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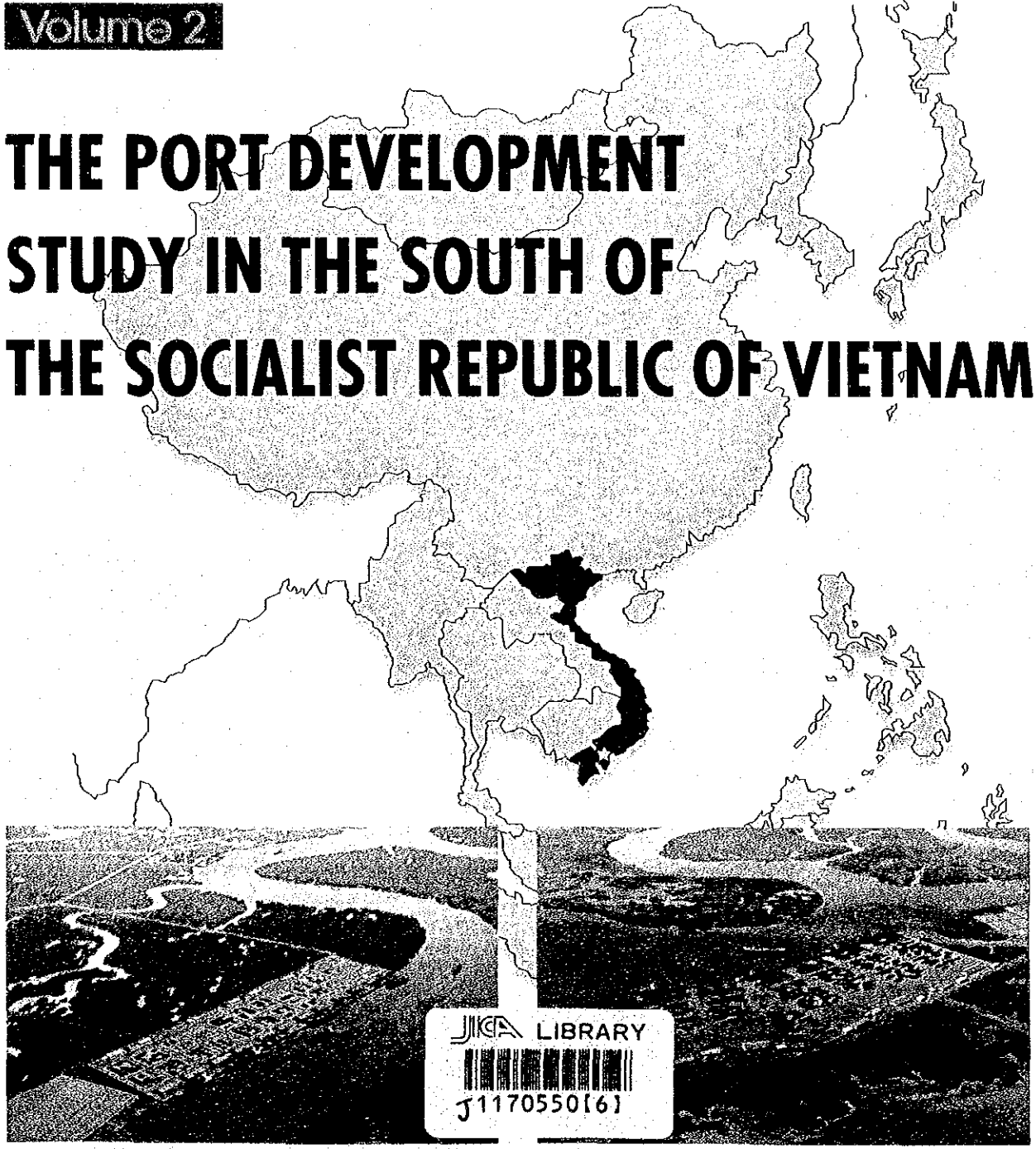
Japan International Cooperation Agency (JICA)
Ministry of Transport (MOT), the Socialist Republic of Vietnam
Vietnam National Maritime Bureau (VINAMARINE)

NO. 52

FINAL REPORT

Volume 2

THE PORT DEVELOPMENT STUDY IN THE SOUTH OF THE SOCIALIST REPUBLIC OF VIETNAM



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December 2002

The Overseas Coastal Area Development Institute of Japan (OCDI)
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The Port Development Study in the South of The Republic of Vietnam
FINAL REPORT
Volume 2
December 21

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Note: The following exchange rate is used in this report.

US\$ 1.00=Vietnam Dong 15,000VND=Japanese Yen 120

August 2002

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1170550[6]

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PART 2 MASTER PLAN

PART 2.1 PORT DEVELOPMENT STRATEGY AND MASTER PLAN IN SFEA

Chapter 11 Demand Forecast

11.1 Socio-economic Framework

(1) Review of the Past Economic Development

The Vietnamese economy has immensely changed since 1986 brought about by the Doi Moi initiatives. In the process, however, the country experienced many hardships such as the collapse of the socialist block in the former USSR and Eastern Europe countries, the resulting severe inflations in the late 1980s, a persistent blockade and embargo against Vietnam by the United States and its followers in the early 1990s, the regional financial crises, and the consecutive natural calamities in many areas in the late 1990s. Despite those numerous difficulties, Vietnam has more than doubled its GDP during the period 1991-2000. The once negligible domestic savings accounted for 27 percent of GDP in 2000. Once beset with a serious scarcity of goods, the country can now produce and deliver most of the requirements to satisfy the essential needs of the people as well as the local economies.

The economic development in Vietnam has been experiencing in the last decade can be mainly attributed to:

- i) Control of inflation achieved by improved macro-economic balance,
- ii) Promotion of industrialization by means of, inter alia, introduction of market principles and FDI, and
- iii) Infrastructure development including rehabilitation of existing infrastructure and new construction to support economic activities and to ensure market access.

(2) Policy Direction towards 2010

The 9th Vietnam Communist Party Congress formulated the "Strategy for Socio-Economic Development During the First Decade of the 21st Century" wherein the overall strategy directs for accelerated industrialization and modernization along the socialist line, laying the foundations for Vietnam to become an industrialized country by 2020.

The specific goals of the strategy include, among others, the following:

- GDP in the year 2000 will have at least doubled its level by 2010,
- Export will increase at a rate more than double of GDP growth while industrial exports account for 70-75 percent of the total export value,
- Value added industry (including construction) will grow at over 10 percent annually,
- The population growth rate will be dropped to 1.1 – 1.2 percent by 2010,
- The number of poor households will be quickly reduced in line with expanding employment opportunities in both urban and rural areas, and
- The focal economic zones will achieve higher growth than on average as major contributors to the nationwide growth, and stimulate and help other regions.

(3) Forecast Model

To fulfill the ten-year strategy, the country will have to attract investment, strengthen labor force and rationally mobilize available resources. The issue is how to quantitatively forecast future GDP among various attributable factors such as labor force and investment. The VITRANSS

GDP/GRDP Projection Model was developed based on the Klein-Kosobud econometric model which was adapted for Vietnam. The model's basic concept is based on labor productivity which determines the level of capital-equipment ratio (accumulated capital stock per employee). The model is depicted in Figure 11.1.1 and its variables and formulae are noted below.

After a review of two government documents issued by the National Committee for Population and Family Planning (NCPFP) and the Ministry of Construction, a forecast of both population and urbanization were developed. Employment-related parameters were set adequately taking into account parameters such as population, labor ratio, working days, and hours.

(4) Forecast Results

Given the demographic framework and other updated planning indicators, the determinant factor in forecasting GDP is gross investment. Thus, future GDP is projected for three development alternatives: high, medium and low growth cases derived from the Vietnam's economic performance in the 1990s. (Refer to Table 11.1.1)

Table 11.1.1 Vietnam's Development Alternatives

		High Growth Case	Medium Growth Case	Low Growth Case
GDP (VND trillion at 1994 price)	2000 (actual)	275,918 (1.00)		
	2010 (projected)	647,262 (2.35)	595,213 (2.16)	531,225 (1.93)
	2020 (projected)	1,393,238 (5.05)	1,137,525 (4.12)	885,634 (3.21)
Investment per GDP Rate	2001-05	35 %	31-32 %	25 %
	2006-10	35 %	29-30 %	21-24 %
	2011-20	35 %	28 %	20 %

As results, the high and medium growth cases may satisfy the development pace envisioned by the strategy formulated in the 9th Vietnam Communist Party Congress in terms of GDP growth and rapid industrialization. The high growth case will be possible when Vietnam fast-tracks economic development for the coming two decades although the country has only three years experience in such high growth in the 1990s. On the other hand, the medium case will start from the average investment per GDP rate over the 1990s, and then slightly decline it in line with economic scale expansion. As results, the Study adopts the medium growth case as its GDP forecast. (Refer to Table 11.1.2 and Figure 11.1.2)

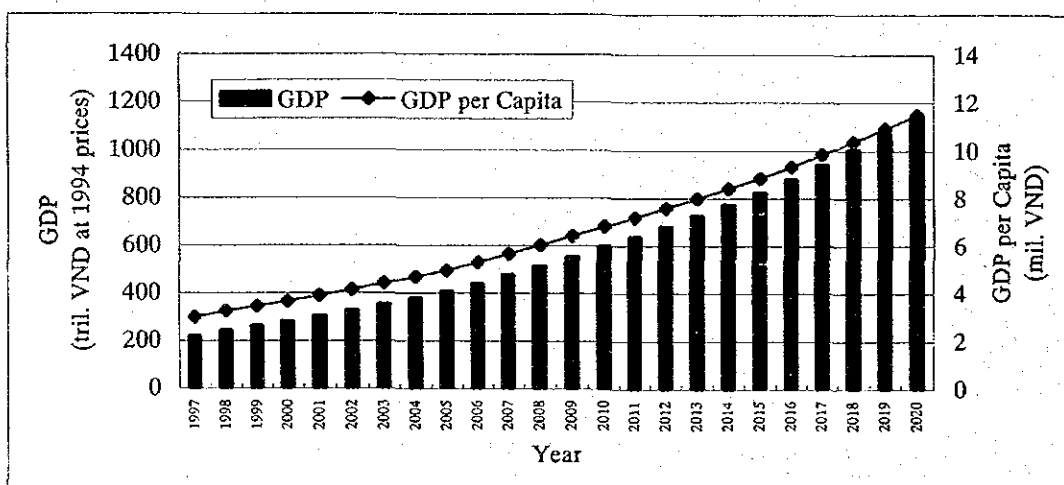


Figure 11.1.2 GDP Forecast between 1997 and 2020

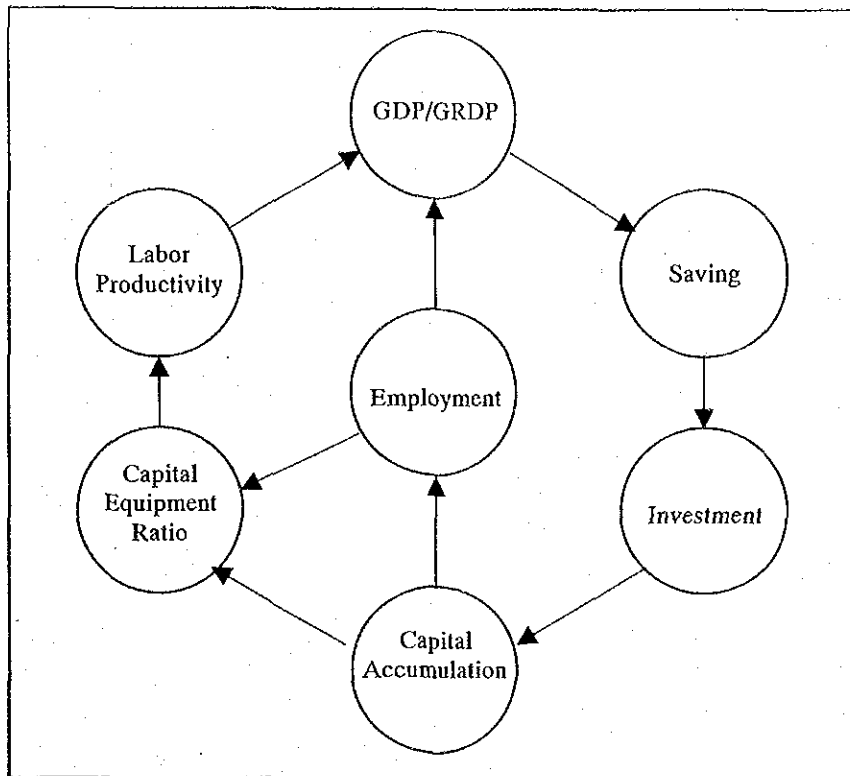


Figure 11.1.1 VITRANSS GDP/GRDP Projection

Internal Variables:

- Y: GDP
- S: Gross Saving
- K: Capital Stock
- ΔK : Increase in Capital
- I: Gross Investment
- N: Total Employment
- N_h : Annual Working Hours
- \bar{a} : Employment Parameter

External Variables

- P: Total Population
- W_h : Average Daily Working Hours a Day
- L_d : Annual Average Working Days per Person

Klein-Kosobud Model:

- | | |
|---------------------------------------------------------------|-----------------------------------------------|
| (1) $\frac{S(t)}{Y(t)} = f\left(\frac{Y(t)}{P(t)}\right)$ | (4) $K(t) = K(t-1) + \Delta K(t)$ |
| (2) $\frac{Y(t)}{N_h(t)} = g\left(\frac{K(t-1)}{N(t)}\right)$ | (5) $S(t) = I(t)$ |
| (3) $\Delta K(t) = f[I(t)]$ | (6) $N_h(t) = W_h(t) \cdot L_d(t) \cdot N(t)$ |
| (7) $N(t) = \delta(t) \cdot P(t)$ | |

Table 11.1.2 Forecast Results (2001-2020)

Year	Population ('000)	GDP (bil. VND at 1994 constant prices)	GDP per Capita (mil. VND)
1997 (actual)	74,307	221.9	3.0
1998 (actual)	75,456	244.7	3.2
1999 (actual)	76,597	264.0	3.4
2000 (actual)	77,686	283.5	3.6
2001	78,657	304.7	3.9
2002	79,640	328.3	4.1
2003	80,636	353.4	4.4
2004	81,644	379.8	4.7
2005	82,664	407.0	5.0
2006	83,698	440.3	5.3
2007	84,744	476.0	5.6
2008	85,803	513.2	6.0
2009	86,876	552.9	6.4
2010	87,962	595.2	6.8
2011	89,061	636.1	7.2
2012	90,174	679.2	7.6
2013	91,302	724.5	8.0
2014	92,443	772.2	8.4
2015	93,598	822.3	8.8
2016	94,768	878.8	9.3
2017	95,953	938.4	9.8
2018	97,152	1,001.4	10.4
2019	98,367	1,067.7	10.9
2020	99,596	1,137.5	11.5

The provincial-level forecast indicates that SFEA is expected to grow during the planning period 2000-2020, as follows:

- GDP will increase from VND 85,862 billion at 1994 constant prices to VND 347,250 billion (4 times).
- The industry sector will increase its share in GDP from 56.7 percent in 2000 to 59.6 percent in 2020.
- Population will increase from 8.5 million in 2000 to 12.0 million in 2020, faster than the anticipated national trend.
- GDP per capita of VND 16.3 million at 2000 current prices will increase to VND 46.8 million accordingly. In US dollars, these figures translate to about US\$1,125 and US\$3,329 respectively (US\$ 1 = VND 14,500).

To analyze the forecast more closely, the anticipated SFEA development at the provincial levels can be characterized as follows:

- HCM City will continue to attract immigrants and investments despite apparent increase in land scarcity. Its share in SFEA will slightly decrease from 61.0 percent in 2000 to 53.8 percent in 2020 in terms of GDP.

- There will be a sharp increase in urban development such as industrial estates and housing settlements in the neighboring provinces of Dong Nai and Binh Duong. This rapid urbanization will eventually result to a staggering increase in their respective GDPs, increasing 7.2 times in Dong Nai and 6.6 times in Binh Duong during the planning period.
- Ba Ria-Vung Tau Province will experience active urbanization, transforming its industry-dominated provincial structure into a balanced urban province. Thus, despite further accumulation of industrial investment, the industry sector will reduce its share in the provincial GDP, from 85.5% in 2000 to 71.6% in 2020.

Table 11.1.3 Economic Growth Forecast at SFEA

Province	GDP (bil. VND at 1994 constant prices)			Industry Sector's Share (%)		
	2000	2010	2020	2000	2010	2020
HCM City	52,342	101,652	186,649	46.0	52.3	54.5
Binh Duong	3,751	11,671	24,932	60.0	60.3	62.9
Dong Nai	10,422	35,953	75,126	56.6	56.8	61.4
Baria-Vung Tau	19,347	29,037	60,543	85.5	78.5	71.6
SFEA Total	85,862	178,313	347,250	56.7	58.0	59.6
Whole Country	275,918	598,574	1,143,799	35.9	38.1	40.8

11.2 Domestic Coastal Shipping Demand

(1) Forecast Methodology

This study uses the VITRANSS study's projected future cargo demand for domestic coastal shipping. Transport demand is strongly linked to socio-economic activities. In VITRANSS, future cargo demand by transport mode was estimated by forecast models developed based on the future socio-economic indicators such as GDP and population, etc. This forecast procedure followed the conventional four-step method, as follows:

- 1) Traffic generation and attraction
- 2) Traffic distribution
- 3) Modal split
- 4) Traffic assignment

The models for traffic generation and attraction were developed by commodity type based on the socio-economic indicators as well as surplus and deficit of commodities by province. Surplus and deficit was calculated using volumes of production and consumption of respective commodity type. Future production volume was worked out based on the government's sectoral development plan. Future OD traffic volume was estimated using future volumes of traffic generation and attraction and OD pattern of present traffic. Traffic volume by transport mode was estimated to minimize the total transport cost to some extent. Traffic assignment was done for road traffic.

(2) Present Domestic Cargo OD Traffic

In 1999, there was 7.2 million in total volume of domestic cargoes transported by coastal shipping, meaning 14.4 million tons of cargoes were handled at the Vietnam ports during that year. In 2000, the total domestic cargo throughputs were increased to about 21 million tons, 1.42 times of 1999's traffic volume.

Domestic cargo movement by coastal shipping was estimated for the year 2000 in this study. The OD (origin and destination) matrices by commodity type for the year 1999, which was developed in VITRANSS, was expanded using the latest port traffic statistics. Inter-provincial OD matrices in VITRANSS were aggregated into the five regions, as follows: north, central, SFEA, Mekong Delta Region, and the remaining areas in the South.

The domestic cargo volume transported between the SFEA and other regions was estimated as shown in Table 11.2.1. There were about 3.9 million tons of domestic cargos loaded in the SFEA and shipped to other regions. On the other hand, 2.8 million tons were shipped from the other regions and unloaded in the SFEA. There were very limited volume of cargoes transported to and from Mekong Delta region and the remaining areas in the south.

Most of domestic cargoes handled in the SFEA are shipped to and from the north accounting for 85% export and 88% in import. This can be attributed to the shipping industry's competitiveness over other transport means in long distance freight transport. Major commodity types were petroleum products in domestic export and cement and clinker in import, sharing 64% and 44% of respective totals.

The OD matrices by commodity type are shown in **Appendix 11-A**.

Table 11.2.1 Estimated Domestic Cargo Movement to/from SFEA, 2000

(unit: '000 tons)

Commodity Type	Domestic Export (from SFEA)			Domestic Import (to SFEA)		
	To North ^{1/}	To Central ^{2/}	Total	From North ^{1/}	From Central ^{2/}	Total
Rice / Other Food Crops	734	107	841	1	0	1
Wood / Forestry Products	0	0	0	0	7	7
Steel / Iron	193	0	193	141	3	144
Construction Materials	0	0	0	51	24	75
Cement / Clinker	0	0	0	1,137	81	1,218
Fertilizer	194	46	240	295	74	369
Coal / Other Mining Products	0	0	0	420	108	528
Petroleum Products	2,079	398	2,477	0	0	0
Manufactured Goods	113	17	130	383	35	418
Total	3,314	568	3,882	2,429	332	2,761
% share	85.4	14.6	100	88.0	12.0	100

Note: 1/ includes the regions of Red River Delta, North East and North West.

2/ includes the regions of North Central Coast, South Central Coast and Central Highlands

(3) Future Port Throughputs of Domestic Cargo in Vietnam

Total port throughput of domestic cargoes in Vietnam for the years 2010 and 2020 were estimated by commodity type as shown in Table 11.2.2. Total throughputs are projected to increase to 38.9 million tons in 2010 and 76.6 million tons in 2020, an increase of 1.8 times and 3.6 times, respectively, from the year 2000.

Wood, steel, construction materials, coal and petroleum products are the commodity types with more than an average increase rate from 2000 to 2020. The OD matrices by commodity type are shown in **Appendix 11-B and 11-C**.

Table 11.2.2 Future Port Throughputs of Domestic Cargo in Vietnam

Commodity Type	Port Throughputs ('000 tons)			2010/2000	2020/2000
	2000	2010	2020		
Rice / Other Food Crops	3,582	7,838	12,937	2.2	3.6
Wood / Forestry Products	285	1,064	1,937	3.7	6.8
Steel / Iron	678	1,280	2,547	1.9	3.8
Construction Materials	499	676	1,897	1.4	3.8
Cement / Clinker	3,718	2,689	8,117	0.7	2.2
Fertilizer	2,219	3,462	6,327	1.6	2.9
Coal / Other Mining Products	2,130	6,300	11,349	3.0	5.3
Petroleum Products	5,696	12,163	25,778	2.1	4.5
Manufactured Goods	2,384	3,390	5,683	1.4	2.4
Total	21,191	38,862	76,572	1.8	3.6

(4) Future Port Throughputs of Domestic Cargo in the SFEA

Future port throughputs of domestic cargoes in the SFEA were estimated by commodity type as shown in Table 11.2.3. Total throughputs are projected to increase to 12.5 million tons in 2010 and 20.3 million tons in 2020, an increase of 1.9 times and 3.0 times, respectively, from the year 2000.

Rice, wood, steel, construction materials, coal and petroleum products are the commodity types with an average increase rate from 2000 to 2020. However, the volumes of wood and construction materials are not significant.

Future domestic cargo movement between the SFEA and other areas for the year 2010 and 2020 are shown in Table 11.2.4 and Table 11.2.5, respectively. It is projected that in 2010, the petroleum products will be the most dominant commodity type in domestic export with 4.2 million tons or 59% of the total. This will mainly include the transport of crude oil from the off-shore of Vung Tau province to the Central Vietnam where Dung Quat Oil Refinery, with a capacity to process 6.5 million tons of crude oil per annum, is planned to be built by 2010. Given this set-up, there is therefore no loading that will take place at the coastal ports. The second dominant commodity type is 1.9 million tons of rice and other food crops to be transported to the North Vietnam.

With regards to domestic import, coal and other mining products will be the most dominant commodity type with 2.8 million tons or 54% of the total domestic import. Most of these coals will come from Quang Ninh province in the North Vietnam.

The growth trends from 2000 to 2010 for these different commodity types will basically continue until 2020 except those of coal and cement. The throughput of coals in the SFEA will not increase much after 2010 due to the anticipated decrease in the consumption of coals brought about by the conversion of domestic energy source from coal to gas or electricity in the South Vietnam.

In the case of cement, due to its very unbalanced production and consumption, it is anticipated that the volume of cement transported to the SFEA will be decreased from 1.2 million tons in 2000 to 0.3 million tons in 2010 and will be increased to 1.4 million tons in 2020.

Table 11.2.3 Future Coastal Shipping Traffic Demand to be handled in the SFEA

Commodity Type	Port Throughputs ('000 tons)			'10/'00	'20/'00
	2000	2010	2020		
Rice / Other Food Crops	842	2,027	2,989	2.4	3.5
Wood / Forestry Products	7	57	163	8.1	23.3
Steel / Iron	337	579	969	1.7	2.9
Construction Materials	75	110	314	1.5	4.2
Cement / Clinker	1,218	305	1,505	0.3	1.2
Fertilizer	609	898	1,249	1.5	2.1
Coal / Other Mining Products	528	2,983	2,971	5.6	5.6
Petroleum Products	2,477	4,631	8,621	1.9	3.5
Manufactured Goods	548	910	1,480	1.7	2.7
Total	6,643	12,500	20,261	1.9	3.0

Table 11.2.4 Future Domestic Cargo Movement to/from SFEA, 2010

(unit: '000 tons)

Commodity Type	Domestic Export (from SFEA)					Domestic Import (to SFEA)				
	North ^{1/}	Central ^{2/}	South ^{3/}	Mekong	Total	North ^{1/}	Central ^{2/}	South ^{3/}	Mekong	Total
Rice / Other Food Crops	1,577	369	0	0	1,946	58	23	0	0	81
Wood / Forestry Products	6	1	4	19	30	14	13	0	0	27
Steel / Iron	201	5	0	0	206	265	90	0	10	365
Construction Materials	35	14	0	0	49	10	50	0	1	61
Cement / Clinker	0	0	0	11	11	169	43	0	80	292
Fertilizer	263	53	0	2	318	395	158	0	27	580
Coal / Other Mining Products	36	12	0	0	48	2,732	60	10	21	2,823
Petroleum Products	763	3,460	0	18	4,241	105	275	0	10	390
Manufactured Goods	216	60	1	6	283	541	81	1	4	627
Total	3,097	3,974	5	56	7,132	4,289	793	11	153	5,246

Note: 1/ includes the regions of Red River Delta, North East and North West.

2/ includes the regions of North Central Coast, South Central Coast and Central Highlands

3/ includes the provinces in Northeastern South Region except the SFEA's provinces

Table 11.2.5 Future Domestic Cargo Movement to/from SFEA, 2020

(unit: '000 tons)

Commodity Type	Domestic Export (from SFEA)					Domestic Import (to SFEA)				
	North ^{1/}	Central ^{2/}	South ^{3/}	Mekong	Total	North ^{1/}	Central ^{2/}	South ^{3/}	Mekong	Total
Rice / Other Food Crops	1,917	573	0	0	2,490	336	159	0	4	499
Wood / Forestry Products	22	8	15	35	80	52	30	0	1	83
Steel / Iron	181	11	0	1	193	459	250	3	44	756
Construction Materials	61	28	0	0	89	28	193	0	4	225
Cement / Clinker	0	16	8	47	71	143	1,066	18	193	1,420
Fertilizer	334	60	0	4	398	490	293	1	65	849
Coal / Other Mining Products	47	321	0	0	368	2,535	17	0	3	2,555
Petroleum Products	874	6,809	0	85	7,768	334	497	0	23	854
Manufactured Goods	316	113	3	20	452	793	213	2	20	1,028
Total	3,752	7,939	26	192	11,909	5,170	2,718	24	357	8,269

Note: 1/ includes the regions of Red River Delta, North East and North West.

2/ includes the regions of North Central Coast, South Central Coast and Central Highlands

3/ includes the provinces in Northeastern South Region except the SFEA's provinces

(5) Future Container Traffic Volume

Domestic container traffic is still very small in Vietnam's coastal shipping with only about 48,000 TEUs or 525,000 tons volume of domestic containers handled by four ports in the SFEA. Since disaggregated figures for loading and unloading by commodity type are not available, the figures were estimated by applying containerization factors by commodity type. It is a fact that the most suitable commodity type for container transport is manufactured goods.

In VITRANSS, containerization factors are set for planning purpose by commodity type. However, these factors were based on international shipping. Therefore, it is assumed that the containerization factors are relatively less in Vietnam's domestic coastal shipping. Similarly, the average weight per TEU is also assumed to be getting gradually lighter. These assumed factors are shown in Table 11.2.6.

Based on the assumed containerization factors, the SFEA's future containerized cargo throughputs were estimated as shown in Table 11.2.7. The number of containers will increase to 120,000 TEUs in 2010 and 252,000 TEUs in 2020, an increase of 2.5 times and 5.3 times respectively from the 48,000 TEUs in 2000.

Table 11.2.6 Assumed Containerization Factors and Average Weight for Domestic Cargoes

Commodity Type	2010	2020
Rice	0.20	0.30
Steel	0.15	0.20
Fertilizers	0.15	0.20
Manufactured Goods	0.75	0.80
Average Weight per TEU	10.5 ton	10.0 ton

Table 11.2.7 Future Domestic Containerized Cargo Throughput in the SFEA

		2000 actual	2010	2020
'000 Tons	Domestic Export	-	680	1,227
	Domestic Import	-	581	1,293
	Domestic Total	525	1,261	2,520
'000 TEU	Domestic Export	-	65	123
	Domestic Import	-	55	129
	Domestic Total	48	120	252

11.3 Overseas Shipping Demand

11.3.1 Methodology

(1) Trade Environments and Associated Policies

International transport requirements and infrastructure development are strongly linked with international trade volumes, trade facilitation and economic integration and socio-economic development. Rational and sound trade policies should also be developed to provide guidelines and at the same time promote proper and desirable trading activities.

In Vietnam, the most modest trade policy was applied in the 1980s where only deficit goods were imported from and surplus goods were exported to limited countries. The policy emphasized self-sufficiency and the protection of domestic markets.

However, during the 1990s, there has been a growing consensus that the route to prosperity lies in the integration with the global economy. This led to the increased acceptance of international trade as the primary engine of economic growth and development. Vietnam adopted market principles in a selective manner in order to strengthen its inter-dependency with the global economy and improve its macroeconomic balance by:

- i) Exporting advantageous primary commodities as foreign currency earners such as rice, coffee, shrimp, coal and crude oil.
- ii) Promoting industrialization to alternate domestic goods with imported goods to satisfy domestic needs and keep foreign currency reserves. The major commodities are sugar, cement, fertilizer, and steel.
- iii) Enhancing the establishment of processing and exporting industries to utilize abundant labor force and other local resources. In particular, FDI plays an important role in shifting from low to high value products and compete with the international markets.

In the next two decades, Vietnam needs to comprehensively liberalize its trade policies by removing trade and investment barriers in order to participate in various trade liberalization regimes such as AFTA, APEC, Vietnam-US Trade Agreement, and eventual admission to WTO.

(2) Traffic Demand Segments and Forecast Methods

As discussed in the previous section, within the context of the changing trade environments, port traffic forecast needs to include not only conventional trade activities to keep national economy but also liberalized trade transactions with special attention to global logistics management. Different forecast methods are applied to delineate those traffic demand segments. (Refer to Table 11.3.1)

National trade balance: The VITRANSS conducted a series of traffic surveys and analyzed the present commodity-based traffic flow, totaling 13 commodity groups. To understand the socio-economic conditions of the present cargo traffic, commodity production and consumption were analyzed at the provincial level using provincial statistics, trade statistics, government documents, and the results of various VITRANSS surveys. Then future production and consumption by commodity were forecast to also project possible cargo traffic demand, assisted by the socio-economic development framework, governmental policies and investment projects. The resulting national trade balance mostly considered overseas shipping demand due to negligible cross-border traffic on land.

Liberalized trade transactions: Vietnam imports numerous industrial goods not only for end-users but also for manufacturers who may use them as parts or intermediate materials of final products which may either be exported or sold to local markets. Such trade transactions have become apparent since the Tan Thuan EPZ and the Linh Trung EPZ started their respective operations in 1991 and 1992. In the future, liberalized trade regimes will further accelerate such transactions as Vietnam's economy becomes more integrated with the global economy. Compared with advanced ASEAN countries, Vietnam's accumulated investment in internationally linked manufacturers, particularly in the processing and export industries, is still in a fledgling level although there are rich reserves for industrial estates and labor force. It is therefore projected that the recent trade expansion in manufactured goods and their parts and mean products will continue as the industry sector's GDP grows.

Global logistics management: The globalization phenomenon, which gained momentum in the 1990s, has reached that point where its effects are now being felt in almost all parts of the world. It has brought structural changes in the world economy and governments as well as the private sectors. One of the most passive effects is the drastic expansion of inter- and intra-regional freight movement including transshipment cargo from only 2 million TEU in the world in 1985 to

28 million TEU in the Asia and Pacific region in 1999. Governments have been adopting policies that reduce barriers to both trade and investment. Under the ASEAN cooperation mechanism, the representative tools are the “ASEAN Framework Agreement on Services, signed in 1995”, “ASEAN Framework Agreement on the Facilitation of Goods in Transit, signed in 1998” and “ASEAN Framework Agreement on Multimodal Transport, officially drafted”. Shipping lines and port operators have responded to the challenges and opportunities. These challenges have occurred most profoundly in container shipping such as assignment of very large ships on trunk routes, preference of hub ports from others and promotion of multi modal transport on the port hinterlands.

Within the scope of the SFEA port system, two possibilities are examined from a global logistics management viewpoint, i.e., transshipment containers at ports and transit cargo with neighboring countries.

Table 11.3.1 Methods Used to Forecast Overseas Shipping Demand

Demand Segments	Cargo Types	Forecast Methods	Indicators
National Trade Balance	<ul style="list-style-type: none"> • Primary sector's Products • Fossil fuels • Bulk industrial materials 	<ul style="list-style-type: none"> • Future production, consumption and surplus/deficit are estimated by commodity type based on the Main Commodities Survey conducted by VITRANSS 	<ul style="list-style-type: none"> • Population • Sectoral GDP • Government policies • Investment projects
Liberalized Trade Transactions	<ul style="list-style-type: none"> • Manufactured goods and their parts/mean products 	<ul style="list-style-type: none"> • Recent trade trend is expected to continue in line with industrial development 	<ul style="list-style-type: none"> • Recent trade volumes • Industry sector's GDP
Global Logistics Management	<ul style="list-style-type: none"> • Containerized cargo in transshipment • Transit cargo with neighboring countries 	<ul style="list-style-type: none"> • The latest information on regional transshipment ports is duly examined. • The possibility to transship other Vietnamese cargo is assessed. • The on-going trans-Asia highway project is reviewed. 	<ul style="list-style-type: none"> • Port statistics in neighbors • Container shipping schedule around Vietnam • Related cross-border road project document

(3) Containerization

To forecast container traffic volume in the Study, the following two assumptions are made:

- i) In 2000, Vietnamese Ports handled 1,147,572 TEU containing 11,685,010 tons, i.e., 10.18 tons per TEU. Thus, future container shipping is assumed to transport 10 tons per TEU.
- ii) Containerization rates in the future are adequately set on containerized cargoes as shown in Table 11.3.2.

Table 11.3.2 Conversion Rates for Containerization

Commodity	0 : Bulk Cargo 1 : General Cargo	Factor
Rice and Other Food Crops	1	0.3
Sugarcane/Sugar	0	0.0
Forestry Products	1	0.2
Steel	1	0.2
Construction Material	0	0.0
Cement/Clinker	0	0.0
Fertilizer	1	0.0
Coal/Other Minig	0	0.0
Crude Oil/Petroleum	0	0.0
Industrial Crops	1	0.8
Manufactured Goods	1	0.8
Fishery products	1	1.0
Animal Meat and Others	1	1.0

Source: VITRANSS

11.3.2 National Trade Balance

Major commodities have been analyzed in the light of Vietnam's trade balance with featuring the possible roles of the South Vietnam.

(1) Rice and Other Food Crops

Due to increase in paddy productivity and newly cultivated lands, in just a short period of time, Vietnam has become a rice-exporting country exporting 1.4 million tons in 1989 to 3.5 million tons in 2000. The Ministry of Agriculture and Rural Development (MARD) expects to harvest 38-40 million tons of food crops in 2010, representing a production increase of 1.8-2.1 percent annually to enable the country to export 5 million tons of rice. In 2020, exported rice is estimated to be at 6 million tons.

The Mekong River delta is a rice basket region and it will keep this role until the year 2020, offsetting other regions' deficit in rice production and exporting the rest to global markets.

(2) Fishery Products

The fishery sector is important among Vietnamese since it supplies them with an average of about 40 percent for the country's animal protein requirements. Their products have also proven to be a high foreign-currency earner. In 2000 alone, it accounted for 10.3 percent of total export with a value of US\$1,475 million. With an increase rate of 3-5 percent, per capita fishery consumption will reach an average of 29 kg in 2020. The export volume, on the other hand, is projected to double its 2000 figure.

The potential for aquaculture is more promising in the south since its climate is warmer, resulting in longer periods of growing season for tropical species such as tiger shrimp. Its relative freedom from typhoon is also more favorable for coastal saline, brackish water and marine aquaculture. In fact, the Mekong River delta has dominant shares of 59 percent in breeding fishes and 80 percent in breeding shrimp.

(3) Animal Meat

Since 1989, farmers have been entitled to purchase, sell and trade their products in the market. Vietnam's animal husbandry sector has been growing rapidly among farmers gaining a small but constant income. Government believes that animal husbandry could account for about 30 percent of the total agricultural gross value by the year 2010 (19.7 percent in 2000). Consequently, the subsector will produce nearly 2.7 million tons of various animal meats in 2020. Export of meat, pork in particular, is deemed to be a possible source of foreign exchange.

Compared with fishery products, there is an expected production surplus in the Red River delta and the north central coast which may offset the likely shortage of meat production in the south.

(4) Industrial Crops

In Vietnam, cultivable industrial crops are classified into two: perennial crops (tea, coffee, rubber, pepper, coconut) and single-year crops (cotton, jute, tobacco, etc.). The country has harvested 2.7 million tons of industrial crops, with 1.2 million tons exported. In fact, most of the coffee, rubber and pepper harvests were exported, thus limiting domestic consumption.

Coffee is the second hard-currency earner in the agricultural sector. With a favorable natural environment and climate, Vietnam has a strong policy of developing rubber plantations. Coffee and rubber plantations are concentrated in the central highlands. Since they are located on mid- to uplands, access roads to ports are of important consideration.

(5) Sugar

Vietnam imports a small volume of sugar products to make up for the shortage in domestic consumption. Experiences of other countries show that per capita consumption increases as an economy grows. Thus, current sugar consumption of 9.5 kg a year per person is projected to be 20 kg in 2020. There are at present 33 sugar mills in operation with the Government planning to operate an additional 11 mills by 2010 and 17 mills by 2020. With the additional sugar mills, Vietnam will be able to export sugar products in 2020.

Since new sugar mills are mostly planned in the north where major planting of sugarcanes are expected, no trade activity is expected at ports in the south.

(6) Wood and Forest Products

The country has long been an exporter of timber, notably to the former USSR and other socialist countries. In 1992, a ban on the export of logs and processed timber was introduced to limit the destruction of Vietnam's remaining forests. At present, Vietnam imports a small volume of timber and export wood chips instead.

Government has assigned the National Forestry Corporation to reforest 500,000 hectares for the wood processing industry. However, the wood and forest products will be supplied only to domestic consumers.

(7) Steel and Iron

There is a growing consumption need for steel products in Vietnam. During the period 1995-2000, domestic production increased by 3.6 times while importation by 2.4 times. Vietnam Steel Corporation is constructing new plants to replace imported final products with domestic ones. But their small steel plants need iron ingot and scrapped steel as inputs.

Many steel plants are located in the north for proximity to coal, limestone and iron ore reserves. Still, these plants cannot provide sufficient volume in the domestic markets. Thus, the South Vietnam imports most of its steel products.

(8) Cement and Clinker

With an abundance of limestone and other mineral resources, Vietnam can provide favorable locations for cement production not only for domestic cement makers but also to foreign investors. In the early 1990s, however, domestic cement production did not keep pace with its demand. Foreign invested plants such as Chin Fong and Nghi Son are freeing the country from its reliance on imported cement.

During the forecast period, 25 large plants, including 18 new plants, will meet the projected domestic demand and shall export 3-6 million tons of surplus cement. Since necessary mineral products are concentrated in the north and north central coast, cement products will be exported from the north while southern cement mills will receive clinker from the north.

(9) Fertilizer

Phosphate and nitrogen fertilizers are mostly produced in the north. Appetite (phosphaticore) is a source used in the manufacture of fertilizers, with reserves mainly in Lao Cai. Domestic production of fertilizers cannot compete with imported ones in terms of price as well as quality. Imported chemical fertilizers reached 3,982,000 tons in 2000, or 3.0 times bigger than domestic production. Since Vietnamese-made products may not be dominant in the domestic markets during the forecast period, southern farmers will continue to patronize imported fertilizers.

(10) Coal and Other Mining Products

Vietnam's principal coal reserves lie in the Quang Ninh coalfield. Other countries favors Vietnam's anthracite coal for its low ash, low phosphorus and high fixed-carbon content. From a global marketing perspective, Vietnam accounts for a 30 percent share of anthracite coal, which is limited to about 10 million tons a year.

Vietnam has other mining resources such as chromium, titanium, crystalline, silica sand, bauxite and alumina. But their total export amount is quite marginal in the country's trade structure, e.g., 120,000 tons in 1997.

(11) Crude Oil

Vietnam's continental shelf remains largely unexplored relative to those of its neighbors. Petro Vietnam has intensified its efforts to attract international oil companies to explore the country's sedimentary basins. But the potential reserves are likely to change because some of the main oil and gas discoveries are still at an early stage of appraisal. Preliminary analysis indicates that an amount of 17 million TOE (tons of oil equivalent) is anticipated in the early 2000s. In fact, 14.9 million TOE was extracted. But many potential fields still remain unexplored.

In regard to crude oil haulage, crude oil is currently exploited at the offshore of Vung Tau Cape and loaded on tankers directly. No shipment port is required.

(12) Refined Oil Products

Vietnam is not yet equipped with refinery facilities which are able to process its ample reserves, except for small facilities such as Saigon Petro. Government announced that the first oil refinery is going to be built in Dung Quat, Quang Ngai Province, with a capacity to process 6.5 million tons per annum of crude oil by 2003. It has also a plan to construct one more refinery somewhere in the

central region by the year 2010. Further addition will be determined judging from crude oil production and refined oil consumption in future.

According to the WB's energy sector report, the increase in refined oil demand will be faster than Vietnam's GDP growth until the year 2015: 10.4 million tons in 2005, 15.3 million tons in 2010, and 22.7 million tons in 2015. Necessary import volume, e.g., 8.0 million in 2000, will reduce considerably because of the expected construction of domestic refineries.

At present, SFEA ports import considerable refined oil and partly ship them out to north and central Vietnamese ports. With the Vietnamese refineries, a coastal flow will be dominant in refined oil haulage while no transshipment flow is predicted.

Table 11.3.3 Forecast of Basic Trade Balance among Major Commodities
(unit: thousand tons)

	Whole Country			South Vietnam		
	2000	2010	2020	2000	2010	2020
Rice & Food Crops	3,500	5,000	6,000	3,300	4,700	5,600
Fishery Products	614	860	1,236	614	688	989
Animal Meat	14	62	71	0	0	0
Industrial Crops	1,160	2,130	4,430	380	700	1,460
Sugar	<i>43</i>	0	470	0	0	0
Wood Tip	175	175	175	100	100	100
Timber	<i>100</i>	0	0	<i>100</i>	0	0
Steel & Iron	<i>2,661</i>	<i>1,751</i>	<i>6,779</i>	<i>2,000</i>	<i>1,313</i>	<i>5,084</i>
Cement & Clinker	<i>250</i>	3,139	6,779	<i>160</i>	0	0
Fertilizer	<i>3,982</i>	<i>4,655</i>	<i>5,913</i>	<i>2,987</i>	<i>3,491</i>	<i>4,435</i>
Coal & Other Mining Products	3,038	5,000	5,500	0	0	0
Crude Oil	14,944	3,470	3,470	14,944	3,470	3,470
Refined Oil Products	<i>7,999</i>	<i>5,251</i>	<i>17,823</i>	<i>5,642</i>	<i>3,599</i>	<i>7,945</i>

Note 1: Figures in italics mean imported volumes.

Note 2: For detailed information such as provincial breakdown and existing/proposed factories, please refer to the related VITRANSS Reports.

11.3.3 Liberalized Trade Transactions

(1) Trade Volume

Liberalized trade regimes firmly support international manufacturers with production facilities in the different regions and countries but can efficiently connect with the industry regardless of borders and can provide competitive products in the global markets. Vietnam has set its policies to attract investment and expand trade to become one of the major production centers under this globalization trend.

SFEA has a longer history to receive such international manufacturers than other areas in Vietnam. By using a regression model, a clear correlation can be observed between the industry sector's GDP and trade volume. Thus, the future demand forecast was based on the following formulae:

$$\begin{array}{lll} \text{(Export)} & Y = -973.91 + 0.07385 X & (R=0.851) \\ \text{(Import)} & Y = -2,592.38 + 0.15905 X & (R=0.909) \end{array}$$

Where, Y: Overseas Shipping Cargo Demand ('000 tons)
 X: Industry Sector's GDP (bil. VND at 1994 constant prices)
 R: Correlation Coefficient

This shows that the trade volume of various manufactured goods inclusive of parts and mean products will increase from 8.2 million tons in 2000 to 44.6 million tons in 2020 or 5.4 times.

Table 11.3.4 Projection of Various Manufactured Goods in SFEA

Year	Industry Sector's GDP (billion VND at 1994 constant prices)	Manufactured Goods ('000 tons)	
		Export	Import
1994	19,845	929	783
1996	32,722	704	1,433
1998	34,553	1,520	3,788
2000	48,684	2,981	5,226
2010 (forecast)	103,422	6,664	13,857
2020 (forecast)	206,951	14,310	30,323

(2) Absorptive Capacity

The projected increase in the trade volume now brings to the issue of whether SFEA will be able to absorb such huge industrialization or not. If it is physically impossible within SFEA, the recent trade trend must be curbed below an acceptable level.

The existing government policy encourages new industrial development in designated industrial zones rather than in congested urban areas. Industrial zone regulations are articulated in Decree No. 192-CP dated 25 December 1994. These regulations, which are established by Government decisions, defined the boundaries of industrial zones and 'concentrated' industrial areas. The regulations, which restrict inhabitants in the area, also provided for services to support industrial production.

There are at present 3 export processing zones (EPZs) and 30 industrial zones (IZs), 8,573 ha of which are industrial lands for exclusive industrial use. There are 2,168 ha of industrial land or 25 percent which are actually occupied with various industrial enterprises. In addition, 31 IZ projects have been officially approved with an aggregated land of 9,685 ha. (Refer to Table 11.3.5 and Figure 11.3.1)

Table 11.3.5 Designated Industrial Areas in SFEA (1/2)

Province	Status	EPZ /IZ	Name	District	Industry Type	Established Year	Area (ha)		Occupancy Rate ^{1/} (%)	No. of Projects	Total Investment Capital ^{2/} (mil. US\$)
							Existing	Planned			
HCMC	Existing	EPZ	Tan Thuan	District 7	Light	1991	300	300	70	125	578
		EPZ	Linh Trung	Thu Duc	Light	1992	126	143	68	28	162
		IZ	Tan Tao	Binh Chanh	Light	1996	181	181	38	85	167
		IZ	Hiep Phuoc	Nha Be	Heavy	1996	332	2,000	7	14	41
		IZ	Binh Chieu	Thu Duc	Light	1996	27	27	78	20	74
		IZ	Vinh Loc	Binh Chanh	Light	1997	207	207	26	41	38
		IZ	Tan Binh	Tan Binh	Light	1997	155	178	28	73	43
		IZ	Tan Thoi Hiep	District 12	Light	1997	215	215	4	13	15
		IZ	Tay Bac - Cu Chi	Cu Chi	Light	1997	220	220	12	16	34
		IZ	Cat Lai	District 2	Light	1997	134	134	0	0	0
		IZ	Le Minh Xuan	Binh Chanh	Light	1997	100	100	25	87	110
				Sub-Total			1,997	3,705	22	502	1,262
	Planned	IZ	Tan Qui	Cu Chi	Light	-	-	150	-	-	-
		IZ	Linh Xuan	Thu Duc	Light	-	-	200	-	-	-
		IZ	Hiep Hoi Nhua	Hoc Mon	Light	-	-	n.a	-	-	-
		IZ	Hiep Binh Phuoc	Thu Duc	Light	-	-	n.a	-	-	-
		IZ	Cong Nghe Cao	District 9	Light	-	-	n.a	-	-	-
		IZ	Binh Hoa	Binh Thanh	Light	-	-	n.a	-	-	-
		IZ	An Ha	Binh Chanh	Light	-	-	200	-	-	-
		IZ	Phu My	Nha Be	Light	-	-	400	-	-	-
			Sub-Total			0	950				
HCMC Total							1,997	4,655		502	1,262
Dong Nai	Existing	IZ	Bien Hoa 1	Bien Hoa	Light	1963	335	335	90	88	318
		IZ	Bien Hoa 2	Bien Hoa	Light	1993	365	365	90	115	1,295
		IZ	AMATA	Bien Hoa	Light	1994	129	760	40	16	308
		EPZ	LOTECO	Bien Hoa	Light	1996	100	100	8	7	105
		IZ	Nhon Trach 1	Nhon Trach	Light	1995	-	430	80	23	341
		IZ	Nhon Trach 2	Nhon Trach	Light	1997	448	350	45	10	810
		IZ	Nhon Trach 3	Nhon Trach	Light	1997	-	368	12	4	268
		IZ	Go Dau	Long Thanh	Chemical	1995	186	186	75	14	342
		IZ	Ho Nai	Thong Nhat	Light	1998	191	523	20	32	128
	IZ	Song May	Thong Nhat	Light	1998	227	471	20	16	161	
				Sub-Total			1,981	3,888	47	325	4,076
	Planned	IZ	Thanh Phu	Vinh Cuu	Light	-	-	186	-	-	-
		IZ	Nhon Trach 4, 5, 6	Nhon Trach	Light	-	-	1,552	-	-	-
		IZ	Long Khanh	Long Khanh	Light	-	-	100	-	-	-
IZ		An Phuoc	Long Thanh	Light	-	-	800	-	-	-	
IZ		Ong Keo	Long Thanh	Light	-	-	800	-	-	-	
IZ		Tam Phuoc	Long Thanh	Light	-	-	380	-	-	-	
IZ		Bau Xeo	Thong Nhat	Light	-	-	215	-	-	-	
IZ		Xuan Loc	Xuan Loc	Light	-	-	100	-	-	-	
IZ	Tan Phu	Tan Phu	Light	-	-	50	-	-	-		
IZ	Dinh Quan	Dinh Quan	Light	-	-	50	-	-	-		
			Sub-Total			0	4,233				
Dong Nai Total							1,981	8,121		325	4,076

Table 11.3.5 Designated Industrial Areas in SFEA (2/2)

Province	Status	EPZ /IZ	Name	District	Industry Type	Established Year	Area (ha)		Occupancy Rate ^{1/} (%)	No. of Projects	Total Investment Capital ^{2/} (mil. US\$)	
							Existing	Planned				
Binh Duong	Existing	IZ	Viet Huong	Thuan An	Light	1996	32	46	43	31	n.a.	
		IZ	Song Than 1	Di An	Light	1995	153	180	100	73	n.a.	
		IZ	Song Than 2	Di An	Light	1997	250	354	52	58	n.a.	
		IZ	Dong An	Thuan An	Light	1996	85	120	71	28	n.a.	
		IZ	Binh Duong	Di An	Light	1998	19	26	78	10	n.a.	
		IZ	Tan Dong Hiep	Di An	Light	1997	148	211	0	2	n.a.	
		IZ	Vietnam - Singapore	Thuan An	Light	1994	116	500	100	30	n.a.	
				Sub-Total				803	1,437	61	232	2,154
	Plan	IZ	Tan Dinh An	Ben Cat	Light	-	-	-	495	-	-	-
		IZ	An Phu	Thuan An	Light	-	-	-	297	-	-	-
		IZ	Lai Khe	Ben Cat	Light	-	-	-	320	-	-	-
		IZ	Bau Beo	Thuan An	Light	-	-	-	350	-	-	-
		IZ	Truong Bong Bong	Thu Dau Mot	Light	-	-	-	500	-	-	-
		IZ	My Phuoc	Ben Cat	Light	-	-	-	300	-	-	-
		IZ	Lai Uyen	Ben Cat	Light	-	-	-	500	-	-	-
			Sub-Total				0	2,962				
Binh Duong Total							803	4,399		232	2,154	
Ba Ria-Vung Tau	Existing	IZ	Dong Xuyen	Vung Tau	Light, Oil	1996	161	161	3	10	22	
		IZ	Phu My 1	Tan Thanh	Heavy	1998	954	954	27	16	436	
		IZ	My Xuan A	Tan Thanh	Light	1996	123	300	33	6	177	
		IZ	My Xuan A2	Tan Thanh	Light	2001	371	371	0	3	10	
		IZ	My Xuan B1	Tan Thanh	Light	1998	200	200	0	1	30	
				Sub-Total				1,809	1,986	17	36	675
	Plan	IZ	Cai Mep	Tan Thanh	Heavy	-	-	-	660	-	-	-
IZ		Phuoc Thang	Vung Tau	Light	-	-	-	140	-	-	-	
IZ		Long Huong	Ba Ria	Light	-	-	-	40	-	-	-	
IZ		Ngai Giao	Chau Duc	Light	-	-	-	200	-	-	-	
IZ		Phu My 2	Tan Thanh	Light	-	-	-	500	-	-	-	
			Sub-Total				0	1,540				
BR-VT Total							1,809	3,526		36	675	
SFEA	Existing						6,590	8,573				
Total	Planned						0	9,685				
	Total						6,590	18,258				

Source: Respective provincial EPZ/IZ management authorities

Note: 1/ rate to the total developed area

2/ including registered capitals

The total combined land area of existing unoccupied industrial area and planned IZ area is thus 16,090 ha, 7.4 times larger than the presently occupied land. It is deemed enough to support the forecasted various manufactured activities. Full industrial investment on those designated lands may generate considerable employment opportunities, i.e., around 0.3-0.4 million. Taking account of continuous population inflow into SFEA, labor force opportunities may not be restraint by continuing industrialization.

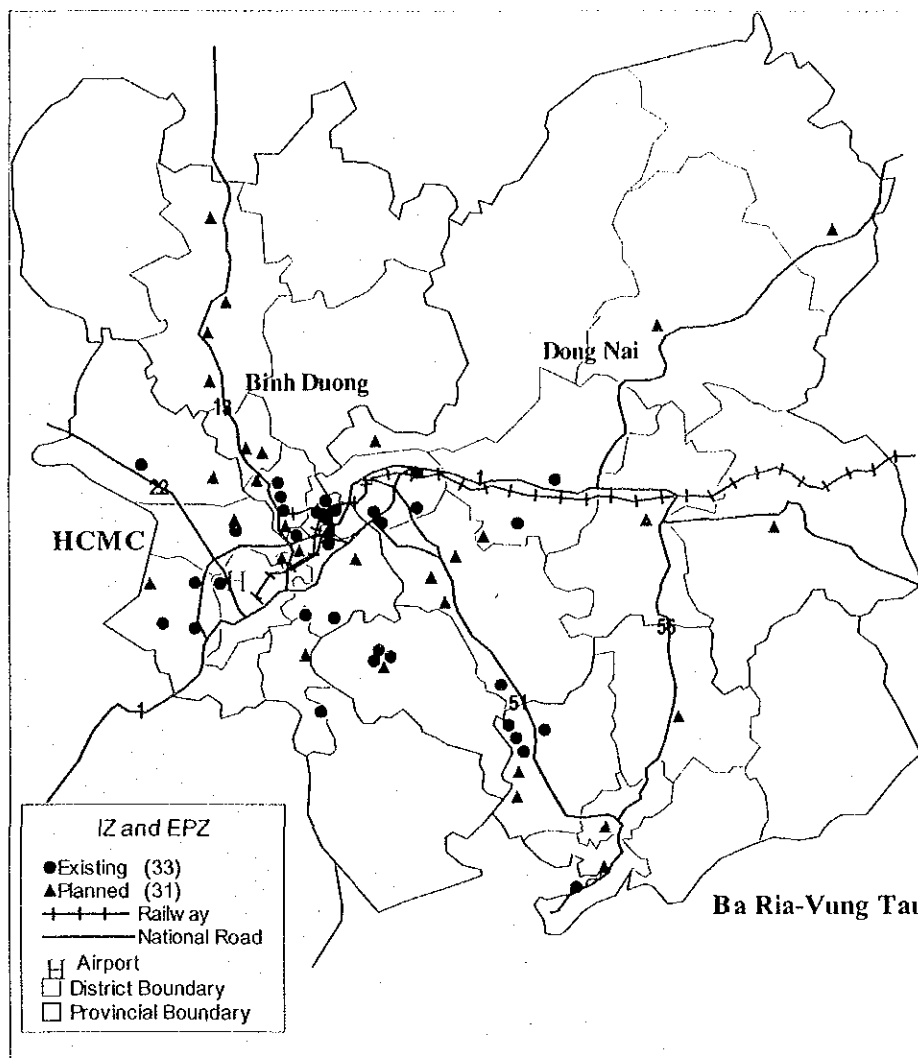


Figure 11.3.1 Location of Designated Industrial Areas of SFEA

11.3.4 Global Logistics Management

(1) Regional Transshipment Hubs

It is estimated that the total volume of containers being transshipped within the Asia and Pacific region will increase from an estimated 28.4 million in 1999 to 46.7 million in 2006 and 63.4 million in 2011.¹ The share of transshipment in the total port volume is expected to remain fairly constant at around 30 percent throughout the period, which however does not necessarily imply that the transshipment market will remain static.

Since transshipment cargoes offer port authorities and terminal operators an opportunity to develop their businesses at a faster rate than the development of their economic hinterlands would permit, the competition for this business is fierce and also very volatile. It is expected that the new ports of Kwangyang (Republic of Korea) and Tanjung Pelepas (Malaysia), and the transshipment hub emerging in Shanghai will all capture substantial transshipment volumes. The traditional port centers of Singapore, Kaohsiung and Hong Kong are expected to retain their importance

¹ UN ESCAP 2001 'Globalization and Integration of Transport: Regional Shipping and Port Development Strategies'

throughout the period. (Refer to Table 11.3.6)

In the intensified battle for hub status, international container terminal operators are continuously expanding the scope and scale of their activities and are operating terminals in ports around the world. Hutchinson Port Holdings (HPH), whose original stronghold was in Hong Kong, has developed a wide range of investments on the Chinese mainland, and has expanded its terminal operations to a total of 159 berths in 28 ports around the world. PSA Corporation of Singapore currently operates terminals in 10 different ports and continues to maintain its expansion strategy. Around 48 million TEU, or 21 percent of the world container throughput, was handled at the terminals operated by PSA and HPH in 2000. Australian-based P&O Ports has a lower global throughput, but an even more diverse and growing range of port investments which includes facilities in China, SE Asia, India, the Middle East, Europe and Africa. In addition to these port specialists, some major shipping lines also control international terminal networks. Some of these shipping lines, like Maersk-Sea Land for example, are clearly focused primarily on controlling stevedoring for their own vessels at Tanjung Pelepas Port in Malaysia and other ports.

Table 11.3.6 Estimated Transshipment Shares in the Asia and Pacific Region, 2011
(Thousand TEU, %)

	Base Case			Big Ships		
	Total	T/S	Share	Total	T/S	Share
Colombo	5,361	3,825	71.3%	6,309	4,773	75.7%
Singapore	28,717	20,917	72.8%	33,002	25,203	76.4%
Port Klang	8,436	5,068	60.1%	7,364	3,995	54.3%
Tanjung Pelepas	5,813	5,062	87.1%	3,772	3,020	80.1%
Hong Kong	26,021	5,985	23.0%	26,144	6,108	23.4%
Kaohsiung	13,190	6,106	46.3%	12,526	5,442	43.4%
Shanghai	18,648	7,368	39.5%	19,622	8,342	42.5%
Busan	11,562	3,938	34.1%	11,347	3,723	32.8%
Kwangyang	8,579	3,862	45.0%	8,002	3,284	41.0%
Tokyo/Yokohama	6,822	599	8.8%	6,849	626	9.1%
Kobe/Osaka	5,095	453	8.9%	5,153	510	9.9%
Total	138,246	63,183	45.7%	140,089	65,026	46.4%

Source: UN ESCAP in collaboration with Korea Maritime Institute, 2001

Note: The 'big ships' scenario is assumed to deploy vessels of 9,000 – 13,000 TEU on the major trade lanes.

The valuable finding from the estimation works is that the aggregated capacity of transshipment ports by 2011 exceeds the anticipated regional transshipment volume to great extent. In fact, many ports call for more transshipment containers than estimated ones to justify their investment plans. Transshipment port is considered a new business in the 1980s. However, in the 2000s, it is expected to become a risky business although ports aspiring hub status will be forced to spend huge investment given the intensive port competition.

A transshipment port project may be justified only when both infrastructure investment and operation is undertaken by the private sector. Tapping public funds, may it be from domestic funds or ODA funding would only be translated to costs shouldered by Vietnam's economy.

(2) Likely Transshipment Needs

Regardless of competition among the regional hubs, the Study has identified three kinds of constant transshipment needs in Vietnam. These are (i) minor transshipment on an ad hoc basis, (ii) transshipment with other Vietnamese ports and (iii) transit cargo along the on-going Trans-Asia Highway Project (Phnom Penh – HCM City).

Minor transshipment on an ad hoc basis: Without particular investments and worldwide logistics negotiations, a port with many container shipcalls may handle some transshipment due to shipping lines' convenience on an ad hoc basis. For example, Laem Chabang Port in Thailand handled 2.1 million TEU in 2000, of which 28,029 TEU or 1.3 percent were transshipment. In the forecast, such minor transshipment is assumed to have a share of 1 percent among SFEA foreign container demand.

Transshipment with other Vietnamese ports: At present, only small container ships with mostly less than 1,000 TEU call at Vietnamese ports for feeder services in connection with Hong Kong, Singapore and other major ports. In the future, the SFEA gateway port which shall be handling several million TEU, will accommodate many large ships and thus enable direct linkage with many other ports not through regional transshipment ports. Due to its outstanding container handling, it will be possible for the SFEA gateway port to transship cargoes shipped out from other Vietnamese ports, southwards in particular (Thailand, Indonesia and Oceania) and far west beyond Singapore (Middle East and Europe). In the forecast, the SFEA gateway port is assumed to transship one fourth of the foreign cargo which will be transported between other Vietnamese ports such as Cai Lan and Danang and the foreign ports of both the southwards and the far west beyond Singapore.

Transit cargo along the on-going Trans-Asia Highway Project: The road project connecting two metropolises, Phnom Penh and HCM City, is under construction with the assistance of ADB. According to the related F/S report prepared by ADB consultants, the project anticipates considerable cross-border traffic, i.e., 1,385 trucks and 2,536 trucks a day in 2010 and 2020, respectively, with some of these trucks accessing through the SFEA ports. Their package forms will be bagged, boxed and containerized suitable to road transport. As also indicated in the project's F/S report, the transit cargo with Cambodia is projected to be 646,000 tons in 2010 and 1,183,000 tons in 2020.

11.3.5 Summary of SFEA Cargoes

Based on the above-mentioned discussions and projections in connection with the domestic cargo demand forecast (Section 11.2), the future cargoes, which shall be handled at SFEA ports, are summarized in Figure 11.3.2 and Table 11.3.7. This shows that SFEA cargoes will increase by 3.4 times during the forecast period with the containerized cargo showing a faster increase (5.4 times).

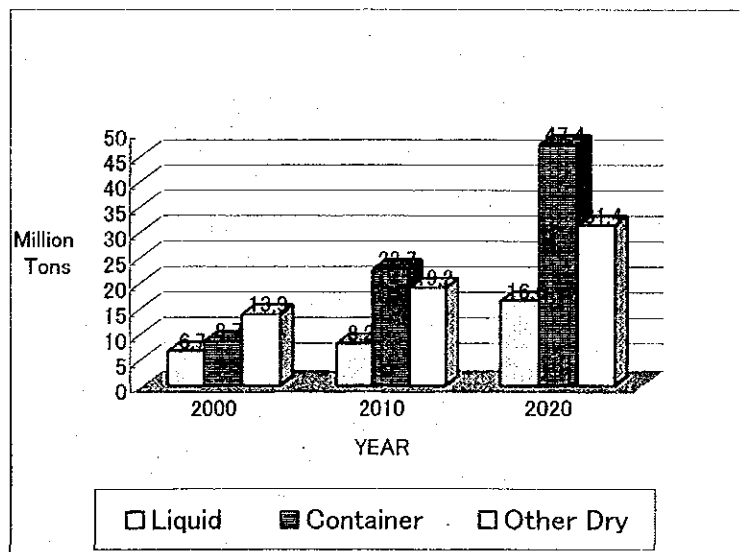


Figure 11.3.2 Forecast of SFEA Port Throughput

Table 11.3.7 Summary of Cargo Throughput at SFEA Ports

	Year 2010		Year 2020	
	Freight Volume ('000 tons)	Of which, Containerized ('000 TEU)	Freight Volume ('000 tons)	Of which, Containerized ('000 TEU)
Rice & Food Crops	4,700	141	5,600	168
Fishery Products	688	69	989	99
Industrial Crops	700	56	1,460	117
Forest Products	100	2	100	2
Steel & Iron	1,313	26	5,084	102
Fertilizer	3,491	0	4,435	0
Manufactured Goods	20,521	1,642	44,633	3,570
Refined Oil Products	3,599	0	7,945	0
Ad Hoc Transshipment	204	20	430	43
Transshipment with Other Vietnamese Ports	834	83	1,657	166
Transit Cargo with Cambodia	646	32	1,183	59
Overseas Shipping Total	36,796	2,071	73,516	4,326
Domestic Shipping Total 1/	13,334	203	21,918	418
SFEA Total	50,130	2,274	95,434	4,744

Note: 1/ Including transshipment cargo with other Vietnamese ports

Passenger Shipping Demand

In the light of the SFEA port system development, this section deals with oceangoing cruise ships. Other passenger shipping forms currently observed in SFEA, such as hydrofoil fast craft for tourists and ferry boats for river crossing, are disregarded since they do not require substantial port infrastructure.

(1) Previous Cruise Performance

Cruise ships started to call at the Vietnamese ports just after the World War II. At that time, most of the cruise ships came from the former USSR Block. In 1999, nine ships on their world tours and 63 ships on their regional tours called in the Vietnam ports. The ships which made frequent calls were MV Xin Shanghai Youlin (19 trips, 4,641 grt), MV Superstar Europe (9 trips, 37,012 grt) and Superstar Aries (4 trips, 37,012 grt).

In 2001, Star Cruises is the operator which most frequently sends ships to Vietnam with the following itineraries and their respective timetables:

- Hong Kong - Sanya - Danang (April to September)
- Hong Kong - Ahanjiang - Ha Long Bay (October to March)
- Laem Chabang - Phu Quoc Island/Con Dao Island/Phu My (October to April)

There is however no domestic cruise operator in Vietnam.

(2) Cruise Ports in SFEA

Saigon Port: The port is located just next to HCMC and 88 km away from Vung Tau Pilot Station. Pilot service is a must to access Saigon Port from the pilot station. The access channel depth is

8.5 meters. Saigon Port has four terminals with 17 berths in total. Port authority usually designates Nha Rong Terminal to receive the cruise ship. As a policy though, the terminal handles domestic general cargo at its nearest point to the CBD on other occasions. The port's advantage is its location while its disadvantages are ship size restriction (draft: 8.5 m, LOA: 220 m, height: 44 m) and a four-hour channel sailing only during daytime.

Table 11.4.1 Cruise Shipping Volume at Saigon Port

	1995	1996	1997	1998	1999	2000
No. of Ships	36	29	24	9	28	35
Total GRT	483,217	426,587	377,271	125,614	357,330	522,138
Embarked Passengers	12,046	8,395	11,719	2,107	6,105	11,470
Disembarked Passengers	12,090	7,643	11,729	2,122	6,081	9,270

Source: Saigon Port

Baria Serace Port: The port is located along the Thi Vai River, 70 km from HCMC and 45 km from Vung Tau City. Since its berth is deep at 12 meters, large ships that cannot enter Saigon Port use this instead. The largest cruise ship that docked here was MV Regal Princess (70,285 grt) in October 2000. The port mainly handles fertilizers. Since Star Cruises installed navigational aids along the access channel, nighttime navigation has become possible.

(3) Identified Potentials and Constraints

Vietnam has geographical advantages in terms of cruise development. First, it is located between the regional cruise hub ports of Hong Kong and Singapore. The ships on world cruise programs are expected to pass by the country. Second, Vietnam is endowed with tourist attraction sites spread along its very long coastline. For example, all of the country's four UNESCO World Heritage sites are located within the cruise passengers' one-day excursion areas. Thus, these world cruises must drop their anchors at two or three Vietnamese ports. In addition, Laem Chabang Port in Thailand is now fast becoming a regional cruise hub. Vietnam is therefore strategically located to become a potential regional cruise destination.

However, there is no port dedicated to cruise shipping at present. Cruise ships must enter congested and dirty cargo ports or use tender boats. There is no cruise ship that starts and ends its tour in Vietnam. Therefore, the fly and cruise concept which can attract cruise passengers has never been practiced.

It was observed that there are at least three attractive cruise ports: Ha Long Bay, Danang Bay and HCMC. The government is keenly promoting these three areas as gateway ports. However, the ongoing and proposed projects do not give enough attention on passenger shipping including cruise shipping. This should be a critical concern for Vietnam since the other countries' ports may temporarily use the facilities and amenities of passenger shipping for cruise passengers. For its part, Vietnam has no choice for such arrangements and thus ground cruise operators must carefully support cruise passengers.

The fly and cruise concept may be viable at HCMC if a satisfactory cruise port is developed along the Saigon River or its downstream. The Tan Son Nhat International Airport is located in the city area with enough space for future expansion.

(4) Demand Forecast

To identify a potential SFEA cruise market, the study focuses on foreign visitors and local tourists who can afford cruise tours and transit passengers probably coming from Bangkok and Hong Kong. Their individual demands are analyzed as follows:

- There is no doubt however that the foreign visitors are the potential cruisers. Singapore has provided cruising opportunities to 2.5 % of its foreign visitors in 2000. It is assumed that cruisers among the foreign visitor arrivals to SFEA are 0.5 % in 2010 and 1.0 % in 2020. It means that the cruisers will buy fly-and-cruise packages and use the SFEA cruise ports as their homeports.
- On the other hand, there is no available data to establish cruise affordability in the region. A cruise market survey in North America showed that more than 80% of actual cruisers have an annual income of at least US\$ 40,000. Since the per night cruise fare rates between North America and ASEAN are comparable, the results of the survey which presented the defined affordable potential cruisers (i.e., household income of US\$ 40,000 and more and per capita income of US\$ 10,000 and more) may be good indicators for reference to the SFEA market. However, such middle-class social segment will apparently not emerge yet by 2020 in SFEA. Thus local cruisers are forecast to be negligible.
- The SFEA cruise ports received approximately 45,000 cruise passengers in transit in 2000. In line with the growing regular short cruises around both Bangkok and Hong Kong, SFEA will receive much more transit cruisers as their ports-of-call. It is noted that some transit passengers may not disembark to participate in on-shore excursion programs.

Table 11.4.2 Forecast of Cruise Passengers at SFEA

	2000	2010	2020
Embarked/Disembarked Passengers	Neg.	15,000	60,000
Transit Passengers	45,000	148,000	266,000
Total	45,000	163,000	326,000

Chapter 12 Port Development/Administration Strategy

12.1 General Principles for Port Development

12.1.1 Maritime Strategy in Vietnam

“Emerging Issues in Transport, Communication and Infrastructure Development: Globalization and Integration of Transport: Regional Shipping and Port Development Strategies” by Economic and Social Commission for Asia and the Pacific (ESCAP) Report in July 2000 is referred to in this section.

(1) Container Fleet Forecast in the World

In order to explore implications of the ship size increase, the study developed two scenarios on the future network of liner shipping. The base case explores a relatively conservative hypothesis, in which the growing demand for the carriage of containerized cargoes will be met by continuation of slow creep in ship size similar to that which characterized the 1970's and 1980's, allowing for increase in scale of the largest vessels in service, up to 8,000 TEU in 2006 and 12,000 TEU in 2011. This is combined with an increase in the number of strings that are operated in each of the major trades. The number of ports included on each string is similar to the number included on the major services of today. Under this base case scenario, it has been projected that a total of around 950 vessels with capacity of more than 3,500 TEU, of which 30 ships are in the range of 9,000-13,000 TEU capacity for the trans-Pacific, Far East-Europe and North American Atlantic Coast services, will be operated by 2011.

The ‘big ships’ scenario starts from a different assumption that the major carriers will attempt to exploit further economies of scale, and deploy vessels of 9,000-13,000 TEU on the major trade routes, which will be radically simplified, calling at only one or two ports in Asia. Some of these streamlined routes appear to have some potential, particular if other hubs can be included on a route with minimal deviation, which is the case in the Far East-Europe trade and on the Suez route to the USA, while the trans-Pacific route appears less promising for streamlined large ship service. Under this big ships scenario, less than 890 vessels with capacity of more than 3,500 TEU are required while 127 ships of 9,000-13,000 TEU capacity will be in service by 2011. This implies the elimination of some of the smaller inter-continental services in the base case – typically operated by vessels in the order of 4,000 TEU – by the 10,000 TEU and 12,000 TEU ships of the streamlined East-West services.

In the base case, it is expected that the new ports of Kwangyang, Tanjung Pelepas and the transshipment hub emerging in Shanghai will capture substantial transshipment volumes. The traditional ports centres of Singapore, Kaohsiung and Hong Kong are expected to retain their importance throughout the period. Following implementations are indispensable for the above ports in order to maintain the status of a hub port.

- provide a deepwater berth (15~ 16m depth at present and 17~ 18m depth maybe in future) and a big scale gantry crane with outreach longer than 48m
- increase efficiency of container handling operation remarkably

- lower container handling charge in competition with other hub ports
- adopt information technology (EDI system etc) actively

If the 'big ships' scenario does eventuate, it will have implications for both total trans-shipment volumes and the distribution of trans-shipment opportunities between ports. The big beneficiary from the streamlined of routes is Singapore, mainly at the expense of Tanjung Pelepas and Port Klang, as shipping lines operating very large vessels are forced to concentrate their calls on the port with the largest cargo base. Shanghai also appears likely to benefit from this consolidation, mainly at the expense of the Korean ports.

(2) Container Fleet Forecast on Vietnam Routes

In the base case, if container handling volumes of nearly two million TEUs in some port of Vietnam are achieved, there is a possibility that the Panamax type vessels on the trunk routes will use a port in Vietnam similar to the case of Laem Chabang Port in Thailand. The port in Vietnam will be required to provide appropriate berthing facilities to accommodate larger ships. In addition, a regional transshipment port in Vietnam might have some possibility due to the booming of container service in Asia. However, it is noted that a transshipment port has to satisfy aforementioned conditions required to maintain the status of a hub port. Since transshipment cargoes offer port authorities and terminal operators an opportunity to develop their business at a faster rate than the development of their economic hinterlands would permit, the competition for this business is fierce and very volatile. Therefore, careful and long-term consideration will be necessary to develop a transshipment port in Vietnam.

In the big ship case, it is expected that if container handling volumes in Asia increase remarkably, 2,200 TEU vessels, which presently represent the maximum size vessel on the South East route, will be replaced by vessels bigger than 3,000 TEU. And similar vessels will be deployed on Vietnam route due to rapid increase of container cargoes in Vietnam, most probably caused by the AFTA effect. In addition, trunk-line services with a big scale container fleet has possibility due to the conclusion of the Vietnam-US Bilateral Trade Agreement.

Based on two scenarios, a following container fleet will be forecasted to deploy on Vietnam route in ten years. (For example ship size of 3,000 – 4,000 TEU container ship is 40,000-50,000 DWT, LOA of 250-300m and a draught of 11-13m).

Local routes in Vietnam have been used for cargo shipment from the North and Central Vietnam to the new port for transit to other countries. Considering features of ports in Vietnam, it is expected that 500-1,000 TEU vessels, which are popular at present, will continue to be deployed.

(3) Other Ships on Vietnam Routes

(a) Bulk Cargo Ships

In general, bulk cargoes do not represent a large portion of the total handling volume as in the case of container cargoes and bulk cargo vessels of about 30,000 DWT are presently deployed in HCMC port group. However, vessels with 50,000 DWT capacities will be considered in the new

port, due to future growth of bulk cargo vessels in Vietnam.

(b) Passenger Ships

Ship dimensions such as length, draft and air draught are major constraints when passenger ships navigate the Long Tau River Channel. For example, only ships or boats with LOA, draught and air draught less than 230m, 9.5m and 45m respectively are permitted to come in and out the HCMC ports (in case of night navigation, ships and boats with LOA less than 160m are permitted).

It is expected that limited cruise ships in Intra-Asia, which satisfy the above restrictions, will come into the HCMC ports. Recently, the following ship came into a HCMC port.

Name of a passenger ship:	Crystal Harmony
LOA:	240.9 m
Draught:	8.0 m
Moulded Breadth	29.6 m
Gross Tonnage:	48,621 GT

It is expected that Development of cruise terminals in HCMC area will be more and more active due to the high potential of the tourist industry in Vietnam.

(4) Maritime Strategy in Vietnam

Following maritime strategy will be proposed.

(a) Short-term Development

- Enhance the potential of maritime transportation in order to correspond to the booming of container service in Asia.
- Enhance the potential of a bulk cargo distribution base for supporting regional industries.
- Enhance the maritime networking for the coastal shipping.

(b) Long-term Development

- Develop trunk-line services between Asia and Europe/America in order to enhance the potential of trade industries.
- Enhance the transportation by a bulk cargo corresponding to the diversification of the regional industries.
- Attract cruise ships to HCMC ports in order to encourage the tourist industry in Vietnam.

12.1.2 Regional Development and Transport Network

(1) Sustainable Regional Development by the Decentralization Policy

SFEA is one of the most vital socio-economic centers of the country, and expected to expand its function even in the future. SFEA will be one of the leading international areas in Vietnam and will function to cover a wide area including Asian countries. The area will serve as a dynamic and advanced complex supported by well-balanced industrial, commercial, agricultural and cultural activities. SFEA is surrounded by the vast open space available for the international and domestic

enterprises, and is blessed with the fertile agricultural land in Mekong Delta and Central Highland areas as its hinterlands. These enterprises and the hinterlands generate a huge volume of export-and-import goods in the region.

The industry sector, a locomotive of the economy in SFEA, has achieved a remarkable development basing on the industrial zones in the middle of 1990s. The number of IZs established in the area has exceeded 30, and is planned to be double in the future even though it may be affected by the international and domestic economic situations. Most of the existing IZs are specialized in the light industries to produce garment, footwear, machine parts, processed food etc.

Newly established and projected IZs in SFEA are located or to be located along Dong Nai River and Thi Vai River. In particular, those IZs in HCMC are planned in the northern-east area and in the southern area where they plan to construct new urban areas. IZs in the other provinces are planned to locate in the remote areas along the major national roads. In these newly established and projected IZs, heavy industry such as power generation, cement and fertilizer manufacturing is planned to locate. And the existing enterprises located in the urban areas are also expected to move to these IZs. IZs in the urban areas are planned to occupy only by hi-tech and clean industry.

HCMC with a vital role of the economic development in SFEA has the population density to exceed 10 times of the national average. HCMC now occupies about 20% of the national total in GDP (about 60% to SFEA), and attracts about 60% of the foreign direct investment in SFEA. Under these circumstances, they have been suffering from serious urban problems such as traffic congestion and various kinds of environmental deteriorations in the city area

To overcome such a situation, the concerned authorities in SFEA have been studying the long-term regional development plans to construct a new urban area in Phu My area and in Ba Ria-Vung Tau province and to shift the major IZs to the suburbs of Bien Hoa City in Dong Nai province and to the southern area of Binh Duong province. It is recommendable, for a well-balanced regional development in SFEA, to disperse the development centers to the several areas in the region that are now over-concentrated in HCMC.

(2) Integrated Transport Network in the Region and Gateway Port

For the well-balanced regional development, it is indispensable to establish the transport network that connects the development centers and the hinterlands in SFEA efficiently and effectively.

This transport network is the Corridor Plans suggested even in the VITRANSS report that combine traffic modes of roads, railways and inland waterways etc. They propose a North-South Coastal corridor, a Nha Trang - Da Lat - HCMC corridor, a HCMC - Vung Tau corridor, and a HCMC - Can Tho corridor as high priority projects in the region.

In HCMC they have already been in the preparation stage to construct East-West Highway and Phu My Bridge etc. to develop the northern-east area of the city. A new road is planned to be constructed even in the southern area of the city as a high priority project under the next Five Year Plan. This road will help develop a new city and IZs in the area. In addition, the construction of an outer-ring highway in HCMC is now being considered to mitigate traffic congestion in the city caused by heavy trucks and also to provide easy access to the ports.

With the above situation, port development as a gateway of the transport network to connect the development centers in SFEA and its hinterlands becomes significant and indispensable for effective regional development including industrial and agricultural development. Moreover, if the ports and other transport infrastructures would be appropriately developed in the area, they could attract more ocean-going vessel calls and thus could develop the region in multiplication.

12.1.3 Basic Concept of Long-term Port Development

Vietnam is a north and south long maritime state like Japan. Most ports in Vietnam exist along riverside and there is no deep port for performing efficient trade now. For this reason, it depends on secondary transportation for the northern part through Hong Kong, and for the southern part through Singapore. Moreover, main ports have problems. Port charges such as a pilot's fee for the long navigation channel are high compared with the other main ports in foreign countries.

Vietnam introduced a Doi Moi policy and has accomplished rapid economic development. There is especially a remarkable thing in development in light-industries fields, such as garments and miscellaneous goods. Moreover, agricultural products, such as rice and coffee, are also extended. In order to export these light-industries goods and agricultural products and to carry out economic development further, the development of transportation infrastructure and the increase in efficiency of transportation are indispensable.

The importance will increase as a new base of an international transportation that connects not only the Asian countries but also American and European countries as one of the bases of the maritime Silk Road in the 21st century. Moreover, the importance will also increase as a base of transportation for coastal service, which connects the southern part and northern part of Vietnam.

Formulating the port development of the south of Vietnam in the 21st century, it carries out based on the following fundamental views.

(1) To Support the People's Lives and Activities

As various industrial production activities become borderless, industrial production and people's lives are dependent on trade. Therefore, it is essential that a port performs its functions properly to develop the economy and support everybody life of citizens.

(2) To Coordinate with Industrial Development

A port creates the vitality of an area and jobs by making the transportation and port-related industry active. Companies in the area will benefit in terms of production and inter-trading opportunities.

(3) To make HCM City more attractive as an International City

The selection of the port's relocation and functions in a city has important environmental implications. A city's charm is heightened and international and attractive urban areas are recreated. A port should be redeveloped as a place, which can attract new businesses such as

international business, tourism, cruise and entertainment.

(4) To Preserve the Natural Environment

Harmonization of port development and environmental preservation is necessary to protect the precious natural environment, which will be inherited by next generations.

(5) To Concentrate Investment in Important Ports

The limited funds should be used effectively. Therefore, the investment should be concentrated to important port facilities. In addition, the investment effect should be seen at an early stage.

(6) To Minimize the Risk through phased Investment

To minimize the investment risk by a step-wise development, time flexibility is required.

(7) To Harmonize with other Infrastructure

Other transport infrastructures such as bridges over the access channel and highway are necessary for effective operation.

12.1.4 Basic Direction of Port Development

In the year 2020, total cargo volume is forecasted to reach 78 million tons, including 4.7 million TEUs of container cargo. This figures is 3.5 times during the forecast period while containerized cargo will show 5.4 times in the same period.

The number of vessels forecast to use the Long Tau River channel is double the channel's capacity while the volume of cargo to be handled at ports is forecast to be double the actual handling capacity. Because the traffic congestion in the center of city is already severe, such an increase in cargo is not desirable. In addition, vessel size will become larger. Therefore, it is necessary to develop new ports outside the center of city.

On the basis of concept above, the fundamental direction of port development in each area is proposed below.

(1) Port Development in HCMC Area

In the area around Saigon River banks, the investment cost for port construction is generally lower than that in Thi Vai and Vung Tau areas and there are also advantages in terms of port services. But this area also has great disadvantages related to the channel, water surface area, environment, and transportation in the hinterlands. While new ports should be constructed in the suburban area step-by-step, the charm of HCMC as an international city should be increased taking advantage of the various functions of port and waterfront.

The main direction of port development of HCMC should be toward the north-east, adjoining to

Thuan An (Binh Duong province), Bien Hoa (Dong Nai province) and its auxiliary development directions should be toward the south and south-east to the sea, adjoining to Nha Be, Binh Chanh, Hiep Phuoc, and the new urban area of Nhon Thach – Long Thanh. The city center will be extended to Thu Thiem to take advantages of its geological location, natural conditions, land, infrastructure and environment.

The existing inner city ports such as Sai Gon, Ben Nghe, Tan Thuan, Tan Cang and Ba Son have *limits of extension and development*. The selective relocation of port function in a city is necessary to improve its urban environment. A city charm will be heightened and international and attractive urbane space is recreated. A port should be redeveloped as a space where new businesses, such as international business, tourism, cruise and an amusement can be improved.

New ports should be constructed in the suburban area step-by-step. Cat Lai IZ Port Group and Hiep Phuoc Port Group will be the major ports of HCMC. The access channel and water area will be *improved in cooperating with the port development in Dong Nai River (Cat Lai) and in the upper Soai Rap River*.

The development of transport infrastructure, particularly the construction of the city's road network including the outer ring road in conformity with port facilities is prioritized.

(2) Port Development in Thi Vai River Area

There are four candidate sites for port development along the Thi Vai River where relatively deep navigational channel is available up to almost the end of the main stream of the river. They are Go Dau, Phuoc An, Thi Vai and Cai Mep areas.

Go Dau is one of the oldest industrial areas that has its own port facilities that could be expanded to serve the future potential cargoes of the new industries expected to be located near the existing ones. Development of industrial port at Phuoc An is still in the conceptual stage, and realization of the project is not confirmed at this stage. This port will be developed in conformity with Nhon Thach IZ

In this Study, the major roles of these two candidate ports, even if realized, are considered to serve only for the potential cargo traffic to/from their limited direct hinterland.

On the other hand, the other candidate ports, namely Thi Vai and Cai Mep of which location and channel conditions are more advantageous, may reasonably be considered as the ports with both transit function to/from the northern part of the area and direct service function for the industrial zone behind.

Judging from the various conditions confirmed so far on Thi Vai River area, it might be considered that the overall capacity of Thi Vai and Cai Mep sites might not be enough to accommodate total future port demand beyond year of 2020.

Selection of a priority port development site should carefully be examined based on the site surveys including the detailed natural conditions. Particularly, the development of an access

channel to Thi Vai area is limited due to two sharp bends.

(3) Port Development in Vung Tau Area

Vung Tau Area is blessed with an advantageous location close to the trunk ocean shipping route and deep approaching channel, which are ones of the most vital requirements for an international container hub-port. At the same time, it has some potential disadvantages such as necessity of the breakwater(s), adverse effects of monsoon on maneuverability of the entering vessels, long distance to the center of economic activities of the area, expensive access road including the relocation of the existing residences and the expansion of the width of the NR51 to the nearest trunk road (if the site would be selected in Ben Dinh Sao Mai area), possible unstable movement of the seabed, highly complicated sedimentation mechanism of the estuary and unconfirmed scale of the future international transshipment and/or transit traffic demand under severe competitive situation of the Asian hub-port business.

Considering the above conditions, the port development policy of this area should carefully be studied on the long-term basis on such factors as the relevant natural conditions, total estimated cost of the project, transshipment and/or transit market in the future international container movement, modal allocation between water and land traffic of the sea-born cargo, appropriate road network in the area, the possible core sites of port traffic generation and so on.