughput of VENALUM Port in 1997

	Commodity	Volume (Tons)
Export	Aluminum	340,054
	Others	5,000
Import	Tar	24,305
	Coke	21,675
	Others	5,165
(Total)		396,199

Note; Excluding clinker

Source; Group of Aluminum Industry

(8) San Felix Port

San Felix Port is the only general port in Puerto Ordaz and is owned by CVG. ALCASA, SIDETUR, FESILVEN, INMCO, other enterprises use this port mainly for exportation. Maize silo is equipped at yard, but not used practically and there was no importation in 1997. Cargo throughput was 110,651 tons in 1997 (see Table 4.4.6).

Table 4.4.6 Cargo Throughput of San Felix Port in 1997

	Commodity	Volume (Tons)
Export	Aluminum Products	49,561
	Silicon	13,013
	Aluminum Ingot	17,978
	Anode	28,806
	Others	1,179
Import	Graphite	114
(Total)		110,651

Source; San Felix Port

(9) Cementos Guayana Port

Cementos Guayana Port is a special port for CEMEX, but it has not been used on account of its aged facilities. Main materials such as clinker are transported from Pertegalete (locates near Puerto La Cruz) by ship (50%) and truck (50%), while materials are unloaded at VENALUM Port. All cement is distributed by truck. Unloading volume of clinker by ship was approximately 180 thousand tons in 1997.

(10) Corpoven Port

Corpoven Port is a special port for PDVSA-Corpoven and is used for crude oil exportation. Export volume was 3,940 thousand tons in 1997 according to MTC-INC statistics.

(11) Veneston Port

Veneston Port is a special port for wood chip exportation. It is under construction now and port operation is scheduled to start in January 1999. Caribbean pine, materials for wood chip is transported from CVG-PROFORCA plant by truck.

4.4.2 Summary of Cargo Throughput

Cargo throughput in 1997 of the above eleven ports is summarized in Table 4.4.7 based on the statistics of MTC-INC, Ferrominera, SIDOR, Group of Aluminum Industry and San Felix Port. Total cargo throughput was 24,957 thousand tons, of which export volume was 18,206 thousand tons and its share was 72.9%, followed by domestic unloading from El Jobal Port to Puerto Ordaz (19.7%), import (5.3%), domestic loading (1.4%) and domestic unloading (0.7%). Furthermore, cargo share by commodity is given in Fig. 4-4-1.

Table 4.4.7 Cargo Throughput of Ports in Puerto Ordaz and El Jobal Port (1997)

(Unit; Thousand Tons)

Downstream from Puerto Ordaz			
	Commodity	Enterprise	Volume
Export	Iron Ore	Ferrominera	9,320
	Direct Reduced Iron	SIDOR/FIOR/VENPRECAR/OPCO	1,810
	Steel Products	SIDOR	1,439
	Bauxite	BAUXILUM	217
	Alumina	BAUXILUM	480
	Aluminum Ingot	VENALUM/ALCASA	411
	Crude Oil	Corpoven	3,940
	Steel Bar	SIDETUR	448
	Aluminum Products	SURAL/Others	50
	Silicon	FESILVEN/Others	35
	Anode	INMCO	29
	Others	VENALUM/HEVENSA/Others	27
	(Sub-Total)		18,206
Import	Coke, Tar, Carbon	Group of Aluminum Industry/INMCO	502
	Steel Materials	SIDOR	495
	Caustic Soda	BAUXILUM	247
	Others	FESILVEN/HEVENSA/Others	81
	(Sub-Total)		1,325
Domestic (Out)	Steel Products	SIDOR	339
	(Sub-Total)		339
Domestic (In)	Clinker	CEMEX	180
	(Sub-Total)		180
(Total)			20,050
From El Jobal Port to Puerto Ordaz			
Domestic (In)	Bauxite	BAUXILUM	4,907
	(Sub Total)		4,907
(Grand Total)			24,957

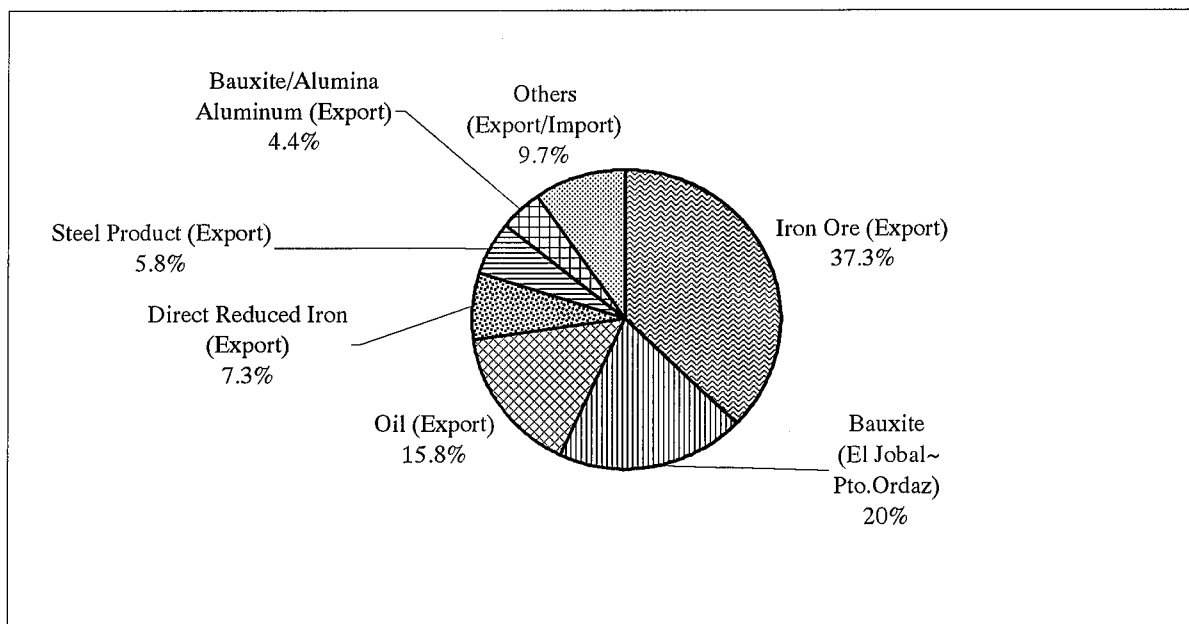


Fig. 4-4-1 Cargo Share by Commodity of Ports in Puerto Ordaz and El Jobal Port (1997)