

## AN INTERNATIONAL FREIGHT FLOW ANALYSIS IN KOREA

- In the Context of Containerization at Port of Pusan-

Ja-yeong GU,  
Graduate Student,  
Department of Human-Social Information  
Information Science, Graduate School of  
Information Science, Tohoku University,  
Sendai 980-77 Japan.  
Fax: +81-22-217-7494

Hajime INAMURA,  
Professor,  
Department of Civil Engineering,  
Tohoku University,  
Aoba, Aobaku, Sendai,  
980-77 Japan.  
Fax: +81-22-217-7494

abstract: Owing to the growing interdependence of Asian economy and the promising growth of Korean economy, Port of Pusan has a great potential to be one of the hub ports in the Pacific Rim countries. Port of Pusan recorded 2.75 millions TEU of container handling in 1992, and ranked the fifth biggest container port in the world. This paper analyzed port competitiveness and summarized the international freight flow from/to Korea around the East and Southeast Asia (i.e Hongkong, Singapore, China, Indonesia, Malaysia etc.) based on various statistical data. The paper also discussed the structural changes of Korean economy from the viewpoint of international trade, and the reason behind the tremendous growth of container throughput at Port of Pusan.

### 1. INTRODUCTION

Formation of economic bloc organization such as European Community(EC), North American Free Trade Agreement (NAFTA) prompted Asia-Pacific countries to reestablish and consolidate inter-regional relationships within the region. ASEAN countries for example, are experiencing rapid economic growth comparable to that of the rapid growth recorded by Newly Industrialized Economies(NIEs) in the 1970s. This achievement gave a strong and significant impact to the world economy and by taking EC performance as comparison, it accounts nearly the same proportion in terms of trade value of the total international trade(Table 1). As for Pan - Pacific countries, the actual transportation of containerized cargo via main sea routes of the world in 1990s observed an enormous increase in trade volume. They command 22.1% and 21.8% with Japan - Far East - North America route and Japan-Far East-Europe route respectively. With the encouraging economic growth reflected by the ASEAN region, capital investment increased, better employment opportunities, improved dissemination of trade information and increment of freight activities. Taking these to Korea's perspective and fittingly being centrally positioned economically in the East and Southeast Asia region, Korea can be visualized as the hub for raw and intermediate material goods. More specifically, Pusan Port in Korea is capable of becoming an international trade center with the increase of the physical trade transaction. This phenomenon demands the review of the existing port functional purpose. Expansion of physical structures and providing higher level of service are the priorities need to be addressed if the role as the major gateway for trade transaction is to be met.

In order to establish the relevance and importance of Pusan port, this paper discussed the ports in East and Southeast Asia region(Singapore, Hongkong, Kaoshiung, Kobe) which

are the main competitors. It is then followed by the analyzing the transformation of Korean trade corresponding to world and Asia economy based on the International Trade Statistics Yearbook, Statistical Yearbook of Foreign Trade, Statistical Yearbook of Shipping and Ports of Korea, and The Trend of Foreign Trade, as the main references. This paper also study the structural changes experienced by the industrial sector in Korean economy and analyzed the container freight flow according to Korea trade volume in the East and Southeast Asia. Insight to the port development strategies were also deliberated with proposed solutions to the problems encountered.

Table 1. Proportion of the Pan-Pacific zone to world economy

Unit: Billion US\$, %

	Year	World	Pan-Pacific Region(Weightage)	European Community(EC)(Weightage)
G N P	1980	11790	4630 (37.0)	3037 (25.8)
	1987	15789	7590 (50.4)	4287 (27.2)
Trade Value	1980	3838	1368 (35.7)	1465 (38.2)
	1987	4764	1750 (36.5)	1913 (40.0)

\* Area: Korea, Japan, America, Canada, Australia, New Zealand, ASEAN 6 Countries, Taiwan, Hongkong  
Taiwan, Hongkong (Pacific Circle)

\* Source: Journal of the Korean Institute of Port Research

## 2. ANALYSIS OF PORTS COMPETITIVENESS

### 2.1 Criteria of Evaluation

There are many criteria for evaluating port competitiveness, but this paper selected only 3 main criteria; port facility charge, service, and port charge.

#### 1) Facility level

Table 2 shows that Kobe port as having the most surplus facilities while Pusan port having the worst condition. In terms of productivity of port (handling cargo TEU/length of berth 'm', hour, berth), Pusan port performance is in the middle level (Table 3).

Table 2. Facility level

Based on 1991

Facility Level	Length of Berth	Numbers of Berth	Equipments(G, T, S)	Capacity of storage
Singapore	4,582m	18	56,201,13	98,877 TEU
Hongkong	4,374m	14	37,91,74	79,484 TEU
Kaoshiung	4,222m	19	33,29,29	63,000 TEU
Pusan	2,162m	7	15,28,22	54,788 TEU
Kobe	5,050m	16	30,41,50	57,143 TEU

\* G: Gantry crane, T: Transfer crane, S: Straddle carrier; number of unit

\*\* Source: Journal of the Korean Institute of Port Research

Table 3. Productivity of ports

Productivity of Ports(1990)

	TEU/m/year	TEU/hr	1000TEU/berth/year
Singapore	1520	65.1	401
Hongkong	1254	73.4	318
Kaoshiung	850	70.4	233
Pusan	1083	46.8	342
Kobe	324	86.7	106

\* m: Unit of berth length

\*\* Pusan based on JASUNGDAE

\*\*\* Source: Journal of the Korean Institute of Port Research

Pusan port is also confronted by several major problems in particular congestion due to the increasing freight and insufficient container exclusive berths as shown by table 4. Figures for other ports are not available.

Table 4. Status of congestion(Port of Pusan)

Status of Congestion(Port of Pusan)

	1989			1990			1991(Jan.-Oct.)		
	Num.	Ratio	Days	Num.	Ratio	Days	Num.	Ratio	Days
Port of Pusan	12414	5.2%	2.6	12866	7.4%	2.4	11650	10.1%	2.6
Cont. exclusive	1737	8.6%	0.3	1594	48.1%	4.0	3349	48.4%	4.5

\* Num.:Numbers of arrived ship

\*\* Ratio:Congestion ratio(Waiting ships/Arrived ships)

\*\*\* Days:Waiting time for berthing

\*\*\*\* Source:Journal of the Korean Institute of Port Research

## 2) Service level

The service level in the container exclusive port need to deal with comprehensively including navigation aids, handling work, transportation, storage, delivery, information, and operating management system. Only storage and liner service were considered. As shown in table 5, port of Pusan permitted 9 days for the free storage period and recorded the most expensive of the overcharge standard on 10 days basis. Liner service is not good either (Table 6).

Table 5. Service level for the free storage

Service Level	Period for Free Storage		Overcharge (based on 10 days)
	Export(day)	Import(day)	
Singapore	5	3	32,858
Hongkong	7	5	41,665
Kaoshiung	n.a	n.a	18,320
Pusan	4	5	61,449
Kobe	10	10	Included C.H Charge*

\* C.H Charge means cargo handling charge

\*\* Source:Journal of the Korean Institute of Port Research

Table 6. Service of liner ships, routes, and frequency

Level of Service(Liner Ship's Company, Routes, and Frequency)

	Company	Routes	Frequency/month
Singapore	61	219	849
Hongkong	63	258	848
Kaoshiung	53	128	514
Pusan	54	174	568
Kobe	53	210	681

\* Frequency based on over 1,000 TEU ship in 1992

\*\* Source:Journal of the Korean Institute of Port Research

## 3) Port charge

In this criteria, Kobe port offers the most expensive charges while Pusan port ranked the 1st position as in Aug. 1993. Port of Pusan has the best rate in cargo handling charges(Table 7).

Table 7. Port's charges

Port's Charge Unit:million Won in 1993.8

	Handling Charge	Facility Charge	Storage Charge	Total
Singapore	80.6	6.6	19.7	106.9
Hongkong	107.9	2.4	25	135.3
Kaoshiung	122.9	50.7	11	184.6
Pusan	41.9	28.7	21	91.6
Kobe	121.2	345.6	Included C.H Charge*	466.8

\* C.H Charge means cargo handling charge

\*\* 30,000GT Container Ship, 24hr Berthing, 1,200 TEU handling, 600 TEU 10 days storage.

\*\*\* Source:Journal of the Korean Institute of Port Research

In this analysis of ports competitiveness, Singapore consolidated its position as being the top ranked port followed by Hongkong, Pusan, Kaoshiung, and Kobe based on port productivity only. But for ship's service level, Hongkong, Singapore, Kobe, Pusan, and Kaoshiung are positioned in this order in terms of providing good service.

### 3. ANALYSIS OF KOREA TRADE ON VALUE BASIS

#### 3.1 Recent Trend of Korea Trade

Although Korean trade recorded a ratio of high extension of 26.4% in export for 3 years consecutively after 1986, the ratio plummeted and maintain an average of 6.3% per year from 1989 to 1993. For 1994 the ratio rose to 16.8% mainly due to the increase of export volume directly related to the economic recovery of developed countries such as the United States and the appreciation of Japanese Yen. Meanwhile, the trend of import showed continuous decreasing pattern after 1987, but an upsurged to 22.4% in 1994 mainly due to raw material importation as reported in Korea domestic business recovery.

#### 3.2 Historical Changes of Korea Trade by Area

For the year 1986 to 1993, total export value to South America and Africa increased from 2.6% to 6.0% and from 1.2% to 1.8% respectively. Significant increased was observed for

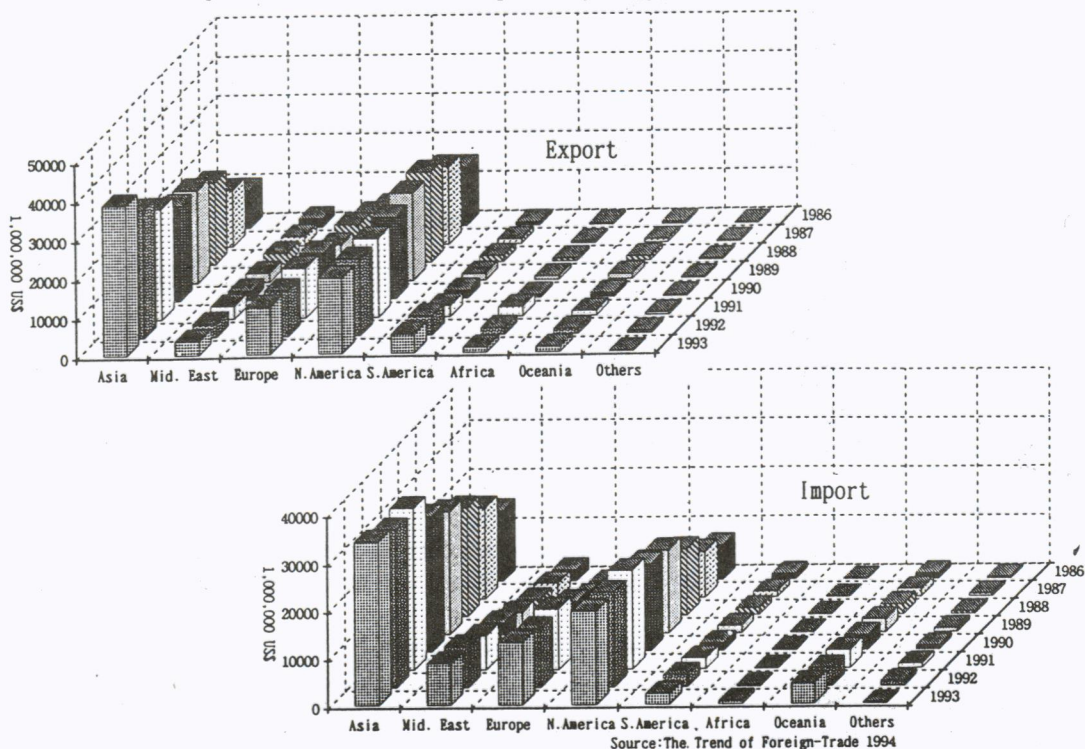


Figure 1. Distribution of trade value by area

Asia region with sharp increased from 28.5% in 1986 to 47.0% in 1993. For the year 1986 to 1993, export decreased for these areas; North America - 43.6% to 23.7%, middle East -

6.4% to 4.5%, Europe -15.3% to 14.9%, and Oceania -1.9% to 1.7%. On the other hand, for the year 1986 to 1994, total import value increased for most areas/countries but for Asia and South America, a decreased trend was observed from 46.4% to 41.4% and from 4.0% to 2.8% respectively(Figure 1).

### 3.3 Historical Analysis of Trade Growth by Commodity

An increment pattern of trade growth to all general articles, while for the share of the whole trade, difference exists and varies. Export increased continuously for products like chemical, plastics and rubber articles, wood pulp or of other fibrous cellulosic, machinery and chemical appliances, vehicles, aircraft, vessels and associated transport equipment. Machinery and mechanical appliances recorded an exceptionally rapid growth of 37.5% to the total export value in 1994 as compared to 19.4% registered in 1986. Based on 1994 import data, machinery and mechanical appliances consumed the highest value with 31.3% to the total import value, followed by mineral products, base metals and product of base metal, products of chemical or allied industries, vehicles, aircraft, vessels and associated transport equipment. Among these items, machinery and mechanical appliances, and transport equipment show an increment of 27.9% to 31.3% and from 4.9%to 5.3% respectively in terms of total import value.

## 4. ANALYSIS OF KOREA TRADE ON VOLUME BASIS

### 4.1 Distribution of Korea Trade Volume with the Pacific Rim Countries

Figure 2 illustrates the trade volume recorded for East and Southeast Asia (such as, Hongkong, Singapore, Indonesia, Malaysia etc.), Japan, China and America. Export volume from these areas command a ratio of 74.9% to the total export of Korea in 1994 as

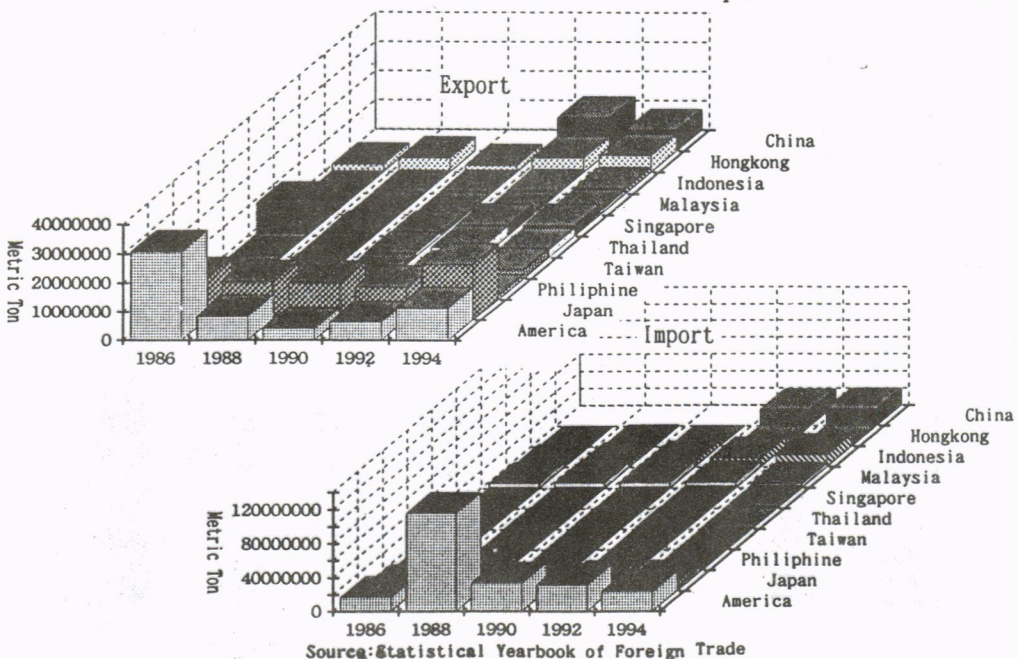


Figure 2. Trend of Korea trade volume by E & SE Asia country and America

compared to 48.3% in 1986. America and Japan accounted for 14.8% and 24.9% respectively, followed by China, Hong Kong, Singapore whose proportion were 9.3%, 7.4%, 4.8% respectively in 1994.

In 1994, the import volume from the Pacific Rim countries contributed a ratio of 31.2% to the total import volume of Korea. For the same year, America with the quantity of 23.7 million ton provided 9.2% of the import value, while China, Indonesia and Japan forming 7.8%, 5.7%, 4.5% respectively for the same year.

#### 4.2 Distribution of Korea Trade Volume by Item

For the export volume, the products of chemical or allied industries, plastics and articles thereof, and textiles and textile articles showed a trend of big increase, especially to the products of chemical or allied industries with an increment of 14.0% to the total export volume in 1990 (2.9% in 1986). Products of chemical or allied industries vehicles-1, aircraft, vessels and associated transport equipment-2, base metal and articles of base metal-3, and mineral products-4 are the four major article groups in Korea export trade.

For import volume based in 1990, the mineral products ranked top in the list and it consumed 66.6% to the total import volume. Wood and articles of wood, base metals and products of base metal, vegetable products, products of chemical or allied industries, and wood and articles of wood increased gradually whilst vehicles, aircraft, vessels and other transport equipment decreased.

### 5. ANALYSIS OF KOREA PORT CARGO

#### 5.1 Trend of General Cargo

Seaborne cargo in Korea reached a high level of 285.6 million tons in 1992 due to rapid economic growth and increased in trade volume. Cargo import and export accounted for 78.0%(222.7 million ton) and 22.0%(62.9 million ton) respectively of the total port cargo. (Figure 3)

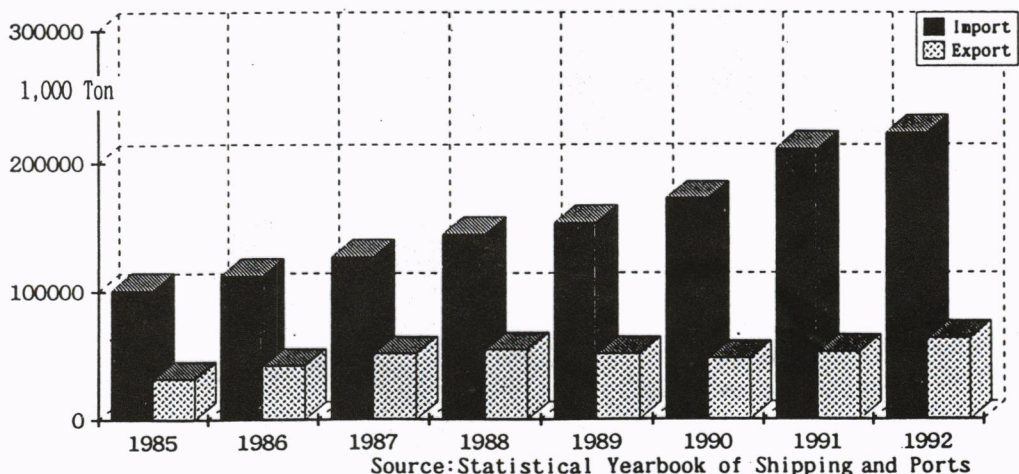


Figure 3. Trend of general cargo in Korea

### 5.2 Transaction of Korea Container Cargo

Corresponding to the changed in industrial structure and active economic growth, container cargo increased rapidly in response to the changing of cargo mode in terms of import and export of goods. In 1980s, Korea ranked 14th in the world by handling 0.688 million TEU of container cargo(Figure 4). With the growth ratio of 12.6% annually for 12 years, this position was promoted to 9th place in 1990 justifying the handling of 2.75 million TEU.

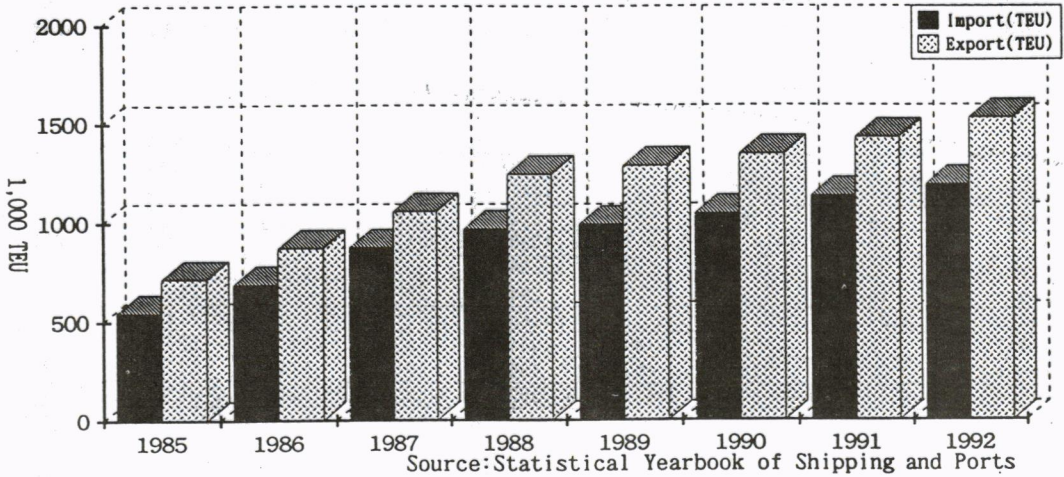


Figure 4. Level of container cargo transaction in Korea

In terms of container cargo by region, figure 5 shows that the export quantity of container cargo bound for Southeast Asia exceeded that of North America while for South America the quantity increased gradually since 1991.

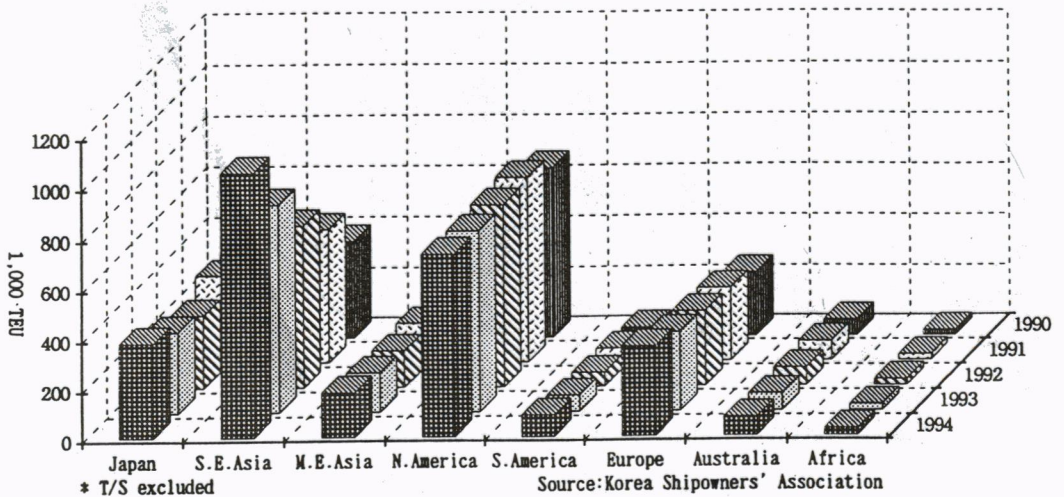


Figure 5. Transaction of Korea container cargo by area

Import of container cargo from Southeast Asia increased rapidly while Europe shows constant increased. It can also be seen that export quantity bound for/in Japan and North

America remain at the same level. Container cargo for Southeast Asia contributed 42.7% that is 28.5% of the whole transaction of container cargo handled in Korea in 1994. As for import, Southeast Asia is still below the quantity level attributed by the route of the route bound for North America but the gap is reducing rapidly.

### 5.3 Cargo Transaction in Pusan Port

#### 1) General cargo

As the gateway of Korea, Pusan port commanded 18.7% of the cargo transaction and thus contribute substantially to the rapid economic growth of Korea. In 1992, it contributed

Table 8. Weightage of general cargo in Port of Pusan

	1985	1986	1987	1988	1989	1990	1991	1992
Import(All)	101111	112058	126784	144190	152983	172278	210544	222720
Pusan	14463	15849	18451	20259	21505	23510	25825	24290
Ratio	0.1430408	0.1414357	0.145531	0.1405021	0.1405712	0.1364655	0.1226584	0.1090607
Export(All)	31899	41765	51226	54298.5	50918	47504	52423	62851.7
Pusan	16273	21808	26831	29422	28626	28897	26934	29204
Ratio	0.5101414	0.5221597	0.523777	0.5418566	0.562198	0.6083067	0.5137821	0.4646493
Total	133010	153823	178008	198489	203900	219781	262972	285573
Pusan	30736	37657	45282	49681	50131	52407	52759	53494
Ratio	0.2310804	0.2448073	0.2543818	0.250296	0.2458607	0.238451	0.2006259	0.1873216

Unit:1,000 Ton

Source: Statistical Yearbook of Shipping and Ports

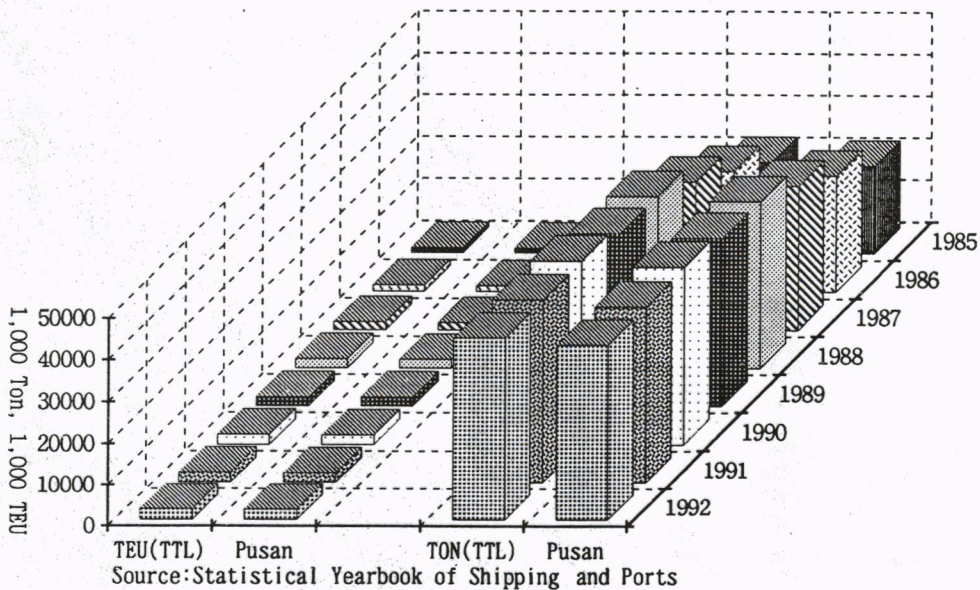


Figure 6. Comparison of container cargo in Port of Pusan

10.1% and 46.7% for import and export respectively implying that Port of Pusan plays a major role as an export port. Table 8 shows that Port of Pusan has reduced the coefficient of utilization for general cargo transaction.



## 2) Container cargo

According to Containerization International Yearbook 1994, in 1992 Pusan port handled 2.75 million TEU of container cargo, and ranked the 5th in the world. It handled exceeding 95% of the total container transaction in Korea. Figure 6. shows the trend of container cargo handling quantity increasing year by year in terms of TEU, but decreasing with tonnage.

## 6.SUMMARY

From 1985 to 1994, Korean trade experienced an increase in export and import ratio with the growth recorded as 13.1% and 13.3% respectively. In 1993, it ranked 13th and contributed 2.2% to the world trade. In terms of trade volume, the growth ratio of the export and import are 9.2% and 12.3% respectively.

Changes in economic activities brought about changes to the trend of export and import of goods. For example, main export goods based on value in 1986 sequentially were textiles and textile articles-**a**, machinery and mechanical appliance, electrical equipment parts thereof-**b**, vehicles, aircraft, vessels and associated transport equipments-**c**, but the sequence changed to the order of **b, a, c** in 1994. This changes were the result of the transformation of Korea industrial structure from labour intensive to capital intensive industry.

In the case of import goods in 1986, the value order were machinery and mechanical appliances; electrical equipment; parts thereof-**a**, mineral products-**b**, products of the chemical or allied industries-**c**, base metals and articles of base metal-**d**, but the priority changed to the order of **a,b,d,c** in 1994. Due to the capital intensive industry policy adopted, main import goods (**a,b**) remain unchanged and they command an average ratio of 47.8% (1986-1994) to total import value. Import was largely concentrated on high added value goods (machinery, precision instrument etc.) from high technology countries such as Japan and U.S.A.

In 1986, the volume export sequence in terms of quantity were mineral products-**a**, base metal and articles of base metal-**b**, vehicles, aircraft, vessels and associated transport equipment-**c**, but the order changed to **c, b, a** in 1990. Heavy and chemical industry policy implemented from 1970s was the reason for the changes.

For import volume, the order of importance were mineral products-**a**, vegetable products-**b**, base metals and products of base metal-**c**, vehicles, aircraft, vessels and associated transport equipment-**d** in 1986, but **b** and **d** were replaced by wood and articles of wood, and vegetable products respectively in 1990. The replacement was due to the increase in the import of labor intensive industrial goods as a result of the changes undergone by Korea industrial structure.

Through the experienced gathered from advanced countries practicing import control and those countries that had undergone depression in domestic business, the change in flow of trade is influenced by regions and countries. This deduction can be explained by the fact that trade to America and Japan based on value decreased between the year 1986 to 1994. Both America and Japan recorded export reduction of 40.0% to 21.4% and 15.6% to 14.1% respectively while for import from 34.4% to 24.8% pertinent to Japan only. Regional

analysis indicated the level of trade dependent on U.S.A. and Japan has decreased, the ratio greater with Japan than U.S.A. This is as a result of Korea main import goods - base metals and articles of base metal, iron and steel command 9.8%, of the total import value while machinery and mechanical appliance; electrical equipment; parts thereof; with 31.3%. For the same goods, import from Japan decreased from 50.1% to 28.0% in 1986 and from 55.9% to 41.5% in 1994 respectively owing to the development of heavy and chemical industry, and electric parts.

The scale of Korean trade to the East and Southeast Asia is also increasing and in terms of value, the export ratio increased from 9.9% to 29.5% and import from 10.8% to 15.0%. Volume wise, export increased from 21.4% to 35.1% and import from 12.1% to 17.5%. From these statistical facts, it has adequately proven that export and import trend increased between the period of 1990 to 1994., from 22.3% to 48.7% and 17.6% to 20.1% respectively. It is also observed that the trade to Europe is also increasing gradually for export and import by the amount of 4.3% to 9.1% and 0.6% to 0.8% respectively in the period 1990-1994. On the other hand, for 10 years duration (1985-1994), the total ratio of port cargo to America and Japan is declining. For export, America and Japan registered a reduction of 41.1% to 20.0% and 28.5% to 19.7% respectively while import from 7.3% to 4.1% and 24.9% to 17.6% respectively. After 1980, according to the diversification policy of export market, freight flow structure by region conformed as the pattern mentioned above.

With this argument, together with the Korean active economic growth and the changes in the industrial structure, the existing port cargo type also changes. In other words, the container cargo quantities increased due to the the rapid increment of the capital materials but a slowdown of the exports/imports of raw materials, which in turn warrant for the speedy and safety handling of the cargoes. Rightly so, the growth ratio of container cargo recorded an average 12.0% per year for the period 10 years(1980-1990). Thus for Korea, Port of Pusan plays the main role as an export port focusing on capital materials and finished products rather than raw materials catering for the cargo import supplied by Korean industrial sectors. Port of Pusan also deals with general cargo with 18.5% from the total port cargo and exceeding 95% of the total container cargo of Korea.

## **7. FUTURE TRADE PROSPECTS AND PORT DEVELOPMENT STRATEGIES (DESCRIPTIVE ANALYSIS)**

### **7.1 Future World Trade Prospects**

Active international trade sees today's world economy turning to a single economy system, engaging individual countries to stamp their dominance in reaping the trade exchange to their benefit. Recently, the world trade operation concentrated around the West Europe and West coast of North America, but eventually transformed it into an economic bloc and changed the world trade system by establishing a new order of world economy under the influence of industrial products activity from Pacific coastal countries. One of the keynote in diversification of world trade center is to undergo changes in cargo transportation system. Activities from 1970 to 1988 saw the world trade increased 8.7 times the trade value, with a modest increase of 1.4 times the trade volume. These indicators mean that the average price per ton cargo is increasing gradually implying containerized cargo as a

solution to international transportation. Forecast on container cargo leads to the trend of increase proportion in general cargo and trade volume as shown by Table 9. And these trend of world trade affected Korea trade to certain extent, the scale of investment to ASEAN increased gradually reaching US\$235.3 million in June 1988. It accounts 75.6% to the total foreign investment, comprising of Indonesia( 24 articles, US\$184.1 million, 78.2% to the total ASEAN investment), Malaysia( 18 articles, US\$28.3 million, 12.0%), Singapore( 10 articles, US\$4.7 million, 2.0%), and Philippine( 4 articles, US\$2.6 million, 1.1%). Thus, it can be seen that increased of foreign investment in turn increase the freight flow volume.

## 7.2 Future Korea Trade Prospects

Pan-Pacific countries, maximizing efforts of interdependence among members in the area of capital, material, and technology witnessed the emergence of several different industries. Service industry for Hongkong and Singapore, manufacturing industry of Korea, Taiwan and agriculture industry for China and ASEAN countries. For China and ASEAN, industrialization is fast catching up. America and Japan are supplying a huge market to these areas with industrial products together with high capital assistance while ASEAN provide cheap labour forces. Oceania provides first industrial products and Far East Russia, area of highly demanding raw material market. With this economic chain, investment and trade volume increased rapidly together with the specialization of human resource sector.

Table 9. Trend and forecast of cargo container transaction:1970-2000

Year	Cargo container transaction value		Cargo container transaction volume		Port freight volume (Million TEU)
	US\$	Ratio to world trade	TEU(Million)	Ton(Million)	
1970	86	26%	2.1	17	6.3
1975	298	34%	6.1	56	18.3
1982	661	33%	12.8	112	37.3
1985	792	41%	19.3	181	56.7
1990	1051	42%	24.8	250	77.9
1995	1385	44%	32.6	314	96.5
2000	1646	46%	38.8	372	112.2

\*Forecasting based on 1987' constant price

\*\*Included local and transshipment cargo

\*\*\* Source:Journal of the Korean Institute of Port Research

Northeast Asia economic cooperation will remained unperturbed because of existing comparative advantage and greater mutual cooperation they shared together. Given Japan capital assistance and superior technology, with China, Russia and North Korea provision of raw materials and cheap labour forces, together with Korea middle technology, the economic growth and trade volume of Northeast Asia will expand and experience a rapid growth. Taking advantage of Korea geopolitical position, and venture into converging investment of frontier industry, Korea intermediate industrial structure will be match up to the light industry and low added value heavy industry of ASEAN. In addition to middle material, machinery, industry instrument and electronic industry contributed by highly active Pan-Pacific area, and high added value of frontier industry and finance service of U.S.A. and Japan. Foreign investment of Korea increased to US\$1,442 million in 1989 from US\$153.1 million in 1988. Of this value Pacific zone contributed 75.6% to the total amount. On the

other hand, Korea also started to invest in other countries like as China, Vietnam, and Russia. The amount increased gradually, for instance China, US\$85 million (112 articles) in 1991 to US\$622 million (629 articles) in 1993 and Vietnam, Russia commanded US\$0, 11 million ( 10 articles) in 1991 to US\$116 million ( 40 articles), US\$140 million (29 articles) in 1993 respectively. This will progressively increase the value and volume of Korea trade overseas.

### 7.3 Port Development Strategies

Modern port goes to the extent of non-limited competition under globalization and internationalization of world trade in order to compete effectively and high load factors will be essential and port concentration will also be inevitable. Few favoured ports will become the load centers while others will assume the role of a secondary feeder. In other words, this modern port should be a service center and a logistic platform for international trade and transport creating a third generation port (Table 10).

On top of putting every effort to be competitive in cost and service, port also has to focussed on transport and distribution service center. Well planned port development needs lead time(\*). Late time (necessity of development) implementation will only bring about tremendous social and economical loss directly and/or indirectly. For lead time development,

Table 10. Evolution of port development concept

	First generation port	Second generation port	Third generation port
Period	Prior 1960	Between 1960 to 1980	After 1980
Main cargo	Break bulk cargo	Bulk, dry, liquid cargo	Bulk, container cargo
Attitude and strategy for port development	-Traditional, conservative -Space transportation method	-Port enlargement -Nucleus for transportation center of commerce and industry	-Profit orientated -Center of intermodalism and pivot freight in international trade
Scope of activities	1)Cargo loading/unloading and supporting affairs for navigation	1)ditto 2)Transform of cargo style and commerce and industry business ships' relation	1)+2) 3)Center of cargo and information for freight flow
Gen. Characteristics	-Independence of port activities within port	1)closely connected with port user	1)ditto 2)Unification with regional society 3)Enlargement port concept and organization
Specification of products function	1)Freight flow 2>Loading and unloading work	1)+2) 3)Offer mixed service	1)+2)+3) 4)Information of freight flow and distribution
Main decision. variable	Labour/capital	Capital	Technology and information

\* Source:Journal of the Korean Institute of Port Research

through analysis of development elements, forecast should be reliable for at least 7 years. By performing inter-industry analysis, port industry shows backward linkage effect, implying that port industry is not self supported but relies on various surrounding industrial development support. **(\*)Lead time - time period between planning to commissioning for port development**

## 8. DISCUSSION AND CONCLUSION

This paper analyzed ports competitiveness in the East and Southeast Asia, and the changes of Korean trade structure, comparison of export and import by value and volume, and the transformation of port cargo type, and the strategic position of the Pusan Port based on various statistical data corresponding to the changes of world economy and the rapid development of Korean economy.

Under the evaluation criteria of facility and service level, comparing Pusan port and Kaoshiung port both having about the same scale of import/export, the former has yet to improve its competitive edge. Comparing with other selected ports in the region also leading to the same conclusion. Though in the ports competitiveness analysis didn't directly indicate the importance of Pusan port in the East Asia region, this aspect can be supported by the explanation in the succeeding paragraphs and sections. In addition, in order to function effectively and efficiently as an international port, Pusan port have to improve the efficiency of freight handling with specification of exclusive port to meet with the objective of each port. Taking this phenomenon and assuming the trend to increase continuously, development of Pusan Port have to emphasize on feeder transportation system, accomodating service level around Southeast Asia region rather than concentrating on being a bigger port.

From the viewpoint of the Korean transportation authority, Korea is the nucleus for the Pan-Pacific Asia and East and Southeast Asia region in terms of economy and industrial aspects. They are also of the opinion that by capitalizing on the central location, more cargoes will venture in these region via Korea. These stated potential cannot be capitalized if the total amount of handled cargo at Port of Pusan which exceeded 35% more of the adequate capacity in 1990, causing the level of service to get worse year by year are not addressed. The present situation has contributed to the decline of economic efficiency and weaken the international competitive power of Korean products. The effect is more critical to the container exclusive wharves.

To solve the above problems, port authority plan to operate two port(Pusan and Kwang - yang) system and build 4 additional berths(50,000 TEU) in the 4th step development plan (1990-1997) for Pusan port, 10 berths(50,000TEU)build for Kwangyang development plan (1987-2000). Meanwhile, although there are scattered development carried out to upgrade Pusan Port facilities but the so called improved capacity handling always lags behind the rapid increased in trade transaction. In 2001, transaction container freight are expected to be 8.21 million TEU in Korea. This volume also will exceed about 0.62 million TEU aboved two development plan if the indicator of productivity of port berth in 1990 is taken into consideration.

These overdue problems are of huge magnitude if it were to be identify and solve directly through this paper in addition to the difficulty in pin-pointing the forecast of freight flow. For these to be done, we have to examine not only the analysis of the Korean own economy and trade but also the analysis of other trade partners. The first factor used in port development and improvement forecast is the transaction port cargo volume which in turn based on domestic economy forecast. To be more accurate, trade forecasting system should include trade partners economic situation corresponding to the changes of world economy and trade, and own country's trade. With this in mind, port authorities need to analyze the

commodities of each trade partners and the changes of industrial structure at port vicinity. Figure 7 shows the elements of port development from viewpoint of freight flow. This paper is just the required platform for the further research intended.

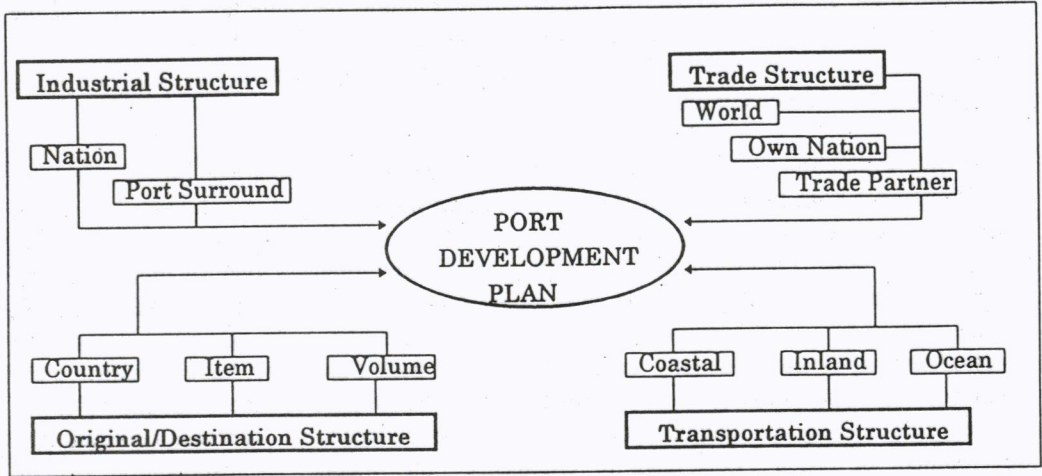


Figure 7. Elements of port development from viewpoint of freight flow

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