

A Study on Concentration and Centralization of Tonnage in Korean Shipping (A Comparative Study with Egypt)

Hyun-Deok Kim* · Ki-Myung Ahn** · Yong-John Shin***

*Research Fellow, Institute of International Maritime Affairs, Korea Maritime University

**Professor, Division of Shipping Management, Korea Maritime University

***Full-time Lecturer, Division of Shipping Management, Korea Maritime University

Abstract : *The shipping industry can be explained by a growing process of concentration and centralization of tonnage. A few largest shipping company control a great deal of shipping tonnage in the total tonnage through the process of concentration and centralization of tonnage in shipping over time. It confirms that a decreasing number of operators take an increasing quantity of tonnage in the total tonnage. Thus, the extremely dualistic structure (extremely unequal distribution of tonnage) are shown not only in the shipping industry in a given country but also in liner shipping in the world. In this paper, the two countries, that is, Korea and Egypt, are compared considering the absolute size of tonnage and shipping policy in terms of concentration and centralization of tonnage in shipping. In order to measure the degree of concentration of tonnage in shipping, the quantitative measurements; the Lorenz curve and Gini coefficient are introduced. But it should be supplemented with the qualitative measures of tonnage in a given country.*

Key words : *Concentration and centralization of tonnage, Extremely dualistic structure, Gini coefficient, Lorenz Curve*

1. Introduction

The shipping industry can be explained by a growing process of concentration and centralization of tonnage controlled by a few largest shipping companies in a given country. It confirms that a decreasing number of owners take an increasing quantity of tonnage in the total tonnage.

Thus, it is interesting showing that how the shipping tonnage in a given country is distributed and quantifying the degree of concentration of tonnage considering its own size of tonnage and shipping policy over time. In this paper, the Korean shipping industry including the Egyptian shipping industry is analyzed and compared by measuring the degree of concentration of tonnage considering the quantitative and qualitative aspects, that is, its structural features. In doing so, the Egyptian shipping industry can take some lessons from the Korean shipping industry since the Korean shipping industry considerably grew not only qualitatively, but also quantitatively in terms of the size of tonnage, and employed a lot of measures in terms of shipping policy towards its own shipping industry.

2. Concentration and Centralization of Tonnage, its Measure

The process of concentration of tonnage can be explained

as an increase and growth of tonnage within an individual owner's limits and abilities, while centralization of tonnage means an accumulation of already created tonnage in the hands of a decreasing number of owners. Having said that, centralization of tonnage is of a subjective character, while concentration of tonnage is of an objective character.

However, even though the processes of accumulating tonnage, i.e. concentration of tonnage and centralization of tonnage, are separately defined, the both processes happen simultaneously and are characterized by a dynamic growth and on-going phenomenon.

Fig. 1 shows the relationship between the concentration and centralization of tonnage. Chrzanowski (1975) explained and defined the process of concentration and centralization of capital in his book *Concentration and Centralization of Capital in Shipping*. In this paper, this concept is used in order to define concentration and centralization of tonnage. An increase and growth of tonnage within individual shipping companies appears. Such a concentration of tonnage accumulates through centralization of tonnages among shipping companies, thus increasing the quantity of tonnage at their disposal. On the other hand, a centralized tonnage engaged in producing shipping services also accumulates, and therefore creates high degree of concentration of tonnage by a decreasing number of owners

* Corresponding Author : Hyun-Duk Kim, alex0921@hhu.ac.kr 051)410-4724

** kmahn@hhu.ac.kr 051)410-4385

*** yjshin61@hhu.ac.kr 051)410 4382

which means new concentration of tonnage. These processes are repeated and follow that a decreasing number of owners control larger and increasing quantity of tonnage. However, concentration of production of shipping service is generally defined as the growth of production of shipping service within the shipping industry. Although the concentration and centralization of tonnage and concentration of production of shipping service resulting from it is internally linked, the two processes must not be identified.

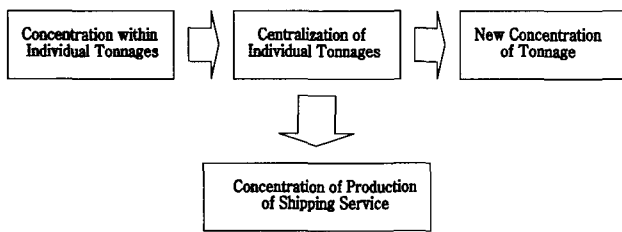


Fig. 1 Relationship between the concentration and centralization of tonnage

However, shipping tonnage is engaged mostly in the three basic forms of this industry, i.e. liner, tramp and tanker shipping according to type of service offered. If shipping tonnage is analyzed from the industry point of view, two schemes are broadly drawn, first, a horizontal concentration and centralization of tonnage involving shipping firms of the same profile, i.e. liner with liner, tramp with tramp and tanker with tanker, and second, a mixed concentration and centralization of tonnage involving types of shipping companies such as liner, tramp and tanker.

The scheme of concentration and centralization of tonnage can be shown in Figure 2. Horizontal concentration and centralization of tonnage is an amalgamation and growth of tonnage of shipping companies engaged in the same form of shipping i.e. within liner companies, within tramp companies and within tanker companies and it includes not only a consolidation of liner companies through a competitive strategy, but also a joint venture, consortia, strategic alliance through a cooperative strategy among shipping companies which is formerly competitors. Whilst mixed concentration and centralization of tonnage involves an amalgamation and growth of tonnage of shipping companies representing various production profiles i.e. among liner, tramp and tanker companies and it includes not only mergers of shipping companies engaging in shipping services of various types but also shipping

tonnage diversification to adjust more flexibly to the changing conditions in the freight market.

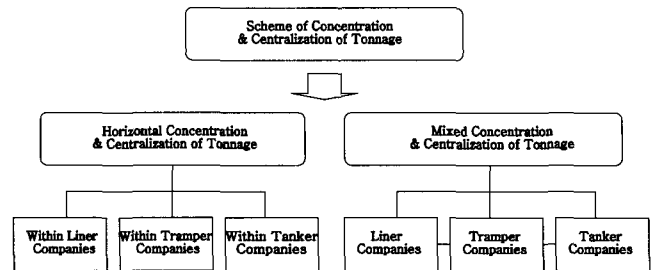


Fig. 2 Scheme of concentration and centralization of tonnage

In principle, all measures of concentration can be divided into two categories. The more representative measures include physical measures such as number of employees, volume of production, number of machines and equipment and values measures such as those used in terms of value. Generally, the share of three or four of the largest enterprises in the total output, which is a relative measure unlike the absolute measures, i.e. number of employees, size of production, is used as a basic measure of concentration. The wider the assortment of production, the less importance of physical measures used; and vice versa, the lower the degree of aggregation of production and the smaller the variety of a firm's substance, the greater the value of physical measures. Thus, physical measures, which are the absolute tonnage, can be adopted to measure the degree of concentration owing to the fact that the assortment of transport production is limited, as compared with that of manufacturing. Two main measures are used in this paper in order to measure concentration and centralization of tonnage, first, number of ships and tonnage operated by the largest shipping companies, second, the share of the largest shipping companies out of the total tonnage.

3. Concentration and Centralization of Tonnage in Liner Shipping

As shown in Table 1, a clear concentration of tonnage through liner consolidation in the period 1988-2002. The top 20 carriers controlled just 26% of the world capacity in 1980. In 1988, the 20 biggest companies held 37.4% of the total world capacity, and 45.5% in 1996. By the end of 1999 these companies reached 51.4%. Table 1 clearly shows the above phenomenon. In 1997, the 10 biggest companies held

34.9 per cent of the total world capacity. And the top 10 carriers controlled about 37 per cent in the total world capacity in 1999 and finally reached 42.8% in 2002.

Table 1 Share of the Top 10 and 20 Carriers in the World Capacity of Container ships

(Unit: Million TEU)

Year	Total Capacity	Top 20 carriers		Top 10 carrier	
		Capacity	Share	Capacity	Share
1988	2.78	1.04	37.4	0.68	27.9
1996	4.83	2.29	45.5	1.43	29.5
1997	5.26	2.61	49.7	1.84	34.9
1999	6.51	3.34	51.4	2.41	37.0
2002.7	7.67	4.62	60.2	3.28	42.8

Source: Containerization International.

This, it can be said from Table 1 that the share of the top 10, 20 carriers in the total world capacity was increasing over time. It follows that a decreasing number of owners control an increasing number of tonnages. In other words, at one extreme, there are 20 biggest operators accounting for 42.8 per cent in the total capacity (top 20 companies holding over 1% respectively), while, at other extreme, the remaining companies holding less than 1 per cent respectively. The former shows a clear concentration of tonnage by a decreasing number of owners in liner shipping and the latter represents that shipping is rather fragmented, compared to other industries, since no single line controls more than 10 per cent of the world's total slot capacity (Table 2).

Table 2 Share of the Top 20 Companies on July 2002

Companies	TEU	Share(%)
Maersk-Sealand/Safmarine	760,300	9.9
MSC	413,800	5.4
P&O Nedlloyd	385,600	5.0
Evergreen/LT	372,200	4.9
Hanjin/Senator	304,400	4.0
Cosco	255,900	3.3
APL/NOL	233,500	3.0
MOL	188,500	2.5
CMA-CGM	185,400	2.4
CP Ships	180,500	2.4
K-Line	174,000	2.3
NYK	170,500	2.2
OOCL	157,500	2.1
China Shipping	148,200	1.9
Hapag-Lloyd	136,000	1.8
Zim	129,000	1.7
Hyundai	122,700	1.6
Yang Ming	120,300	1.6
CSAV	96,300	1.3
Hamburg Sud/Columbus	77,000	1.0

More important than which carriers were in the top 20 is the fact that only a few container carriers outside the top 20 operate post-Panamax vessels and that most of the top 20 carriers were involved in multi-trade strategic alliances. However, independent of the exact measure of concentration of tonnage in liner shipping, there clearly exists a tendency towards more consolidation. Mergers and acquisitions seem to dominate the contemporary transport scene.

Mergers and take-overs and share-holding agreements for the last decade in liner shipping include the acquisition of Sea-land by Maersk, that of APL by NOL, the merger between P & O and Nedlloyd, the purchase of Blue Star by P & O Nedlloyd as shown in Table 3. There have been well-marked trends for horizontal merger and strategic alliances in liner shipping.

Table 3 Liner Industry Consolidation, 1997-1999

Company acquired	Purchaser	Date
CTE	TMM	Apr 1997
Lykes Lines	CP Ships	Jul 1997
Conship Containerlines	CP Ships	Oct 1997
APL	NOL	Nov 1997
Blue Star Line	P & O Nedlloyd	Feb 1998
Ivaran Lines	CP Ships	May 1998
Safmarine & CMBT Lines	Safmarine	Jul 1998
South Seas Steamship Co	Hamburg Sud	Aug 1998
Lloyd Trestino	Evergreen	Aug 1998
Italia Navigazione	D'Amico	Aug 1998
ANDAL	CP Ships	Oct 1998
Alianca	Hamburg Sud	Nov 1998
ANL	CMA-CGM	Dec 1998
Tasman Express Line	P & O Nedlloyd	Jan 1999
Montemar	CSAV	
Safmarine Container Lines	AP Moller/Maersk	Jan 1999
Grupo Libra	CSAV	Mar 1999
Transroll	Alianca (Hamburg Sud)	Jul 1999
South Pacific Container L.	Hamburg Sud	Jul 1999
OT Africa Line	Delmas	Nov 1999
Harrison Line	P & O Nedlloyd	Dec 1999
Sea-Land	AP Moller/Maersk	Dec 1999
Crowley American Tpt	Hamburg Sud	Dec 1999

Source: LSE (2001).

4. Concentration and Centralization of Tonnage in the Korean and Egyptian Shipping Industry

In order to show and measure the degree of concentration of tonnage in the Korean and Egyptian shipping industry, two main measures are adopted: first, number of ships and tonnage operated by the Korean ocean going companies, second, the share of the companies out of the total tonnage. However, in order to apply the measures, a set of complete statistical and relevant, uniform

information, and a certain number of companies are required but in case of the Egyptian shipping industry, relevant and uniform data is not available so the only 2000's statistic was used and measured. This measure is supplemented with the qualitative aspects of tonnage in the Korean and Egyptian shipping industry.

Generally, the Gini coefficient was developed to measure the degree of concentration (inequality) of a variable in a distribution of its elements. It compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. This line assumes that each element has provided the same contribution to the total summation of the values of a variable. For complete inequality, only an element contributes to the total summation of the values of a variable (if that were possible). The Gini coefficient ranges between 0, where there is no concentration (perfect equality) and 1 where there is total concentration (perfect inequality). In other words, at an extreme, the Lorenz curve would closely follow the horizontal and vertical axes which mean the lowest 99 % of the shipping companies concerned gets a tiny proportion of total tonnage, while the top 1 % gets all the rest.

4.1 Concentration and Centralization of Tonnage in the Korean Shipping Industry

Table 4 presents the number of operators, their share in the total operators and their tonnage and share in the total tonnage by size group in 2001, which can be divided into six group as shown in Table 2. In 2001, there were 34 ocean-going operators in Korea. The two largest operators(Hyundai Merchant Marine Co. and Hanjin Shipping Co., Ltd) account for 52.4% in the total tonnage, while there are 25 operators possessing 885 thousand grt and their share in the total tonnage only 7.8% but 73.6% in the total operators.

Table 4 Number and Tonnage of Korean Ocean-going Operators in 2001

(Unit: thousand grt)

Size group (grt)	No. of operators	% of the number of operators	GRT	% of the total tonnage	Cumulative percent	
					operators	tonnage
~99 (A)	25	73.6	885	7.8	73.6	7.8
100~499(B)	3	8.8	447	3.9	82.4	11.7
500~999(C)	2	5.9	1,518	13.3	88.3	25.0
1,000~1,499(D)	1	2.9	1,008	8.9	91.2	33.9
1,500~1,999 (E)	1	2.9	1,564	13.7	94.1	47.6
Over 2,000(F)	2	5.9	5,959	52.4	100.0	100.0
Total	34	100	13,381	100.0		

Source: Ministry of Maritime Affairs and Fisheries, Statistics, 2002.

Table 5 Concentration Ratio/Gini Coefficient of the Korean Ocean-going Companies in 2001

Com.	Grt	X	Y	$\frac{1}{n}X$	$\frac{1}{n}Y$	B	A	A*B
25	885	0.736	0.078	0.736	0.078	0.078	0.736	0.057
3	447	0.088	0.039	0.824	0.117	0.195	0.088	0.017
2	1,518	0.059	0.133	0.883	0.250	0.367	0.059	0.022
1	1,008	0.029	0.089	0.912	0.339	0.589	0.029	0.017
1	1,564	0.029	0.137	0.941	0.476	0.815	0.029	0.024
2	5,959	0.059	0.524	1.000	1.000	1.476	0.059	0.087
34	13,381	1.000	1.000					0.224

Source: Derived from Table 10.

Note : $A = \frac{1}{n}X_{i-1} - \frac{1}{n}X_i, B = \frac{1}{n}Y_{i-1} + \frac{1}{n}Y_i$

Thus, this distribution is fairly unequal with a Gini coefficient of 0.776 (1-0.224). In the same way, Lorenz curves in the past is drawn as shown in Fig. 3.

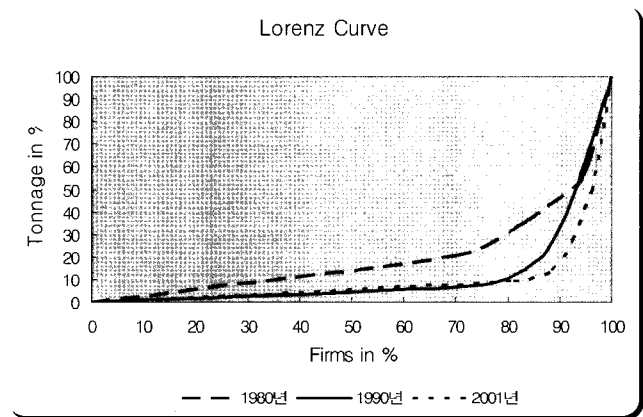


Fig. 3 Development of the Lorenz Curve

The Lorenz curve closely follows the horizontal and vertical axes over time. In conclusion, It can be said that the degree of concentration of tonnage by a few largest companies in the Korean shipping industry increase over time. It confirms that a decreasing number of owners control an increasing quantity of tonnage in the total tonnage. As far as the qualitative aspects of Korean shipping tonnage are concerned, the Korean ocean-going fleet was concentrated on newer and larger vessels than that of the world. More than 80 percent was concentrated on newer ships less than 10 years in 2001, while its share was about 56 percent in 1980. Thus, the tonnage growth of Korea had a positive impact on the age structure and clearly indicates that the Korean ocean-going fleet achieved a highly qualitative and structural improvement in the age distribution.

4.2 Concentration and Centralization of Tonnage in the Egyptian Shipping Industry

In 2000, there were 41 ocean-going operators in Egypt, as shown in Table 5. In the case of A group, there are 21 operators amounting to about 75.4 thousand grt. The average company size in terms of grt and their share in the total operators is about 3.6 thousand tons, 69.3 per cent respectively while at another extreme, there are two operators amounting to 544.7 thousand grt and their share in the total operators is just 4.9 per cent and their share in the total tonnage is 40.7 per cent. Several conclusions are drawn from Table 5. Firstly, the degree of the concentration of tonnage by a few largest companies is highly intense. Secondly, 18 companies own just one ship and their ships are even much obsolete one. In other words, these companies could be withdrawn from the service whenever the shipping market is not optimistic and could be consolidated by a larger tonnage.

Table 6 Number and Tonnage of the Egyptian Operators in 2000

(Unit: thousand grt)

Size group (grt)	No. of operators	% of the number of operators	GRT	% of the total tonnage	Cumulative percent	
					operators	tonnage
~9(A)	21	51.2	75.4	5.6	51.2	5.6
10~19(B)	9	22.0	138.4	10.3	73.2	15.9
20~29(C)	3	7.3	79.8	6.0	80.5	21.9
30~49(D)	3	7.3	103.6	7.7	87.8	29.6
51~99(E)	1	2.4	58.9	4.4	90.2	34.0
100~199(F)	2	4.9	338.9	25.3	95.1	59.3
Over 200(G)	2	4.9	544.7	40.7	100.0	100.0
Total	41	100.0	1,339.7	100		

Source: MRCC (The Maritime Research & Consultation Center), Statistical Yearbook, September 2001, Arab Academy, Egypt.

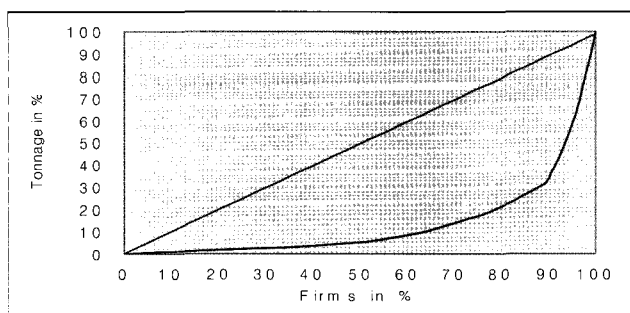


Fig. 4 Lorenz Curve in 2000

Fig. 4 shows the degree of the tonnage concentration in Egypt. It can be seen that the fleet under consideration is

highly concentrated as this curve follows the horizontal and vertical line. About 95 percent of the total number of operators controlled just about 60 per cent of the total tonnage.

Table 7 Concentration Ratio/Gini Coefficient of the Egyptian Shipping Companies in 2000

Com.	Grt	X	Y	$\frac{1}{n}X$	$\frac{1}{n}Y$	B	A	A*B
21	75.4	0.512	0.056	0.512	0.056	0.056	0.512	0.029
9	138.4	0.220	0.103	0.732	0.159	0.215	0.220	0.047
3	79.8	0.073	0.060	0.805	0.219	0.378	0.073	0.028
3	103.6	0.073	0.077	0.878	0.296	0.515	0.073	0.038
1	58.9	0.024	0.044	0.902	0.340	0.636	0.024	0.015
2	338.9	0.049	0.253	0.951	0.593	0.933	0.049	0.046
2	544.7	0.049	0.407	1.000	1.000	1.593	0.049	0.078
41	1,339.7	1.000	1.000					0.281

Source: Derived from Table 12.

Note : $A = \sigma X_i - 1 - \sigma X_i$, $B = \sigma Y_i - 1 + \sigma Y_i$

Thus, this distribution is highly unequal with a Gini coefficient (G) of 0.719 (1 0.281). In other words, the Egyptian shipping tonnage is concentrated by a few largest companies as a result of concentration and centralization of tonnage. But it must be mentioned that this measure is supplemented with the structural features of the Egyptian merchant fleet such as the fleet composition, the age distribution, and the average ship size of the Egyptian merchant vessels.

When considering the qualitative aspects of Egyptian shipping tonnage, the Egyptian merchant fleet lagged considerably behind the trends towards newer and bigger vessels. In particular, more than 81 percent was concentrated mainly on older ships more than 15 years old, while the average ship age was 13.9 years old for the world, 19 years for Egypt in 2000.

In the case of the average ship size of the Egyptian merchant fleet, it increased slightly to 10.55 thousand grt in 2000 from 9.99 thousand grt in 1990. Thus, the Egyptian shipping tonnage was concentrated on relatively smaller ships. On top of those, about 62 percent in the total tonnage was controlled by six state owned companies, unlike Korea. However, over the period 1990-2000, the growth of seaborne trade increased by 3.78 per cent per annum, while the shipping tonnage decreased by 0.7 per cent annually. A positive relationship between the both indices was found over the period 1990-1996. Since then, there was no strong relationship unlike Korea and the world. As far as the role of the government is concerned, the Korean government played a pivotal role in developing and encouraging its own

shipping industry through a number of policy measures such as financial supports, administrative measures and ship financing program, whilst the Egyptian government's role was completely limited. Table 8 shows the policy measures or subsidies which had been carried out by Egypt and Korea in the past. The Korean government employed most of the lists over the last three decades in order to develop its own shipping industry, while the role of the Egyptian government in developing and encouraging the industry was almost few. Since 1981, in practice, the Egyptian government stopped any kind of subsidies for the Egyptian shipping industry.

Table 8 Type of Subsidies Carried out by Egypt and Korea

Type of subsidy	Egypt	Korea
Operational subsidies	X	O*
Construction subsidies	X	X**
Restructuring subsidies	X	O
Financing program	X	O
Cargo preference	O	O
Bilateral agreements	O	O
Scrapping subsidies	X	X
Export subsidies	X	O
Tax exemptions	X	O
Customs exemptions	X	O
State Ownership	X	X
Cabotage trade	O	O
Research & Development	X	O
Marine insurance subsidy	X	X
Others	O	O

Source: Shoura Council(1999), Final Report of Shoura Council, Committee of Industrial Production & Energy in the Egyptian Maritime Transport Sector, pp. 21-23.

Note: * O means list carried out by each government
 ** X means list that was not carried out.

5. Summary and Conclusion

Some findings drawn from this paper are as follows:

First, a clear concentration of tonnage in liner shipping through a consolidation and strategic alliances was observed over the period 1988-2002. The share of the Top 20, 10 largest carriers in the total tonnage was increasing. Over the period 1997-1999, 12 largest shipping companies were absorbed or merged by others.

Second, the degree of concentration of tonnage in the Korean shipping industry was increasing over time.

It clearly indicates that the Korean shipping tonnage was controlled by a few largest companies with an increasing quantity of tonnage and has a clear dualistic structure over time. It confirms that a decreasing number of owners

control an increasing quantity of tonnage through the process of concentration and centralization of tonnage.

As far as the qualitative measures of the Korean shipping tonnage are concerned, the tonnage growth of Korea had a positive impact on the age structure and clearly indicates that the Korean ocean-going fleet achieved a highly qualitative and structural improvement in the age distribution.

Third, the distribution of the Egyptian shipping tonnage was highly unequal with a Gini coefficient (G) of 0.719 (1-0.281) in 2000. In other words, there existed a clear concentration of tonnage by a few largest companies in terms of concentration and centralization of tonnage. But when considering the qualitative aspects of the shipping tonnage, the growth of the Egyptian shipping tonnage lagged considerably behind the trends towards newer and bigger vessels. On top of those, about 62 percent in the total tonnage was controlled by six state-owned companies, unlike Korea.

Finally, the Korean government played an important role in developing and encouraging its own shipping industry through a number of policy measures such as financial supports, administrative measures and ship financing program, while the Egyptian government's role was few.

In conclusion, the high degree of concentration and centralization of tonnage follows that a decreasing number of owners control an increasing quantity of tonnage and shows an extremely dualistic structure. But it should be supplemented with the qualitative measures of tonnage in a given country.

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