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An innovation in liner shipping : the round-the-world service as a global strategy

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AN INNOVATION IN LINER SHIPPING : THE ROUND-THE-WORLD SERVICE AS A GLOBAL STRATEGY

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ABSTRACT

In recent years, one of the major events in the container liner market was the introduction of the Round-the-World service(RTW), whereby the intensity of competition among carriers has been exacerbated.
Consequently, because of its significant impact on the market, there have been many arguments which were rather superficial, while few have dealt with the subject in detail.

However, this study has a different approach based on three assumptions, Those are, firstly, the assumption that innovation is an essential factor in economic changes, secondly, the RTW concept is an innovation in the liner market, and thirdly that the innovation influences the future liner market.

With these assumptions, I undertook to explore the following series of questions,

1. What are the major innovations in the liner market and the interactions on changes in the liner market?
2. What is the significance of the RTW concept as an innovation?
3. What are the core of the RTW concept in its principle and its application to the real world?
4. What would the advantages and disadvantages of this concept and the result of its analysis be?
5. What would the impact of the RTW concept in a future projection be?

The above questions were dealt with in the relevent chapters through various methods;of theoretical, practical and analytical access,and summarized at the end of each

part.

The summary of major findings in these processes are;

1. If we define the core of containerization as the unification of cargo through the change of its characteristics being heterogeneous toward being homogeneous, the RTW concept is the unification of both cargo and trades.
2. If the penetration of containerization in international liner cargo trades represents the level of accomplishment of standardization of the liner industry, the standardization in the production process of the service commodity in liner shipping has almost completed in the three mainstream trades.
3. This means that market integration in a global point of view can be realized through the establishment of a international marketing strategy.
4. Among various global strategies, the RTW concept is categorized as the overall cost-leadership strategy which is very effective in penetrating the market with its low cost structure and bargaining power in order to build up a defensive position to be able to cope with the competitive market.

Accordingly, this paper concludes that the RTW concept as a global strategy should be built in such a way that the concept does not bring about friction with the reality in its application, keeping flexibility and adaptability in the business entity.

Finally, the study leaves a further discussion concerning the behavioristic strategies of rivalry and the economic and manageral effectiveness to the market for a future study.

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A research paper of this kind should be a reflection of contemporary thoughts in the liner shipping industry, particularly in container shipping, and it should be an integration of theoretical knowledge with paractical experience in the industry.

Therefore, a great deal of time and efforts in writing this paper were spent to gather the necessary information through personal interviews, library researches and many visitings to related organizations, taking the opportunities at the field-trips to various countries such as U.K.,France, Norway, Sweden, U.S.A.,Germany and Denmark.

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INTRODUCTION

1). Purpose and Task

The economic situation in liner shipping has changed drastically during the last two decades, particularly in recent years.
Many refer to the current liner market as a chronic recession because of the lasting or even aggravated over-tonnage situation.

In general, economic changes are affected by internal factors within the industry as well as external factors from environment, thus the economic system generates evolution through the changes of process.
We can not sketch any of economic status by merely reproducing it at constant rates and in a static equilibrium at any point in time.
Because it is dynamic.

Then, the question is raised ;
What cause the changes in liner shipping ?
There are many factors to consider to answer this question.
Among the factors, innovation is one of the most important factors for economic changes as Professor Joseph.A. Schumpeter pointed out.
Therefore, the prime purpose in this paper is to observe the economic phenomena in liner shipping from this perceptive angle and analyse those economic impact on the market.

In recent years, the round-the-world service concept has been introduced to the liner market as a business strategy whereby a carrier can cover the globally integrated marketing network.

As the title of this paper explicitly refers to the Round-the-World concept as an innovation in liner shipping, this new concept has influenced the current liner market in various ways,which is discussed in the paper.

Accordingly, the primary concerns as the tasks of this paper go to the following questions regarding the RTW concept.
First, what is the significance of the RTW concept as an innovation in liner shipping?
Second, what are the practical applications of the RTW concept to the real market?
Thirdly,the quantitative analysis of the RTW concept compared with the traditional liner service.
Finaly, what would be the impacts of the RTW concept in the future liner shipping?

2). Limitations and Scope of the Research

However, in observation of the major economic phenomena in liner shipping, the study does not cover all factors involved in the changes of the liner market, but includes only striking events to varify the ideas which is relative to the subject matter.
Furthermore, in the discussions any detailed explanation and justification of ideas and thoughts which are generally accepted are excluded in order to avoid the voluminous content of the paper.

There are many limitations in collecting proper and accurate information and data particularly which are useful for the computer caculation and building a computer program. Therefore, most of the information was acquired from various publications, periodicals and Lloyd's List. The information which was not available from any of these sources was added by assumptions being relevant in terms of values and quantities.

In this study, it is very regretful that the topic regarding the competitors' behaviour in terms of business strategy was not fully discussed because of time and space constraints.

One of the major concerns in the study lies in the analytical approach to business behaviour in the container liner market and its global marketing strategy as a defensive measure to cope with competitive forces in the industry.

However, this topic shall be continued in my future study especially from the international marketing point of view which I have stressed in the conclusion of this paper.

Finally, the scope of this research is limited to the study of liner shipping, praticularly, container liner shipping.

Eventhough conventional liner shipping exists in various trade routes, the study excludes that area of liner shipping.

However, occasionally, the term "liner shipping" is used instead of container liner shipping, when it refers to a broader sense of container liner shipping.

3). Methodolgy

This research has been conducted mainly through three different methods, that is, library research, practical research on the case study of the practice of the RTW concept and computer research on cost comparison and analysis.

Library research was undertaken at various libraries such as World Maritime University, the World Bank Sectoral Library and the Federal Maritime Comission in Washington D.C. during my on-the-job training in the World Bank last April and May.

Practical research was fulfilled during various field trips to many countries, such as France, Norway, Sweden, the United Kingdom and the U.S.A.,collecting several practical data and information which were useful for the analytical approach.
The practical research includes personal interviews with many experts, visiting professors and technical personnel in different organizations.

Lastly, computer research has been done by using the computer model which was built by the Transportation Department of the World Bank,to produce the costs for TEU/mile of the RTW carriers according to various assumptions.
Another computer program was built to conduct the comparison of voyage costs.

4).The Plan of this Study

The study consists mainly of three different approaches to the subject matter ;
The first is the theoretical approach which was undertaken in the first part for the justification of the RTW concept as an innovation, the second is the practical approach of a case study of the RTW concept and the third is analytical approach done in the third part.

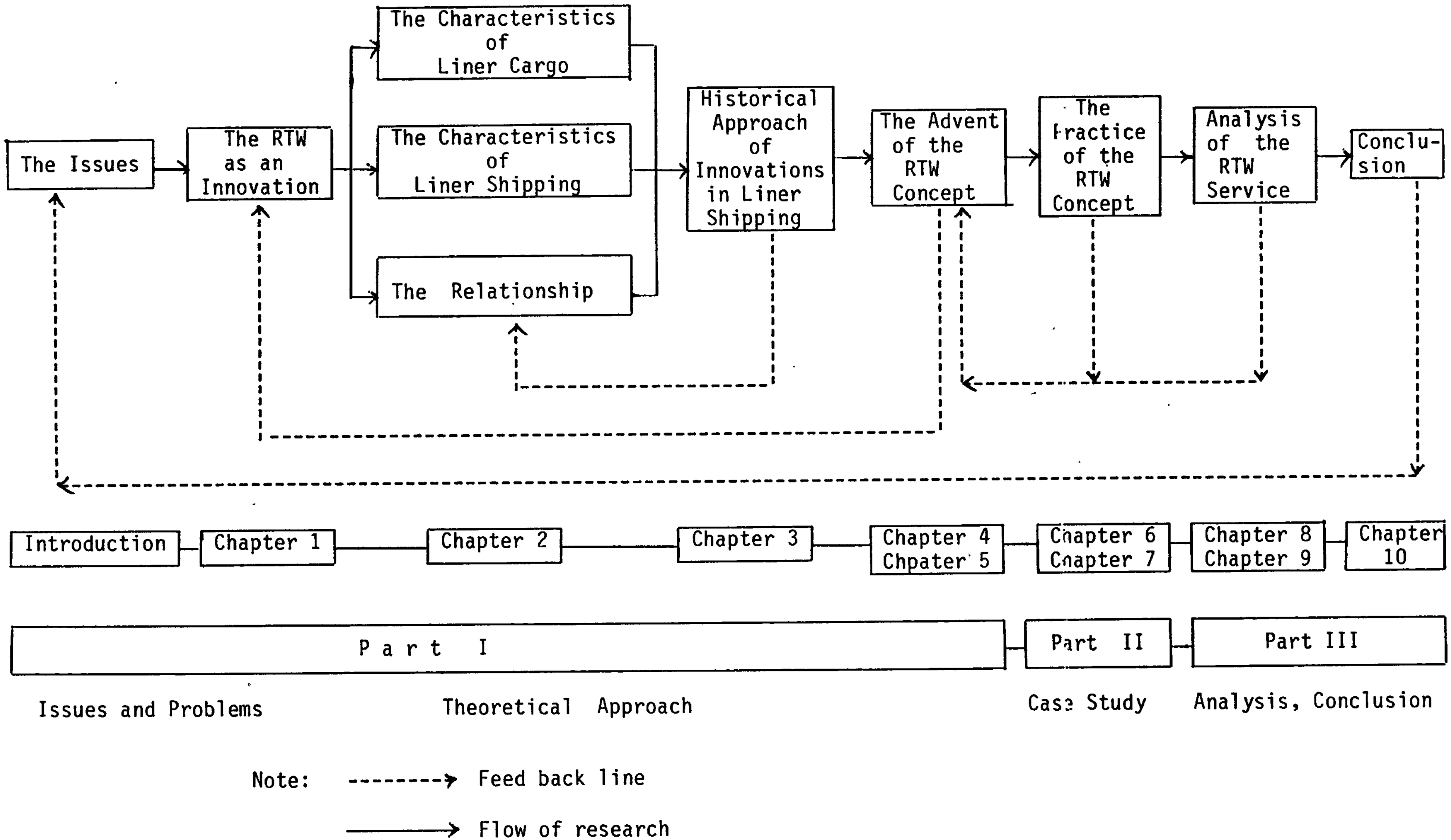
Figure (1-1) represents the plan of this study in schemetic form.

The figure shows the flow of discussions and the interrelationship between topics which are dealt with in different chapters.

Eventually the flow of thoughts feed back to the previous discussions so that the conclusion of each part highlights the questions raised before.

Figure (1-1)

THE PLAN OF THE STUDY



PART I

INNOVATIONS IN LINER SHIPPING

As shown by the title of this paper, the round-the-world service (RTW) concept is referred to an innovation in the evolution of liner shipping.

Therefore, before going to the discussion of the RTW service as a main topic of this paper, it is necessary to review various innovations which have been involved in the process of developing liner shipping, and it is also necessary to define what innovation is.

Chapter 1. WHAT IS INNOVATION?

In Webster's Third New International Dictionary Unabridged,the word "INNOVATION" is defined as: 1) the act or an instance of innovating: the introduction of something new;2) something that deviates from established doctrine or practice: something that differs from existing forms (1).It refers to the infusion of something new into real-world activities; hence it excludes abstractions such as new theories or concepts.

Innovations may come about as a result of such new theories or concepts, as a result of new inventions, or simply as a result of new ways of implementing previously known principles.

In economics, innovation means one of three things(2):

1) The implementation of changes in production, i.e. changes in the production function;
2) The intrdduction of new types of commodities in the market, i.e. the appearance of new supply functions;
3) Procedural changes introduced into markets or the economy as a whole, i.e. social reform.

Professor Joseph A. Schumpeter stressed that the concept

of innovation assumes a position of central importance in business cycles, and more generally, the course of and the outlook for the capitalist process.
He defined the innovation by means of the production funtion(3).

This function describes the way in which a quantity of a product varies if quantities of factors vary.
If, instead of quantities of factors, we vary the form of the function, we have an innovation.
However, this does not limit us to the case in which an innovation consists in producing the same kind of product which had been produced before by the same kind of means of production that had been used before.

The definition INNOVATION as the setting up of a new production function covers the case of a new commodity as well as those of a new form of organization such as a merger, cartel, or the opening up of a new market.

Innovation can also be defined with reference to cost. Total costs to individual firms must, in the absence of innovation and with constant price factors monotonously increase in function of their output.

Whenever at any time a given quantity of output costs less to produce than the same or a smaller quantity did cost or would have cost before, under the condition that price factors had not fallen, certainly there has been innovations somewhere. In this case, it follows that it would be incorrect to say that innovation causes long-run marginal cost curves to fall or makes, with a certain intervals, marginal cost negative.
An innovation breaks off the old total or marginal cost

curve and puts a new one in its place at the same time.

In a broad sense, reduction in unit costs by the innovation of individual firm favors the growth of an industry, which means that an industrial cost curve, as well as an individual cost curve is ultimately charged.

Innovation has a pragmatic connotation.Different from invention, it implies something, such as implementation or introduction of a new concept to reality.

For actions which consist in carrying out innovations, we reserve the term entrepreneurship.
The idea of entrpreneurship and the theory of the entrepreneur are the basic factors for economic development. According to Schumpeter, a static economy, characterized by a given, undisturbed circular flow of economic activity, is disrupted by an innovation, undertaken by an entrepreneur.A sucessful innovation will then be imitated by others until it becomes absorbed into a new circular flow, a pattern which leads to cyclical fluctuations in economic activities.

Professor A. Stromme Svendsen also highlights the importance of the entrepreneur as a dynamic factor in modern shipping (4).
He explained that the entrepreneurial function is a central concept in economics since uncertainty implies risks in organizing production. It consists in the task of co-ordinating the flow of resources to produce and sell an output, and it is therefore essentially concerned with decisions which establish and change the direction of the firm. His approach is rather based on the decision-taking and the risk-taking function of entrepreneur-

ship.

The innovation concept contains the behavioristic connotation together with the idea of entrepreneurship.
In the process of implementaton of an innovation, the decision-making has been undertaken very much based upon fundamental assumptions of business behavior. This is because only some firms carry out innovations and then act along new cost curves, while others can not but merely have to adapt themselves.

The business behavior is affected not only by the motivation of the implementation of new cost curves but, more importantly in many cases, also by the quality of products to meet the customer's needs. We can identify a good example in liner services. The tariff rate in liner services is comparatively higher than that of tramp services. This is so called the cost for stability, which will be discussed in the following chapter.The conference system is an innovation to secure the quality of services in terms of stability.

Innovations discussed in this paper are classified into two categories, one hardware-oriented innovation and the other, software-oriented innovation

As we have defined earlier,an innovation covers procedural changes introduced into the market or the economy as a whole, e.g. the conference system, Containerization and the RTW service concept. These procedural, organizational and operational changes are categorized as software-oriented innovations

The hardware-oriented innovation includes technical innovations mainly focusing on the implementation of changes in production functions i.e., propulsion devices.

Chaptert 2. SOME CONSIDERATION REGARDING THE RELATIONSHIP BETWEEN THE MAIN CHARACTERISTICS OF LINER CARGO AND LINER SERVICES

As a result of the Industrial Revolution, a system of regular, public transport services beween countries were required. Scheduled ocean transport in the form of liner services plays an essential role in industrial development and international trade through its evolution.

The evolution of liner shipping has been caused by various innovations in such ways as introduction of new production functions, implementation of new production processes and a market reform such as the Conference system.

Before discussing innovations having been involved in the liner market,it is necessary to review the characteristics of the liner cargo and the liner service, because, those are fundamental factors and the basis on which the innovations can take place.

2.1 Characteristics of Liner Cargo

General cargo are carried by either liner shipping or,-though in less degree, by tramp shipping. This makes it difficult to make a strict distinction between the two different groups of cargoes, liner cargo or tramp cargo. Nevertheless, the following statements are generally accepted.

2.1.1 The main characteristics of liner cargo from the view point of its value

a) High value

The most common types of liner cargo are manufactured goods which are normally high in value compared with raw material cargo. Therefore, safe and fast delivery is usually of greater concern to the shipper in liner services, which means that the cost for inventory and handling of the cargo in transit is higher than that of tramps,because of the value of the cargo affected by financial cost and insurance cost during transit time.(5).

Table (1-1) illustrates the major liner commodities with a wide range of value per long ton. Among the range of the liner cargo, high value cargo and low value cargo are sometimes diverted to airfreight and tramp services respectively.

b) High freight rates

The freight rates of liner cargo are comparatively high in level at which the commodity can bear.

c) The proportion of freight to the total price of cargo.

Despite high freight rates of liner cargo, its proportion of freight to the total price of cargo is relatively low. Regarding low-value commodities,freight rates can easily amount to more than 50 per cent of the delivered price, while high value products are rarely subjected to such a heavy freight burden. A likely estimate of the proportion in liner cargo would be from 5 to 10 per cent which is shown in table(1-2).

d) Low price elasticity of the demand of liner shipping services.

Because of the nature of the characteristics of liner cargo as mentioned above,the increment of freight rates is not usually subjected to diversion to substitute the mode of transportation. However there are competitive forces, such as airfreight liners for the high value cargo and tramp shipping for low value cargo.

2.1.2 Main characteristics from the point of view of other than the value of cargo

e).Liner cargo are typically bulkier and of lower density than raw materials

f).In a single voyage in liner services, many kinds of cargoes are loaded and discharged in various ports from various shippers.

These two characteristics formulate the characteristics of liner cargo as being heterogeneous,which decisively influences the liner shipping.

Table(1-1)

Value per Long Ton of Selected Major Liner Commodities, 1973

Code	Description	Range Dollars per Long Ton
72	Electrical machinery	5,891- 5,174
89	Manufactured articles, NES	3,987- 2,643
71	Nonelectrical machinery	3,875- 784
732	Road motor vehicles and parts	3,651- 1,232
733	Vehicles, nonroad, and parts	3,584- 2,397
629	Rubber manufactures	2,330- 1,882
121	Tobacco, unmanufactured	2,150- 1,334
821	Furniture	2,038- 806
011	Meat, fresh, chilled, frozen	1,747- 1,456
68	Nonferrous metals	1,478- 963
42	Vegetable oils and fats	1,165- 1,075
112	Alcoholic beverages	1,098- 941
263	Cotton	829- 582
211	Hides and skins	806- 762
24	Wood, lumber and cork	694- 224
26	Textile fibers and waste	605- 358
58	Synthetic resins and cellulose	470- 381
411	Animal oils and fats, NES	291- 224
221	Oilseeds, nuts and kernels	269- 224
081	Animal feed excluding cereals	269- 112
251	Pulps and waste paper	224- 67
641	Paper and paperboard	179- 157

*** Source;Gunnar K.Sletmo,Ernest W,Williams,Jr., Liner Conferences in the Container age, P.55.

Table(1-2)

A 1 Values and Rates Per dw Tonne

Trade leg	1 Value/Tonne ($US'000)	2 Rate/ Tonne ($US'000)	3 Rate/Value (2/1x100)
UK-Australia	4.3	0.29	6.7
Australia-UK	1.4	0.17	12.1
UK-Japan	4.5	0.12	2.7
Japan-UK	6.9	0.28	4.1
UK-Malaysia	2.2	0.11	5.0
Malaysia-UK	1.8	0.11	6.1
UK-India	1.6	0.13	8.1
India-UK	2.9	0.16	5.5
UK-Kenya	2.2	0.18	8.2
Kenya-UK	1.4	0.08	5.7

*** Note;Value data are based upon OECD world trade statistics for 1982.

*** Source;M.G.Graham, D.O.Hughes, Containerisation in the Eighties,p.221

2.2 Characteristics of Liner Shipping.

Liner shipping offers all potential shippers regular and scheduled departures on particular geographic routes and calling ports with a fixed schedule and fixed sets of rates. From this definition, we can derive the two fundamental ingredients as its characteristics, that is to say regularity and stability.

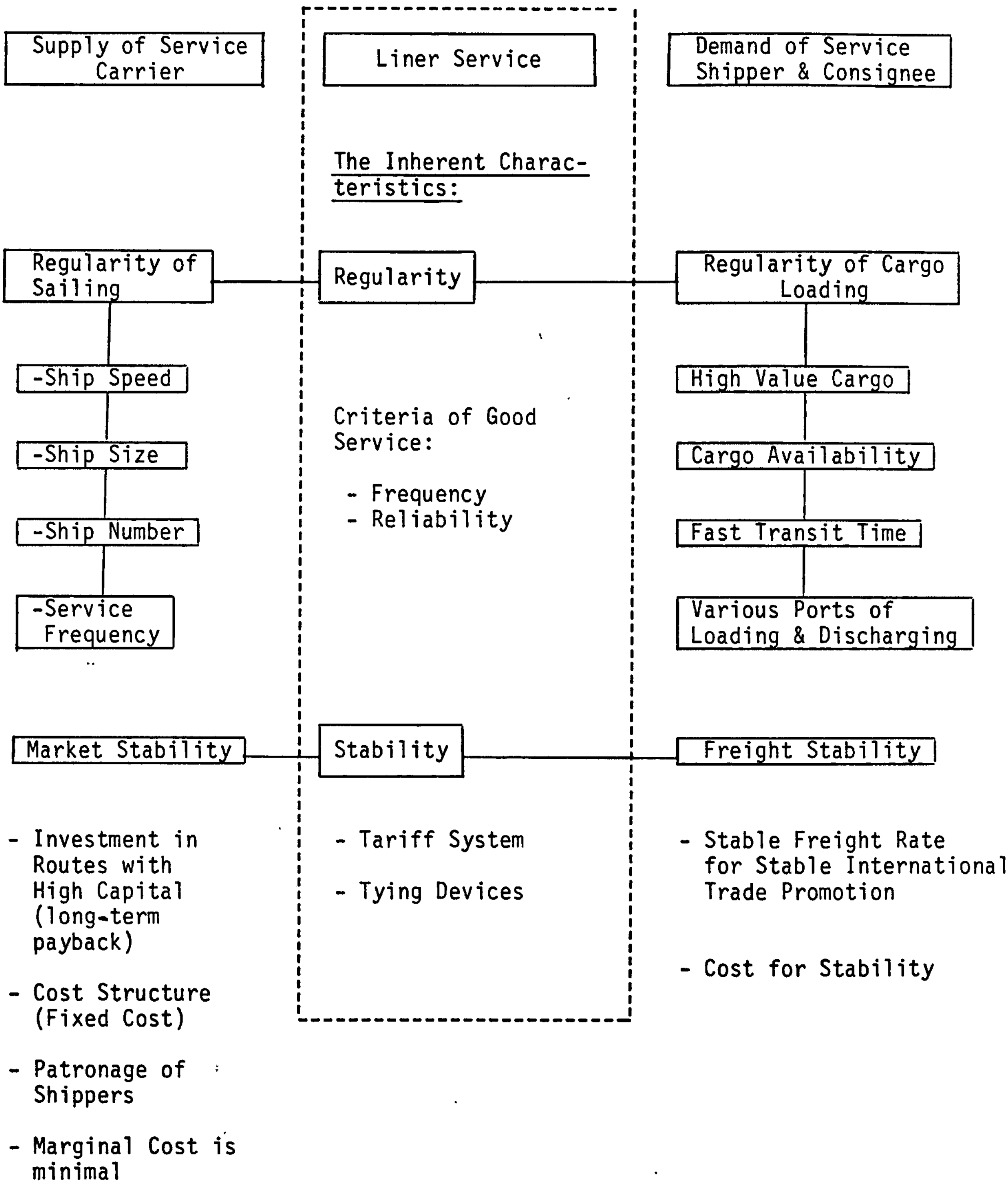
2.2.1 Regularity

Figure(1-2) represents schematically the factors influencing the characteristics of liner services in the market. From carriers' point of view, they have to provide the regularity of sailing and on the other hand shippers have to provide the regularity of cargo loading. Here, the criteria of a good liner service are better frequency of regular sailing and reliability of regular sailing which can be explained in terms of regularity.

However, the regularity rendered by the carrier is restricted by the demand side of the liner market,that is, regularity of cargo loading. Because of the characteristics of liner cargo being heterogeneous: various kinds of cargoes and volume, different shippers and various loading and discharging ports. Therefore when the cargo is not sufficient in volume or lacks regularity in generating cargo, carriers can not provide a good regularity of sailings.

The regularity of cargo loading influences the parameters of the service configuration which is the ship's,speed, ship size, ship number and frequency in the service routes(6).

Schematic Representation of Factors Influencing on the Characteristics of Liner Service in the Market



2.2.2 Stability

Another ingredient characteristic of liner service is stability. Liner service is of the nature that with a fixed schedule on particular geographic routes, a carrier has to deploy vessels regardless of the cargo availability in the short-run.

Furthermore, the carriers in liner service should conduct huge investments to the route to build market networks which means that the fixed costs of liner services are inevitably higher than those of tramps. Thus this makes it difficult for the liner carrier to withdraw his service from the routes.

Therefore liner carriers require the stability of the market so as to provide a better reqularity of services. This is the reason for the introduction of conference system to secure the market stability through various tying devices.

One of the strong tying devices in conference systems is the dual rate tariff system. Despite the monopolistic nature of the dual rate in the conference system, the dual rate contract was accepted as legal(7) in the U.S.A. where the anti-trust spirit is deeply involved in the industries.The conclusion(8) of long controversy was that the dual rate contract is essential to the conference system. Without this tying device, the economices of ocean shipping will force lines into rate wars among themselves that might result in the destruction of commom ocean carriage.

This conclusion implies two dimensions of stability: first,market stability and secondly,freight stability.

From the shipper's point of view,stable freight rates are of greater concern than low freight rates with a great many fluctuations in the long-run. Shippers rely on the stability of conference rates(9) which enable them to calculate their production cost more accurately.

For the liner carriers, the freight have to be determined, in the sort-run, by the formula:
Freight rate (Revenue)= cost obsorbing point + reasonable profit + cost for stability.

In this formula,theoretically,the the cost for stability should be zero in the long run. Because, in order to keep relative stability of freight rate, its should be set higher as much as the amount of the cost for stability to compensate the negative figure of this cost later.

Especially, in the conference system, it takes long time to undertake General Rate Increase(GRI) which needs various time lags,such as the recognition lag, administration lag and implementation lag. The stability of the freight in liner shipping can be identified in Table(1-3), compared with the tramp time charter rate.

Therefore,as shown in Figure(1-2),the stability of the liner service can be formulated by the supports from two angles,one the market stability from the carriers' stand point,and the other, freight stability from the shippers' stand point.

Table(1-3)

The Fluctuation of Liner Freight and Dry Cargo Tramp Time Charter Rate

A. Tendancy of the Freight Rate Change

	Liner freight rates (1965=100)				Dry cargo tramp time charter (1968=100)			
	1972	1973	1974	1975	1972	1973	1974	1975
Jan.	131	134	171	201				
Feb.	131	134	175	201				
Mar.	131	135	179	203	79	175	307	159
April	132	136	183	203				
May	132	138	185	203				
June	132	137	187	203	82	212	322	94
July	131	139	189	205				
Aug.	131	139	193	206				
Sept.	131	142	194	207	95	267	251	109
Oct.	132	146	194	207				
Nov.	132	145	196	207				
Dec.	132	154	197		134	358	257	137
Monthly or quarterly Average	132	140	187		98	253	284	125

B. Freight Rate Indices 1979-1981

	Liner freight rates (1965=100)			Dry cargo tramp time charter (1976=100)			Dry cargo tramp trip charter (July 1965-June 1966=100)		
	1979	1980	1981	1979	1980	1981	1979	1980	1981
Jan.	247	283	308				144	194	225
Feb.	250	284	312	138	254	264	146	210	220
Mar.	254	285	315				158	209	215
April	259	285	317				156	217	204
May	265	285	315	194	297	221	168	221	200
June	269	284	316				178	226	202
July	274	283	315				196	203	201
Aug.	277	285	315	206	252	174	190	207	177
Sept.	278	286	316				201	201	179
Oct.	277	287	316				203	204	177
Nov.	278	289	319	237	261	142	206	227	178
Dec.	276	292	317				203	241	169
Annual average	267	286	315	194	266	200	179	213	195

***Source:p 38, Shipping Conference, Amos Herman, LL B., Lloyd's of London Press Ltd.

2.3 The Relationship Between the Main Characteristics of Liner Cargo and Liner Services.

The afore mentioned characteristics of liner cargo such as,

a) high value: high financial cost for transit,

b) higher freight rate,

c) lower proportion of freight rate to the total price of the commodity,

d) low price elasticity of demand for shipping services,

e) bulker: lower density and

f) variety of cargo from various shippers at various ports

are creating what the characteristics of the liner shipping should be. In other words, those characteristics of the liner cargo have deeply influenced the formation of the feature of liner shipping and they are involved in the evolution of the liner industry as shown in figure(1-2)

The nature of high value cargo requires the the service with fast transit time. The characteristics of higher freight rates of liner cargo and the low price elasticity allows the cost for stability for stable freight rates in the market.

In addition to this freight stability from the viewpoint of demand side, market stability from the carrier's view point is also essential factor determining the characteristics of liner services, because liner carriers have to invest in routes with high capital which requires relatively long-term payback period.

Furturemore, in the cost structure of liner shipping, most of costs are fixed costs except few factors such as cargo handling cost, which means that greater concerns of liner carriers lie in the stable market, in which reasonable load factor is guaranteed to cover the fixed costs, rather than in the speculative market.

The characteristics of cargo, e), and f) mentioned above, require the reqularity of liner shipping with a certain frequency and scheduling to the various ports offering a set of stable tariff rates to the various shippers. Furthermore, those characteristics have deeply played a part in the advent of a series of innovations in liner shipping, which are discussed in the following chapter.

Chapter 3. HISTORICAL APPORACH OF INNOVATIONS IN LINER SHIPPING

The growing demand of the industrialized world for transportation of manufactured goods in international trade motivated the specialization of shipping into the form of tramp shipping for raw materials and liner shipping for manufacured general cargo and passangers.

The specialization in liner shipping had been continued by introducing passanger ships through a division of the liner shipping market into two segments: 1) passanger and mail transport and 2) cargo transport.

The introduction of passanger ships on the North Atantic in the second half of the 19th century was based on its segment of markets, with the background of the rapidly increasing emigration. Up to the mid 1920's, two passanger categories, with separate demands for transport services, could be found on the North Atlantic, cabin passangers and steerage passengers(10).
However, my disussion in this paper excludes the passanger liner shipping.
In the development of liner shipping, a series of innovations have been introduced and the more interesting fact is that the characteristics of cargo and liner shipping have deeply inspired in the introduction of innovations and each of the innovations has influenced the economic changes leading to another innovation and so on, continuously.

Generally speaking, there has been a tendency towards innovations whose nature were rather hardware-oriented at the incipient stage and software-oriented later, in the

evolution of liner shipping.
In other words, innovations in the early years were focused on the tools of the shipping service such as vessels, propulsion devices and so on, but, with the passage of time, new developments of operational concepts have become more oriented towards software.

3.1 Hardware-Oriented Innovations

As afore mentioned, the innovations of liner shipping in the embryonic stage had taken place in the ship itself because the major tool producing services, the space and time utility, in shipping is the vessel itself.

The first important hardware-oriented innovation was the introduction of steamers(11) which improved the service to meet the customer's primary needs such as,

1) increased security,
2) less dependency on the weather,
3) shorter transport time,
4) better regularity and
5) increased ship size.

Those are the fundamantal factors formulating the characteristics of liner shiping in terms of regularity, frequency and reliability of scheduling.

The propulsion devices were the second important technical innovation, with the advancement of technology, whereby annual plans could be established, and a fixed schedule could be kept.

Deakin and Seward (12) stated that it took a sailing boat an average of 60 to 65 days to get from the U.K. to Aus-

tralia. This voyage was shortened by about 15 days between 1873 and 1897 with the steamship.
These innovations, however, made liner shipping able to improve better regularity in service, but caused to two economic changes.

a) Liner shipping became a very capital intensive industry not only because of the high prices of steamships but also because the carrier began to invest in the routes to establish a international marketing network.
b) The trade routes became overtonnaged. The immediate reactions of the shipowners were to lower their rates in order to attract customers. This caused a chain of reaction.The cut-throat competition was very fierce almost murderous.(13) Thus, as a result, the innovations for improving the regularity jeopadized the stability of liner shipping.

Eventually, these two economic changes caused the introduction of the conference system.(14) The first gathering took place on the U.K.-Calcutta route in 1875, where a few competing shipowners decided to cooperate. They established a uniform tariff that secured them reasonable profits and allotted sailings for each vessel.(15)
Currently, there are about 350 conferences operating in ocean transportation.(16)
However, through the hardware-oriented innovations, the foundation of liner services to meet the customer's primary needs was accomplished.

3.2 Software-Oriented Innovations

3.2.1 The conference system.

Shipping conference is an nonincorporated association of mutually competitive liner operators, maintained for the purpose of a) controlling competition among its members and b) strengthening the members, through co-operative action,in their competitive fight against non member carriers.(17)

There are two different types of conferences, one is the closed conference and the other the open conference. The former is illegal in the United States: rationalization of services in a conference system is not illigal, but it requires approval by the Federal Maritime Commission.(18) However, there have been many controversies regarding the monopolistic behaviour of the conference system. The direction of the debate in the United States has focused much more on what kinds of conference agreements produce the most efficient liner services,as they are desirable not only for shipowners but also for shippers. This is a rather theoretical approach based on the anti--trust philosophy.

My discussion in this subject does not need to go into in depth concerning the controversies, but it is necessary to identify the relationship between the characteristics of the conference system and liner shipping.

From the above mentined definition of the shipping conference, the three major pillars of a conference system such as the tariff system, the pooling system and tying devices can be derived.

As seen in figur (1-2), the stability of the liner shipping consists of market stability and freight stability. The former is very much important to the shipower when there is severe competition. In the conference system the tying devices are the cure of it. The latter is the interest of the shipper as was discussed in the previous chapter. The freight stability is secured by the tariff system.

In this point, two questions are raised;

a)Is the cost for freight stability in the conference tariff system worth while to pay?from freight stability point of view.

b)Can the system maximize efficiency despite the monopolistic nature of tying devices? from market stability point of view.

Regarding the first question, I have discussed in terms of the cost stability in the previous chapter. My conclusion was that, as far as inherent characteristics of liner cargo require freight stability, it is worth while. This does not mean that the conference tariff rates are reasonably priced. It is a different question.
According to the theory of efficency, whenever monopolism exists in a market, it may distort the allocative efficiency. The barrier of entry does not allow the free flow of the capital and manpower, to the market, hence monopoly power may achieve monopoly profits.

However, in the reality of the liner shipping market, the conferences do not seem to interfere with the free-flow of resources and distort the allocative efficiency, Mr. Gunnr K.Sletmo and Etnsest W. Williams, Jr. made observation and concluded as follow:(19)

"------It is because of these problems of resource allocation in the real world that we have given so much attention to the market structure of the liner industry and to the constraints that limit the conferences' freedom to use whatever market power they possess. We were, indeed, looking for signs that conferences have been able to frustrate the functioning of the market for ocean transportation of general cargo. Our previous conclusions can now be restated by saying that we have found that conferences are not capable of interfering with the allocative efficiency."

This conclusion is supported by the study prepared by Standard and Poor's Corporation and submitted to the Joint Economic Comittee of the US congress.
This study gives various profit rates for U.S. liner shipping as compared to other industries for the years from 1956 to 1962(20). The return on capital equity in the liner industry averages 7 percent as opposed to 11 percent for all other industries. This means that the monopolistic profits do not exist in liner shipping.
Mr. B.M. Deakin provides intersting figures for the rate of return on capital employed in the Europe-Autralia conference group(21). The data shows a comparatively low percentage of rate return ranging from a low of 3 percent and a high of 8.6 percent which signifies that conferences do not make monopolistic profits. The similar conclusions are seen in the so-called Rochdale Repport:
------During the course of our inquiry----conferences have been so organised as to give to shippers services which are, and can be seen to be, reasonably priced and generally efficient.(22)

However, the conference system in liner shipping has not distorted the " allocative efficency" but played a vital role in achieving both market stability and freight stability in liner markets.

3.2.2 The Containerization

The second important software-oriented innovation in liner shipping is the containerization. In the process of containerization, the physical essence includes the following elements sudch as,

1) container boxes,
2) container ships,
3) handling equipment,
4) special container terminals and assembly depots and
5) inland transportation means.

Despite the physical development, containerization is categorized as a software-oriented innovation. Because the advent of containerization does not merely refer to an innovation of a container box itself but more importantly the revolution of the operational systems in the flow of the cargo as a whole.
The large containerships produced a " tidal wave " effect of landing large numbers of containers in a short period, which led to a " tidal wave " effect of a physical innovation of container boxes toward the operationsl revolution such as,"through transport concept" together with computer technology development.

The organizations in the transport process were logically linked to other functions in the distribution chains between sea legs and inland transportation with a different transport mode mix.

Containerization also has a close relationship with the characteristics of liner cargo. Liner cargo are bulkier with lower density and thousands of commodities from various shippers are loaded and discharged in various ports. Because of these characteristics, the shipowners

have been very much barred from the way of obtaining efficiency.
In other words, such characteristics of liner cargo distorted the technical efficency and dynamic efficiency of the economy, even in the severe competitive market.

In the deep sea liner shipping, in order to obtain higher efficiency, the size and speed of ships have to be increased. But in reality, it is not practicable, because, due to the nature of cargo being heterogeneous, port days are inevitably long which means that sea days, the period to produce time and space utility, are relatively short. The more the size and speed of ships are increased, the shorter the sea days become.

In the cost structure of liner shipping, most of the voyage cost is the fixed cost. Therefore, without obtaining a fast turn round, liner shipping can not enjoy the economies of scale.
This implies that the characteristics of liner cargo have constrained the benefits of the economies of scale. Containerization changed that and gave the liner shipping the chance to benefit from economies of scale to the extent that it secured the vital break through.

Table(1-4) shows the significance of the economies of scale in containerization with the comparison between a break-bulk cargo liner of the mid sixties and a second generation containership a mere seven years later.(23)

Through the containerization, liner shipping could realize the technical and dynamic efficiency of the ecomony. The core of containerization is the unification of the heterogeneous cargo to homogeneous cargo. Thus containerization succeeded the change of the characteristics of liner cargo and made the benefit out of it through the introduction of intermodalism and door-to-door service concept.

Table(1-4)

Containership and Break-bulk Cargo Liner Comparison

	B/B cargo liner (Antenor class) 1950-60	containership (Liverpool Bay) 1972
Capacity		
length	491'5"	950'
Balecapacity of cargo (tons of 40 cu ft)	13,687	60,000 (2,450 TEU)
HP	8,000	81,132
Service speed	16 1/4	26
Appr.round voyage pa	2.7	5.4
Annual capacity (tons of 40 cu ft)	74,000	648,000 27,000(TEU)
Handling Characteristics Appr.freight(1)tons carried	11,000	57,000
Tons handled per working days(2)	1,000	19,000
Discharging days	14	3
Loading days	14 28	3 6

1) freight ton = tons of 40 cu ft

2) excluding steaming days

***Source:p.18,Containerization in the Eighties,Lloyd's of London Press Ltd. M.G.Graham D.O.Hughes

The discussion regarding the result of the conference system and containerization is continued in the following chapter, however, we can derive,from the above discussion, the conclusion that the hardware-oriented innovations in the early days played a vital role to meet the primary needs of cargo owners through the accomplishment of the fundamental function of liner shipping as regularity and stability, while the software-oriented innovations have concentrated to improve efficiency and productivity in liner shipping service through better regularity and stability. In addition to this, we can find that the characteristics of liner cargo have been deeply involved in the advent of innovations.

Chapter 4. THE RESULTS OF THE CONFERENCE SYSTEM AND CONTAINERIZATION

We have briefly reviewed major events in the liner market and discussed the relationship between the caracteristics of liner cargo and shipping and its interaction with various innovations so far.

However, it is necessary to discuss the question, "What are the results of the conference system and containerization ? " because this topic is very close to our main discussion, the RTW as an innovation in liner shipping. Furthermore it highlights current market conditions motivating the advent of the RTW.

In the discussion of this question, the range of events and factors is much broader than the phrase covers in its literal acceptance. Therefore, most dominating events and factors are included in my consideration.

4.1 The Results of the Conference System

4.1.1 The erosion of the market power of conferences

Before containerization, in the liner market, shippers had relied on the stable tariff of conference system and conferences with its self-regulatory scheme. They were dominant the liner routes.

However, with the maturity of containerization, conferences were faced with a gradual erosion of the market power.

Table(1-5) shows the tendency of market shares between conferences and outsiders at the early stage of containerization in 1972 and in 1983 in several routes(24).

This table raises a question why the market power of conferences has become weaker.

Table.(1-5)

The Strength of Outsider -in 1972 and in 1983

Europe--- Far East Trade.

1972:Only Seatrain and USL by transhipment an Marchessini (conventional).Also Russians and East Germans not very regularly.

TSR just beginning.

Outsider percentage of total;

Overall, Europe, both ways	4 %
U.K. East	1 %
West	5 %

1983:Evergreen, Balt-Orient, YangMing, Norasia,COSCO, Sammi and TSR-all are important.

outsider percentage of total

	1982	1983
West	22 %	28 %
East	17 %	23 %

U.K-ANZ Trade (South Bound)

1972:Virtually nil outsiders-only POL, not very strong in U.K.

1983:ABC, Zim, Eagle & NVOs all prominent.

Outsider percentage total;

	1982	1983
U.K-Australia	12 %	15 %
U.K-NZ	5 %	5 %

U.K-South Africa

1972:Only 2 outsiders, both Greek: Hellenic & Meandos.

Their percentage of trade;1-2 %

1982:Major outsiders:

Africa Europe Shipping Line (AESL)---Dutch

Mediterranean Shipping Co. (MSC)---Geneva Maritime

Container Service (MACS)---Germany

Cape Lines / Prodos Maritime Carriers -S. African Their Percentage of trade : 15 %

irregular U.K.-Middle East Gulf

1972:Only one outsider had much of an interest in U.K: U.K-Middle East Line (Lebance controlled).

1983:Outsiders are very strong sea-land Merzario / NCHP, Scancarriers,Norasia, Foss, Hellenic, PNSC, et al.Their percentage of trade : 45 %

*** This table refers to the four major trade routes of Overseas Container Line.

***Source; p.41, M.G.Graham, D.O.Hughes, Containerisation in the Eighties.

Major constraints on the exercise of economic power by conferences in general and on open conferences in particular were studied by Daniel Marx, Jr. as follows:

a)Intraconference competition;

b)Actual or potential competition from other lines, which perhaps did not intend to join the conference;

c)Alternative sources of supply or markets;

d)Actual or potential competition from tramps;

e)The bargaining strength of shippers; and

f)Government regulation or intervention(25).

In addition to these important factors constraining the monopoly power of conferences, my approach has a different angle concentrating on the conference system itself which has inherent deficiencies causing adverse effects toward its objecetives.

1)The tariff system as an inherent deficiency.

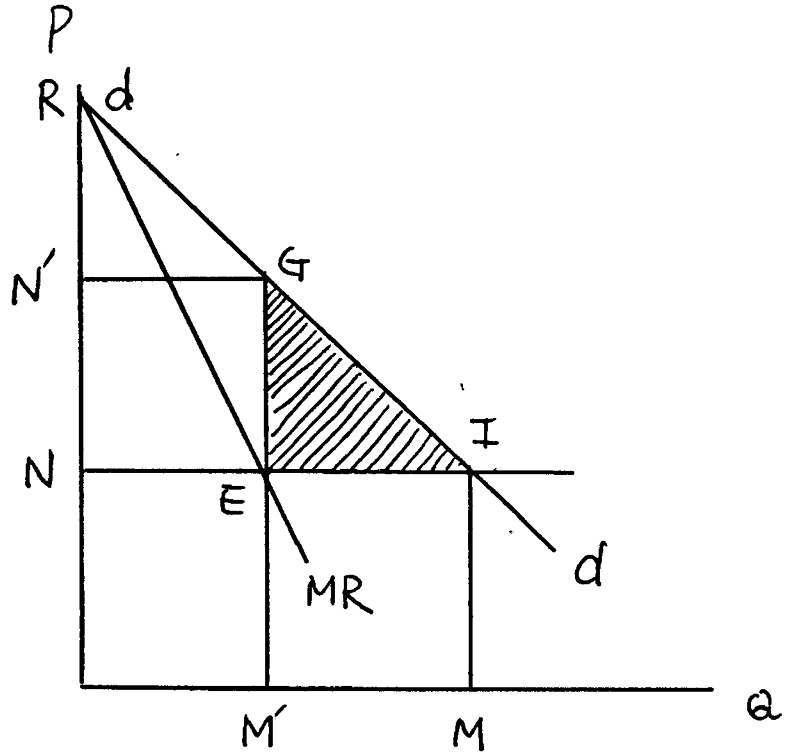
As mentioned earlier,the three main pillars of conference systems are the tariff system, the pooling system and tying devices. In the conference tariff system,the freight rate structure has inherently cross subsidization among commodities with different value, which is a very unique price policy of the liner market. Here, we need to discuss further in depth regarding the conference tariff system.

In order to minimize the " deadweight-loss triangle " shown in Figure(1-3),all prices are set equal to the marginal cost and average cost.

Nevertheless in reality, the conference tariff is impractical to set freight rates at one price level for various valued commodities,because freight rates should vary : high value cargo, which has a low price elasticity, for high freight rates and low value cargo for low freight rates. This means, in other words as shown in the Figure (1-4),that cross subsidization from commodity group A to commodity group B is undertaken .

This price differentiation is an economic justification, for charging what the market will bear, ,minimizing the distortion in resource allocation. Thus the value of the tariff structure is often favorably regarded because it makes liner service available for low-value commodities in the liner routes in less than the average cost P shown in the Figure(1-4).

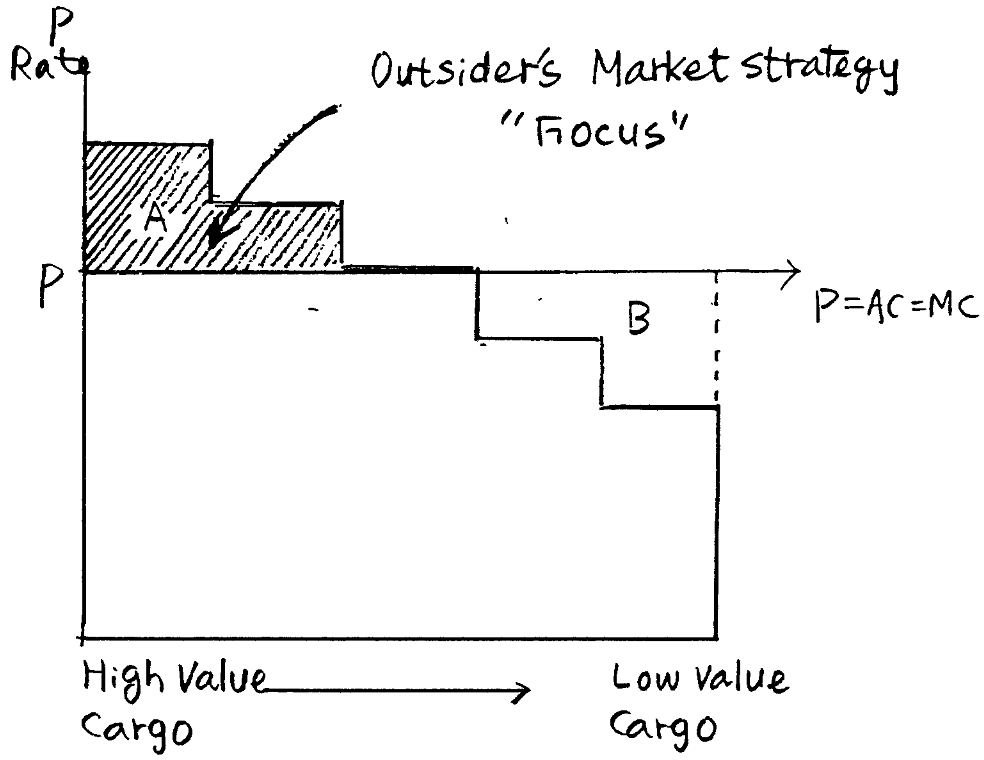
Figue(1-3)
Monoploy Distortion



At the competitive level I, each similar consumer enjoy Marshallian consumer's surplus given by the whole triangular area NIR. When monopoly raises P to the maximum profit point G, the consumer loses to the monopolist that part of the consumer's surplus measured by profit rectangle NEGN' and is left only with the consumer's surplus triangle N'GR. At the same time, triangular area EIG is lost to everybody, both consumers and monopolists.
Thus consumers lose more than the monopolists profits. The triangular EGI represents " Deadweight loss " which is of no benefit whatsoever to anybody due to the devil of inefficiency.

*** source: p 486, Economics, Paul A. Samuelson McGRAN.-Hill, International Book Company

Figure(1-4)
Differential Rate



*** source :The lecture of Docter Hans Ludwig Beth.
at the World Maritime University

The incidence of the price differentiation is well illuslustrated in the study of Gunnar K. Sletmo and Ernest W. Williams,Jr.(26) The study stressed that transportation permits producers to take advantage of these price differentials and in such instances, but rather an integral part of the total value added to the product on the way to its final destination.
Certainly, this incidence enlarges liner trade to a certain extent, and with this incident, liner service takes more the benefit of economies of scale, which may result in the average cost down accordingly.
Therefore, the conference tariff system should be kept according to theoretical and practical reasons as mentioned above. In the meantime this gives outsiders the opportunity to cream the market, concentrate on the high paying cargo,so that even with rates well below those of the conference.

This can be explained in figure.(1-4)
If other factors are equal between conference line and outsiders and assuming that the conference tariff is set in which the average cost is fixed at the freight rate level P,the outsider's price policy to cream the market concentrates on commodity group A.
Certainly, this allows outsiders to earn high profits even with lower freight rates to attract high paying cargo by often using the " Box rate " system. This affected most of the conferences to take countermeasures such as, narrowing the range of freight rate bands and restructuring its tariffs which may create a negative effect on the justification of the price differentiation discussed earlier. However, we can identify that the conference tariff system has an inherent deficiency in competition with outsiders.

2)." Decision Making " in conference system.

Another important inherent deficiency in the conference system should be discussed in terms of "Decision Making ". The conference is a self-regulatory body in order to exclude unnecessary competition among menber lines and to protect their interests from outsiders.

Accordingly, in order to obtain their objectives, they have to consult or negotiate in a decision making process where it inevitably takes time to arrive to a common agreement.

As an example, if we discuss the procedure for GRI it takes at least several months while outsiders may make the decision in a short period.

The reason can be clear through the following descussion. Liner freight rates are administrated rates. The administrative actions conduce toward stability of rates which give the reason for justification of conference systems as discussed earlier. The conference procedure for varying rates consists of three important time lags; the recognition lag, the administrative lag and the implementation lag(27).

The recognition lag occurs because it takes time for cost changes to be noted and their effects on overall profitability. The administrative lag takes place inevitably because the decision can not be undertaken by one member of conference. There are various member companies whose cost-absorbing points are different(28).

Each member line differs in cost structure from any other members which implies that the response of cost change is quite different from one to another.The member line whose cost-absorbing point is the highest may start to raise the question of GRI and a member line whose cost-absorbing point is low enough to still make a profit may be reluctant to begin the discussion. This would normally be brought before a regular meeting, either of the whole conference or of the rate committee. It takes longer time to arrive at a conclusion of GRI, especially when the market is under severe competition and outsiders are strong.

Lastly, the implementation period is inevitable, before GRI comes into force. During this period, the conference announces advance notice, which varies among different conferences,30 days, 60 days or 90 days, and they sometimes consults with shippers.
Therefore, to make a dedcision of GRI, it takes much longer time. This is only one example of how the conference system has a lack of flexibility and adaptability to the change of the market condition.
Taking into account the definition of innovation and the idea of entrepreneurship as we discussed earlier,it is not a coincidence that the containerization was introduced by an independent, Sea-Land.

Therefore, we can conclude that the conference system itself has inherent deficiencies and the objective of the conference system to monopolize the market and to exclude competition from outsider has been deteriorated by the nature of the conference system itself as a paradox.
Table (1-6) shows the outsiders market penetration into the main routes.Almost 50 percent of the market share was penetrated by outsiders in the main stream trade, transpacific, Far East-Europe and Transatlantic. This possibility of being deteriorated can be more clearly identified with the discussion of indepentent activites.

Table (1-6)

Non-conference Penetration Report on Main Routes

	1980(a)	1983
Transpacific	30(b)	35-50(e)
Far East-Europe	19(c)	30-40(f)
Transatlantic	28(d)	50(g)
Europe-Australasia	10	20(h)
Far East-Australia	-	30(i)
Europe-South & East Africa	3	very low

*** Source

a)Maritime transport center, the competitive Dynamics of Container shipping, 1983.

b)Until March 1980: after that many lines left the conference, and the outsider's share rose to about 48 percent for a short period.

c)Excluding the Mediterranean.

d)US East Coast and Canada

e)Mitui OSK market research department, reported in Seatrade, July 1983, and Containerisation International, October 1983.

f)Seatrade, September 1983,reported 30-40 per cent outsider penetration.Containerisation International, May 1983,reported 30-35 per cent.

g)Containerisation, June 1983: including Canadian gateway.

h)Transport Journal, February 27,1983, and Lloyd's Shipping Economist, March 1983.

i)Seatrade, May 1983, The figures of course, vary continually with registrations and rejoining of conferences by insiders as well as the movements of outsiders.

4.1.2 Independents' activites

The definition of the word Independent is somewhat different from that of an outsider and a newcomer to the market.The essential characteristics of an indepentent is that they act independently. They are often newcomers and outsiders, but not exclusively so. The independents have single "decision making entity" hence they can expand their fleet whenever they want to. Very often, development of the ship technology favors the newcomers more and sometimes this encourages the outsiders to enjoy creaming the market as mentioned earlier. The most striking feature of recent Independents' activities is that they are the expansionists.

Under the conference system, it is difficult for the member liners to justify such an expansion. In the liner market, most of the major newcomers emerged in 1970s, after the introduction of containerization and expand their fleets very fast.
Table(1-7) shows that most of top rankers are independents and they ordered newbuildings more than 10,000 TEU slots by January 1987.

Top 20 Container Service Operators on the Basis of Projected Total TEU Slots in Service by January 1987

Table 1: Top 20 container service operators on the basis of projected total TEU slots in service by January 1987, analysed on the basis of vessel type, TEU capacity and (number of ships)

Operator	FC	CC	RC	RR	SC	BC	BA	Present Total	Newbuildings	Projected Total
Evergreen	72 542 (36)	7 496 (7)	—	—	4 316 (6)	1 360 (2)	—	85 714 (51)	17 380 (6)	103 094 (57)
US Lines	67 000 (24)	5 668 (6)	3 600 (2)	— (1)	2 094 (7)	—	288 (1)	78 650 (40)	14 576 (5)	93 426 (45)
Sea-Land	40 931 (32)	15 718 (14)	1 074 (3)	144 (1)	4 078 (7)	—	—	61 945 (57)	11 658 (3)	73 603 (60)
Maersk	43 303 (22)	8 400 (7)	5 100 (3)	1 050 (2)	1 464 (2)	—	—	59 317 (36)	3 300 (1)	62 617 (37)
OOCL	30 495 (21)	3 260 (4)	—	—	—	—	—	33 755 (25)	15 000 (6)	48 755 (31)
Hapag-Lloyd	39 600 (23)	3 730 (4)	—	—	1 849 (8)	—	—	45 179 (35)	2 824 —	48 003 (35)
MOL	27 830 (20)	—	432 (1)	450 (1)	6 180 (8)	770 (1)	—	35 662 (31)	9 714 (4)	45 376 (35)
OCL	40 864 (22)	—	—	—	592 (1)	3 443 (3)	—	44 899 (26)	—	44 899 (26)
Cosco Shanghai	23 405 (26)	—	2 689 (4)	3 120 (8)	2 353 (14)	3 420 (3)	—	34 987 (55)	8 070 (11)	43 057 (66)
Yangming	21 141 (11)	2 268 (3)	—	—	—	—	—	23 409 (14)	18 527 (4)	41 936 (18)
NYK	27 928 (19)	2 028 (3)	—	250 (1)	6 169 (10)	1 600 (2)	—	37 975 (35)	3 790 (2)	41 765 (37)
Nedlloyd	18 919 (9)	—	—	4 108 (4)	15 481 (39)	989 (1)	—	39 497 (53)	—	39 497 (53)
Zim	28 090 (27)	—	450 (2)	320 (2)	6 334 (16)	—	—	35 194 (47)	190 —	35 384 (47)
CGM	17 380 (13)	951 (1)	5 733 (6)	8 184 (10)	2 840 (7)	—	—	35 088 (37)	—	35 088 (37)
UASC	21 254 (13)	1 700 (2)	—	—	12 010 (29)	—	—	34 964 (44)	—	34 964 (44)
APL	18 832 (9)	12 241 (9)	—	—	1 408 (4)	—	—	32 481 (22)	—	32 481 (22)
K-Line	19 068 (16)	3 030 (3)	—	689 (1)	—	—	—	22 787 (20)	6 207 (3)	28 994 (23)
NOL	12 170 (8)	1 539 (3)	1 227 (1)	—	—	—	—	14 936 (12)	11 880 (4)	26 816 (16)
Lykes	4 384 (4)	—	—	1 976 (2)	2 496 (13)	—	2 700 (3)	11 556 (22)	15 000 (6)	26 556 (28)
POL	—	—	5 668 (4)	5 286 (6)	7 809 (21)	—	—	18 763 (31)	7 401 (12)	26 164 (43)
Total TEU	577 404	68 229	25 973	25 577	77 473	11 582	2 988	789 226	145 517	934 743
No of ships	(355)	(66)	(26)	(38)	(192)	(12)	(4)	(693)	(62)	(755)
World total TEU	970 126	138 553	79 669	242 646	565 136	194 916	19 717	2 211 763	258 850	2 469 613
World No ships	(910)	(167)	(119)	(466)	(1 747)	(230)	(31)	(3 666)	(204)	(3 870)
% share of top 20 (TEU)	59.5	49.2	32.6	10.5	13.7	5.9	15.2	35.7	56.7	37.9
% share of top 20 (no ships)	39.0	39.5	21.8	8.2	11.0	5.2	12.9	18.9	30.4	19.5

Notes: FC fully cellular; CC converted to fully cellular; RC ro-ro/cellular; SC semi-containership; BC bulk/container carrier; BA barge carrier

Source: Containerisation International, September 1985.

4.2 The Result of Containerization

As I mentioned earlier, the topic of the result of containerization is so broad to cover in this paper that my discussion will only be concentrated on the points which are the striking factors.

4.2.1 Severe competition

Containerization caused a cut-throat competition and has resulted in oversupply of liner services.
As we discussed earlier, containerization gave liner carrier the chance to paticipate in experiencing the advantage of economies of scale which is illustrated in Table.(1-4). This drastic improvement in productivity led to a overtonnage situation in the liner market because new tonnage of container vessels of larger size with faster speed were simply added to the existing tonnage and, furthermore, they were very efficient in cargo handling with larger capacity. The severity of competition was very similar to that of the period when the steamer was introduced into the liner market.

Another factor causing severe competition is that, through containerization, the barriers of entry to the market have been lowered.
There are six major sources of barriers of entry:(29)

a)economies of scale,
b)product differentiation,
c)capital requirement,
d)switching cost,(30)
e)access to distribution channels and
f)cost disadvatages independent of scale.(31)

At the incipient stage of containerization, it seemed that since container liner services required huge capital investments and vertical integration with inland infra structures.the barriers of entry might become higher and the market would be monopolized.
However, containerization is not a high technology revolution. The imitators followed it and in a short period it was readily available to everyone. Soon after, chartering container vessels and leasing container boxes became very common in the market. The banker's role in financing the aquisition of vessels lowered the entry to the market.
None of the above sources can be significant sources of barriers of entry to the liner market.

On the other hand, exit barriers are still high because of the nature of liner services. Therefore, profitability has inevitably been deteriorated by the competition as can be explained in Figure (1-5) by taking the simplified cases in which exit and entry barriers vary and its influence on profitability. In the table, we can identfy the worst case is the one in which the entry barrier is low and the exit barrier is high.

Figure(1-5)

Barriers and Profitability

Entry Barriers \ Exit Barriers	Low	High
Low	Low, stable returns	Low, risky returns
High	High, stable returns	High, risky returns

***Source; Competitive Strategy, Techniques for Analyzing Industries and Competitiors Michael E.Poter. p.22
The Free Prees, A Division of MacMillan Publishing co., Inc

4.2.2 Change of the cost structure.

As shown in Table(1-8),the cost structure of celluar container ships is different from that of conventional ships especially in capital cost, fuel cost and cargo handling cost. Those three cost factors are decisive to determine the carrier's competitiveness. Thus continuous technical innovations have been introduced, particularly for saving fuel consumption and scale of the ship in order to minimize the capital and fuel cost per slot. This has been more accelerated because containerization break off the barrier to draw the advantages of the economy of scale.

Table(1-8)

Cost Structure of Liner in 1975

(Per ton carried cargo, in percentage)

Cost items	Vessel type							
	Conventional		Cellulra					
	12,500 dwt		750 TEU		1750 TEU		2500 TEU	
	A	B	A	B	A	B	A	B
Capital(ship)	16	34	24	29	25	29	25	28
Capital(container)	0	0	10	12	12	14	14	15
crew	4	8	4	5	2	2	2	2
provisions	0	0	0	0	0	0	0	0
M & R	1	3	2	2	2	2	2	2
Insurance	2	4	3	4	3	4	3	4
Residual	1	3	0	0	0	0	0	0
Fuel	6	20	5	32	13	30	12	30
Port charge	4	2	14	5	14	6	14	6
Cargo handling	65	26	28	11	28	12	27	13
Total	100	100	100	100	100	100	100	100

A. U.K.-U.S.

B. U.K.-Japan

***Source:Laing, E.T.,1975. Containers and their competitors, Liverpool.

4.2.3 Differentiation

In the marketing of consumer products, the most decisive factor to create consumer preference is product differentiation.

In the traditional liner service, each carrier had different ways of stowing, cargo handling and so on, and the trade routes also had different characteristics with different cargoes and volumes. Thus even in a single geographidcal route, there have been different conferences in each direction.

However,containerization changed the situation. The core of containerization is the unification of cargoes, from heterogeneous cargo to homogeneous cargo. Thus containerization has evolved to such a degree that the significance of an individual liner service has lost its importance, because all cargoes are carried in much the same way; boxes are identical and handling facilities and stowing methods are similar.
Therefore, competition based on quality of service has also lost its significance as a dominent factor which means that product differentiation has diminished in its significance. As being discussed previously, this also influenced on lowering entry to the market.

The more important fact is that conatainerization resulted in diminishing not only the significance of product differentiation of individal carriers but also the differences among the routes.
On traditional conference routes, due to the heterogeneous characteristics of cargoes, liner services should adapt to the market using different ways of stowage and cargo handling with the deployment of different types of ships.
But nowadays, after containerization, everything is homogeneous except the size of container vessels which are mainly determined based on the distance of route and cargo availability.

Chapter 5.THE ADVENT OF THE RTW CONCEPT AS AN INNOVATION

In the previous chapter, we have observed the result of conference systems and containerization, whereby we could identify the reasons why conferences are becoming weaker and essential factors which resulted in changes of the whole liner market scene.

The task of this chapter, as a conclusion of the part 1, is to identify the significance of the RTW concept and the reasons why it is defined as an innovation: a software-oriented innovation.

One of the major container shipping "events" of these years is the inauguration of the Round-the-World service initiated by independents again(32): Malcon Mclean of the US Line and Evergreen Line.
This RTW concept catered for many counter arguments in various directions as did the emergence of containerization at first.
One claims that the RTW service may just be a device to pre-empt further competition from established carriers.
Another raised the question "Is the RTW service purely and simply a marketing 'gimmick'?".
And it was considered that the RTW service may just be a consequence of ship ordering prgrammes of other carriers.

Nevertheless, the RTW concept has came into reality and the liner market has entered a new era.
No one would dare to predict whether the RTW strategy of a certain liner carrier will succeed or not. It purely depends on the individual business firm, because it is business strategy.
Therefore, apart from the above question, accepting the

RTW service as a reality of an economic phenomenon in the liner shipping market, my disscussion is rather based on the theoretical approach.

5.1 Economic Environment of the Liner Market

As we discussed in the first chapter, the innovation has an important influence on the mechanism of economic change. However it exists in the economic environment. therefore, before going to the topic of the RTW concept, we need to review the current aspect of the world container liner market.

5.1.1 Chronic recession

The current world container liner market is very often referred to as a chronic recession.
The major reasons can be identified in following discussion.

1) Overtonnage

Recently the gap between supply and demand of container services has widened rapidly. The analysis was conducted by the Economist Inteligence Unit Limited(33) based on the OECD statistics regarding exports and imports of manufactured goods.
The OECD statistics(34) summerized the overall average growth rate of cargo volume for the main area in which container traffic is generated.
Table(1-9) shows the average growth rates per annum during 1980-85: intra-OECD area 3.5% , Developing countries(imports only) 1.5% and OPEC(imports only) 5.5%.
Taking into account the level of further penetration of containerization in each trade, the study concluded a "best estimate" of about 6% for container traffic growth between 1980 and 1985.

A similar study, entitled "Global outlook for container trade" by the US consultants Temple, Barler & Sloane, examined the estimated future cargo growth rates in the world's seven largest container trades. These are summerized in Table(1-10) and the conclusion of the study is that taking all seven trades together, the average growth rate in container cargo is put at 4.6% during 1983-90.

Table (1-9)

Average Growth in Trade in Manufactured Goods (1980-85) (percent annum)

Intra-OECD (imports & exports)	3.5
Developing Countries (imports)	1.5
OPEC (imports)	5.5

Source: OECD, Economic Outlook, December 1983.

Table (1-10)

Projected Average Annual Percentage Growth of Container Cargo in the World's Seven Largest Trade Routes During 1983-90

	East bound/ South bound	West bound/ North bound
North America/Far East	6.5	5.5
North America/Europe	2.0	5.5
North America/Mid-East	1.5	-
Europe/Far East	4.0	4.0
Europe/Mid-East	1.5	
Europe/Australasia	2.0	1.8
Far East/Mid-East		3.0

***Note: overall average rate 4.6%

***Source: Temple, Barker & Sloane Inc.

The study of the Economist Intelligent Unit Limited estimated the supply-demand gap up to 52% oversupply by 1985, shown in Table(1-11).

Table (1-11)
Estimated Surplus Capacity in Deep-Sea Container Shipping

	1 Traffic index, 1980=100	2 Fleet index, 1980=100(a)	3 Surplus Capacity 2+1 (%)
1980	100	110	10
1982	114	142	23
1985	133	202	52

a) Assuming 10 per cent surplus capacity in 1980.
***Source:P.22. Container, Conference and Competition.
The Economist Intelligence Unit limited.

2) The structural friction

(a) Shipbuilding market: Supply side of the ships

In the cyclical concept, when the shipping market is overtonnaged, the shipbuilding market is led to a period of low newbuilding activity until growth in cargo demand catches up with tonnage supply. This means. in other words, the shipbuilding market is very closely related to the shipping market and these two different markets affect each other directly.
Each of the markets has its own price mechanism regulating the market to lead the balance point into equilibrium of supply and demand.
However in reality, the function of this invisible hand

is distorted by other forces such as, governmental subsidies, aspiration of national shipping, softened bank financing and so on.
Coupled with these forces,the rapid development of ship technology has also added the same effect. The new ship with the new technololgy has always been attractive to shipowners and has given them advantages in competitiveness.

If the price is going down, the supply should be diminished, but this simple supply theory is not applied in the shipbuilding market.
Table (1-12) and (1-13) show that the trends of prices of container ships decreased rapidly after 1980.
Nevertheless, as mentioned earlier, more tonnage was increased in the same period. There are many arguments why the price mechanism is distorted in the shipbuilding market and why governments give subsidies to ship yards. The reasons are generally accepted as that, since the shipbuilding industry is labor intensive, many developing countries have entered the market and for the developed countries, because of its significance in economic effect as well as social impact, they are obliged to subsidize.

(b) Shipping market: Demand side of the ships

The container shipping market is in the same situation in which the price mechanism has lost its function.
Even with a low freight level due to the overtonnaged market, the supply has continuously increased as we discussed earlier.
Therefore the linkage controled by the price mechanism between the shipbuilding market and the shipping market was broken and caused a structural friction between the

two markets, whereby the shipping market has been led to chronic recession.

5.1.2 The ship technology development together with the results of the conference system and containerization

The ship technology development, coupled with the results of the conference system and containerization, is also an important factor leading the market to chronic recession. As we discussed in the previous chapter, containerization broke off the characteristics of liner cargo being heterogeneous, thus liner shipping could take the advantage of economies of scale. This spurs the ship technology to be developed in various directions towards, such as the ship's scale, propulsion devices and so on.

The ship's scale reached the fourth generation. As can be seen in Table(1-14),the fourth generation of US Line, ship with a capacity of 4,500TEU, has almost the same scale up to the Panama limit with length(bp) x beam x depth; 279 x 32.2 x 21.5, as the third generation Hapag-Lloyd ship with 271 x 32.2 x 24.0, built in 1981. However, the capacity was jumboized up to one and half time, while engine bhp became half.
Professor Kept. E.Mangles pointed out the main feature of US Line ships as being a cigar type rectangular which makes it possible to drastically improve in capacity with the same scale, in his lecture at the World Maritime University.

The recent trend of jumboization was studied by the Container Insight,titled "World Container Data":An assessment of the mainstream market, 1976-87 with a forecast up to 2001 as shown in Table.(1-15)

Table (1-16) show us the ship's major operators and their jumbos up to 2,500TEU and above.

Table (1-12)
Estimated Container Ship Construction Prices

	1,200 TEU (a)		1,600 TEU (b)
	pound mn	US$ equivalent	US$
1968	4.0	9.6	
1969	4.4	10.5	
1970	5.0	12.0	
1971	6.8	16.7	
1972	8.2	20.5	
1973	10.0	24.5	
1974	22.0	51.5	
1975	25.0	55.5	
1976	26.0	46.8	
1977	27.5	48.1	
1978	28.2	54.1	
1979	28.7	60.8	28.0
1980	29.2	68.0	31.5
1981	30.1	61.1	35.8
1982	30.2(c)	52.9	34.5
1983	-	-	28.0

a)Fairplay.
b)Lloyd's shipping Economist.
c)First half 1982.

***Source:The Economist Intelligence Unit Limited Containers, Conferences and Competition, May 1984.

Table (1-13)

Recent Report Prices for Container ship

Year of delivery	Company	Ships	Price per ship	Price per TEU
1982-83	UAAC(Kuwait)	9x1,846	42	23
1982-83	APL	3x2,500	58(a)	23
1982-83	Yangming	4x1,845	30	16
1983	ABC	2x1,900	34	18
1983	NSC(Saudi Arabia)	4x2,025	63	31
1983-84	Barber	2x2,400	67	28
1983-84	ACL	5x2,300	53	23
1983-84	Evergreen	16x2,240	30	13
1984-85	US Lines	12x4,200	48	11

a) Price paid by APL, excluding construction differential subsidy.

Prices are reported by companies to the shipping press.

***Source:p.48-49 Container, Conferences and Competition, The Economist Intelligence Unit Limited, May 1984.

Table (1-14)

Main Features of Selected Jumbo Container Ships

Carrier	Ship TEU	Year built	Tons dwt	Length(bp)xbeam xdepth	Engine bhp	Service speed
US Lines	4482	1984	58870	279x32.2x21.5	28,000	18.5
Maersk	3386	1984	53400	259.3x32.2x19.8	47,500	24.3
Hapag-Lioyd	3045	1981	51540	271.0x32.2x24.0	65,680	24.0
APL	2750	1982	30825	246.9x32.2x20.1	432,000	24.4
Yangming	3050	1986	39000	252.6x32.2x19.7	26,330	21.5
NOL	2970	1985	45000	244.0x32.2x21.4	315,000	21.7
OOCL	2900	1985	40560	227.0x32.2x21.1	29,610	22.0
Evergreen Line	2928	1986	46580	225.0x32.2x19.2	25,760	20.4
LykesLine	2600	1986	33360	245.0x32.2x18.8	28,800	21.0
Hanjin Line	2480	1986	36000	224.0x32.2x19.0	30,000	22.0
Sea-Land Service	2472 (a)	1985	34400	258.2x30.6x17.5	30,150	22.0

***Note:(a) 1980 built as 1,678 TEU, jumboized 1985: reference has been made to Motor Ship 'ship on Order' and Lloyd's shipping Index for certain vessel tonnages, dimensions and engine /speed data, Avalysis:Container Insight.

***source:p,10, World Container Data 1985. An Assessment of the mainstream market 1976-87 with a forecast up to 2001. Container Insight.

Table(1-15)

Evolution of Mainstream Container Ship Fleet by Size Range, 1979-88

Size range	1979	1984	1988
3,001 & upwards	-	7	36
2,401 / 3,000 TEU	18	23	126
sub total	18	30	162
2,001 / 2,400 TEU	3	36	63
1,801 / 2,000 TEU	24	51	38
1,601 / 1,800 TEU	11	50	42
sub total	38	137	490
600 / 1,600 TEU	263	460	490
Total	319	627	795

Figures: Container Insight: Data for 1979 & 1984 is for vessel deployment on mainstream trades (east--west arteral routes) only, at year-start (all ship types); 1988 figures are Container Insight estimate (on some basis) assessed from known contracts and forecast trends

*** source: p.22, World Container Data 1985 An assessment of the mainstream market 1976-87 with forecast up to 2001. Container Insight.

Table(1-16)

Operators and Their Jumbos (as of Jan.1988)

(provisional)

Operator	No.	TEU capacity	Year of building
US Line	12	4482	1984-85
Maersk Line	3	3386	1984-85
Yangming	4	3200nc	1987
Yangming	4	3050	1986
Hapag-Lloyd	1	3045	1981
Ben Line Con.	3	3032	1972-73
Korea Shpg Corp	5	3000nc	1986-87
Maersk Line	6(4)*	3000	1984-85*
Hapag-Lloyd	2	2986	1972-73
NOL	4	2970	1985-86
OCL	5	2968	1972-73
CGM	1	2960	1973
Nedlloyd	2	2952	1973
Evergreen Line	4	2948	1987
Hapag-Lloyd	2	2944	1972
Evergreen Line	4	2928	1986
OOCL	6	2900	1985-86
East Asiatic	2	2820	1972-73
Swedish East Asia	1	2820	1972
Wilh Wilhelmsen	1	2820	1972
NOL /NYK /YS Line	6	2800nc	1986-87
MISC	2	2770	1979
APL	3	2750	1982-83
Evergreen Line	20	2728	1984-85
Nedlloyd	1	2714	1977
Yangming	11	2650nc	1986*
Lykes Lines	6	2600	1986
Maersk Line	2	2600	1982
Hapag-Lloyd	4	2598	1985*

Note:Only vessels deployed on mainstream east west arterial routes are included in the table;
no= contracts not confirmed as of time of writing;

*denotes year of jumboisation to 2300 TEU and upwards.
Detail as of late-July 1985;Analysis; Container Insight

***source: p 22 World Container Data 1985. An assessment of the mainstream market 1976-87 with a forecast upto 2001. Container Insight.

Another important ship technology has been developed in concerning the saving of fuel costs.
Savings in fuel costs have come from two sources in recent years.
These sources are i) the move from steam turbine to diesel and ii) reduction in ship speed.(35)
A study made by the Economist Intelligence Unit Limited observed that diesel engines generally have a consumption of about 130 grams per bhp / hour, about 25 per cent below ten to fifteen years ago for steam turbines when they were new (about 170-175 grams, although consumption will have risen as these engines aged).
In addition to this, according to the study, fuel savings have increased during the period in which diesel engines were taken over by improved hull and propeller designs, and better surface treatments, particularly anti-fouling and self-polishing finishes.
The improvement of propellars alone could reduce fuel consumption by around 10-20 percent and hull surface finishing about 6-7 percent.
Thus the total saving in fuel costs per ton/ mile due to

technical developments alone, excluding speed reduction,- which is examined by the study below probably averages about 25 percent over the last ten years (i,e. comparing fuel consumption of a new diesel engine ship launched in 1984 with a new steamship launched in 1974).

The study continued regarding slower speed.
Table(1-17) shows the signficance of reduction of fuel consumption by slower speed.

Table(1-17)

Approximate Engine Power Required for Varying Service Speeds

Speeds(Knots)	Bhp for 1,800 TEU ship
25	51,000
24	45,000
23	40,000
22	35,000
21	30,000
20	26,000
19	23,000

Comparing this tabel(1-17), with table(1-14), we can find an interesting fact that US jumbo with a capacity of 4482 TEU, has a service speed of 18.5 knots with bhp 28,000,engine while Hapag-Lloyd's ship has a 24 knot service speed with a 65,680 engine bhp,which implies a drastic development in ship technology.
This ship technology development was accelerated by the oil shock in 1974 and 1979.
As we discussed in the previous chapter, containerization

resulted in the change of cost structure of liner shipping, whereby the capital cost and the fuel cost became the most vital factors determining the carrier's competitiveness.

Therefore, we can realize that the continuous improvement of ship technology, coupled with the result of containerization (i,e. the change of cost struture) added the influence on chronic recession in container shipping eventually. It has been also influenced by the indepentents' behaviour to expand their fleet with more efficient ships, because the most effective way to survive under the cut-throat competition is cost reduction.

5.1.3 Other factors to characterize the current economic environment of liner shipping

Ther are many important factors materializing the current aspect of liner shipping such as:

i) the aspirations of national lines,

ii) the Comecon group,

iii) Other modes of transportation: Siberian Land Bridge and airfeight lines,

iv) US shipping act of 1984,

v) the Liner Code of Conduct.

All those factors have caused the current market environment to a state of turmoil,together with political issues between developed and developing countries especially.

In this paper, however, my discussion does not go into detail on those topics, not only because a vast space is needed in order to cover but also because those topics are already familiar to us and the discussion done so far is sufficient to shape the current picture of the container liner market on this small canvas.

5.2 The Advent of the RTW Concept

We have observed the current container liner market in which competition is acute due to overtonnage, structural friction and other forces whether they are political, economic or technological. Furthermore we have identified that the current aspect of the liner market has been affected by the result of conference systems and containerization as well.

Based upon our previous understanding, my discussion started to discover the factors caused to the advent of the RTW concept, as a conclusion of this part, leaving the topics regarding the definition of the RTW concept and the core of the RTW service which will be coverd in the following part.

5.2.1 Industry competition and its strategy

The RTW concept is a business strategy to cope with industry competition. The goal of competitive strategy for a business unit in an industry is to find a position in the industry where the company can best defend itself against the competitive environment forces or can influence them in its favor.

In the prevous discussion we have reviewed the features of the container liner market where individual liner carriers should defend themselves through their strategy.

Professor Michael, E.Porter discussed the structural analysis of industries and generic competitive strategy in his literature.(36)

In his work, the five factors, such as:

a)threat of new entrants,

b)threat of substitute products or services,

c)bargaining power of buyers,

d)bargaining power of supliers and

e)rivalry among current competitors.

are identified as forces deriving industry competition. If we apply this idea to the current container liner market, figure(1-6) can be produced. In figure (1-6), the five forces can be explained as follows:

1)competitors existing in the current maket,

2)potential liner carriers,

3)oversupply of the ship building market,

4)competition from other modes of transportation and

5)preasure from shippers or their councils.

In addition to this, forces indirectly intensifying the competition of the market are:

6)Political aspiration to the new national lines,

7)Government subsdization to the national lines,

8)Government subsidization to the ship building market,

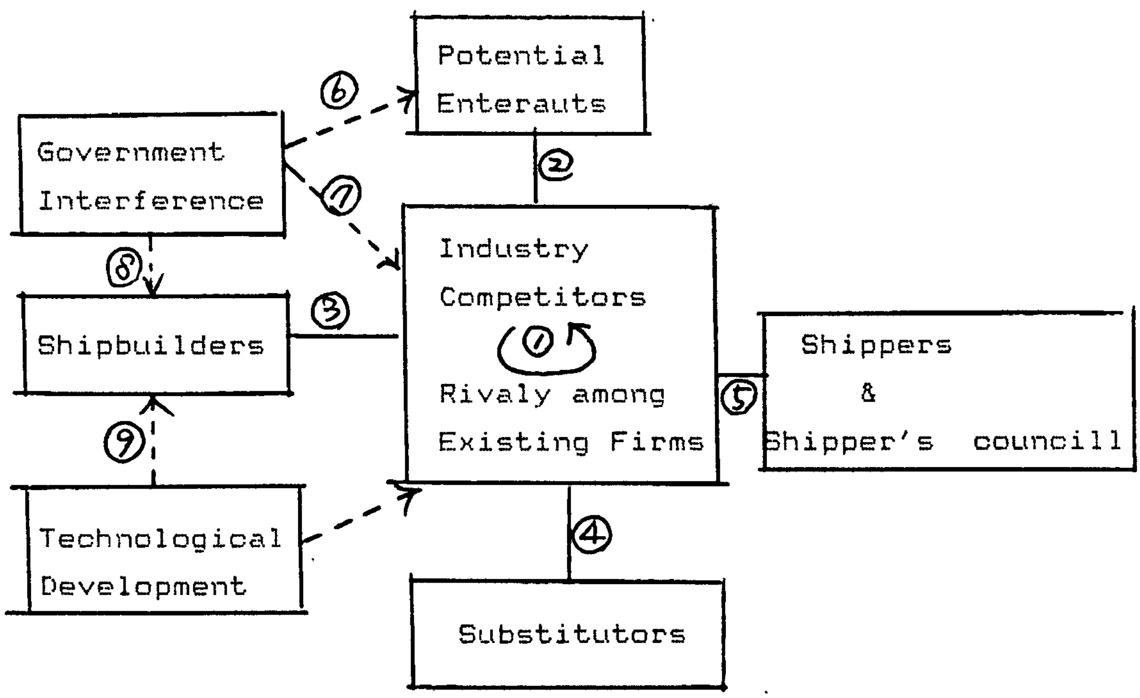
9)and 10) influence of technological development on the ship building market and the conatainer liner market.

Professor Porter continued the discussion that all five competitive forces jointly determine the intensity of industry competition and profitability, and the strongest force or forces are governing and become crucial from the point of view of strategy formulation. We have already discussed the intensity of industry competition in the container liner market.

Here, we encounter a question, that is,"What are the strategies available for a individual firm to cope with the competition and to maximize profitability?".

Figure(1-6)

Forces Driving Competition in Container Shipping Industry



5.2.2 Three generic strategies

According to the study of professor Porter,three internally consistent generic strategies (which can be used alone or in combination) are effective for creating a defendable position in the long run and outperforming competitors in an industry.

The three generic strategies referred to are :

1) overall cost leadership,

2) diffrentiation,

3) focus.

Figure(1-7) explains the relationship and difference of the three generic strategies.

The first strategy is to take position of the overall cost leadership in an industry.

Cost leadership requires as, professor Porter says, aggressive construction of efficient-scale facilities, vigorous pursuit of cost reductions, tight cost and over-head control, and so on.

The second generic strategy is one of differentiating the product or service offered to the firm, creating some-thing that is perceived in all industry as being unique.

The last generic strategy is focusing on a particular buyer group, segment of the product line, or geographic market, as with differentiation. This strategy may take various ways, either the low cost or differentiation through focusing on a particular segment of a consumer group.

Figure(1-7)

Three Generic Strategy

		Strategic Advantage	
		Uniqueness Perceived by the Customer	Low cost Position
Strategic Advantage	Industry wide	DIFFERENTIATION	OVERALL COST LEADESHIP
	Particular Segment only	FOCUS	

Source:

P.39. Competitive strategy, Techniques for Analysing Industries and Competitors Michael E, Poter. The Free Press ADivsion of Macmillan Publishing Co., Inc.

5.2.3 The RTW concept as a business strategy

The core of containerization is as discussed earlier, the unification of cargo, whereby the characteristics of cargo having been heterogeneous was changed as to be homogeneous. This led to the change of characteristics of liner shipping in various aspects:
first, liner shipping can take advantages of economies of scale causing later overtonnage situation, secondly, traditional end-to-end trade routes having been heterogeneous, could also be unified, which means that there is no significant difference among different traditional end-to-end trades which have been divided into more than 300 conference routes because of its heterogeneousity.

The change of the characteristics in liner shipping gave the possibility to the container carriers to deviate from traditional concepts of vessel deployment and scheduling under the conference system toward unifying world trade routes into one single route. It is more likely that the independents adopt the RTW concept with idea of entrepreneurahip.

Taking into account the current container shipping market and its intensity of competition, carriers have to effectively implement any of the three generic strategies to cope with the competitive forces.

The RTW concept,as a container shipping strategy, can be categorized as the overall cost leadership strategy, having a low-cost position, deploying jumbo vessels which are yielding maximum benefits from the economices of scale. The effectiveness of this strategy is that :firstly, a low-cost position provides substantial entry barriers

in terms of scale economies and cost advantage, which is defensive against potential entrants, secondly, a low--cost position usually gives the firm a favourable position vis-a-vis substitutes relative to its competitors in the industry, thirdly, this strategy usually has very strong bargaining power in the aquistion of vessels,containers and other assets.
Fourthly, the overall cost leadership strategy always has a strong competitive position against shippers because of the low freight rates.
Thus this strategy protects the carrier against all competitive forces and are extremely effective in order to eliminate the marginal competitors who are suffering from low-profitability.

5.3) The RTW Concept as Software-Oriented Innovation

In the first chapter, we discussed that the definition of the innovation includes not only the implementation of a new production function but also the introduction of a new product and procedural changes into the market.
Based on the definition,we can indentify that the RTW concept is an innovation in various aspects.

a) An innovation in the area of the production function.
The RTW concept replaced a new production function.
With the huge Econoship with the maximum scale of the Panama limit, it minimize the cost of TEU /mile. This topic will be discussed in detail in the next part.

b) An innovation in the area of price setting.
Through this concept, the carrier can offer the lowest freight rate based on its low cost structure penetrating

the market with low pricing policy.

c) An innovation in the area of distribution.
The Round-the -World service unified the three mainstream routes: Tranapacific, Transatlantic and Far East / Europe trade, into one horizontal route with vertical connections of the feedering system. Therefore it covers, globally, services in destribution networks.

d) An innovation in the area of communication. The RTW service promises shippers a service based on that any cargo from any place to any place at any time is available. This means that this marketing innovation is significant enough to create new customers, most likely, low value cargo, which leads to more advantages of economies of scale eventually.
Furthermore, it may create a change in the long traditional concept of end-to-end routes scheduling.

Part II

The CORE OF THE RTW CONCEPT

Chapter 6. DEFINITIONS AND PREREQUISITES

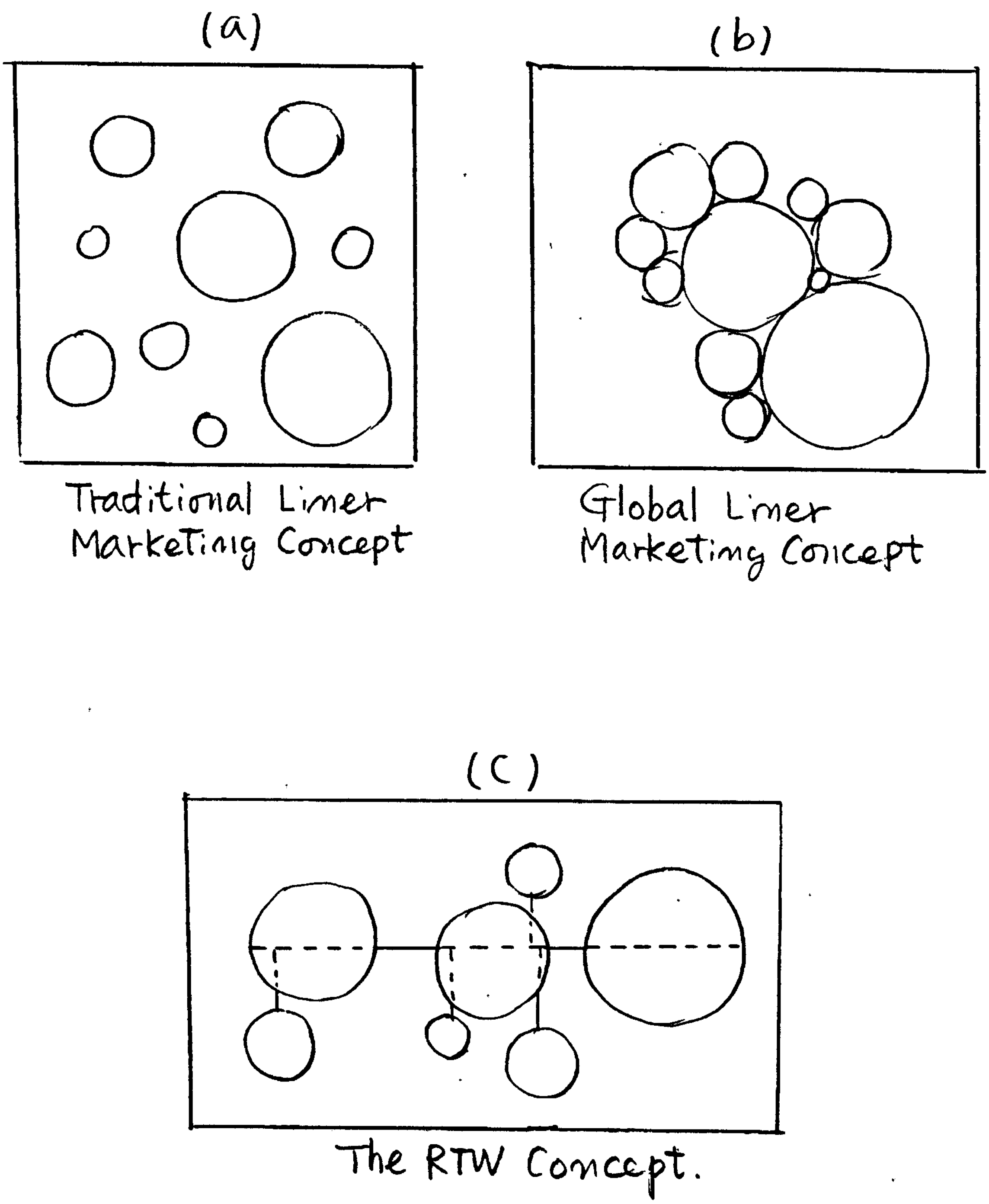
We have discussed,in the previous part,that the change of the characteristics in liner shipping, through containerization, gave the possibility to the container carriers to deviate from the traditional concept of vessel deployment and scheduling on segmented geographical routes, towards unifying major world trade routes into a globally integrated operational network.
In other words this means that two major developments have imperceptibly become the vital factors which have determined the strategic approach that liner shipping firms have taken. The two major developments are; Internationalization and The marketing concept. Thus major container carriers have begun to establish their strategies based on the international marketing concept.

6.1 Global Strategy

Liner shipping produces a service commodity creating time and space utility. Through the evolution of containerization, the commodity service has been widely standardized so that the producer of container liner services would innovate the new marketing concept so the container liner market itself has become internationalized. In doing so, major liner carriers have established global strategies whereby each market segmentation, traditionally divided into various end-to-end trade routes, could be integrated on a global scale.
As shown in Figure (2-1), traditional liner markets have been segmented and isolated.But, in the golbal marketing strategy, each segment has been integrated as a single comprehensive marketing network.

Figure(2-1)

The Schematic Represntation of the Liner Market Concepts



6.2 The RTW Concept

The RTW concept is one of the global strategies, and it can be defined as the unification of the traditional end-to-end trade routes into one overall route through the horizonatal connection of the mainstream trade routes in the northern hemisphere, via vertical feedering extremities.
As shown in Figure (2-1), the main stream trade routes in the northern hemisphere are the Transatlantic, Transpacific and the Far East-Europe trade routes. The trade between the South and North are covered by the vertical feedering connections on the regional basis in order to accomplish global coverage. Here, horizontal extremity implies circumnavigation around the world.

From this concept, we can identify some factors which are ingredients of the RTW concept as follows:

a) Operational aspects.

1) Container ships are circumnavigating along the horizontal mainstream routes toward the same direction;
2) On regional basis, there are transportation centers whereby the horizontal and vertical container flows are connected. The transportation center has significant functions, that is, the linkage between the sea leg of the horizontal mainstream and the land leg of the wide range hinterland coverage as well as the linkage of sea legs with a feedering connection.
   For example, in the case of Marseilles Fos as a transportation center,the container flows are connected not only to Italy and Spain but also to North and West Africa.
3) Vessels deployed in mainstream routes are huge econo-ships with the range of 3000-4500 TEU, in order to

maximize the benefits of economies of scale;

b) Marketing aspect

4) On the other hand, a marketing network should be organized in such a way that the carriers' global marketing strategy may cover all the trades; in certain trades as an outsider, penetrating the market with a cost leadership strategy and in other trades as a conference member, with conference freight rates.

6.3 The Prerequisites of the RTW Concept

As the RTW concept is a business strategy, there are preconditions for carriers to build such a strategy.
The prerequisites can be discussed from two angles:external and internal.

a) External preconditions

1) The equilibrium of the contaniner cargo flow of the major trades:Transpacific, Transatlantic, and Far-East-Euroupe.

This condition is a fundamental factor on which the RTW concept can be built, because the sufficient average load factor should be guaranteed in terms of vessel utilization in the circumnavigation of the three arterial routes.
Table(2-1) shows the mainstream trade loaded container volumes.This table gives us a brief observation of the equilibrium of container cargo volume.
If we add the volume of the container flow of the "Mainstream to/from Mid-East & S.Asia" to the container flow of the " Orient/Europe/Orient", the three arterial routes are very much likely to be in equilibrium.

Table(2-1)

Mainstream Trade Loaded Container Volumes Relative to World Port Total Box Movement.

(000 TEU)

Trade route	1976	1981	1982	1983	1984	1985	1986	1987
(1)	1706	2410	2540	2690	3120	3310	3500	3740
(2)	2123	2296	2245	2387	2695	2855	2920	3010
(3)	960	1302	1400	1485	1580	1690	1790	1940
(4)	136	1222	1353	1474	1520	1580	1640	1705
(5)	310	532	592	658	875	985	1130	1280
(6)	130	178	195	211	250	285	315	345
Total	5365	7940	8325	8905	10040	10705	11295	2020
(7)	21400	40300	42130	45200	51400	54950	58200	62400

(1) Orient/N.America/Orient

(2) Europe/N.America/Europe

(3) Orient/Europe/Orient

(4) Mainstream to/from Mid-East& S.Asia

(5) Inter-Asia & mainstream to/ from PRC

(6) Mainstream to/from Caribbean & C.America

(7) Total World Port box movements

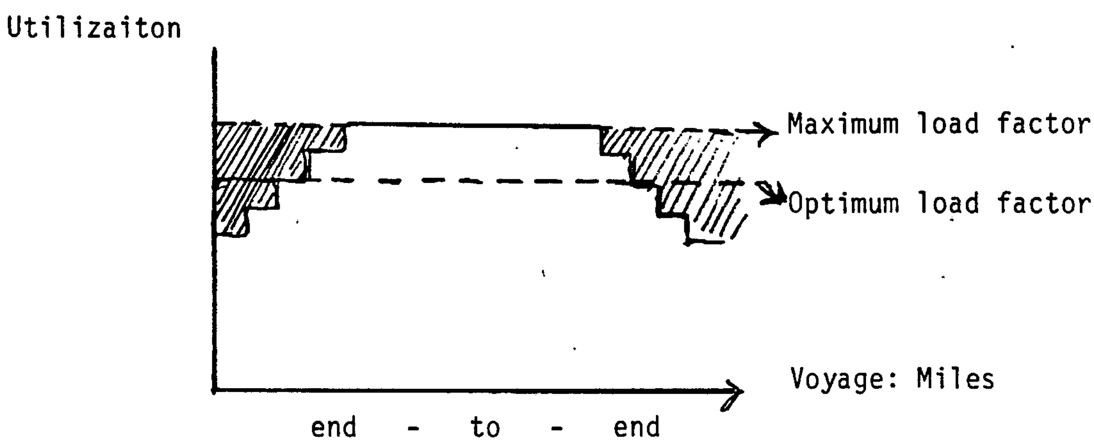
***Figure; Container Insight.

***Source; p.5 World Container Data 1985
1984:estimated
1985-87: forecasts.

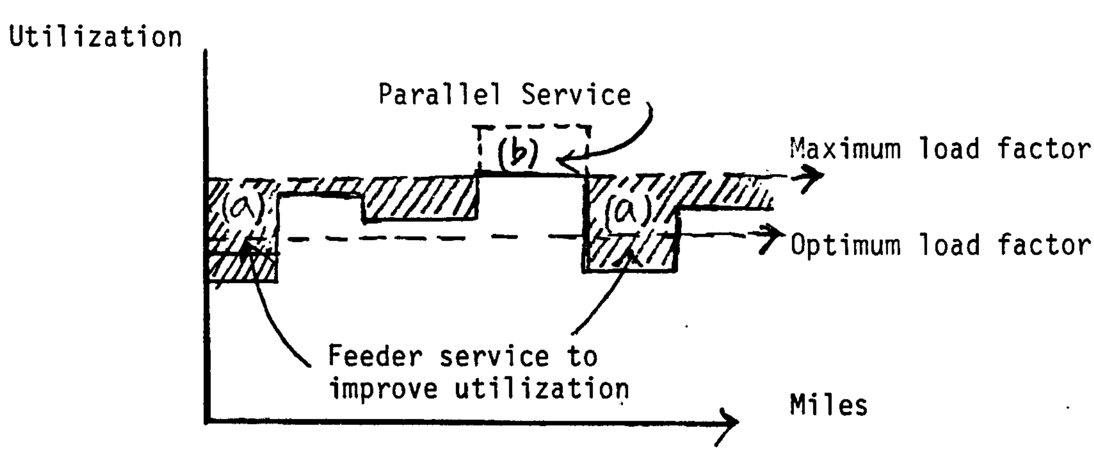
Figure (2-2)

Schematic Container Vessel Utilization Profile

1) Utilization of Normal Converence Liner (end-to-end trade service)



2) The RTW Concept Utilization Profile



Source: The lecture of Doctor Hans Ludwig Beth at the World Maritime University.

Fugre(2-2) shows hypothetically a schematic RTW utilization profile and that of a normal conference liner profile.

In the circumnavigation of the three arterial routes, the feeder system and the parallel system are employed in order to keep an optimum average utilization. The feeder system has two main economic functions. One is to connect the trades of vertical extremities to the mainstream flow in order to accomplish a global network and the other is to acquire a additional container flow to feed it to the circumnavigator in order to keep the desired level of the load factor, especially in a particular segment where the basic container cargo generated in that trade is not sufficient.

In figure(2-2), we can identify the segments; (a), where feeder systems are accompanied.

The parallel system (b) in figure(2-2), is adopted in the opposite case of the feeder system, where the cargo volume is sufficient to achieve optimum utilization.

However, the equilibrium of the container cargo flow of the major trades is the essential factor, because, eventhough the feeder and parallel systems may mitigate the imbalance among each segment to a certain extent, there is a limit to do so in the case of extreme imbalance.

2) The homogeneousity of cargo and trades

Before containerization, liner cargo and trades were heterogeneous,thus, even in a single trade route, there had been two different conferences in both directions.

If containerization is referred to as a unification of cargo through the change of the caracteristics from being

heterogenous to being homogeneous, the RTW concept would be referred to as an accomplishment of the unification of both cargo and trades, which implies very important economic changes of liner shipping.
However, the homogeneousity of cargo and trades is a fundamental precondition for the advent of the RTW concept.

The standardization of liner shipping service, as a service commodity, has been matured as can be identified in Table(2-2) and (2-3).

Container penetration represents the level of standardization of the service commodity in the industry and its penetration in world liner trade implies the internationalization of the container shipping service commodity from the global marketing point of view.
Table(2-2) shows that container penetration i.e. standardization, between developed countries, has been almost completed up to 95 % and globally undertaken up to 75 % by 1984.
The more interesting fact is, as Table(2-3) shows, that, in the three mainstream routes, such as the Atlantic,the Pacific and the Europe-Far East, on which the RTW carriers are circumnavigating, the standardization has been fufilled to almost 96 percent of each trade. This means, thus, that the homogeneousity of cargo and trade has been accomplished to the extent whereby the RTW concept can be emerged.

Table(2-2)

Container Penetrationin of World Liner Trade(1984)

Category of trade	% of total liner trade	% of container penetradion
Between developed countries	39	95
Developed to/ from developing	49	65
Between developing countries	12	51
Total	100	75

Notes:

1.Figures are based on IMF Direction of Trade statistics.

2.OPEC exports, trade with EEC, and table between the US and Canada are excluded from this table.

3.Developed countries are IMF é Industrial Countries' together with South Africa, Hong Kong, South Korea and Singapore.

Table(2-3)

Estimates of Container Penetration in Some Major Trades (1984)

Trades	%
Atlantic	96
Pacific(US-Far East)	96
Europe-Far East	95
OPEC imports from developed countries	77
Argentina, Brazil, Mexico trades with developed countries	60

***Source:p 195 Containerization in the Eighties, M,G, Graham, D.O. Hughes, Lloyd's of London press Ltd.

3) Intermodalism

Intermodalism is referred to as the efficient combination of different transportation mode mix i.e., land, air and sea transportation.

The success of the RTW sevice can be realized through a efficient combination of land and sea legs,covering a global distribution network.

Especially with the transportation center concept,the RTW service limits the number of port calls concentrating the container flow on the major ports on a regional basis, which leads to the fact that the function of inland transportation becomes of vital importance.

Therefore, intermodalism is an essential factor as a prerequisite of the RTW concept.

However, the RTW service carriers are not protagonists of the intermodalism like the Sea-Land and the A.P.L. whose marketing strategies are focusing on speed and convenience rather than cost(37). This topic will be discussed later.

4) Political interference in cargo accessibility

As during previous years cargo sharing and other restictive practices limiting access to cargo in liner shipping have been increased in many parts of the world.

Such political interference of the free market found its expression in various ways, including direct measures, such as cargo reservation for government-owned cargoes and bilateral/multilateral cargo-sharing or even monopolization of transport, and indirect measures, subsidizing national lines.

According to a OECD Report titled "Maritime Transport 1984", protectionism in one or another form exists in about 75 countries and the overall quantity of liner cargoes falling under such measures, taking into consideration about three quarters of the world's liner trades between OECD member countries not being subject to any significant protectionism, are estimated to be between 5 and 10 percent of the total liner traffic; a relatively small amount.

One of the most striking events in liner shipping in recent years is the "Code of Conduct for Liner Conferences" which came into force in Octorber 1983, with a 40-40-20 formula for cargo sharing among trading partners and third flag carriers. There are ifs and buts regarding the impact of the Code, however, the cargo sharing provisions of the Liner Code have encouraged many countries to enhance potectionism measures and, at least, it gives sound reasons to do that as a generally accepted practice.

These continuously growing non-tariff obstacles and other forms of limiting access to cargo affect the RTW service strategy as a constraint, because in the RTW concept many of the vertical extremities are the trades between developing countries where protectionism is strong.
Therefore, political interferences in any form of protectionism measures affecting cargo accessibility, especially in dveloping countries, bar the way to the vertical coverage of the RTW concept in a global marketing network.

b) Internal conditions.

For individual liner carriers, in order to adopt the RTW concept,various preconditions should be satisfied internally unlike the traditional end-to-end service.
The RTW concept requires a globally integrated marketing and operational organization. The large vessels deployed in the horizontal extremity would be sensitive to the load factor in saving their economies and they would require extensive feeding by subsidiary services in order to fill them, which inevitably accompanies transhipment activities.

Maintaining a high level of the load factor to save economies of scale is indispensable so as to outbalance the transhipment cost, which means that if the scale saving of going to huge container ships were not sufficient to offset the cost of large scale transhipment, therefore, the RTW concept could not succeed.

Another important factor to be considered is the management information system (MIS).
The management of any activities normally calls for the following steps:(38)

Information gathering
Objective setting
Operations
Control Prodedures.

The control prodedures in turn feed back for the next cycle.
Hence, in the process of all decision makings associated with marketing and operational activities, the adequate and comprehensive MIS is of vital imporatnce.

Lastly, the financial requirement is also an essential factor.
Accurate information regarding the amount invested in building the RTW service is not available.
However, about one billion dollar is likly to be required to acquire ships, boxes, terminals,trucks, other hardware items and facilities(39).
For a rough calculation of the case of the US Lines, financial investment seems to be required amounting to 570 million dollars for the aquisition of 12 jumbo container ships and approximately 134 million dollars for container boxes assuming that the pice per box is 2,500 dollars.

Chapter 7. THE RTW CONCEPT IN PRACTICE: A CASE STUDY OF US LINES AND EVERGREEN LINE

In the previous chapter, we defined the RTW concept and identified prerequisites which are indispensable conditions in building the RTW strategy in reality.
Accordingly the task given in this chapter is to review how the RTW concept is applied to the practice as the case of United States Lines(US Lines) and Evergreen Line inaugurated in April and August, 1985 respectively to compare the two different applications.

In the application of the RTW concept to reality, various aspects are involved, such as operational, financial and marketing aspects.
However, my discussion concentrates mainly on the operational aspect because this is the most typical feature, compared with other liner shipping strategies.

7.1 Operational Aspect

As shown in Figure(1-2),the schematic representation of factors influencing the characteristics of liner services we discussed,the regularity of sailing of the supply side of liner services is constrained by the regularity of cargo loading and its parameters of the service configurations are

1) ship size,
2) ship speed,
3) ship numbers,
4) numbers of calling ports and
5) service frequency.

Therefore, my discussion concerning how the RTW concept is applied to the practice by the two liner carriers, also includes those parameters of service configuration.

7.2 The Practice in US Line.

1) Ship size, numbers, slot capacity and its ulilization

McLean Industries Inc(Parent group), led by Mr Malcom McLean, has two shipping subsidiaries, United States Lines(SA) and United States Line Inc which was acquired from Walter Kidde & Co. through the transaction of a total US $ 111 million on April 12, 1978(40).

Five years later, on April 21, 1983 McLean Industries finalised US $ 570 million shipbuilding contract for 12x4258 TEU ships with the South Korean shipbuilder Dae Woo with 1984-85 delivery.
It meant that US Line was poised to move from the ninth largest container operator in the world to the first by 1985 according to Table(2-4), from the source of Containerisation International.
On the other hand,a more interesting fact is that, as shown in Table(1-13), with the substantial deduction of ship price, the price per TEU slot was merely US $ 11,000 which was the lowest one ever.

The recent McLean Industries' fleet and its deployment in trades on January 1, 1986 were listed by Lloyd's List July 28, 1986 as shown in Table(2-5) and the ship's particulars of the new jumbo-econoships are shown in Table(2-6).

Theoretically, therefore, this jumbo-econoship on a weekly eastbound circuit gives the global annual capacity sums as being equal to 699,192 TEU(3x52x4482 TEU), assuming that triple ulilization per cell in a round voyage attainable.

Table (2-4)

Leading Container Operators, Ranked by TEU capacity of their Fleets.

	1983 Fleet '000 TEU	1983 Ranking	1985 Fleet 000	1985 Ranking
US Line	30	9	88	1
Evergreen Line	29	12	70	2
Sea-Land	60	1	61	3
Hapag-Lloyd	50	2	53	4
Maersk	46	3	51	5
Nedlloyd	43	5	51	6
OCL	44	4	44	7
Mitui-OSK	32	8	33	8
OOCL	33	7	33	9
NYK	30	11	31	10
A.P.L	31	9	31	11
CGM	28	13	30	12

***Source: Containerization International, May 1983.

However, on the basis of the carryings detailed in US Line estimate of loaded FEU when all 12 of the 2,241 FEU container ships are in the RTW service, filed to the US Maritime Administration (MarAd) on August 23, 1985, loading and discharging 4,665 FEU per week were expected, as shown in Table(2-7), for one round voyage, which means that per slot ulilization of these ships are 2,08 FEU. This loading estimation, 4,665 FEU per week, gives a total sum per year as being 485,160 FEU (4,665x2x52) in TEU equivalent, which means that the target set by US Line in its filing with MarAd would represent the utilization of 69.4 percent when assessed in relation to the triple usage of the 12-month total of 699,192 TEU as mentioned above.

Table(2-5)
THE MCLEAN INDUSTRIES FLEET

Ship Name	TEU Capacity	Year Built	Deployment at 1/1/86
	United States Lines Inc		
American Alabama	4,458	1984	RTW
American California	4,458	1985	RTW
American Illinois	4,458	1985	RTW
American Kentucky	4,458	1985	RTW
American Maine	4,458	1984	RTW
American Nebraska	4,458	1985	RTW
American New Jersey	4,458	1984	RTW
American New York	4,458	1984	RTW
American Oklahoma	4,458	1985	RTW
American Utah	4,458	1985	RTW
American Virginia	4,458	1985	RTW
American Washington	4,458	1985	RTW
American Apollo	1,300	1970	Transpacific
American Aquarius	1,300	1971	Transpacific
American Astronaut	1,300	1969	Transpacific
American Lancer	1,300	1968	Transpacific(1)
American Lark	1,300	1969	Transpacific

American Legion	1,300	1968	Transpacific
American Liberty	1,300	1968	Transpacific
American Lynx	1,300	1968	Transpacific(2)
American Marketer*	1,358	1973	Transpacific
American Mercham	1,358	1973	Transpacific
American Entente	2,326	1973	Transatlantic(3)
American Envoy	2,326	1972	Transatlantic(3)
American Pioneer	2,326	1979	Transatlantic(3)
American Puritan	2,326	1980	Transatlantic(3)
American Monarch	214	1969	MSC
American Spitfire	214	1969	MSC
American Titan	214	1968	MSC
American Trojan	214	1968	MSC

United States Lines SA Inc

American Argo	628	1964	Laid up
American Banker	1,024	1962	Laid up
American Builder	1,024	1961	Laid up
American Reservist	628	1964	Laid up
American Vega	628	1964	Laid up
American Hawaii	1,800	1985	US/S. America
American Michigan	1,800	1985	US/S. America
American North Carolina	1,800	1985	US/S. America
American Altair	521	1965	Laid up
American Draco	521	1965	Laid up
American Rigel	200	1965	Laid up
American Tide	200	1962	Laid up
American Veteran	26,456	1973	Pacific
	ton gross		

***Source: Lloyds' List, July 28, 1986.
*=chartered in. RTW=round the world service.
Msc= in Military Sealift Command fleet

NB(1) subsequently deployed on South American trades.

(2) Switched to North Atlantic.

(3) Being transferred to Transpacific roules. Other Pacific vessels probably including American Apollo and Legion, will move to North Atlantic as replacements.

Table (2-6)

Ship's Particular of US Line Jumbos

1. Port of Registry	New York. NY
2. Flag	U.S.A.
3. Gross Tons	57,075
4. Net Tons	18,995
5. Deadweight Tons	58,500
6. Date of build	1984 or 1985
7. Length Overall(m)	289.52(BB)
8. Length B.P.(m)	279.00
9. Shipbuilder	Dae Woo SB. & Heavy Machinary Ltd.
10. Breadth extreme(m)	32.26
11. Breadth moulded(m)	32.22
12. Draught maximum(m)	11.677
13. Draught moulded (m)	21.49
14. Type/ Facilities	4,258 TEU(1) C.Ho.1232/40'(20)c Dk867/40'-(20') incl. 146 ref.C
15. No.& Type of engines	Oil 2SA 7CY 900x1900
16. Power	23,620 bhp(17.374KW)
17. Design	Sulzer
18. Engine builder	Hyundai SB & Heavy Ind.
19. Fuel bunkers(tonnes)	70
20. Speed	18kn

(1) TEU capacity has been increased up to 4,458 TEU

***Source: Register of Ships 1984-85

Table(2-7)

US Lines Estimate of Loaded FEU carried when all 12 of its 2,241 FEU containerships are in round-theworld service.All capacities are in FEU.

Origin (load ports)	Destination	FEU per week	Loadings as % of 2,241 FEU	Loadings as % of weekly loadings
US East Coast	North Europe	275	12.3	5.9
(Savannah and New York)	Mediterranean	115	5.1	2.5
	MSC North Europe*	150	6.7	3.2
	MSC Mediterranean*	60	2.8	1.3
	Mid-East/India	194	8.7	4.2
	Far East	356	11.4	7.6
Total loaded ex US East Coast		1150	51.3	24.7
Total ex US,including the West Coast		1256	56.4	27.1
Total carried ex US, including FEU loaded in the Far East for Northern Europe		1365	60.9	29.3
Northern Europe	Mid-East/India	385	9.1	8.6
(Rotterdam)	Far East	440	19.6	9.4
Total loaded ex Northern Europe		825	36.8	17.7
Total carried ex Northern Europe including FEU loaded in the US for onward destinations		1550	69.2	33.2
Mediterranean	Mid-East/India	270	12.0	5.8
(Marseilles-Fos)	Far East	345	15.4	7.4
Total loaded ex Mediternean		615	27.4	13.2
Total carried ex Mediterranean including FEU loaded in the US and		1990	88.8	43.7

Northern Europe for onward destinations				
Mid-East/India	US West Coast	70	3.1	1.5
(Khor Fakkan)	US East Coast	165	7.4	3.5
	Far East	65	2.9	1.4
Total loaded ex Mid-East/India		300	13.4	6.4
Total carried ex Mid-East/India including FEU loaded in the US, Northern Europe and the Mediterranean for onward destinations		1441	64.3	30.8
Far East	US West Coast	275	12.3	5.9
(Singapore,Hong Kong,	US East Coast	1285	57.3	27.5
Kaohsiung,Kobe,Yokohama)	North Europe	100	4.5	2.1
Total loaded ex the Far East		1660	74.1	
Total carried ex the Far East,including FEU loaded in the Mid-East/India for US		1895	84.6	40.6
US West Coast(Long Beach)				
Northern Europe		115	5.1	2.5
Total loaded ex US West Coast		115	5.1	2.5
Total carried ex US West Coast, including FEU loaded in the Mid-East/ India and the Far East for onward destinations		1665	74.3	35.7

***Note:*= Military Sealift Command cargo is subject to competitive bids, therefore US Lines' volumes can vary within any six-month period. This estimate was based on the contract period October 1,1985 to March 30,1986.

***Source:p.33 Containerization International, October 1985.

Based on the filing with MarAd as shown in Table (2-7), load factors on departure from each trade region can be produced as the following Table(2-8);

Table(2-8)

Container Balances(FEU/week) and Load Factors

Region	Loaded	Discharged	Balance	load factor on Departure
US East Coast	1150	1450	+300	56.4 %
Northern Europe	825	640	-185	66.5 %
Southern Europe	615	175	-440	88.8 %
Mid East/India	300	849	+549	66.2 %
Far East	1660	1206	-454	84.5 %
US West Coast	115	345	+230	74.3 %

***Source: p 21 Lloyd's shipping Economist December 1985.

2) Calling ports and global network

According to the sailing schedule for the week of April 6-12,1986, issued by US Lines, shown in Table(2-9), a round vayage takes 84 days with 12 ships' weekly service and they call 12 ports which are the transpotation centers on a regional basis.

Among the ports, as shown in Figure(2-3), US Lines' most important transportation center in terms of total FEU loaded/ discharged(1,465 FEU) per week is Rotterdam where container flows are connected from West Germany (190 FEU) Denmark (170 FEU),Sweden (125 FEU), and Ireland (70 FEU). The Khor Fakkan also has a significant function for feedering with regional coverage of total FEU carried per week, as being 82,4 percent (560 FEU/680 FEU), according to the filings to MarAd, followed by Singapore and FOS.

Table (2-9)

United States Lines Vessel Schedule

WASHINGTON
K. O'Rourke (1)

UNITED STATES LINES, INC.

SCHEDULE FOR WEEK OF APRIL 06 - APRIL 12, 1986 PAGE 1

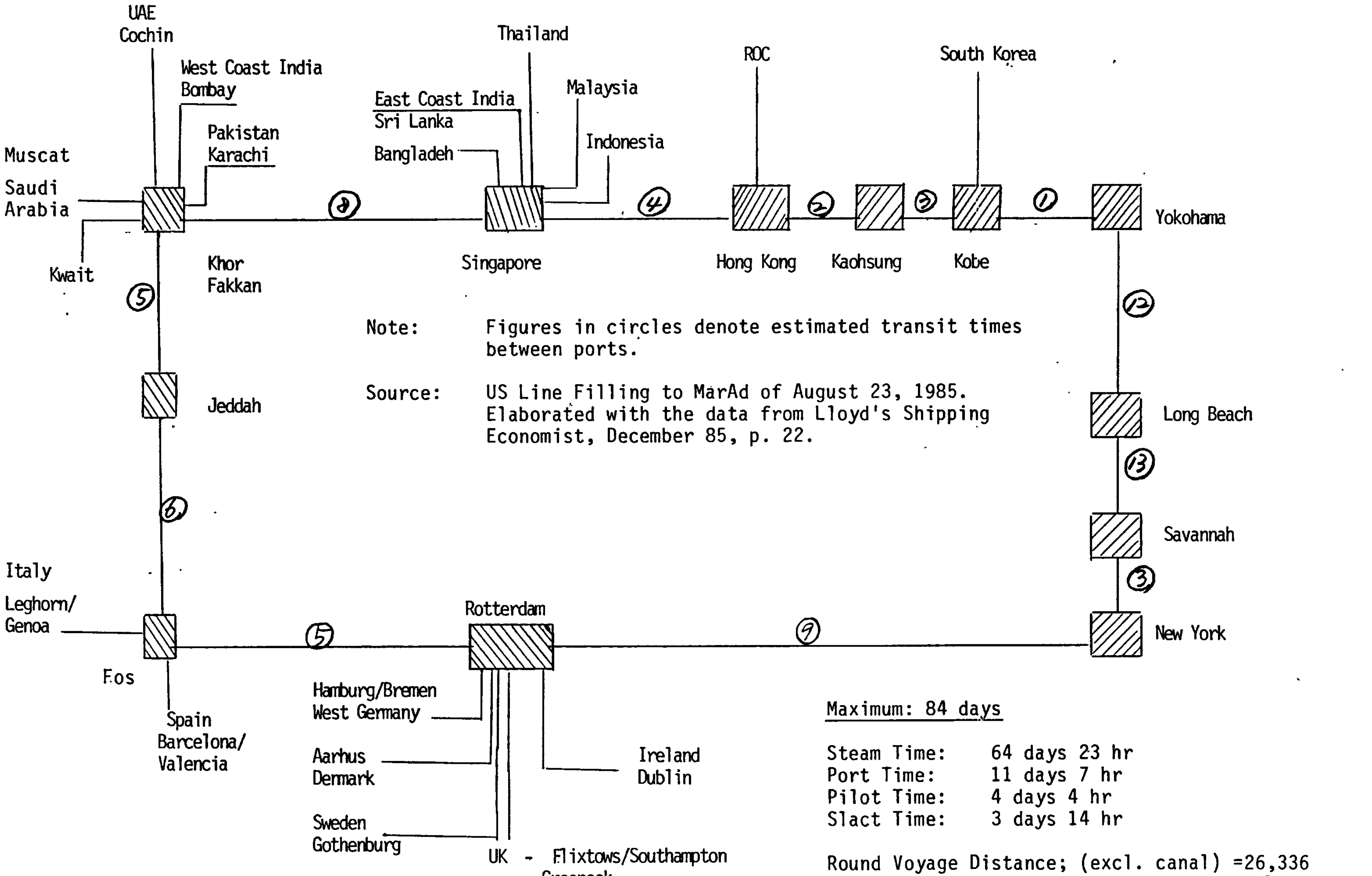
ROUND THE WORLD SERVICE

POS.	VESSEL	VOY. NO.	Sls Sav	Sls N.Y.	Sls Rdam	Sls FOS	Sls S.C.	Sls Jeddh	Sls Khor Fkkan	Sls Sing	Sls H.K.	Sls Kaoh	Sls Kobe	Sls Yoko	Sls L.B.	Due P.C.	Due Sav	Due N.Y.
RW 03	AM MAINE	8	1/11	1/15	1/26	2/1	2/6	2/9	2/16	2/25	3/2	3/5	3/8	3/10	3/22	3/30	4/4	4/7
RW 04	AM UTAH	3	1/18	1/22	2/2	2/8	2/13	2/16	2/23	3/4	3/9	3/12	3/17	3/20	4/1	4/7	4/12	4/15
RW 05	AM WASHINGTON	3	1/25	1/28	2/9	2/15	2/20	2/23	3/2	3/11	3/16	3/19	3/23	3/25	4/6	4/13	4/18	4/21
RW 06	AM ILLINOIS	4	2/1	2/4	2/16	2/22	2/27	3/2	3/9	3/18	3/23	3/25	3/30	4/1	4/13	4/20	4/25	4/28
RW 07	AM CALIFORNIA	4	2/8	2/11	2/23	3/1	3/6	3/9	3/16	3/25	3/29	4/2	4/5	4/7	4/19	4/27	5/2	5/5
RW 08	AM OKLAHOMA	5	2/15	2/19	3/2	3/8	3/13	3/16	3/23	4/1	4/5	4/8	4/12	4/14	4/26	5/4	5/9	5/12
RW 09	AM NEW YORK	8	2/27	3/3	----	3/14	3/20	3/23	3/29	4/8	4/12	4/14A)	4/24	4/25	5/7	5/14	5/19	5/22
RW 10	AM ALABAMA	8	3/6	3/10	3/20	----	3/29	4/1	4/7	4/16	4/20	4/23	4/26	4/28	5/10	5/18	5/23	5/26
RW 11	AM TRADER	35	----	----	----	----	----	----	----	----	----	4/29B)	4/21	5/5	5/17	5/24	5/29	5/31B)
RW 12	AM VIRGINIA	7	3/16	3/22	4/2	4/8	4/13	4/16	4/22	4/30	5/5	5/7	5/12	5/14	5/26	6/2	6/6	6/9
RW 13	AM NEBRASKA	6	3/22	3/26	4/6	4/12	4/17	4/20	4/26	5/6	5/11	5/13	5/17	5/19	5/31	6/8	6/13	6/16
RW 14	AM KENTUCKY	7	3/30	4/4	4/15	4/20	4/25	4/28	5/4	5/13	5/18	5/20	5/24	5/26	6/7	6/15	6/20	6/23
RW 15	AM MAINE	9	4/5	4/8	4/19	4/26	5/1	5/4	5/10	5/20	5/25	5/27	5/31	6/2	6/14	6/22	6/27	6/30
RW 16	AM UTAH	4	4/12	4/16	4/27	5/3	5/8	5/11	5/17	5/27	6/1	6/3	6/7	6/9	6/21	6/29	7/4	7/7
RW 17	AM WASHINGTON	4	4/19	4/22	5/3	5/10	5/15	5/18	5/24	6/3	6/8	6/10	6/14	6/16	6/28	7/6	7/11	7/14
RW 18	AM ILLINOIS	5	4/26	4/29	5/10	5/17	5/22	5/25	5/31	6/10	6/15	6/17	6/21	6/23	7/5	7/13	7/18	7/21
RW 19	AM CALIFORNIA	5	5/3	5/6	5/17	5/24	5/29	6/1	6/7	6/17	6/22	6/24	6/28	6/30	7/12	7/20	7/25	7/28
RW 20	AM OKLAHOMA	6	5/10	5/13	5/24	5/31	6/5	6/8	6/14	6/24	6/29	7/1	7/5	7/7	7/19	7/27	8/1	8/4
RW 21	AM NEW YORK	9	5/17	5/23	5/31	6/7	6/12	6/15	6/21	7/1	7/6	7/8	7/12	7/14	7/26	8/3	8/8	8/11
RW 22	AM ALABAMA	9	5/24	5/27	6/7	6/14	6/19	6/22	6/28	7/8	7/13	7/15	7/19	7/21	8/2	8/10	8/15	8/18
RW 23	AM NEW JERSEY	9	5/31	6/3	6/14	6/21	6/26	6/29	7/5	7/15	7/20	7/22	7/26	7/28	8/9	8/17	8/22	8/25
RW 24	AM VIRGINIA	8	6/7	6/10	6/21	6/28	7/3	7/6	7/12	7/22	7/27	7/29	8/2	8/4	8/16	8/24	8/29	9/1
RW 25	AM NEBRASKA	7	6/14	6/17	6/28	7/5	7/10	7/13	7/19	7/29	8/3	8/5	8/9	8/11	8/23	8/31	9/5	9/8
RW 26	AM KENTUCKY	8	6/21	6/24	7/5	7/12	7/17	7/20	7/26	8/5	8/10	8/12	8/16	8/18	8/31	9/7	9/12	9/15

A) AM NEW YORK V-8 ETA KAOH 4/14 SECOND CALL DRYDOCK 4/14-20

B) AM TRADER V-35 ETA GUAM 4/12 ETS 4/12, ETA KAOH 4/15 ETS 4/17, AT ANCHOR IN KAOH 4/25 ETS 4/29, SECOND CALL KAOH ETA 4/29 ETS 4/29; IDLE STATUS

USL Main Haul/Relay Network



Note: Figures in circles denote estimated transit times between ports.

Source: US Line Filling to MarAd of August 23, 1985. Elaborated with the data from Lloyd's Shipping Economist, December 85, p. 22.

Maximum: 84 days

Steam Time:	64 days 23 hr
Port Time:	11 days 7 hr
Pilot Time:	4 days 4 hr
Slact Time:	3 days 14 hr

Round Voyage Distance; (excl. canal) =26,336

The transportation centers and its coverage can be broken down as follows:

1) Savannah---South American region
2) New York---North East America
3) Rotterdam--- West Germany(Hamburg, Bremen) Denmark (Aarhus) Sweden/Norway(Gothenburg) Ireland(Dublin) U.K.(Felixstowe, Southhampton Greenock)
4) FOS----Italy(Leghorn, Genoa), Spain(Barcelona, Valencia North West Africa).
5) Jeddah
6) Khor Fakkan---Kuwait, SaudiArabia (Muscat), UAE (Cochin), West Coast of India(Bombay), Paskistan(Karachi)
7) Singapore------East Coast of India, SriLanka, Bangladesh Thailand, Malaysia, Indonesia.
8) HongKong-----Republic of China
9) Kaohsiung----Taiwan
10) Kobe--------South Korea(Busan)
11) Yohohama-----Japan
12) Long Beach---West Coast of North America

The round voyage distance is known to be approximately 26,333 miles excluding two channel paths, Panama and Suez.

According to Figure(2-3), steam time is allotted some 64 days and 23 hours and for port time of 12 mainline ports, some 11 days 7 hours.

Consequently, in order to keep the schedule the ships have to cruise at an average speed of 16,9 knots which is well below the design speed of 18,5 knots and service speed of 17,5 knots.

However, recently it was announced that the ports of FOS in southern France and Jeddah in Saudi Arabia would be deleted from the RTW circuit, according to Lloyd's List August 27, 1986.
Lloyd's List said that. It was understood that FOS and Jeddah were being dropped because rates and volumes at these gateways were no longer considered sustainable by the company.
The reduction of ports of call came just a fortnight after the parent group, McLean Industries had announced net losses of US $ 76,5 million for the second quarter of the year compared with a profit of US $10,4 million in the corresponding 1985 period.
Therfore, there is little doubt, according to Lloyd's List, that the contraction will be interpreted as a stark indication of the company's financial difficulties of an enormous debt, which was US $ 1,16 billion according to the 1985 annual report, increasing the burden of the company.

Obviously, however, this revised RTW strategy would effectively exclude the Italian, Spanish, Southern French markets and North/West Africa, from the global coverage.

7.3 The practice in Evergreen Line

The Taiwanese independent Evergreen Line now ranks as the biggest individual container shipping line; a status it has achieved within the relatively short pace of 10 years.

It was not until 1975, some seven years after Evergreen Marine Corp(Taiwan) Ltd (EMC) was first established by an entrepreneur, Mr.Yung Fa Chang,and six years after its first conventional liner service between the Far East and the Mid East Gulf was inaugurated, that Evergreen entered the container liner market.

As shown in Table(1-7), by January 1987, Evergreen Line is expected to deploy its container slots totaling 103,094 in TEU terms as the largest container carrier.

The drastic expansion in slot capacity can be identified in Table(2-10),the national relationship between Evergreen carryings and the Taiwanese deepsea container traffic which is the basement of its fleet development.

The analysis of Container Insight indicates the period of 1976-1978 as a start-up stage.

During this period Evergreen attained a 27,5 % ratio of (estimated) carryings when compared with Kaohiung/Keelung loaded deepsea movement.

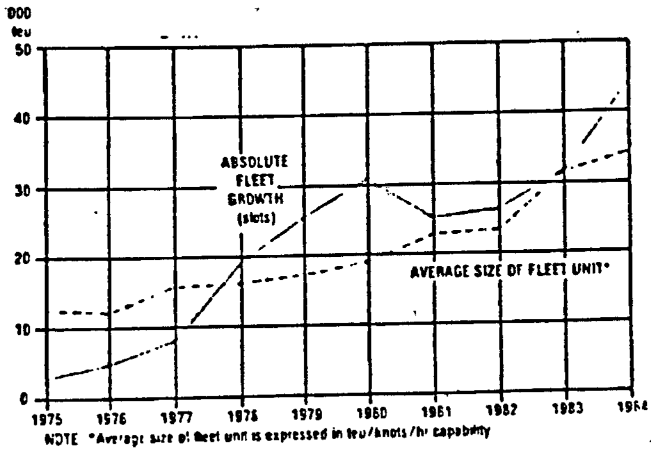
From 1984 onwards the trend is set to change very radically when Evergreen Line's RTW service entered the market.

This can be identified by the study of Mr. R.F.Gibney, "Container Lines", as shown in Figure(2-4).

The increase of slot capacity can be explained by the expansion of the fleet and the average size of the fleet unit.

Figure(2-4)

Evergreen fleet size and container carrying capability 1975-1984



Source - p.38. Container Lines, R.F.Gibney

Table(2-10)

National relationship between Taiwanese deepsea container traffic and Evergreen carryings, 1976-88

Year	Taiwainese traffic(teu)	Evergreen carryings (teu)	% *
1976	370,400	41,576	11.2
1977	417,300	67,730	16.2
1978	589,000	162,097	27.5
1979	763,000	205,116	26.9
1980	903,600	251,674	27.9
1981	946,400	234,731	24.8
1982	984,600	268,722	27.3
1983	1,244,000	303,008	24.8
1984	1,447,200	572,165	39.5
1985	1,639,400	810,205	49.4
1986	1,775,800	970,782	54.7
1987	1,879,700	1,021,795	54.4
1988	1,988,900	1,081,901	54.1

Figures are estimated deepsea movements at Kaohsiung/Keelung (projected from 1984 onwards) and estimated Evergreen loaded carryings on mainstream trades (projected from 1984). * Percentages indicate a purely notional level of the total Taiwanese deepsea traffic that Evergreen might have been able and might in the future be able to cater for if it concentrated all its capacity on mainstream trades to /from Taiwan. Analysis:Container Insight.

***Source: Container Insight. No 2.June 1984.

However, on the other hand, such a drastic expansion requires that the group invest nearly one billion US dollars between 1983 and 1986.
Broken down, this amounts to $700 to $720 million for the 24 "Gs", $160 million on containers and so on.
In addition, the group has invested $15 million in Evermaster Industrial Corp, which started building containers in March 1984, another $!5 million in Evervalor Industial corp, which has been producing chassis and prefabricated container parts since November 1984, and $50 million in Eversafety Container Terminal Corp, an impressive new inland terminal.

Of the group's 16 major operating companies, only eight could be said to be involved directly with the ocean shipping side of the operation.
The remaining units offer a range of related functions embracing container manufacture, repair, haulage, terminals and warehousing, trading and computer software.

In the process of expansion, the scale of this investment, through the latter part of the 1970s and early 1980s, has inevitably left the Evergreen group with an increased debt ratio to equity known to be 3.5:1(41).
Nevertheless, cash flow as an important factor in financial structure seems to be maintained healthily backing up the continuous profit performance even under the bottom market, different from the finaincial position and massive loss in the case of US Lines(42).

However, my discussion does not need to go into detail about the Evergreen group in general, but concentrates on the RTW strategy.

1). Ship's size, numbers, slot capacity

This gradual, but continuous expansion of Evergreen's shipboard container capacity has been matched by the consistent growth of its service network, culminating in the RTW service which came on stream in August 1984.

Table(2-11) shows Evergreen Line's containership fleet and its service routes as of May 1, 1985.
Among the fleet, 20 of 2,728 TEU containerships are the so called "Gs" type and 4 of 2940,TEU "GL" type are on the stream of the RTW service flow.
Four of the "GL" type containerships are the first tranche of an eight-ship new building program costing the group $200 million in total and each 25 million dollars only.

Next year, 1987,four more 2,940 TEU crafts will enter the RTW service with relacement of the four "Gs" type container ships.(43)
The new 2940 TEU "GL" type ship is known to man with a crew of just 14, which has a smaller scale of manning compared with the 2,728 TEU "GL" type ships manning 17 crew.
Another source said that the group has a batch of four extra-large 3,428 TEU ships on order at Onomichi in Japan due to be handed over during the course of 1987 at a reported cost of US $130 million.

The particulars of vessels of "Gs" type are shown in Table(1-12).

Table(2-11)

Evergreen Maritime Corporation Fleet

Table 1: ***Evergreen Line's containership fleet, showing vessels in service and on order as of May 1, 1985***

Vessel	Capacity (TEU)	Type	Service speed	Built/ converted	Flag	Service
Ever Guard	2728	FC	20.5	June 1983	Pan	RTW
Ever Guide	2728	FC	20.5	July 1983	Pan	RTW
Ever Going	2728	FC	20.5	Sept 1983	Pan	RTW
Ever Glory	2728	FC	20.5	Feb 1984	Pan	RTW
Ever Grade	2728	FC	20.5	Mar 1984	Pan	RTW
Ever Gather	2728	FC	20.5	May 1984	Pan	RTW
Ever Giant	2728	FC	20.5	June 1984	Pan	RTW
Ever Globe	2728	FC	20.5	June 1984	Pan	RTW
Ever Grace	2728	FC	20.5	July 1984	Pan	RTW
Ever Garden	2728	FC	20.5	July 1984	Tai	RTW
Ever Genius	2728	FC	20.5	July 1984	Tai	RTW
Ever Greet	2728	FC	20.5	Aug 1984	Pan	RTW
Ever Gentry	2728	FC	20.5	Aug 1984	Pan	RTW
Ever Gentle	2728	FC	20.5	Sept 1984	Tai	RTW
Ever Gifted	2728	FC	20.5	Sept 1984	Tai	RTW
Ever Grand	2728	FC	20.5	Oct 1984	Tai	RTW
Ever Growth	2728	FC	20.5	Feb 1985	Tai	RTW
Ever Golden	2728	FC	20.5	Apr 1985	Tai	RTW
Ever Gleamy	2728	FC	20.5	Jun 1985	Tai	RTW
Ever Govern	2728	FC	20.5	Aug 1985	Tai	RTW
Ever Goods	2923	FC	20.5	Sept 1985	Pan	RTW
Ever Guest	2928	FC	20.5	Jan 1986	Pan	RTW
Ever Group	2928	FC	20.5	Apr 1986	Pan	RTW
Ever Given	2928	FC	20.5	Jul 1986	Pan	RTW
Ever Lyric	1810	FC	21.0	Oct 1979	Tai	FE/Cal
Ever Level	1810	FC	21.0	Jan 1980	Tai	RTW
Ever Living	1810	FC	21.0	May 1980	Tai	FE/Cal
Ever Laurel	1810	FC	21.0	Sept 1980	Tai	FE/Cal
Ever Linking	1810	FC	21.0	June 1983	Pan	FE/Cal
Ever Loading	1810	FC	21.0	Aug 1983	Pan	RTW
*Ever Valiant**	1174	FC	21.0	Apr 1977	Pan	FE/Cal
Ever Valor	1214	FC	21.0	Aug 1978	Pan	FE/Cal
Ever Value	1214	FC	21.0	Nov 1978	Pan	FE/Cal
Ever Vital	1214	FC	21.0	Apr 1979	Tai	FE/Cal
Ever Vigor	1214	FC	21.0	June 1979	Tai	FE/Cal
Ever Spring	878	FC	20.0	1975/77	Pan	Med/USEC
Ever Summit	878	FC	20.0	1975/77	Pan	Med/USEC
Ever Superb	878	FC	20.0	1976/77	Pan	Med/USEC
Ever Shine	878	FC	20.0	1976/77	Pan	Med/USEC
Ever Breeze	510	FC	14.0	Jan 1984	Pan	Carib
Ever Bridge	510	FC	14.0	Jan 1994	Pan	Carib
Ever Better	510	FC	14.0	Jan 1984	Pan	Carib
Ever Ocean	1170	CC	15.0	1982/85	Tai	FE/Med
Ever Oasis	1170	CC	15.0	1982/85	Tai	FE/Med
Ever Order	1170	CC	15.0	1932/85	Tai	FE/Med
Ever Onward	1182	CC	14.8	1982/85	Pan	FE/Med
Ever Orient	1182	CC	14.8	1983/85	Pan	FE/Med
Ever Obtain	1182	CC	14.8	1983/85	Pan	FE/Med
Uni-Pioneer	522	SC	16.0	Aug 1973	Pan	SE Asia
Uni-Promoter	522	SC	16.0	Dec 1973	Pan	SE Asia
Uni-Fortune	956	SC	17.0	Sept 1978	Tai	FE/Med
Uni-Forward	956	SC	17.0	Dec 1978	Tai	FE/Med
Uni-Forever	956	SC	17.0	May 1979	Tai	FE/Med
Uni-Humanity	680	BC	15.5	Nov 1975	Tai	SE Asia
Uni-Handsome	680	BC	15.5	May 1976	Tai	SE Asia
Uni-Moral	818	CC	16.0	1976/84	Pan	FE/PNW
Uni-Modest	818	CC	16.0	1976/84	Pan	FE/PNW
Uni-Master	818	CC	16.0	1977/84	Pan	FE/PNW
Uni-Mercy	818	CC	16.0	1976/84	Pan	FE/PNW

Note: *FC = full container; CC = converted to container; SC = semi container; BC = breakbulk and container*; set to be sold to Hanjin*

Source: Containerisation International, June, 1986.

Table(2-12)

Ship's Particulars of "Gs" Type of Container Ship

(Ever Greet)

1.Port of Registry	Panama
2.Flag	Panama
3.Gross tons	37,042
4.Net tons	18,995
5.Dead weight tons(tonnes)	43,198
6.Date of build	1984
7.Length overall(m)	230,82(BB)
8.Length of B.P.(m)	216.34
9.ship builder	Onomichi Zosen KK
10.Breadth extreme(m)	32.24
11.Breadth moulded(m)	32.20
12.Draught Maximum(m)	11.594
13.Draught moulded(m)	18.67
14.Type /Facilities	2,728 TEU C.No. 1412/20'(40')C.DK 1316/20'(40)'
15.No & Type of engine	Oil 2 SA 6CY 900x1900
16.Power	21,600 bhp(15885KW)
17.Design	Sulzer
18.Engine builder	I.H.I
19.Fuel bunker(tonnes)	225.5(d.o.)
20.Speed	20.5Kn

***Source: Register of ships 1984-85.

Currently, the size of Evergreen deploying ocean going slots is more than 1,5 million on an annualized basis(44).

According to Table(2-4),the total of TEU capacity deployed in the RTW service is 66,320 TEU with 24 of "Gs" and "GL" types This figure is much larger than that of US Lines' totalling 53,784 TEU(12x4482 TEU).
Taking into account the service speed of vessels of Evergreen Line being 20 knots compared with that of US Lines, 17,5 knots, the product volume of Evergreen is, by far, almost 40 % larger than that of US Line on the stream of the RTW circuit.

2) Calling ports and global network

The deployment of the ships of the Evergreen Line is very much subject to change depending on the market situation in each segment and introduction of new ships, which makes it difficult to pin it down at any given moment.
However, the principlal idea is that the large ships, with the replacement, will be introdced to the RTW service which needs just 11 vessels sailing in each direction of circumnavigation on a 77-day round trip with weekly frequency.

Table(2-13) shows services operated by Evergreen group.

Table(2-13)

Services Operated by Evergreen Group

Table 2: *Services operated by Evergreen group*

Service	Frequency	No of vessels/ TEU capacity	Direct port calls	Total annual TEU capacity offered
Round-the-world ☐ Evergreen Line	Weekly	20 × 2 728[1] 2 × 1 810	WB ☐ Tokyo, Osaka, Busan, Keelung, Kaohsiung, Hong Kong, Singapore, Hamburg, Felixstowe, Rotterdam, Antwerp, Le Havre, New York, Norfolk, Charleston, Kingston[3], Tokyo	412 620[2]
			EB ☐ Tokyo, Kingston[3], Charleston, Baltimore, New York, Le Havre, Antwerp, Rotterdam, Felixstowe, Hamburg, Port Kelang, Singapore, Hong Kong, Kaohsiung, Keelung, Busan, Osaka, Tokyo	412 620[2]
Far East/Cal ☐ Evergreen Line	8 days	4 × 1 810	Los Angeles, San Francisco, Kaohsiung, Hong Kong, Keelung	162 900
Far East/Cal ☐ Evergreen Line	6 days	4 × 1 214 1 × 1 174	Los Angeles, San Francisco, Busan, Osaka, Tokyo	73 324
Far East/PNW ☐ Evergreen Line	11 days	4 × 818	Seattle, Portland, Tokyo, Osaka, Kaohsiung, Hong Kong, Keelung	53 988
Med/USEC ☐ Evergreen Line	weekly	4 × 878	Leghorn, Marseilles-Fos, Barcelona, New York, Norfolk, Savannah	91 312
FE/Med ☐ Uniglory Marine Corp	8 days	3 × 1 170 3 × 1 182 3 × 956	Tokyo, Osaka, Busan, Keelung, Hong Kong, Singapore, Jeddah, Limassol, Leghorn, Genoa, Marseilles-Fos, Barcelona, Valencia, Jeddah, Singapore, Hong Kong, Keelung, Tokyo	99 180
Caribbean ☐ Evergreen Line	weekly	3 × 510	Houston, New Orleans, Kingston, Puerto Limon, Cristobal, Curacao, Santo Domingo, San Juan, Houston	53 040[4]
S E Asia ☐ Uniglory Marine Corp	21 days	2 × 522	Kaohsiung, Keelung, Bangkok, Singapore, Cebu, Manila, Kaohsiung	17 748[4]
S E Asia ☐ Uniglory Marine Corp	21 days	2 × 680	Kaohsiung, Keelung, Manila, Singapore, Port Kelang, Singapore, Bangkok, Kaohsiung	23 120[4]

Note: [1] *when 20th G-type delivered in August 1985;* [2] *capacity based on triple utilisation of slots per circumnavigation;* [3] *Cristobal will be substituted for Kingston this summer;* [4] *includes relay boxes and local traffic*

Source: P.9, Lloyd's Shipping Economists, March 1986.

According to Table(2-13), the direct port calls made by Evergreen's two RTW servicies are as follows:

Westbound	Eastbound
Tokyo	Tokyo
Osaka	Cristobal
Busan	Chalston
Keelung	Baltimore
Kaohsiung	New York
Hong Kong	Hamburg
Singapore	Felixstowe
Jeddah	Rotterdam
Hamburg	Antwerp
Felixstowe	Le Harvre
Rotterdam	Jeddah(alternate voya-ges)
Antwerp	Singapore
Le Havre	Hong Kong
New York	Kaoshiung
Norfolk	Keelung
Chalston	Busan
Cristobal	Osaka
Total 17 ports	Total 17 ports

***Note:The Jeddah call is added after Evergreen's reshuffle, introducing one "GL" type ship in March 1986.

This itenerary signifies that the global network of Evergreen Line concentrates very much on particular regions such as Far East Asia, the North East coast of America and Northern Europe.

7.4. The Comparision of the Two Practices

Two different application of the RTW concept have been discussed so far, regarding mainly the operational aspect, whereby we can easily recognize that those two have many similarities as well as differences.
Accordingly, we need to compare the two different practices in order to clearly identify its similarities and differences.

7.4.1 Similarities

As far as those two practices are categorized as the RTW concept, the two practices have basically many similar fronts.
Therefore, these similar fronts goes to the major ingredient factors of the RTW concept which has already been discussed in the previous chapter.
Besides, what should be pointed out is that both of the RTW carriers exercised the bargaining power in the acquisition of the ships.

As we discussed in the first part regarding the RTW concept as a overall cost leadership strategy having a low-cost position is of prime importance, giving cost advantage to obtain a defensive power against not only potential entrants but also existing rivalry and customers. The low-cost position can be realized in such ways as jumboization and saving fuel cost through various ways, as discussed earlier.

Furthermore, in this connection, bargaining power through the aquisition of numbers of ships, at one term of package contract is most effective, especially to save

the capital cost of the assets.
The following Table(2-14) shows the cost effectiveness of the two RTW service carriers.

Table(2-14)
The Ship Prices and its TEU Proportion

Year of delivery	Company	Ships	Total Price million ($)	Price per ship million ($)	Price per TEU ('000) ($)
1984-85	US Lines	12x4482(1)	570	47.5	10.6
1983-84	Evergreen	12x2728	360(2)	30	11
1985-87	Evergreen	8x2940	200(3)	25	8.5

***Note:
1) The scale of capacity was reviced from the initial capacity of 4,218 TEU.
2) The initial rating of 2,240 TEU was jumboized to take 2,728 TEU in June 1984.
3) Eight new ships are being built at US $ 25 million each, according to Lloyd's List, July 1986.

Comparing these figures with Table(1-13), we can identify the substantial reduction of capital cost, for example, the price per TEU of APL's 1982-83 year built is US $ 23,000, while that of Evergreen's "GL" type 2,940 TEU ship is only US $ 8,500, being almost one third.

This package contract, which gives the RTW carriers the bagaining power, would be justified by the reason that the RTW concept necessitates a large number of circumnavigators with the same particulars such as size, capacity and speed, which gives the equality in terms of quantity and quality of value in various areas of management: production, marketing, financing and personnel management.

7.4.2 Differences

There are many factors which make the two applications of the RTW concept to reality different. Some factors are closely relative to other factors. Those factors are discussed as follows.

1) Ships

From the incipient stage of the RTW service, US Lines has deployed huge container ships of 4,482 TEU, while Evergreen Line planned to deploy much smaller vessels rating of 2,240 TEU, although they were half of US Lines' jumbos, and later increased the ship's capacity up to 2,940, even still less than 3,000 TEU.
By contrast, the number of vessels in the US Lines' practice is half of that of Evergreen's.

The speed is also an important factor.
Evergreen's craft has a service speed of 20.5 Kn, while US Lines' has 17.5Kn, which makes a difference in duration of round-the-world voyages, as it takes US Lines 84 days and Evergreen 77 days.

The three major differences, concerning scale, number and speed of ship, postulate different effectiveness in application of the RTW concept to the real market in terms of economy of scale, load factor and transit time.

The practice of US Line focuses on the maximization of the advantages of economies of scale, following the doctrine of the RTW concept. The introduction of the ship of 4,482 TEU to the market is phenomenal, whereas the optimum scale in the mainstream trade is known to be less than 3,000 TEU in a traditional end-to-end multiport service pattern.

By contrast, Evergreen Line has a different approach they are more practical and realistic rather than logical whereby more flexibilty to respond quickly to the change of market can be kept in the strategy.
This resilient power can be exercised whenever they change their strategy to withdraw the RTW service and reshuffle the deployment of circumnavigators to the traditional way without much friction of its reshuffle.
The adaptability and flexibility are the best assets in the balance sheet of Evergreen's RTW practice.

However, this topic will be discussed again in the next part when we observe the advantages and disadvantages of the RTW concept.

2) Direction of circumnavigation

US Lines are only eastbound in circumnavigation.
There is no evident information why US Lines made the decision like this.
However, we can assume two major factors constraining the decision-making, one is financial factors and the other is cargo availability.
If we assume that weekly service is the best frequency in the mainstream trades, it is very difficult for US Lines to aquire 24 ships of 4,482 TEU to cover east and west

circuits weekly, from a financial viewpoint.

It becomes more evident with the following brief observation concerning financial terms studied by Lloyd's Shipping Economist, September,1983.
US Line aquired the twelve ships without injecting any of its own equity, by combining shipyard credit(the second mortgage) guaranteed by the consortium of banks (the first mortgage), that provided the letter of credit of US $ 303 million, with the Prudential Insurence Company of America and General Electric Credit Corporation, providing a 20 percent downpayment amounting to US $ 114 million.
Consequently,US Lines'repayment schedule on the container ship deal is formidable.
The study observed that in the peak repayment years of 1986 and 1987 US Lines will have to find around US $ 93 million and $ 89 million(unadjusted for inflation) as well as maintaining the cash balances and liquidity position required by the banks, which imposed several conditions to improve working capital and cash position.

In addition to this, US Lines had to carry out further investment in container boxes, terminals among other things.
This looks like, said the study, being a tough proposition for a company whose pre-tax profit was US $ 3,1 million in 1980, $ 35,6 million in 1981 and $ 59,9 million in 1982.
The current situation of US Lines is more desperate as a result of the successive deficits, US $ 66,7 million deficit in 1985 and US $ 72,17 million in the opening quarter of this year, which eventually obliged them to modify to loan agreements which provided for a moratorium

of approximately US $ 139,5 million of principal revenue sharing and container box mileage payments over the next two years(45).

The next alternative is to circumnavigate either eastbound or westbound.
According to the filing with MarAd, we can observe that US Lines' initial plan projecting cargo flows by regions was heavily dependent on domestic-related trades, lifting imoport cargo to the U.S. at the rate of 1,795 FEU per week (mainly from the Far East) and export cargo, targeted to 1,265 FEU per week (mostly destined for Europe).
Thus the total of U.S based volume was projected at 3,060 FEU per week which meant that around two thirds of the over all traffic was domestic-related trade, leaving only one third for the cross trade.
Among this domestic-related trade, military sealift cargo has an important portion which is ,eastbound.

With the assumption that US Lines established the strategy based on US trade then we need to observe the container flow of US trade.
The following table(2-15) is extracted from Table(2-16), showing estimated container movement on U.S.-related trades eastbound and westbound.

According to Table(2-15),there is little doubt that the eastbound circumnavigation has more chance to ensure sufficient load factors which are of vital importance, especially taking into accout the massively increased capacity.

The Evergreen Line's approach has a quite different angle.

With a similar whole investment of US $ 1 billion, the group acquired 24 craft which can sufficiently cover both directions with a relatively faster transit time of round-the-world voyages.

This is very much likely to be just an extension of the traditional end-to-end service with the RTW concept.

This can be clearified by the discussion of the transportation center concept in the two practices.

Table(2-15)

Estimated Container Movement on the U.S.Trade Routes

(million TEU--Loaded Containers)

	1982	1983	1984	1985	1986
U.S./Asia-eastbound	1.31	1.55	1.92	2.11	2.20
westbound	1.22	1.21	1.27	1.33	1.39
N.Am./Europe-eastbound	0.88	0.85	0.88	0.91	0.91
westbound	0.86	0.92	1.12	1.25	1.35
Total ------eastbound	2.29	2.40	2.80	3.02	3.15
westbound	2.07	1.77	2.39	2.78	2.74

Table(2-16)

Estimated Container Movement on the Main Arterial Routes

(million T.E.U.-- loaded containers)

	1982	1983	1984	1985	1986
U.S./Asia--eastbound	1.31	1.55	1.92	2.11	2.20
--westbound	1.22	1.21	1.27	1.33	1.39
	2.53	2.76	3.19	3.44	3.59
North Am.	(1)	(1)	(1)	(1)	(1)
Europe Mid. East	1.07	1.10	1.20	1.30	1.40
Far East					
N.Am./Europe					
--eastbound	0.88	0.85	0.88	0.91	0.95
--westbund	0.86	0.92	1.12	1.25	1.35
	1.74	1.77	2.00	2.16	2.30
Europe/Far East					
---eastbound	0.33	0.37	0.41	0.46	0.50
---westbound	0.70	0.75	0.84	0.91	0.95
	1.03	1.12	1.25	1.37	1.45
Total					
---eastbound(2)	2.52	2.77	3.21	3.48	3.65
---westbound(2)	2.77	2.88	3.23	3.49	3.69
Total(3)	6.37	6.75	7.64	8.27	8.74

***Note: projected world GNP growth (real)

:(1) about 90 % into the Middle East

(2) exclude Middle East cargo

(3) include Middle East cargo

***Source:P.6 Alex. Brown & Sons, Inc. Research Containership Industry Special Report.July 1984.

3) The Transportation center concept

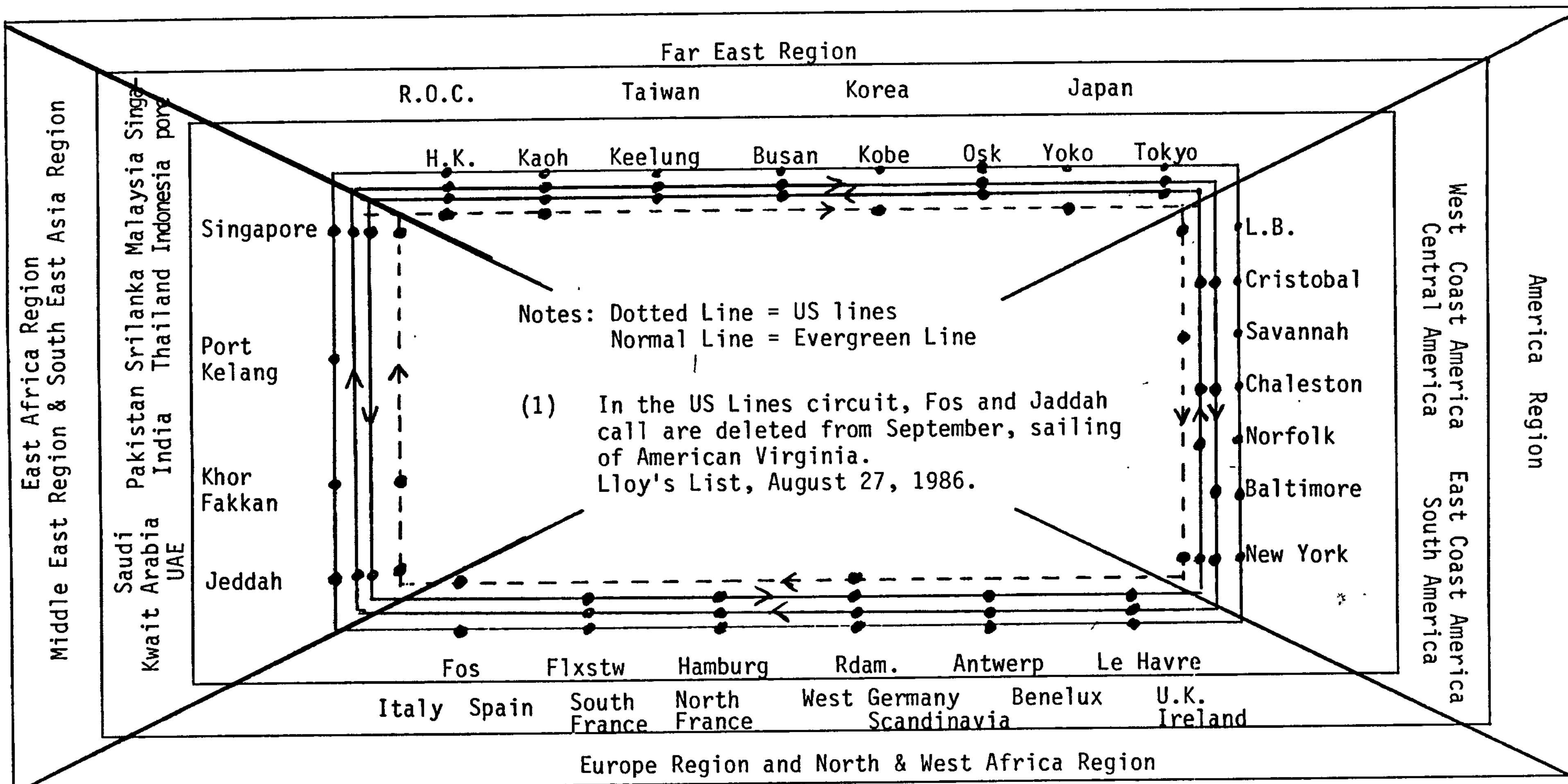
As we have discussed earlier, the transportation center concept has an essential function in the concept of the RTW, which is different from traditional multiport service.
Theoretically, the number of calling ports should be minimized so as to obtain maximum advantages of economies of scale.

Following this principle, US Lines offers the schedule calling only twelve ports which are the transportation center, as discussed in the previous chapter.

Figure(2-5) shows the ports of call used by both Evergreen and US Lines service and the obvious difference in terms of the transportation center concept.

Figure (2-5)

The Comparison of Transportation Centers in the Two Practices



In the pattern of US Lines, there are clear distinctions in the coverage of the marketing area, which means that it is very much logical.
Only one exeptional case is the Far East Region as shown in Figure(2-5). The line pays four calls.

The pattern of Evergreen Line has a different approach which does not stick to the principle of the RTW concept. Paying port calls to the west coast of the U.S.A. is intentionally omitted while the east coast of the U.S.A.and the north-western Europe have 16 ports in both directions which is almost the same number of ports used in traditional end-to-end trade routes in the same region.
In the region of the Middle East and the region of South East Asia, conversely, Evergreen pays only two calls there while US Line makes three.

In general, the way of approach of Evergreen seems likely to be very much practical, while US Lines' is referred to as a logical one.

However, these patterns are closely related to the parallel and feedering system.

4) The parallel and feedering system

As can be seen in Table(2-5) and Table(2-13), the two lines have their own parallel systems based on their own marketing focus.
Commonly, both lines have the parallel system in the region of Transpacific and Transatlantic trade.
Furthermore, each parallel system has an important function to complement their global marketing network as a

whole.
For example, in the RTW service of Evergreen Line, Long Beach calls are omitted, because the line has three service routes in this region.
In the case of the US Lines,the parallel system in the two regions is more important because the Line's RTW service is only eastbound.
Recently US Lines reshuffled its fleet between the Transpacific and the Transatlantic trade in the lights of rationalization to save cost and to increase revenue as shown in Table(2-17).

Table(2-17)
Annulaised Capacity Changes by New Vessel Deployment.

Routes	Annualised two-way TEU capacity			
	Old	New	Increase	Percentage
Transpacific	173,888	192,712	18,824	10,8
Transatlantic	218,400	182,000	(36,400)	(16,7)
US/South America East Coast	172,480	140,800	(31,680)	(18,4)

According to the analysis made by Containerisation International, this change focused on the increase of the capacity of Transpacific trade with the cost of Transatlantic trade and on the increase of the load factor of the RTW service in the segment of transatlantic route with the reduction of US Lines' end-to-end transatlantic capability.(46)

Evergreen's parallel system is rather complicated, compared with US Lines' RTW service concentrating on the U.S. trade-related trade routes.

The parallel systems of Evergreen Line include three services of Far East/North West America region, Med/USEL Trade,Far East/Med, Caribbean and South Asia region as can be seen in Table(2-13).

In general the parallel system of Evergreen Line seems to be more comprehensive because of its vessels, deployed in the RTW srevice, is of relatively smaller scale.

Feedering systems in both Lines has also contradictory features because of the nature of different approaches to the reality such as vessel size and transportation center concept.
With relatively higher speed and smaller size Evergreen can pay muliple port calls where a direct call has an advantage in terms of transit time and transhipment cost which are the merits of traditional end-to-end service, which means that the feedering system in the Evergreen case is not as important as the case of US Line.

5) Marketing segmentation

Naturally, the cost leadership strategy has a very low cost position, which leads to the fact that the strategy can easily penetrate lower freight markets.
In US Line case, as shown in Table(2-9), the transit time is long and in addition to this, in some regions, the cargo should be transhipped to the sea legs for its destination.
Therefore, the service rendered by US Lines is not attractive to high paying cargo.
Another factor to be considered is the problems with its equipment. The line is keen on using 40 ft containers rather than 20 ft units because of the economies of scale

offered, not the least in loading and discharing operations(47).
The ship was designed to carry more suitably 40 ft containers as can be seen in the ship's particulars.

However, both the Middle East/Indian subcontinent and Europe-Far East trades are predominantly a " weight trade", with a preponderence of 20 ft units.
Especially in the case of the Europe-Far East market, market sources estimate that there is a 60/40 ratio in favor of 20 footers.
Therfore, it is very much likely that US Lines may be obliged either to offer 20ft units and use 40ft units to carry 20ft cargoes at 20ft rates, or to follow 40ft cargoes which consist of low-density goods to fill 40ft units.
However, Evergreen Line has a different position in penetrating the market.
The transit time, mutiple port calls, ship's speed, ship's design and its equipment all these factors are effective to focus on the market segment of high paying cargo.

PART III

THE ANALYSIS OF THE RTW PRACTICES AND CONCLUSION

Chapter 8 ADVANTAGES AND DISADVANTAGES OF THE RTW CONCEPT

Previously, we have discussed the definition of the RTW concept and its practical application to the real market. Thus the task given in this chapter is to identify the advantages and disadvantages of the RTW concept.
Some of the topics in this connection were conducted very hypothetically without any elaboration of statistical and analytical study mainly due to lack of time to collect relevant data.

Nevertheless, the major factors which influence the RTW concept significantly are included in the comparison of costs with a computer model in the next chapter.

The advantages and disadvantages which are discussed, are broken down as follows :

1. Advantages
   1) Cross-subsidization
   2) Imbalance of trade
   3) Market penetration and cost reduction
   4) Bargaining power
2. Disadvantages
   1) Transit time
   2) Feeder costs
   3) Optimum Service configuration
   4) Flexibility and adaptability

8.1 Advantage

1) Cross-subsidization

The RTW concept has an advantage of cross-subsidization among the segments of the global routes.
This cross-subsidization can be explained with two different aspects,namely, operational and revenue.

The operational advantage comes from its circumnavigation of several traditional end-to-end routes. which means that as shown in figure(2-2), in the end-to-end service, most of the cargo is discharged at the two extreme ports, while the circumnavigators do not.

Accordingly, the utilization of the ship can be kept at a maximum level in any port of trade theoretically, while that of the end-to-end service is decreased in each end of the trade route.

Another important aspect is the cross-subsidization of revenues among different trades.
Because of various factors, the trade volumes are fluctuating, which means that one trade is booming while others are not and vice versa later.

However, hyphothetically, the RTW service as an integrated global marketing activitiy can stabilize its revenues through the cross-subsidization among different trades.

2). Imbalanced trade

As showen in Table(3-1), substantial imbalances of container flows exist in both directions of the main stream routes.

The imbalanced proportions in the three main arterial routes can be derived from the estimated container flows as follows ;

Table(3-1)

Estimated Imbalance Container Flows

		1984	1985
U.S./Asia	eastbound	100	100
	westbound	63	63
N.America/Europe			
	eastbound	100	100
	westbound	137	142
Europe/ Far East			
	eastbound	100	100
	westbound	197	190

*** Note:1 The container flow of westbound traffic a trade is compared with that of traffic by using eastbound traffic by using 100 percent.

2 This comparison was produced based on Table(2-15).

This table shows the significant problems of end-to-end carriers in empty conatainer handling caused by the imbalance of the trade in different directions.

Statistics shows that in 1982 just over nine million out of the total 42.25 million port TEU movements involved empties and Container Insight has pointed out that for the world's container carriers, the phenomenon of such huge negative volume for the transportation service meant a very considerable logistic problem and the paying out of the US $ 450-500 million to the port to enable the system to work .

However, the RTW concept especially in the case of the two-way direction deployment is effective to solve because the handling of empty containers in the RTW concept has more options, such as putting the boxes to the next leg of the trade, which gives a great advantage to the RTW carrier in operational and marketing aspects.

3) Market penetration and cost reduction

The RTW concept defined as being an overall cost leadership strategy requires an aggressive establishment of cost effective scale facilities,thus vigorous pursuit of cost initiative is exercised through the low cost position of the strategy in such a way that the firm harvests above-average returns in its industry destpite the presence of intense competitive forces.

Such a strong defensive cost position of the RTW concept lies certainly on its economies of scale and low cost structure.

Therefore, the benefits of economies of scale in the RTW concept can be realized at the area of marketing penetration and cost reduction .

Further discussion regarding the cost effectiveness of the RTW concept is made in the next chapter by using a computer model.

4) Bargaining power

In the previous chapter, the price of ships and per TEU slot have been compared between the ships of the RTW carriers and others.
Such a significant low price of the RTW carrier could be obtained not only from the situation of the shipbuilding market as it is a buyer oriented market, but also more effectively also from the bargaining power when ordering the same type of ships at once.

The bargaining power can be exercised not only in the aquisition of assets but also in many areas such as the special contract for port tariffs and terminals.

In many of the major ports where the RTW carriers are calling, it is easily identified that the allocation of the berth and the location of container storage area are very favorable to the RTW carriers, because of their larger volume of trade.

The bagaining power gives the carriers other benefit in financial terms. They may be granted financial credit on a longer term by the contractors, the port company,or terminal operator.

8.2 Disadvantage

1) Transit time

In the RTW circuit compared with the end-to-end service, the transit time would be longer in certain segments of trades.
For example, in the trade between the Mediterranean/ Middle East and the U.S.A., the end-to-end service offers direct carriage of cargo without calling ports of a third country such as Rotterdam in the RTW circumnavigation, by deviating from the shortest geographical route, which means that a longer transit time is inevitable considering the feedering coverage, so the trade between the north and the south takes much longer transit time in the RTW concept.

However, we may find contradicting cases like the transatlantic trade where Hapag-Lloyd line offers a 27-day round trip calling 13 ports in both regions.
In this route, it takes around 20 days to carry cargo from Halifax to Greenok because the ships are calling all 12 ports during the round trip to arrive at the destination in another extremity as shown in Figure in the appendixes.

Therefore, the longer transit time could be one of disadvantages of the RTW concept only in a general context.

2) Feeder costs

One of the major drawback of the RTW concept is the feeder costs which are inevitable an accomplishment of the global market network.

As discussed earlier, the basic elements of the RTW concept in operational aspect are the horizontal extremity and vertical feeder connection. Thus the costs involved in feedering coverage would be an important factor by which the carrier should determine the number of port calls in circumnavigation by comparing the benefit of economies of scale at sea.

Because of the significant adverse effect, the feeder costs are included in the voyage cost comparison in the next chapter.

3) Optimum service configuration

In the traditional end-to-end service concept, the optimum service configuration has been determined through widely different solutions in terms of vessel size, speed and among other reasons, because of the heterogeneous characteristics of cargo and trade in the particular route concerned.

The study done by the Maritime Transport Center at the University of Liverpool(48) identified that an optimum sized ship for an end-to-end north west Europe /Far East trade at a weekly frequency might be of the order of 2,700 TEU while the Middle East /Far East trade could be as low as 700 TEU and moreover, at a lower frequency.
Accordingly, ships optimized in one trade route may not be suitable for another trade route which has different characteristics.

Therefore, the RTW concept certainly does not have advantage in the trade where its service configuration, such as the size of ships and speed, are not favorable.

However, this would be easily compensated by the cross-subsidization among the trades as mentioned before, because the shorter trade route is included as a part of a larger segment of coverage in the RTW concept.

4) Flexibility and adaptability

The advantage of economies of scale comes from the scale of the ship and its fleet, which means that hypothetically, the larger scale benefits are involved, the more benefits are gained, provided that cargo is available.
However, the operational flexibility deploying ships either to the RTW circumnavigation or to the traditional end-to-end service, would decrease, if the size of ships are phenomenal, which means that the adaptability to the change of the market conditions would become rigid.
This is not the case of Evergreen line but the case of US Lines.
The reason is obvious and this is why one shipping industry source said, in the Lloyd's List dated July 28 1986, that up-to-date valuation of the jumbo econoship of US Lines, on a willing seller/willing buyer basis is of around US $ 33 million only and in case of a distressed seller, eventual prices could be even lower, particuarly as the number of potential buyers is relatively limited.

Therefore, the RTW concept should be constructed in such a way that flexibility and adaptability are well balanced.

Chapter 9. CASE STUDIES ON COSTS COMPARISONS

As discussed in the previous chapter, the RTW concept has advantages and disadvantages compared with the traditional concept of the end-to-end trade service.
Certainly, the most important advantage consists in the advantage of economies of scale which should be obtained sufficiently enough to cover the disadvantages whose major factors are transit time and transhipment costs.

Therefore, the task given in this chapter is to elaborate the comparison of costs between the RTW service and the traditional service as a case study.

The case study includes three approaches:
1)the comparison of the cost at sea in terms of TEU mile between the containerships of US Lines, Evergreen Line and Hapag-Lloyd Line,

2)the comparison of average voyage costs between US Lines' RTW service and Hapag-Lloyd service in the segment of transatlantic trade route and

3) The conclusion of the comparisons.

9.1 The Comparison of the Cost at Sea in Terms of TEU Mile between the Containerships of US Lines, Evergreen Line and Hapag-Lloyd Line

The advantage of economies of scale can be gained in various areas, such as purchasing, production, marketing and distribution of products i.e. service products in my discussion.

However, among the various areas, the advantage of economies of scale gained, in the area of production process is most significant.
Hence the costs per TEU mile are compared between the RTW service of Evergreen and US Lines with a traditional end-to-end service carrier, Hapag-Lloyd Line.

The comparison was undertaken by using a computer costing model which was developed by The World Bank,titled "A Vessel and Voyage Costing Model for Project Appraisal"(49).
The computer costing model includes the vessel-costing module, the voyage-costing module and the fleet module.
The voyage-costing module and fleet module are not suittable to compute the RTW service concept because they were designed to provide the analysis for traditional roundtrip voyages.

However, the vessel-costing module of the computer model can be used in a stand-alone mode to determine the dailly costs of a vessel in port and at sea.
Therefore, this module is used to obtain the cost per TEU mile of each carrier's container vessels.

a) Input data and the ship's particulars

In the process of preparation, before running the computer model, collecting adequate data and information from the reality were so diffcult that some data were put down as assumptions.

The data concerning the ship's particulars are based on Table(2-6)and (2-11) discussed in the previous chapter.

1) However, the case of Hapag-Lloyd containerships need some detailed explanation

There are three reasons why Hapag-Lloyd containerships are selected in this comparison:
First, the vessels are currently deployed in one of the main stream trades, the transatlantic route, secondly Hapag-Lloyd Line is one of the typical traditional container liner carriers deploying the vessels in the multiport trade route, thirdly, the containerships built in 1977-78, were jumboised from the rating of 1758 TEU to 2594 TEU with the converting cost of D.M.50 milllion from 25 July to 12 December 1985.

The particulars of these vessels are sumerized as follows:

Name	Built	D.W.T.	Length	Breath	dft.	TEU	Power (bhp)	Speed.
Dusseldorf Express (2)	1977	40,900 (1)	202.42	32.21	11.0	2594	33300	21.5
Koln Express	1978	"	"	"	"	"	"	"
Stuttgart Express	1977	"	"	"	"	"	"	"
Nurnburg Express	1978	"	"	"	"	"	"	"

Note:(1) Jumboised from d.w.t.of 32,470 to 40,900.

(2) As being jumboised in 1984, the remaining life of the ship is also assumed increase up to 18 years, therfore, the data column of "Year Built" is 1984.

Source: Motor Ship "Ship on Order".

2) The fuel cost per tonne.

Data regarding the fuel cost per tonne is based on the Rotterdam sport bunker price at the end of February 1986 quoted from Lloyd's shipping Economist of March 1986, and calculated in such a way that the ship consumes the bunkers, 20 percent of "DO" and 80 percent of "HVO".

Accordingly, the fuel cost per tonne comes out with the following formula:

US $179 ("DO" price per tonne)x20 % = US $ 35,8 -A

US $ 95 ("HVO" price per tonne)x80 % = US $ 76,0 -B

A + B = US $ 111,8 per tonne.

3) The scrap price is base on the price of the Taiwan breaker market in April 1986.

4) The assumption for the crew costs in US Line is US $ 3,108,000 on an annual basis with 21 crew, which makes the daily crew costs to be US $ 8,500 per crew.
In the Evergreen case, the annual crew costs are assumed as US $ 581,000 with 17 crew, which is one fifth of the cost of the US Line case.
Regarding the Hapag-Lloyd case, the crew cost is assuemed to be three times of the cost of the Evergreen.

The types of data and its value in the case of US Lines,Evergreen Line and Hapag-Lloyd Line are shown in the following tables(3-2),(3-3)and(3-4).

TABLE (3-2)

Data for Computer Analysis (US Lines)

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4482	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	47.50	XX.XXX	MILLIONS OF $	54.6	40.4
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	47.50	XX.XXX	MILLIONS OF $	54.63	35.11
ORIGINAL COST OF VESSEL	47.50	XX.XXX	MILLIONS OF $	54.63	40.38
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENGTH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	28.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

TABLE(3-3)

Data for Computer Analysis (Evergreen Line)

DAILY COST FOR CONTAINER SHIP.

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS.		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	30.00	XX.XXX	MILLIONS OF $	34.5	25.5
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	30.00	XX.XXX	MILLIONS OF $	34.50	22.17
ORIGINAL COST OF VESSEL	30.00	XX.XXX	MILLIONS OF $	34.50	25.50
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENETH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	265	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	78.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

TABLE (3-4)

Data for Computer Analysis (Hapag-Lloyd Line)

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2594	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	32.5	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	2	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	2	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	21.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	30.00	XX.XXX	MILLIONS OF $	34.5	25.5
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	30.00	XX.XXX	MILLIONS OF $	34.50	22.17
ORIGINAL COST OF VESSEL	60.00	XX.XXX	MILLIONS OF $	69.00	51.00
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	102.6	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	112.9	92.3
COST PER RATING	102.6	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	112.9	92.3
LENGTH (LOA)	202	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.0	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	21.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	21.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	13.70
ACTUAL SPEED IN BALLAST	21.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	20.30	-
SHP (SHIP HORSEPOWER)	33300	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	37577	9164
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	406	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	131.9	XX.X	TONNES FUEL PER DAY (24 HOURS)	158.3	112.1
-IN PORT	3.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.5	2.5
COST FOR NEW CONTAINERS	16.21	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.14	

b) The results of running the computer model include the daily cost for containerships and a summary of daily costs at sea and in port based on the various methods of computation as shown in Table(3-5),(3-6) and (3-7).

With the outcomes of the computer run,the cost for TEU mile was calculated as follows;

1) Summeries of the daily costs at sea and in port based on the method of the Fixed Depreciation.

Lines	At sea US $	In port US $
US Lines	51,500	43,900
Evergreen	30,400	23,300
Hapag-Lloyd	55,000	40,600

2) The cost for TEU mile at sea with the assumption of the operation at sea for 280 days per year.

Lines	Daily cost US $	Operation days	Ship's capacity TEU	Speed Kn	Total TEU mile (Million)	Cost per TEU mile Cent(A)
US Line	51,500	280	4,482	17.5	527	2.7
Evergreen	30,400	280	2,728	20	366.6	2.32
Hapag-Lloyd	55,000	280	2,594	21	366	4.2

Table(3-5)

Output of Computer Running for Vessel Costs(US Lines)

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.3		THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8		THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108		THOUS. OF $ PER YEAR	3419	2797
ANNL. COST OF PROVISION	71		THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	475		THOUS. OF $ PER YEAR	710	283
ANNL. COST OF R & M	950		THOUS. OF $ PER YEAR	1366	606
ANNL. COST OF STORES	238		THOUS. OF $ PER YEAR	352	121
ANNL. COST OF ADMIN.	406		THOUS. OF $ PER YEAR	622	238
ANNL. NON-CAPITAL COSTS	5247		THOUS. OF $ PER YEAR(EXCL FUEL)	6606	4092
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	10236		1.FIXED DEPRECIATION-DECLIN BAL	11771	8700
IN THOUSANDS OF U.S.	3800		2.RETURN ON RESALE VALUE	4370	2809
DOLLARS PER YEAR	7008		3.ANNUALIZED RESALE VALUE	8735	5093
BASED ON THE	7691		4.ANNUALIZED REPLACE VALUE	9655	6075
METHODS LISTED	5526		5.SINKING FUND-REPLACEMENT COST	7891	4531
IN COLUMN G					
LAYUP COSTS	31		THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29		MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103		THOUSANDS OF $ PER YEAR	198	162

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
51.5	43.9	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
10.3	2.8	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
19.1	11.5	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
22.6	15.1	4. OPERATING COSTS
33.3	25.8	5. RETURN ON RESALE VALUE + OPER. COST
41.3	33.8	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
22.9	15.4	7. RETURN ON SALVAGE VALUE + OPER. COS
42.4	34.8	8. ANNUALIZED RESALE VALUE + OPER. COS
44.3	36.7	9. ANNUALIZED REPLACE VALUE + OPER. CO
38.2	30.6	10. SINKING FUND-REPLACEMENT COST + OP

Table(3-6)

Output of Computer Running for Vessel Costs

(Evergreen Line)

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES		EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT		0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED		7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW		581		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION		57		THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE		300		THOUS. OF $ PER YEAR	449	179
ANNL. COST OF R & M		600		THOUS. OF $ PER YEAR	863	383
ANNL. COST OF STORES		150		THOUS. OF $ PER YEAR	242	77
ANNL. COST OF ADMIN.		118		THOUS. OF $ PER YEAR	195	63
ANNL. NON-CAPITAL COSTS		1807		THOUS. OF $ PER YEAR(EXCL FUEL)	2474	1263
VESSEL CAPITAL COSTS						
IN FINANCIAL TERMS		6391		1.FIXED.DEPRECIATION-DECLIN BAL	7350	5432
IN THOUSANDS OF U.S.		2400		2.RETURN ON RESALE VALUE	2760	1774
DOLLARS PER YEAR		4374		3.ANNUALIZED RESALE VALUE	5459	3171
BASED ON THE		4792		4.ANNUALIZED REPLACE VALUE	6023	3780
METHODS LISTED		3490		5.SINKING FUND-REPLACEMENT COST	4984	2862
IN COLUMN G						
LAYUP COSTS		29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE		1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE		87		THOUSANDS OF $ PER YEAR	167	136

----------ASSUMED CONSTANTS----------

EST FOR CONTAINERSHIP, ..

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
30.4	23.3	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
8.6	1.5	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
10.2	3.2	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
12.4	5.3	4. OPERATING COSTS
19.1	12.1	5. RETURN ON RESALE VALUE + OPER. COST
23.7	16.7	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
12.6	5.6	7. RETURN ON SALVAGE VALUE + OPER. COS
24.7	17.6	8. ANNUALIZED RESALE VALUE + OPER. COS
25.9	18.8	9. ANNUALIZED REPLACE VALUE + OPER. CO
22.2	15.1	10. SINKING FUND-REPLACEMENT COST + OP

Table(3-7)

Output of Computer Running for Vessel Costs

(Hapag-Lloyd Line)

DAILY COST FOR CONTAINER SHIP.

OUTPUT VALUES	EXPECTED		HIGH	LOW
FUEL COSTS - IN PORT	0.3	THOUS. OF $ PER DAY	0.4	0.3
- AT SEA LOADED	14.8	THOUS. OF $ PER DAY	19.5	11.3
ANNUAL COST OF CREW	2155	THOUS. OF $ PER YEAR	2370	1939
ANNL. COST OF PROVISION	71	THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	300	THOUS. OF $ PER YEAR	449	179
ANNL. COST OF R & M	600	THOUS. OF $ PER YEAR	863	383
ANNL. COST OF STORES	150	THOUS. OF $ PER YEAR	242	77
ANNL. COST OF ADMIN.	275	THOUS. OF $ PER YEAR	420	163
ANNL. NON-CAPITAL COSTS	3551	THOUS. OF $ PER YEAR(EXCL FUEL)	4450	2787
VESSEL CAPITAL COSTS				
IN FINANCIAL TERMS	10734	1.FIXED DEPRECIATION-DECLIN BAL	12344	9124
IN THOUSANDS OF U.S.	2400	2.RETURN ON RESALE VALUE	2760	1774
DOLLARS PER YEAR	4307	3.ANNUALIZED RESALE VALUE	5382	3111
BASED ON THE	4707	4.ANNUALIZED REPLACE VALUE	5925	3705
METHODS LISTED	3490	5.SINKING FUND-REPLACEMENT COST	4964	2562
IN COLUMN G				
LAYUP COSTS	27	THOUSANDS OF $ PER MONTH	33	22
SCRAPPING PRICE	0.67	MILLIONS OF $ (LESS 15% DELIVE	0.96	0.79
RETURN ON SALVAGE	70	THOUSANDS OF $ PER YEAR	135	110

-------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
55.0	40.6	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
16.2	1.7	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
22.2	7.8	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
24.8	10.3	4. OPERATING COSTS
31.5	17.1	5. RETURN ON RESALE VALUE + OPER. COST
36.0	21.5	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
25.0	10.5	7. RETURN ON SALVAGE VALUE + OPER. COS
36.9	22.5	8. ANNUALIZED RESALE VALUE + OPER. COS
38.0	23.6	9. ANNUALIZED REPLACE VALUE + OPER. CO
34.6	20.2	10. SINKING FUND-REPLACEMENT COST + OP

3) The cost for TEU mile in the whole voyage including the costs in port.

Lines	Daily cost in port (US $)	Port days	cost for port days ('000$)	Total opn. cost (Million$)	Total TEU mile (Kn)	cost per TEU mile (cent)	% with (A)
US Line	43,900	75	3,292	17.71	527	3.36	124
Evergreen	23,300	75	1,747	10.26	366.6	2.8	120
Hapag-Lloyd	40,600	75	3,045	18.44	366	5.03	119

These figures in the above 2) and 3) show a significant reduction of the operating costs of the RTW carriers compared with Hapag-Lloyd.
Eventhough, the Hapag-Lloyd containership was drastically jumboized up to 50 % in TEU capacity, the RTW carriers still have a significant advantage in terms of the cost per TEU mile.

Furthermore, these results reflect a very important fact namely that the advantage of economies of scale in the vessel operation is obtained only at sea.
In the comparison of the above summeries, 2) and 3), we can identify that the cost which comes to 3.36 cent in case of US Lines after including the cost in port, being increased by 24 percent, while the cost TEU mile of Hapag-Lloyd is increased only by 19 percent.

The result of the TEU mile cost comparison is very much similar to results of the analysis made by Alex.Brown & Sons, Inc(50).
Eventhough, some data, especially the ships capacity of US Line, are different, the results show the same reflec-

tion of cost advantage of the RTW service.
The research team compared the RTW carriers with a European flag containership built during 1980-81 period and its results are summerized as follows:

Cost Per Container Mile

(cents)

	European flag	Evergreen	US Line
100 % Utilization	6.7	3.0	3.4
70 % Utilization	9.6	4.3	4.9

However, we have to take into account important factors by which the RTW carrier can gain such a low cost level. Those are the reductions of capital costs per TEU slot and the fuel costs as discusssed in the previous chapter.

As shown in Table(1-13), the containership, with the range of a capacity of 2500 TEU, was around US $ 60 million in building price.
Therefore, using the computer cost module, various cost comparison per TEU mile are conducted with the assumption of different price levels of US Lines' and Evergreen Line's containerships.

The results are broken down as shown in the following Table(3-8).

Table(3-8)

Cost Per TEU Mile with Various Ship Prices

A. US Lines

Assumed ship price (Million $)	Cost per TEU mile (cent)	Ratio (%)
47.5	3.36	100
55	3.6	107
60	3.8	113
65	3.97	118
70	4.1	122
75	4.3	128

B. Evergreen Line

Assumed ship price (million $)	Cost per TEU mile (cent)	Ratio (%)
30	2.8	100
35	3.0	107
40	3.3	117
45	3.6	128
50	3.8	135
55	4.0	142
60	4.3	153

***Note: The results of the computer work are attached in the appendixes, p.2-23.

The table shows that the cost per TEU mile increased with the increase of the price level.

The price level of US $ 60 million Evergreen ships marked 4.3 cent per TEU mile while US $ 70 million of the US Lines' ships made 4.1 cent, however, this means that with

the same level of ship prices they still have an advantage compared with Hapag-Lloyd vessels.
Obviously, as having been discussed so far, the RTW service liners have significant cost advantages due to the scale economies.
However, what should be discussed further is that feedering costs, one of the major factors giving disadvantage to the RTW concept, are involved in the total coverage of the RTW network.
Therefore, the voyage cost including a feeder operation should be observed.

Nevertheless, concerning this question, my observation encounters many difficulties when comparing the voyage cost of the RTW service with the cost of the traditional trades, because the RTW concept is totally different from the traditional end-to-end service concept especially in terms of vessel scheduling.

Therefore, the transatlantic segment of the RTW service is seleted to compare the voyage cost of this segment with that of the Hapag-Lloyd Line which is one of the major liners in this segment.
There are two main reasons why the transatlantic trade route was selected as a sample case.
First, this trade route is the shortest one among the three mainstream trade routes, which is a disadvantage for the RTW carriers from the view point of economies of scale.
Secondly, this trade is a typically traditional multiport trade route where Hapag-Lloyd has deployed 4 containerships with 13 port calls in a 27-day round trip, while US Line is calling only two ports, New York and Rotterdam, which is an obvious contrast.

9.2. The Comparison of Average Voyage Costs between the RTW service of the US Lines and the Hapag-Lloyd Line in the Segment of Transatlatic Trade Routes

Before programming this voyage cost comparison, the data input are based on the results of previous computer work concerning operating costs per TEU mile and additional information for variable costs.

a) Data input

1) US Lines

A) Fixed costs per year.(Thousanads of US Dollars)

Non-capital costs ---5,247

a) Annual cost of crew	3,108
b) Provision	71
c) Insurance	475
d) Repair & Maintanence	950
e) Stores	238
f) Administration	406

Captial costs --- 10,236
(With fixed depreciation method)

B) Port costs

Port costs are assumed at US $ 15,000 in US ports and US $ 10,000 in European ports

C) Handling costs

US Ports --- US $ 150 per box
Europe ports --- US $ 80 per box

D) Feeder service costs

Feeder services are assuemed as being covered by commer-

cial contracts with regional feeder service operators.
US coast contract rate --- US $ 385 per TEU
European region --- US $ 335 per TEU

Another assumption is the proportion of feedering among the entire cargo loaded and unloaded in both regions, US East coast and Europe.
US region --- 60 percent of cargo by feeder
European region --- 42 percent of cargo by feeder

E) Inventory costs
US $ 9.06 per TEU/day is assumed as inventroy cost for the voyage of 10 days in cross atantic and feeder connections.

F) Fuel costs
a) at sea : 17.5 Knots for 9 days using 70 tons per day
b) in port : port time 2 days using 2.5 tons
c) slack time : 14hrs using 2.5 ton
at the fuel price of US $ 112 per ton.

2) Hapag-Lloyd Line

A) Fixed costs per year (thousands of US Dollars)

Non- Capital costs	---	3,551
a) Annual cost of crew	---	2,155
b) Provisions	---	71
c) Insurance	---	475
d) R & M	---	950
e) Stores	---	150
f) Administration	---	275
Capital costs	---	10,734

(With the Fixed Depreciation method)

B) Port costs

a) port costs

US region --- 5 ports/per port US $ 15,000

European region --- 7 ports/per port US $ 10,000

C) Handling costs

US Ports --- US $ 150 per box

European Ports --- US $ 80 per box

D) Feeder service

Twenty percent of the cargo is served by feedering coverage in the European region.

E) Inventory costs

Inventory costs per day --- US $ 9,06

for an average of 11 days on board a round trip,both ways.

F) Fuel costs

Fuel costs are assumed as the following summeries with various speeds and voyage duration.

Speed	Day and Hours		Consumption per day (tons)
18 Knots	17 days	14hrs	83
15 "	3 "	11 "	48
Pilot time	1 "	3 "	5
Port time	3 "	15 "	3
Slack time	1 "	3 "	3
Total	27days		

The service schedule of Hapag-Lloyd Line in the Transatlantic route is attached in the appendixes(p.28).
According to the schedule of the service route Hapag-Lloyd, published in the Newspapers, "The Journal of Commerce" of May 2-25, 1986, the speeds of each voyage from one port to another should be varied as shown in Table (3-9),taking into account the distances between ports and the ETA/ETD of each port in the published schedule.

Table(3-9)
The Service Shedule of Hapag-Lloyd Line
(adjusted service speeds)

voyage	distance (kn/mile)	service speed (kn)	duration (days,hours)
N.Y-- Southempton	3,254	18	7.13
-- Le havre	105	15	0.7
-- Antewarp	244	15	0.16
-- Rotterdam	260	15	0.18
-- Hamburg	307	18	0.17
-- Bremen	151	15	0.10
-- Greenokk	485	15	1.8
-- Halifax	2,625	18	6.2
-- New York	600	18	1.10
-- Norfolk	292	18	0.16
-- Baltimore	172	18	0.10
-- Philadelphia	95	18	0.5
-- New York	235	18	0.13

Voyage duration with the speed of 18 Knots :17 days 14hrs
Voyage duration with the speed of 15 Knots : 3 days 11hrs
Port time (6hrs- 8hrs in each port) : 3 days 15hrs
Pilot time : 1 day 3hrs
Slack time : 1 day 6hrs

b). Programming the voyage cost module.

With the data and information input, the program is designed so as to produce the average voyage cost per box of various utilizations and the quantity of containers carried(Appendixes, p.24-25).

In order to simplify the computer work, some assumptions were set as follows;

1)the RTW service is segmented into the Transatlantic route so that the voyage costs for this segment can be compared with the Hapag-Lloyd service.

2)The cargo is assumed to be carried only from the east coast of the US region and the European region with different level of uitilization.

3)Feeder services are assumed in terms of percent of total volume of cargo carried as mentioned earlier.

c). Results of the computer running

Based on the data and assumptions, the computer program was built as shown in the appendixes, and outcomes were produced as the following graphs, shown in Figure (3-1) and (3-2).

From the two figures,we can derive an important conclusion that:

1)eventhough the RTW concept has the significant advantage at sea in terms of the cost TEU mile as discussed earlier, its voyage costs including feedering costs are higher than the traditional multiport service in these given conditions.

2)in the case of US Lines, because of the larger scale, there is the advantage that the voyage cost per box rapidly decreased with the increase of utilization,

3)therefore up to 50 percent of utilization, the voyage cost per box of US Lines is lower than that of Hapag-Lloyd Line,

4)US Line has a disadvantage from the utilization of 50 percent because of the feedering costs which are variable costs,

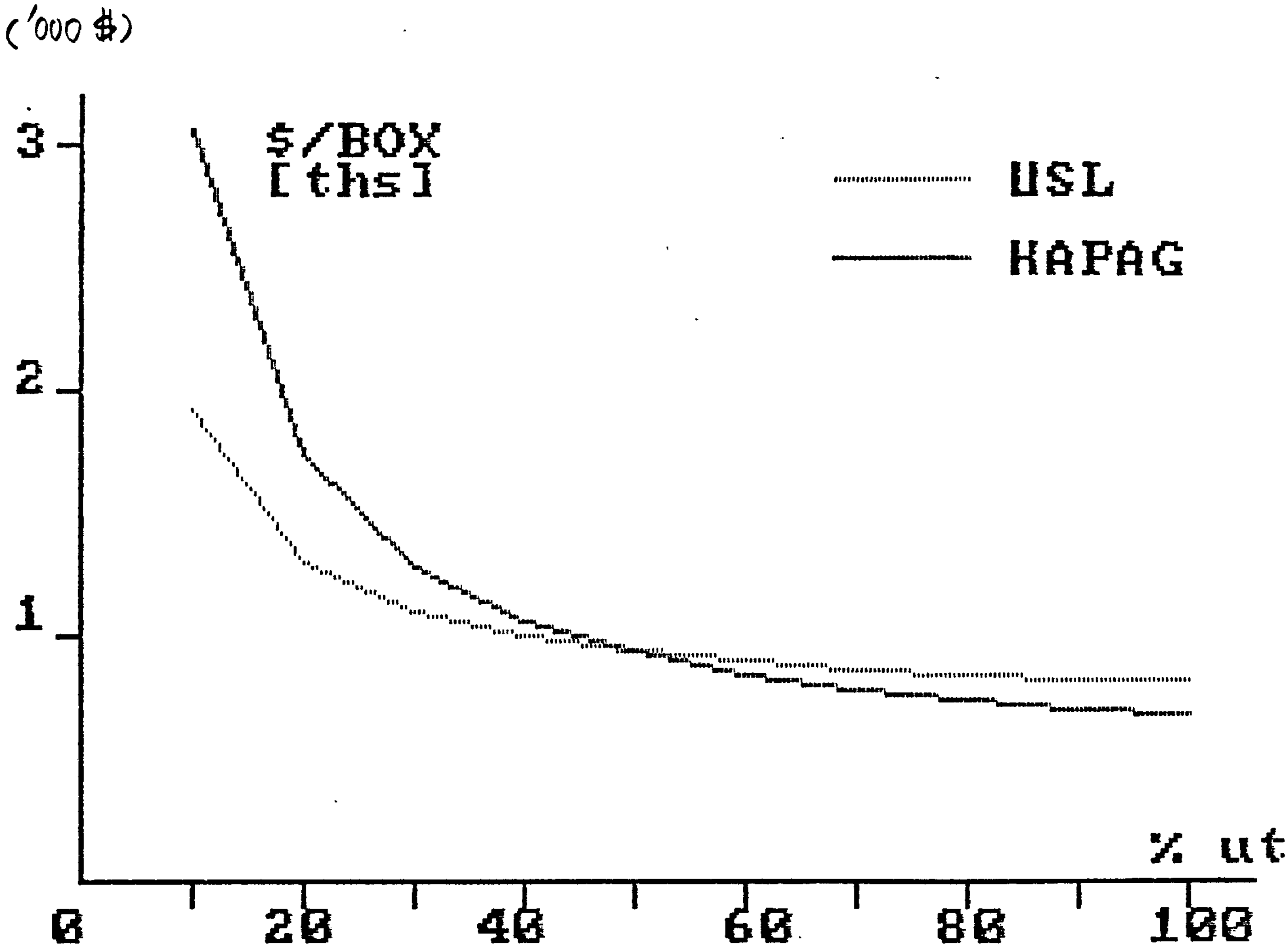
5)if the freight level is set in point "P" in Figure(3-2),the profit zone of US Lines,"A", is much larger than that of Hapag-Lloyd, "B", which means that there are two options for US Lines to choose,

6)one is to make the profits maximize with keeping the level of freight rate "P" and another is to offer a lower freight level up to point "P1" maintaing the same area of profit zone of Hapag Lloyd when the market is competitive.

7)however, in these graphs, US Lines obviously has a higer cost structure because of the feedering costs.

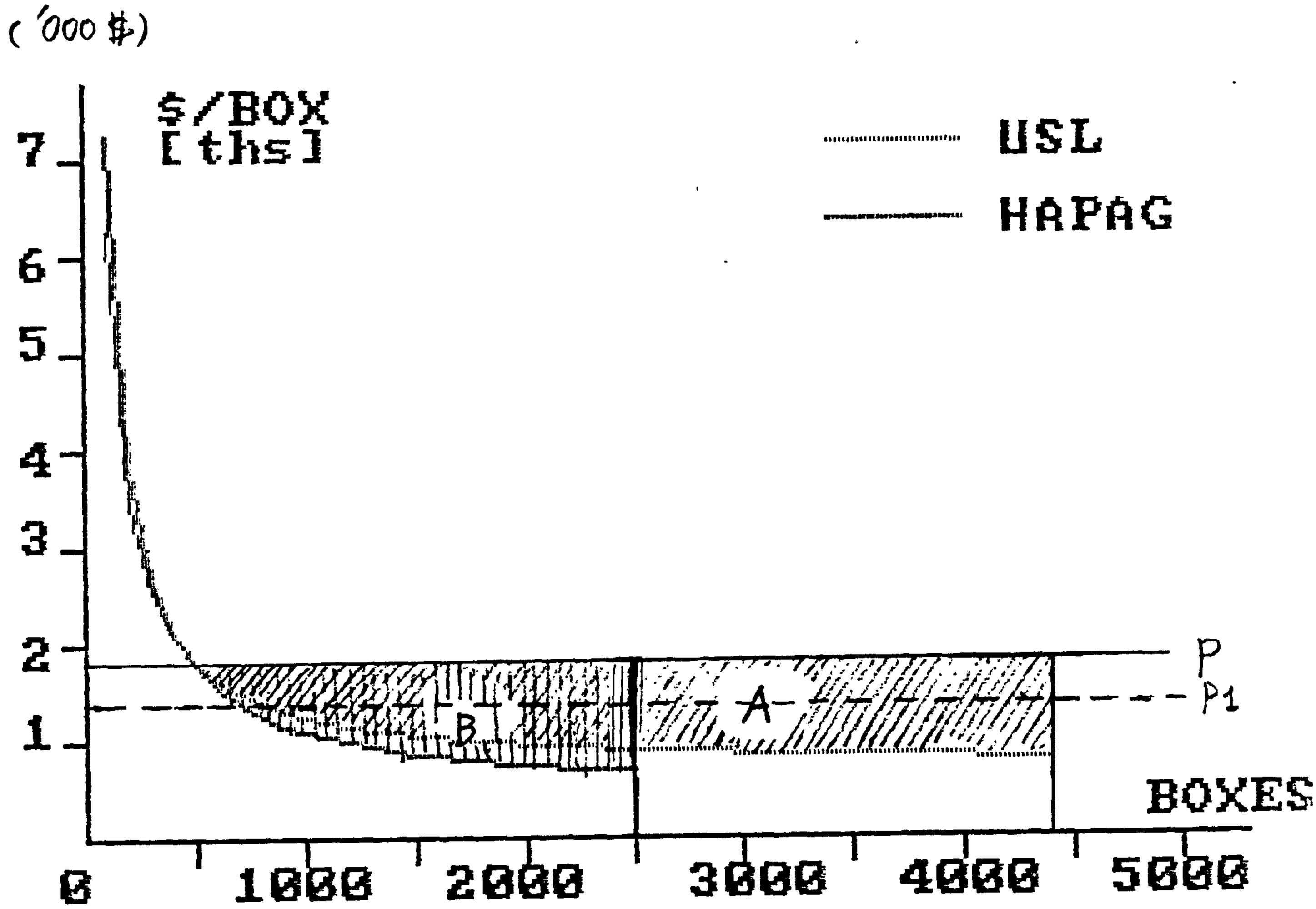
FIGURE(3-1)

Voyage Cost Comparison with Various Percentage of Utilization Between US Lines and Hapag-Lloyd Line in Transatlantic Segment



FIGURE(3-2)

Voyage Cost Comparison with Different Load Factors (TEU Loaded) Between US Lines and Hapag-Lloyd Line in Transatlantic Segment



9.3 The Conclusion of the Comparisons

The comparisons of the voyage costs have been discussed through the two different approaches so far.

Based on these comparisons, we identified the fact that the RTW concept certainly has a disadvantage in a given level of the feedering coverage.
Then, we need to observe how the cost structure is changed when the feedering costs are excluded in the voyage costs of US Lines service.

Figure(3-3) and (3-4) were produced, using the same data and information and only changing the feedering costs which are excluded in the computer program attached in the Appendixes, p.26-27.

Those two figures show the apparent advantage in the case of the US Lines.

Therefore, through these comparisons some conclusions can be generalized as follows:

1) There are significant advantages for the RTW concept in terms of operating costs at sea.
   Hence, to maximize the advantage, the number of port calls should be minimized, and furthermore it can be realized when line haul service distance is long enough.

2) Minimizing the number of port calls implies the increment of disadvantages in terms of feedering costs .

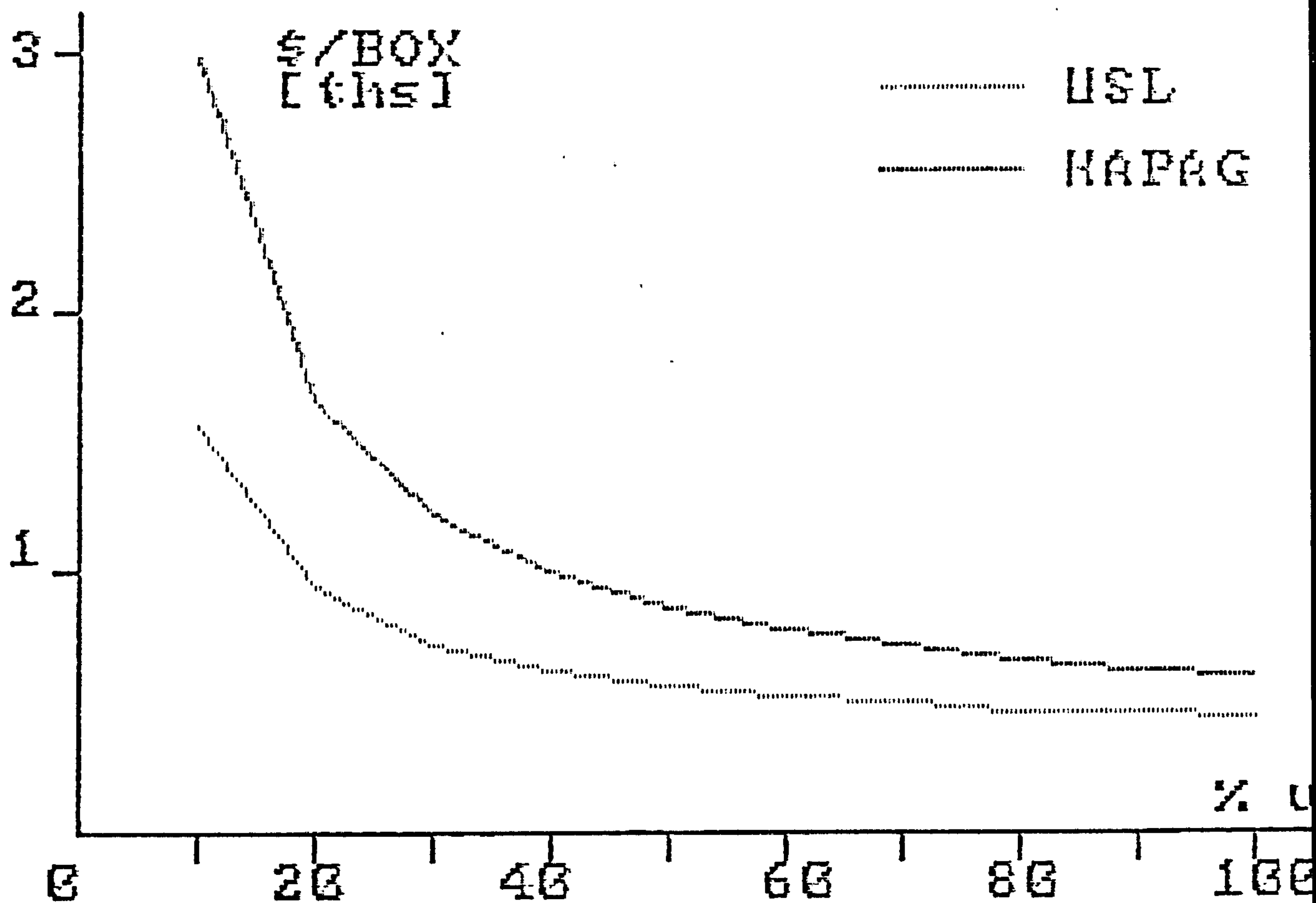
3) The larger coverage of the feedering service eventually

diminishes the advantage of economies of scale.

4) Thus, in the application of the RTW concept to the real market, the flexibility, which means a more practicable approach, is one of the most important factors in establishing the service configuration.

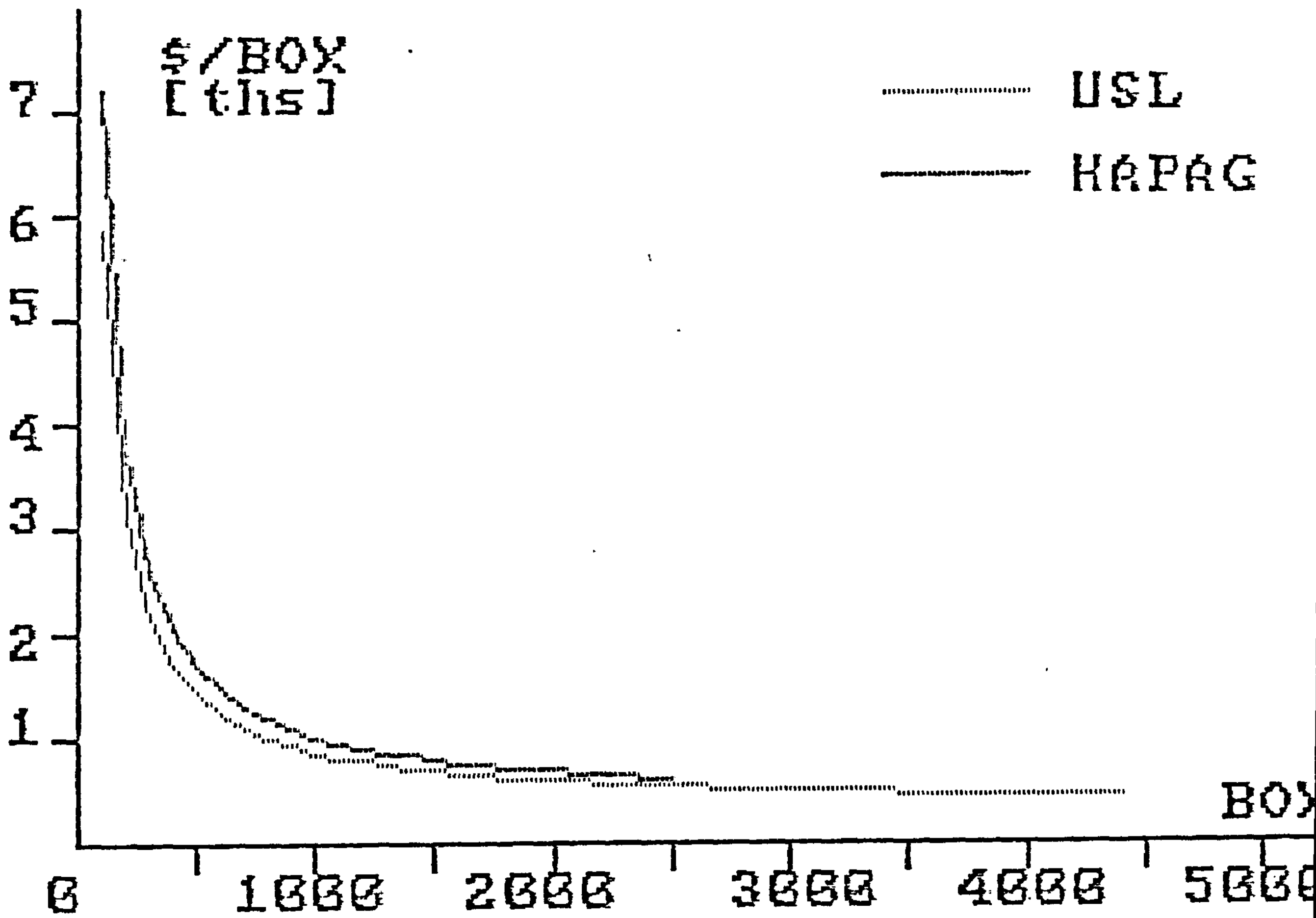
FIGURE(3-3)

Voyage Cost Comparison with Various Percentages of Utilization Between US Lines and Hapag-Lloyd Line in Transatlantic Segment, Excluding Feedering Cost



FIGURE(3-4)

Voyage Cost Comparison with Different Load Factors(TEU) Between US Lines and Hapag-Lloyd Line in Transatlantic Segment, Excluding feedering Cost



Chapter 10 CONCLUSION

10.1 The Impact of the RTW Concept on Future Liner Shipping

Based on the discussion carried out so far, the conclusion can be derived concerning what the impact of the RTW concept on future liner shipping would be.
This future projection of liner shipping in this regard is predicted by the hypothetical approach as the following subject matter including the external and internal impact on the industry.

External impacts

1)Liberalism and protectionism in liner shipping
2)Changes of the role of the ports by the transportation center concept and
3)Changes of the structure of general cargo traffic through widening containerizable cargo.

Internal impacts
4)New marketing concept : internationalization of service commodity,
5)Impact on the conference system,
6)Competitors' behaviour,
7)Structural changes of the liner shipping industry and
8)Changes of the geographical routes of cargo flow.

1). Liberalism and protectionism in liner shipping

Liner shipping has been influenced not only by the economic environment but also, more signifcantly, by political interferences in various ways such as non-tariff obstacles which were discussed earlier concerning the subject of the prerequistes of the RTW concept.

Any form of such measures of protectionism are detrimental to free accessibility to cargo.

The RTW concept, by its nature, is cross-trade, may provoke the increment of non-tariff barriers in a great many countries whose national lines are suffering from the RTW carriers' domestic market penetration with low freight rates.

This phenomenon may occur not only in developing countries but also in traditional maritime countries, because the latter has keen concerns more directly in this respect.

Recently, these typical defensive measures were taken by the Italian and Spanish governments.
According to Lloyd's List of July 21 1986, the two governments were joining forces to protect their national shipping fleets against Evergreen line.
Figures produced by a recent investigation by the governments show that Evergreen has lifted its share from Italy and the US East coast market from 2.7 percent in 1984 to 8.37 percent last year and almost 12 percent in the opening six months of 1986.

This market penetration led to the introduction of new legislative measures, entitled " Measures for the Defence of the Italian Merchant Marine" in the case of Italy, to protect the national fleet in both countries.

Therefore, the controvercy concerning liberalism and protectionism would be bound to be severe in the future projection of liner shipping in this connection except the US related trade routes such as, the Transatlantic and the Transpacific trade.

Accordingly, in order to avoid such non-tariff barriers, the carriers may establish either multi-national liner shipping companies like other international industries or muti-national co-operation in various manners to mitigate the protests.

2). The transportation center concept

The new large container vessels which are deployed in circumnavigation, are calling ports which are the load centers on a regional basis so as to connect the vertical extremities of feedering coverage with the horizontal mainstream line, which means not only that the competition among the ports become intensified but also that being a load center in that region gurantees florishing business due to the concentration of the cargo flow.

The advantages of rationalizing port calls by shipping lines have also added to the significant bargaining power over the lower port tariff rates.

However, on the other hand, it may also bring benefits to the ports.
Savannah, which is a South Atlantic load center,and FOS are good examples as the case of other ports, such as Rotterdam, Singapore and New York.
About two years ago, US Lines signed a 21-year agreement with the Geogia Ports Authority of Savannah port which meant that the line's Savannah liftings, according to

forecasts, would be boosted from 42,000 containers in 1982 to 175,000 this year. The impact of US Lines on Savannah is selfevident.

Acccording to Lloyd's List dated August 18 1986, container tonnage of this port in recent years has increased at about 20-30 percent annually and this seemingly relentless expansion has continued in the last fiscal year ending June 30.

This transportation center conçept as an impact of the RTW concept implies another important fact by which the role of the port in the future would be drastically changed in terms of its connecting function not only between the sea legs and the land but also between the sea legs.

Thus, concentration of cargo flow on the transportation centers with a wide range of sea legs and inland coverage is continuously enhanced in the future liner market.

3).Changes of the structure of the general cargo traffic

Since the introduction of containerization about two decades ago,the containerizable cargo has rapidly widened the trade among industrialized countries and the trade between developed countries and developing countries, which are also now in the way to container penetration to more than 60 percent.

This trend is very much likely to be accelerated by the introduction of the RTW concept fostering low value cargo to be containerized, because the overall cost leadership strategy has a strong position to offer lower freight rates and consequently this attracts low value cargo to flow into the container shipping market.

Traditionally, the freight rate has been determined at the level which the liner cargo can bear, hence the freight rate has been considered as one of the major barriers for low value cargo to be carried by container liner shipping.
However, the recent trend of freight level shown in the following Table(3-10), illustrates the significant reduction of rates in Transpacific westbound trade for example.

Table(3-10)
Sample TWRA Rates
(40ft containers at 1985 dollars)

Westcoast rates	1979	1985	% change
Wastepaper-Japan	2,352	325	-86
Cotton -S.Korea	3,569	990	-72
Hay Cubes -Japan	2,194	350	-84
Wood pulp -Japan	1,826	630	-65
Scrap metal-Taiwan	2,956	400	-86
Oranges -Japan	6,867	2,800	-59

*** Source ; Lloyd's List, May 19, 1986.

This trend of lowering the rates has been influenced by various environmental and internal factors in the industry, however,the price leadership by the RTW strategy can be explained as one major factor.

Therfore, the RTW concept, as the overall cost leadership strategy, initiates the reduction of transportation cost in international trade, which may lead not only to enhance the volume of trade, but also more importantly to widen the range of containerizable cargo, which means that ultimately the container shipping industry itself receives benefits from it.

4). New marketing concept

Through the evolution of containerization, the service commodity which is the product of liner shipping has been globally standardized, whereby the internationalization of the new marketing concept of liner shipping has gradually become perceptive.

This trend is very much likely to be continued in the future in such a way that the liner shipping industry would be developed in the international dimension through the stimulus of the international marketing concept. The traditional concept of liner shipping has limited the scope of its marketing on a regional basis especially in particular trade routes which have been isolated from others.
However, having indroduced the global strategies in one form or another by integrating the traditionally segmented markets, major liner carriers began to exploit the new international marketing concept.

In this context, the internationalization process may lead liner shipping firms to become international companies which can be easily identified in other industries, such as automobile and computer industries e.g., General Motors and IBM.

Certainly, parallel to this development, the way of approach to study liner shipping has to be altered in this connection.

5). Impact on conference system

In the current trends, the traditional conference power has been deteriorated both in closed and open conference systems as discussed previously.
Furthermore, this tendency may be continued especially by the RTW carriers whose nature is independent rather than conference-minded.

Particularly, in the US related trade routes, by the influence of the Shipping Act of 1984, the relationship between shipping lines and shippers has been drastically changed.
According to Lloyd's List of June 14, 1986, 75 percent of Du Point's goods were moved under service contracts.
Successive, reckless independent actions are blamed for having led to lowering freight rates for the change of the current role of many conferences being just a " rate registration bureau ".
There are many controversies among the pros and cons regarding the Shipping Act.

However, the RTW concept, as a price leadership strategy and its indepentent characteristics would continuously influence the erosion of conference market power, which may result in diminishing the number of traditional conferences and instead introducing a super conference system which has practically no regulating power.

6. The behavior of competitors

a) Antagonism

As we have discussed earlier the RTW concept is the overall cost-leadership business strategy in liner shipping, the RTW carriers' major concern is concentrating on the investment in building up an all-water service configuration.

Therefore, by nature, the RTW carriers' market segmentation is likely to be widened to the low value cargo, which does not require the fast transit time, with a low freight rate.

Nevertheless, the intermodalist, as an antagonist of the RTW concept, makes its capital investment in the establishment of intermodal operations, which can offer the carriage of containers, for example, from Asia to the East Coast of the United States anywhere from eight days to more than two weeks faster than an all-water carrier service sending its ships through the Panama Canal.

This intermodal concept can be categorized as being a " Differentiation " strategy rather than being an " Overall Cost Leadership " strategy which were discussed in the chapter regarding the three generic strategies, because this concept has the strategic advantages of being uniquely perceived by the customers especially those whose cargo need fast transit time, and of effectively tying up high-valued cargo, such as television sets, stereos, personal computers, designer fashions and so on. Why the two different strategies exist in liner shipping can also be explained in relation with the introduction of containerization.

We have previously discussed that containerization

changed the characteristics of liner cargo in such a way that the liner carriers could take advantage of economies of scale which eventually led to the establishment of the RTW concept.
However, simultaneously containerization gave the liner carriers the opportunity to change the traditional way of transportation to the door-to-door service by the introduction of the through-transport concept.

This intermodalism is very much effective in the United States related trade routes where inland transportation is a major part of the total carriage in terms of both costs and transit time.

b) Protagonism
Considering that the RTW service is one of the global strategies, there are various types of global strategies among major world liner carriers in one form or another which integrate the markets globally.

Barber Blue Sea which is one of initiators of the RTW concept and other lines, such as Maersk line and Yang Ming Line which have built their own business strategies based on their resources.
This study does not include those global strategies of the abvoe protagonists and leave for furture studies.

One intersting case(51) is that recently a Germany management company is planning to enter the RTW service with deployment of vessels which are all chartered from the Banks with considerable cheap charter rate as explained in the appendixes p.29-30.

This phenomenon is a good example to justify my argument

in this paper, regarding the barriers of entry to the market being lowered.
Chartering vessels and container boxes with very much favorable contracts and concentrating on management and marketing promotion are of great benefits for this new comer,as far as the market is overtonnaged.

However, obviously, there would be more new-comers building their business strategies in terms of global integration in one form or another depending upon their strategic conditions.

7). The structural change of the liner shipping industry

Coupled with the hypotheses, the change of the conference system and the new development of the international marketing concept which were discussed earlier, the structural change of liner the shipping industry is likely to occur in such a way that the scale of a unit firm is enlarged.

Shipping is in a state of constant change, particularly by the introduction of innovation being a vital factor of the economic cycle.
Conference system and any form of co-operation among liner firms, like consortia, have been introduced by the changes of the economic conditions in the market as we discussed in the first part.

The RTW concept necessitates a globally integrated marketing network and its operational tools, which means that the scale of a unit firm should inevitably be increased.
This tendency has already taken place.

Many major liner carriers which established global strategies have increased their scales of unit firms.
In addition, there would be new-comers into the RTW service with bigger scales, while the existing should withdraw their services from the market.

Huge, multi-national, liner carriers would offer internationally integrated liner services with large scale service entities dominating marketing shares which may lead to a structural change of the liner shipping industry.

8). Changes of the geographical routes of the cargo flow

Together with the transportation center concept, the geographical routes of the cargo flow have been changed by the RTW concept.
Different from the traditional end-to-end multiport service, the two elements of the RTW concept are the horizontal extremity and the vertical coverage.
Here, the vertical coverage implies a fundamental change of geographical economics, for example, the trade between the South and the North.
The two practices of the RTW concept in US Lines and Evergreen line do not include the direct call to any port of Australia whose trade is covered by a feeder connection in Singapore.

On the other hand, in the horizontal extremity, the traditional trade routes were also influenced by the transportation center concept, diminishing the number of port calls and connected by feeder coverage.

10.2 Conclusion

The dynamics of liner shipping has been influenced by various factors of economic changes among which the innovation is of vital importance in the process of its evolution.
As having discussed earlier in chapter 1 regarding the definition of innovation, innovation inplies not only the changes of production function but also, more importantly, procedural changes introduced into the market.
In this connection, the idea of entrepreneurship should be considered as an essential ingredient in the evolution because the entrepreneur is the one who implement an innovation in the real world.
Here, the supreme importance comes to the behavioristic connotation of the innovation concept.

The RTW concept as a business strategy in liner shipping has been defined in my discussions, as a soft-ware oriented innovation and its business behaviour centers on the overall cost leadership strategy formulated to cope with the intensity of industry competition in the container liner market.

As the theory of economics is based on the assumption of the scarcity of resources, a unit firm has to establish the best strategy out from its limited resources to obtain the objectives.
This means that the business strategy should be built in such a way that the focus of the strategy is clearly defined so that all the investments undertaken by the firm are aimed at its focus, whereby the effectiveness of the strategy is guranteed.
In this point of view, the RTW concept is a cost leader-

ship strategy penetrating the maket with a low cost structure,a bargaining power and the advantage of scale economies.

However, the strategy also has disadvantages which have been pointed out before. Its adverse effects discussed in the voyage costs comparison should be also analyzed in the establishment of the strategy.
What can be derived as a conclusion of this cost comparison is that in the application of the RTW concept to the real market, the practical aspect should be scrutinized so as to minimize the friction between the doctrine of the concept and the reality, which may lead to the maximization of flexibility and adaptability of the business entity.

Finally, the study does not imply that the RTW concept is the best strategy involved in liner shipping.
There are various patterns of business strategies whether they are globally integrated or not.
Especially the intermodalism as an antagonism of the RTW concept is also considerablly effective in certain market segmentations as well as many other patterns of global strategies.
Therefore, this study leaves a further discussion concerning those behavioristic strategies of rivalry and the economic and managerial effectiveness to the market for future study.

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APPENDIXES

Contents Page

US Line Containership

Input Data with the Assumption of

Ship Price:US$ 55 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4462	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	55.00	XX.XXX	MILLIONS OF $	63.3	46.8
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	55.00	XX.XXX	MILLIONS OF $	163.25	140.65
ORIGINAL COST OF VESSEL	55.00	XX.XXX	MILLIONS OF $	163.25	146.75
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENGTH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	28.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

Output

DAILY COST FOR CONTAINER SHIP

OUTPUT VALUES	EXPECTED		HIGH	LOW
FUEL COSTS - IN PORT	0.3	THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8	THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108	THOUS. OF $ PER YEAR	3419	2797
ANNL. COST OF PROVISION	71	THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	550	THOUS. OF $ PER YEAR	822	327
ANNL. COST OF R & M	1100	THOUS. OF $ PER YEAR	1581	701
ANNL. COST OF STORES	275	THOUS. OF $ PER YEAR	443	140
ANNL. COST OF ADMIN.	421	THOUS. OF $ PER YEAR	650	245
ANNL. NON-CAPITAL COSTS	5525	THOUS. OF $ PER YEAR(EXCL FUEL)	7022	4258
VESSEL CAPITAL COSTS				
IN FINANCIAL TERMS	11345	1.FIXED DEPRECIATION-DECLIN BAL	13047	5644
IN THOUSANDS OF U.S.	4400	2.RETURN ON RESALE VALUE	5060	3252
DOLLARS PER YEAR	7757	3.ANNUALIZED RESALE VALUE	9710	5582
BASED ON THE	6455	4.ANNUALIZED REPLACE VALUE	10562	6641
METHODS LISTED	6399	5.SINKING FUND-REPLACEMENT COST	9137	5247
IN COLUMN 6				
LAYUP COSTS	31	THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29	MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103	THOUSANDS OF $ PER YEAR	198	162

——————————ASSUMED CONSTANTS——————————

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
55.4	47.8	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
10.9	3.3	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
19.6	12.1	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
23.4	15.8	4. OPERATING COSTS
35.8	28.2	5. RETURN ON RESALE VALUE + OPER. COST
44.2	36.6	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
23.7	16.1	7. RETURN ON SALVAGE VALUE + OPER. COS
45.3	37.7	8. ANNUALIZED RESALE VALUE + OPER. COS
47.2	39.7	9. ANNUALIZED REPLACE VALUE + OPER. CO
41.4	33.9	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price:US$ 60 Million

DAILY COST FOR CONTAINER SHIP.

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4482	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SINE/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIALL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
----------ASSUMED VALUES----------				MAX	MIN
REPLACEMNT COST OF VESL	60.00	XX.XXX	MILLIONS OF $	69.0	51.0
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	60.00	XX.XXX	MILLIONS OF $	69.00	44.35
ORIGINAL COST OF VESSEL	60.00	XX.XXX	MILLIONS OF $	69.00	51.00
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENGTH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	28.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED		HIGH	LOW
FUEL COSTS - IN PORT	0.3	THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8	THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108	THOUS. OF $ PER YEAR	3415	2797
ANNL. COST OF PROVISION	71	THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	600	THOUS. OF $ PER YEAR	897	357
ANNL. COST OF R & M	1200	THOUS. OF $ PER YEAR	1725	765
ANNL. COST OF STORES	300	THOUS. OF $ PER YEAR	483	153
ANNL. COST OF ADMIN.	431	THOUS. OF $ PER YEAR	669	249
ANNL. NON-CAPITAL COSTS	5710	THOUS. OF $ PER YEAR(EXCL FUEL)	7300	4369
VESSEL CAPITAL COSTS				
IN FINANCIAL TERMS	12085	1.FIXED DEPRECIATION-DECLIN BAL	13898	10272
IN THOUSANDS OF U.S.	4800	2.RETURN ON RESALE VALUE	5520	3548
DOLLARS PER YEAR	8256	3.ANNUALIZED RESALE VALUE	10360	5907
BASED ON THE	8964	4.ANNUALIZED REPLACE VALUE	11334	7018
METHODS LISTED	6980	5.SINKING FUND-REPLACEMENT COST	9967	5724
IN COLUMN 6				
LAYUP COSTS	31	THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29	MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103	THOUSANDS OF $ PER YEAR	198	162

----------ASSUMED CONSTANTS----------

EST FOR CONTAINERSHIP.

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
55.0	50.4	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
11.2	3.7	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
20.0	12.4	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
23.9	16.4	4. OPERATING COSTS
37.4	29.9	5. RETURN ON RESALE VALUE + OPER. COST
46.1	38.6	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
24.2	16.7	7. RETURN ON SALVAGE VALUE + OPER. COS
47.2	39.6	8. ANNUALIZED RESALE VALUE + OPER. COS
49.2	41.6	9. ANNUALIZED REPLACE VALUE + OPER. CO
43.6	36.0	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price: us$ 65 Million

DAILY COST FOR CONTAINER SHIP.

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4482	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	65.00	XX.XXX	MILLIONS OF $	74.8	55.3
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	65.00	XX.XXX	MILLIONS OF $	74.75	45.04
ORIGINAL COST OF VESSEL	65.00	XX.XXX	MILLIONS OF $	74.75	55.25
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENGTH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	28.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.3		THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8		THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108		THOUS. OF $ PER YEAR	3419	2797
ANNL. COST OF PROVISION	71		THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	650		THOUS. OF $ PER YEAR	972	387
ANNL. COST OF R & M	1300		THOUS. OF $ PER YEAR	1869	829
ANNL. COST OF STORES	325		THOUS. OF $ PER YEAR	523	166
ANNL. COST OF ADMIN.	441		THOUS. OF $ PER YEAR	687	254
ANNL. NON-CAPITAL COSTS	5895		THOUS. OF $ PER YEAR(EXCL FUEL)	7577	4480
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	12825		1.FIXED DEPRECIATION-DECLIN BAL	14749	10931
IN THOUSANDS OF U.S.	5200		2.RETURN ON RESALE VALUE	5980	3843
DOLLARS PER YEAR	8755		3.ANNUALIZED RESALE VALUE	11010	6233
BASED ON THE	9474		4.ANNUALIZED REPLACE VALUE	12006	7396
METHODS LISTED	7562		5.SINKING FUND-REPLACEMENT COST	10798	6201
IN COLUMN 6					
LAYUP COSTS	31		THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29		MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103		THOUSANDS OF $ PER YEAR	198	162

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP.

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
60.6	53.0	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
11.6	4.0	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
20.3	12.8	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
24.4	16.9	4. OPERATING COSTS
39.1	31.5	5. RETURN ON RESALE VALUE + OPER. COST
48.1	40.5	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
24.7	17.2	7. RETURN ON SALVAGE VALUE + OPER. COS
49.1	41.5	8. ANNUALIZED RESALE VALUE + OPER. COS
51.1	43.6	9. ANNUALIZED REPLACE VALUE + OPER. CO
45.7	38.2	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship price: US$ 70 Million

DAILY COST FOR CONTAINER SHIP..

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4482	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	70.00	XX.XXX	MILLIONS OF $	80.5	59.5
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	70.00	XX.XXX	MILLIONS OF $	180.50	151.74
ORIGINAL COST OF VESSEL	70.00	XX.XXX	MILLIONS OF $	180.50	159.50
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENETH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIEN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	28.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED		HIGH	LOW
FUEL COSTS - IN PORT	0.3	THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8	THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108	THOUS. OF $ PER YEAR	3419	2797
ANNL. COST OF PROVISION	71	THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	700	THOUS. OF $ PER YEAR	1047	417
ANNL. COST OF R & M	1400	THOUS. OF $ PER YEAR	2013	893
ANNL. COST OF STORES	350	THOUS. OF $ PER YEAR	564	179
ANNL. COST OF ADMIN.	451	THOUS. OF $ PER YEAR	706	258
ANNL. NON-CAPITAL COSTS	6080	THOUS. OF $ PER YEAR(EXCL FUEL)	7855	4591
VESSEL CAPITAL COSTS				
IN FINANCIAL TERMS	12565	1.FIXED DEPRECIATION-DECLIN BAL	15599	11530
IN THOUSANDS OF U.S.	5600	2.RETURN ON RESALE VALUE	6440	4139
DOLLARS PER YEAR	9255	3.ANNUALIZED RESALE VALUE	11659	6559
BASED ON THE	9963	4.ANNUALIZED REPLACE VALUE	12677	7774
METHODS LISTED	8144	5.SINKING FUND-REPLACEMENT COST	11626	6677
IN COLUMN 6				
LAYUP COSTS	31	THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29	MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103	THOUSANDS OF $ PER YEAR	198	162

------------ASSUMED CONSTANTS------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
63.2	55.6	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
11.9	4.4	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
20.7	13.1	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
25.0	17.4	4. OPERATING COSTS
40.7	33.2	5. RETURN ON RESALE VALUE + OPER. COST
50.0	42.4	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
25.3	17.7	7. RETURN ON SALVAGE VALUE + OPER. COS
51.0	43.5	8. ANNUALIZED RESALE VALUE + OPER. COS
53.1	45.5	9. ANNUALIZED REPLACE VALUE + OPER. CO
47.9	40.3	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption

of Ship Price: US$ 75 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	4482	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	58.6	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	1	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	1	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	17.5	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	6	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	75.00	XX.XXX	MILLIONS OF $	86.3	63.8
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	75.00	XX.XXX	MILLIONS OF $	86.25	55.43
ORIGINAL COST OF VESSEL	75.00	XX.XXX	MILLIONS OF $	86.25	63.75
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	14	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	148.0	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	162.8	133.2
COST PER RATING	148.0	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	162.8	133.2
LENGTH (LOA)	280	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	18.0	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	17.5	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	17.5	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	28000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	55345	13171
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	406	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	70.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	84.0	59.5
-IN PORT	2.5	XX.X	TONNES FUEL PER DAY (24 HOURS)	3.0	2.0
COST FOR NEW CONTAINERS	26.01	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	22.70	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.3		THOUS. OF $ PER DAY	0.4	0.2
- AT SEA LOADED	7.8		THOUS. OF $ PER DAY	10.3	6.0
ANNUAL COST OF CREW	3108		THOUS. OF $ PER YEAR	3419	2797
ANNL. COST OF PROVISION	71		THOUS. OF $ PER YEAR	107	48
ANNL. COST OF INSURANCE	750		THOUS. OF $ PER YEAR	1121	446
ANNL. COST OF R & M	1500		THOUS. OF $ PER YEAR	2156	956
ANNL. COST OF STORES	375		THOUS. OF $ PER YEAR	604	191
ANNL. COST OF ADMIN.	461		THOUS. OF $ PER YEAR	725	263
ANNL. NON-CAPITAL COSTS	6265		THOUS. OF $ PER YEAR(EXCL FUEL)	8132	4701
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	14305		1.FIXED DEPRECIATION-DECLIN BAL	16450	12159
IN THOUSANDS OF U.S.	6000		2.RETURN ON RESALE VALUE	6900	4435
DOLLARS PER YEAR	9754		3.ANNUALIZED RESALE VALUE	12309	6864
BASED ON THE	10492		4.ANNUALIZED REPLACE VALUE	13349	8151
METHODS LISTED	8725		5.SINKING FUND-REPLACEMENT COST	12459	7154
IN COLUMN 6					
LAYUP COSTS	31		THOUSANDS OF $ PER MONTH	37	25
SCRAPPING PRICE	1.29		MILLIONS OF $ (LESS 15% DELIVE	1.42	1.16
RETURN ON SALVAGE	103		THOUSANDS OF $ PER YEAR	198	162

------ASSUMED CONSTANTS------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
65.8	58.2	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
12.3	4.7	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
21.0	13.5	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
25.5	17.9	4. OPERATING COSTS
42.4	34.8	5. RETURN ON RESALE VALUE + OPER. COST
51.9	44.4	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
25.8	18.2	7. RETURN ON SALVAGE VALUE + OPER. COS
53.0	45.4	8. ANNUALIZED RESALE VALUE + OPER. COS
55.0	47.5	9. ANNUALIZED REPLACE VALUE + OPER. CO
50.1	42.5	10. SINKING FUND-REPLACEMENT COST + OP

Evergreen Line

Input Data with the Assumption of

Ship Price: US$ 35 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	6	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	35.00	XX.XXX	MILLIONS OF $	40.3	29.8
REMAINING LIFE OF VESSL	16	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	35.00	XX.XXX	MILLIONS OF $	40.25	25.87
ORIGINAL COST OF VESSEL	35.00	XX.XXX	MILLIONS OF $	40.25	29.75
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	78.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	561		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION	57		THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE	350		THOUS. OF $ PER YEAR	523	208
ANNL. COST OF R & M	700		THOUS. OF $ PER YEAR	1006	446
ANNL. COST OF STORES	175		THOUS. OF $ PER YEAR	282	89
ANNL. COST OF ADMIN.	128		THOUS. OF $ PER YEAR	214	68
ANNL. NON-CAPITAL COSTS	1992		THOUS. OF $ PER YEAR(EXCL FUEL)	2751	1373
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	7131		1.FIXED DEPRECIATION-DECLIN BAL	8201	6051
IN THOUSANDS OF U.S.	2800		2.RETURN ON RESALE VALUE	3220	2070
DOLLARS PER YEAR	4873		3.ANNUALIZED RESALE VALUE	6105	3497
BASED ON THE	5301		4.ANNUALIZED REPLACE VALUE	6694	4157
METHODS LISTED	4072		5.SINKING FUND-REPLACEMENT COST	5814	3339
IN COLUMN 6					
LAYUP COSTS	29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87		THOUSANDS OF $ PER YEAR	167	136

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
33.0	25.9	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
8.9	1.9	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
10.6	3.5	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
12.9	5.8	4. OPERATING COSTS
20.8	13.7	5. RETURN ON RESALE VALUE + OPER. COST
25.6	18.6	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
13.1	6.1	7. RETURN ON SALVAGE VALUE + OPER. COS
26.6	19.6	8. ANNUALIZED RESALE VALUE + OPER. COS
27.8	20.8	9. ANNUALIZED REPLACE VALUE + OPER. CO
24.4	17.3	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price: US$ 40 Million

DAILY COST FOR CONTAINER SHIP.

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS :

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	40.00	XX.XXX	MILLIONS OF $	46.0	34.0
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	40.00	XX.XXX	MILLIONS OF $	46.00	29.57
ORIGINAL COST OF VESSEL	40.00	XX.XXX	MILLIONS OF $	46.00	34.00
NO. OF OFFICERS	. 7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	76.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	561		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION	57		THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE	400		THOUS. OF $ PER YEAR	598	238
ANNL. COST OF R & M	800		THOUS. OF $ PER YEAR	1150	510
ANNL. COST OF STORES	200		THOUS. OF $ PER YEAR	322	102
ANNL. COST OF ADMIN.	138		THOUS. OF $ PER YEAR	233	72
ANNL. NON-CAPITAL COSTS	2177		THOUS. OF $ PER YEAR(EXCL FUEL)	3029	1484
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	7871		1.FIXED.DEPRECIATION-DECLIN BAL	9051	6690
IN THOUSANDS OF U.S.	3200		2.RETURN ON RESALE VALUE	3680	2365
DOLLARS PER YEAR	5373		3.ANNUALIZED RESALE VALUE	6758	3622
BASED ON THE	5811		4.ANNUALIZED REPLACE VALUE	7366	4535
METHODS LISTED	4654		5.SINKING FUND-REPLACEMENT COST	6645	3516
IN COLUMN G					
LAYUP COSTS	29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87		THOUSANDS OF $ PER YEAR	167	136

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
35.6	28.5	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
9.3	2.2	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
10.9	3.9	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
13.4	6.4	4. OPERATING COSTS
22.4	15.4	5. RETURN ON RESALE VALUE + OPER. COST
27.6	20.5	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
13.7	6.6	7. RETURN ON SALVAGE VALUE + OPER. COS
28.5	21.5	8. ANNUALIZED RESALE VALUE + OPER. COS
29.8	22.7	9. ANNUALIZED REPLACE VALUE + OPER. CO
26.5	19.5	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price: US$ 45 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS		
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	45.00	XX.XXX	MILLIONS OF $	51.8	38.3
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	45.00	XX.XXX	MILLIONS OF $	151.75	133.26
ORIGINAL COST OF VESSEL	45.00	XX.XXX	MILLIONS OF $	151.75	138.25
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATINGS	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	78.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	581		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION	57		THOUS. OF $ PER YEAR	87	35
ANNL. COST OF INSURANCE	450		THOUS. OF $ PER YEAR	673	268
ANNL. COST OF R & M	900		THOUS. OF $ PER YEAR	1294	574
ANNL. COST OF STORES	225		THOUS. OF $ PER YEAR	362	115
ANNL. COST OF ADMIN.	148		THOUS. OF $ PER YEAR	251	77
ANNL. NON-CAPITAL COSTS	2362		THOUS. OF $ PER YEAR(EXCL FUEL)	3306	1595
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	6610		1.FIXED DEPRECIATION-DECLIN BAL	9902	7319
IN THOUSANDS OF U.S.	3600		2.RETURN ON RESALE VALUE	4140	2661
DOLLARS PER YEAR	5872		3.ANNUALIZED RESALE VALUE	7406	4148
BASED ON THE	6320		4.ANNUALIZED REPLACE VALUE	8038	4912
METHODS LISTED	5235		5.SINKING FUND-REPLACEMENT COST	7475	4293
IN COLUMN 6					
LAYUP COSTS	29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87		THOUSANDS OF $ PER YEAR	167	136

-----------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
38.2	31.1	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
9.6	2.6	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
11.3	4.2	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
13.9	6.9	4. OPERATING COSTS
24.1	17.0	5. RETURN ON RESALE VALUE + OPER. COST
29.5	22.4	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
14.2	7.1	7. RETURN ON SALVAGE VALUE + OPER. COS
30.5	23.4	8. ANNUALIZED RESALE VALUE + OPER. COS
31.7	24.7	9. ANNUALIZED REPLACE VALUE + OPER. CO
28.7	21.6	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price:US$ 50 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS.

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	6	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	50.00	XX.XXX	MILLIONS OF $	57.5	42.5
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	50.00	XX.XXX	MILLIONS OF $	57.50	36.96
ORIGINAL COST OF VESSEL	50.00	XX.XXX	MILLIONS OF $	57.50	42.50
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	76.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	581		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISIONS	57		THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE	500		THOUS. OF $ PER YEAR	748	298
ANNL. COST OF R & M	1000		THOUS. OF $ PER YEAR	1438	638
ANNL. COST OF STORES	250		THOUS. OF $ PER YEAR	403	128
ANNL. COST OF ADMIN.	158		THOUS. OF $ PER YEAR	270	81
ANNL. NON-CAPITAL COSTS	2547		THOUS. OF $ PER YEAR(EXCL FUEL)	3564	1705
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	9350		1.FIXED DEPRECIATION-DECLIN BAL	10753	7948
IN THOUSANDS OF U.S.	4000		2.RETURN ON RESALE VALUE	4600	2957
DOLLARS PER YEAR	6371		3.ANNUALIZED RESALE VALUE	8057	4474
BASED ON THE	6829		4.ANNUALIZED REPLACE VALUE	8710	5290
METHODS LISTED	5817		5.SINKING FUND-REPLACEMENT COST	8306	4770
IN COLUMN G					
LAYUP COSTS	29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87		THOUSANDS OF $ PER YEAR	167	136

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP,

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
40.8	33.7	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
10.0	2.9	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
11.6	4.6	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
14.5	7.4	4. OPERATING COSTS
25.7	18.7	5. RETURN ON RESALE VALUE + OPER. COST
31.4	24.4	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
14.7	7.6	7. RETURN ON SALVAGE VALUE + OPER. COS
32.4	25.3	8. ANNUALIZED RESALE VALUE + OPER. COS
33.7	26.6	9. ANNUALIZED REPLACE VALUE + OPER. CO
30.8	23.8	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price: US$ 55 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	55.00	XX.XXX	MILLIONS OF $	63.3	46.8
REMAINING LIFE OF VESSL	18	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	55.00	XX.XXX	MILLIONS OF $	63.25	40.65
ORIGINAL COST OF VESSEL	55.00	XX.XXX	MILLIONS OF $	63.25	46.75
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.6	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	76.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED			HIGH	LOW
FUEL COSTS - IN PORT	0.2		THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3		THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	581		THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION	57		THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE	550		THOUS. OF $ PER YEAR	822	327
ANNL. COST OF R & M	1100		THOUS. OF $ PER YEAR	1581	701
ANNL. COST OF STORES	275		THOUS. OF $ PER YEAR	443	140
ANNL. COST OF ADMIN.	168		THOUS. OF $ PER YEAR	289	86
ANNL. NON-CAPITAL COSTS	2732		THOUS. OF $ PER YEAR(EXCL FUEL)	3661	1816
VESSEL CAPITAL COSTS					
IN FINANCIAL TERMS	10090		1.FIXED DEPRECIATION-DECLIN BAL	11604	8577
IN THOUSANDS OF U.S.	4400		2.RETURN ON RESALE VALUE	5060	3252
DOLLARS PER YEAR	6870		3.ANNUALIZED RESALE VALUE	8707	4799
BASED ON THE	7338		4.ANNUALIZED REPLACE VALUE	9381	5667
METHODS LISTED	6399		5.SINKING FUND-REPLACEMENT COST	9137	5247
IN COLUMN G					
LAYUP COSTS	29		THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.08		MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87		THOUSANDS OF $ PER YEAR	167	136

------------------------------ASSUMED CONSTANTS--------------

EST FOR CONTAINERSHIP, 1

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
43.4	36.3	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
10.3	3.3	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
12.0	4.9	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
15.0	7.9	4. OPERATING COSTS
27.4	20.3	5. RETURN ON RESALE VALUE + OPER. COST
33.3	26.3	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
15.2	8.2	7. RETURN ON SALVAGE VALUE + OPER. COS
34.3	27.3	8. ANNUALIZED RESALE VALUE + OPER. COS
35.6	28.6	9. ANNUALIZED REPLACE VALUE + OPER. CO
33.0	25.9	10. SINKING FUND-REPLACEMENT COST + OP

Input Data with the Assumption of

Ship Price: US$ 60 Million

DAILY COST FOR CONTAINER SHIP,

1985 VESSEL COSTING MODULE FOR CONTAINERS VESSELS

TYPE OF DATA	VALUE	FORM	UNITS	MAX	MIN
REQUIRED INPUT DATA					
CAPACITY IN TEU	2728	XXXX	TWENTY FOOT EQUIVALENT UNITS		
YEAR BUILT	1984	19XX			
DEADWEIGHT	43.4	XX.X	THOUSANDS OF DEADWEIGHT TONNES		
VESSEL UTILIZATION	355	XXX	DAYS PER YEAR		
NATIONALITY OF OFFICERS	4	X	1. U.S.A. 2. EUROPE 3. GREEK		
NATIONALITY OF CREW	4	X	4.KOR/SING/PHIL 5.INDIA		
ENGINE/FUEL TYPE	1	X	1. MSD 2. LSD 3. STEAM 4. GAS		
LOADED SPEED	20.0	XX	KNOTS		
FUEL COST	112	XXX.X	$ PER TONNE		
EXPECT. RATE OF RETURN	8	XX.X	% FINANCIAL RATE EXCL.INFLATION		
EXPECT. RATE OF RETURN	14	XX.X	% FINANCIAL RATE INCL.INFLATION		
CURRENT SCRAP PRICE	115	XXX	$ PER TONNE		
PRICE OF CONTAINERS	2500	XXXX	COST OF BOX IN $ PER TEU		
ASSUMED VALUES				MAX	MIN
REPLACEMNT COST OF VESL	60.00	XX.XXX	MILLIONS OF $	69.0	51.0
REMAINING LIFE OF VESSL	16	XX	REMAINING YEARS OF USEFUL LIFE	31	16
RESALE VALUE OF VESSEL	60.00	XX.XXX	MILLIONS OF $	69.00	44.35
ORIGINAL COST OF VESSEL	60.00	XX.XXX	MILLIONS OF $	69.00	51.00
NO. OF OFFICERS	7	XX	NO. OF OFFICERS IN SHIP'S CREW	12	10
NO. OF RATINGS	10	XX	NO. ABLE-BODIED SEAMEN IN CREW	21	17
COST PER OFFICER	34.2	XXXXXX	$ 000'S/YEAR FOR ONE CREW SLOT	37.6	30.8
COST PER RATING	34.2	XXXXXX	INCL. BENEFITS,ASUME 2 MEN/SLOT	37.6	30.8
LENGTH (LOA)	230	XXXX	METERS(IF FEET THEN ft./ 3.28)	269	220
BEAM	32	XXX	METERS(IF FEET THEN ft./ 3.28)	33	30
SUMMER DRAFT	11.6	XX	METERS(IF FEET THEN ft./ 3.28)	12.8	10.4
DESIGN SPEED	20.5	XX.X	KNOTS	23.0	14.0
ACTUAL LOADED SPEED	20.0	XX.X	KNOTS: LOW VALUE FOR DEADWEIGHT	-	14.30
ACTUAL SPEED IN BALLAST	20.0	XX.X	KNOTS:HIGH VALUE FOR DEADWEIGHT	18.20	-
SHP (SHIP HORSEPOWER)	24000	XXXXX	S.H.P. FOR MAIN PROPULSION SYST	45422	10933
INSUR. COST (P&I + H&M)	1.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	1.3	0.7
REPAIR AND MAINTENANCE	2.0	XX.X	ANNUAL COST AS % OF REPLAC.COST	2.5	1.5
STORES	0.5	XX.X	ANNUAL COST AS % OF REPLAC.COST	0.7	0.3
PROVISIONS (DAILY)	9.5	XXX	$ PER CREW MEMBER PER DAY	12.5	7.5
ADMINISTRATION	10.0	XX.X	ANNUAL COST AS % OF CREW AND R&I	13.0	7.0
VESSEL UTILIZATION	355	XXX	AVERAGE NUMBER OF DAYS PER YEAR	408	302
VESSEL LIFE	20	XX	NO. OF YEARS OF ECONOMIC LIFE	30	15
FUEL CONS-AT SEA LOADED	65.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	78.0	55.3
-IN PORT	2.0	XX.X	TONNES FUEL PER DAY (24 HOURS)	2.5	1.5
COST FOR NEW CONTAINERS	17.05	XX.XX	$MN FOR 2.5 SETS:5 YR OLD BOXES	13.82	

Output

DAILY COST FOR CONTAINER SHIP,

OUTPUT VALUES	EXPECTED		HIGH	LOW
FUEL COSTS - IN PORT	0.2	THOUS. OF $ PER DAY	0.3	0.2
- AT SEA LOADED	7.3	THOUS. OF $ PER DAY	9.6	5.6
ANNUAL COST OF CREW	581	THOUS. OF $ PER YEAR	640	523
ANNL. COST OF PROVISION	57	THOUS. OF $ PER YEAR	87	38
ANNL. COST OF INSURANCE	600	THOUS. OF $ PER YEAR	897	357
ANNL. COST OF R & M	1200	THOUS. OF $ PER YEAR	1725	765
ANNL. COST OF STORESS	300	THOUS. OF $ PER YEAR	483	153
ANNL. COST OF ADMIN.	178	THOUS. OF $ PER YEAR	307	90
ANNL. NON-CAPITAL COSTS	2917	THOUS. OF $ PER YEAR(EXCL FUEL)	4139	1927
VESSEL CAPITAL COSTS				
IN FINANCIAL TERMS	10530	1.FIXED DEPRECIATION-DECLIN BAL	12454	9205
IN THOUSANDS OF U.S.	4800	2.RETURN ON RESALE VALUE	5520	3548
DOLLARS PER YEAR	7369	3.ANNUALIZED RESALE VALUE	9356	5125
BASED ON THE	7846	4.ANNUALIZED REPLACE VALUE	10053	6545
METHODS LISTED	6980	5.SINKING FUND-REPLACEMENT COST	9967	5724
IN COLUMN G				
LAYUP COSTS	29	THOUSANDS OF $ PER MONTH	35	23
SCRAPPING PRICE	1.05	MILLIONS OF $ (LESS 15% DELIVE	1.19	0.97
RETURN ON SALVAGE	87	THOUSANDS OF $ PER YEAR	167	136

---ASSUMED CONSTANTS---

EST FOR CONTAINERSHIP.

VESSEL COST SUMMARY TABLE

(THOUSANDS OF US$ PER DAY AT SEA AND IN PORT)

AT SEA	IN PORT	METHOD
46.0	38.9	1. FIX DEPREC. (DECLIN BAL.) + OPER. C
10.7	3.6	2. AVOIDABLE COSTS - LAYUP (EXCLUDES C
12.3	5.3	3. AVOIDABLE COSTS - LAYUP (INCLUDES C
15.5	8.4	4. OPERATING COSTS
29.0	22.0	5. RETURN ON RESALE VALUE + OPER. COST
35.3	28.2	6. ANN. RESALE VALUE+OPER. COSTS-LAYUP
15.7	8.7	7. RETURN ON SALVAGE VALUE + OPER. COS
36.3	29.2	8. ANNUALIZED RESALE VALUE + OPER. COS
37.6	30.5	9. ANNUALIZED REPLACE VALUE + OPER. CO
35.2	28.1	10. SINKING FUND-REPLACEMENT COST + OP

Computer Program for Voyage Cost Comparison :
(Utilization)

```
10 REM program H1%
20 CLS:SCREEN 0:WIDTH 80:LOCATE 10,10:INPUT "T-EXT or G-RAPHIC --> ",
30 LL[1]=3:LL[2]=9:LL[3]=15
40 DIM Q(100,4):J=1:REM USL
50 FOR NK=448.2  TO 4483 STEP 448.2
60 KS=11/365*(5247+10236)
70 KP=9*(63+NK*14/4482)*112+2*2.5*112+14/24*2.5*112:KP=KP/1000
80 KPOR=25
90 KDL=(NK*150+NK*80+9.059999*NK*9+.6*NK*385+.42*NK*335)/1000
100 TOT=KS+KP+KPOR+KDL
110 W1=TOT/NK:W2=TOT/(NK*11)
120 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
130 IF F$="G" THEN 150
140 PRINT NK;W1;W2*1000;TOT
150 NEXT NK
160 IF F$="T" THEN 360
170 SCREEN 1:COLOR 0,0:LINE(30,10)-(30,170),3:LINE(30,170)-(295,170),3
180 FOR X=500 TO 5000 STEP 500
190 LINE (30+X*.05,170)-(30+X*.05,175),3
200 NEXT X
210 FOR Y=1 TO 7:LINE (25,170-Y*100*.5)-(30,170-Y*100*.5),3:NEXT Y
220 LOCATE 23,4:PRINT "0      20      40      60      80      100"
230 LOCATE 21,35:PRINT "% util"
240 LOCATE 3,10:PRINT "$/BOX"
250 LOCATE 4,10:PRINT "[ths]"
260 PP$="321":FOR L=1 TO 3:LOCATE LL[L],3:LL=LL+2:PRINT MID$(PP$,L,1):NE
270 X=55
280 Y=170-Q[1,2]*.5
290 LINE (X,Y)-(X,Y),1
300 FOR K=2 TO 10
310 X=K*25+30
320 Y=170-Q[K,2]*.5
330 LINE -(X,Y),1
340 NEXT K
350 REM hapag
360 J=1
370 FOR NK=259.4  TO 2595 STEP 259.4
380 A=(27+1/24)/365
390 KS=A*(3551+10734)
400 KP=(17+14/24)*(75+NK*17/2594)*112+(3+11/24)*48*112+(1+3/24)*5*112+(
3*112:KP=KP/1000
410 KPOR=7*10+5*15
420 KDL=(NK*300+NK*160+9.059999*NK*22+.2*NK*(385+335))/1000
430 TOT=KS+KP+KPOR+KDL
440 W1=TOT/(NK*2)
450 W2=TOT/(NK*22)
460 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
470 IF F$="G" THEN 490
480 PRINT NK;W1;W2*1000;TOT
490 NEXT NK
500 IF F$="T" THEN STOP
510 X=55
520 Y=170-Q[1,2]*.5
530 LINE (X,Y)-(X,Y),2
540 FOR K=2 TO 10
550 X=K*25+30
560 Y=170-Q[K,2]*.5
570 LINE -(X,Y),2
580 NEXT K
590 LINE (200,27)-(230,27),1:LOCATE 4,31:PRINT "USL"
600 LINE (200,43)-(230,43),2:LOCATE 6,31:PRINT "HAPAG"
610 Z$=INKEY$:IF LEN(Z$)=0 THEN 610
```

Computer Program for Voyage Cost Comparison :

(TEU Loaded)

```
10 REM program W1
20 CLS:SCREEN 0:WIDTH 80:LOCATE 10,10:INPUT "T-EXT  or  G-RAPHIC  --> ",
30 LL[1]=4:LL[2]=7:LL[3]=9:LL[4]=12:LL[5]=14:LL[6]=17:LL[7]=19
40 DIM Q(100,4):J=1:REM USL
50 FOR NK=100  TO 4482 STEP 100
60 KS=11/365*(5247+10236)
70 KP=9*(63+NK*14/4482)*112+2*2.5*112+14/24*2.5*112:KP=KP/1000
80 KPOR=25
90 KDL=(NK*150+NK*80+9.059999*NK*9+.6*NK*385+.42*NK*335)/1000
100 TOT=KS+KP+KPOR+KDL
110 W1=TOT/NK:W2=TOT/(NK*11)
120 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
130 IF F$="G" THEN 150
140 PRINT NK;W1;W2*1000;TOT
150 NEXT NK
160 IF F$="T" THEN 350
170 SCREEN 1:COLOR 0,0:LINE(30,10)-(30,170),3:LINE(30,170)-(295,170),3
180 FOR X=500 TO 5000 STEP 500
.90 LINE (30+X*.05,170)-(30+X*.05,175),3
200 NEXT X
210 FOR Y=1 TO 7:LINE (25,170-Y*100*.2)-(30,170-Y*100*.2),3:NEXT Y
220 LOCATE 23,4:PRINT "0    1000   2000   3000   4000   5000"
230 LOCATE 21,35:PRINT "BOXES":LOCATE 3,7:PRINT "$/BOX"
.40 LOCATE 4,7:PRINT "[the]"
250 PP$="7654321":FOR L=1 TO 7:LOCATE LL[L],3:LL=LL+2:PRINT MID$(PP$,L,1

260 X=Q[1,1]*250/5000+30
270 Y=170-Q[1,2]*.2
280 LINE (X,Y)-(X,Y),1
290 FOR K=2 TO J-1
300 X=Q[K,1]*250/5000+30
310 Y=170-Q[K,2]*.2
320 LINE -(X,Y),1
330 NEXT K
340 REM hapag
350 J=1
360 FOR NK=100  TO 2594 STEP 100
370 A=(27+1/24)/365
380 KS=A*(3551+10734)
 90 KP=(17+14/24)*(75+NK*17/2594)*112+(3+11/24)*48*112+(1+3/24)*5*112+(4
.*112:KP=KP/1000
400 KPOR=7*10+5*15
410 KDL=(NK*300+NK*160+9.059999*NK*22+.2*NK*(385+335))/1000
420 TOT=KS+KP+KPOR+KDL
 30 W1=TOT/(NK*2)
440 W2=TOT/(NK*22)
450 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT
460 J=J+1
470 IF F$="G" THEN 490
480 PRINT NK;W1;W2*1000;TOT
490 NEXT NK
500 IF F$="T" THEN STOP
510 X=Q[1,1]*250/5000+30
520 Y=170-Q[1,2]*.2
530 LINE (X,Y)-(X,Y),2
540 FOR K=2 TO J-1
550 X=Q[K,1]*250/5000+30
560 Y=170-Q[K,2]*.2
570 LINE -(X,Y),2
580 NEXT K
590 LINE (200,27)-(230,27),1:LOCATE 4,31:PRINT "USL"
600 LINE (200,43)-(230,43),2:LOCATE 6,31:PRINT "HAPAG"
610 Z$=INKEY$:IF LEN(Z$)=0 THEN 610
```

Computer Program for Voyage Cost Comparison:
(Utilization, Ecluding Feedering cost)

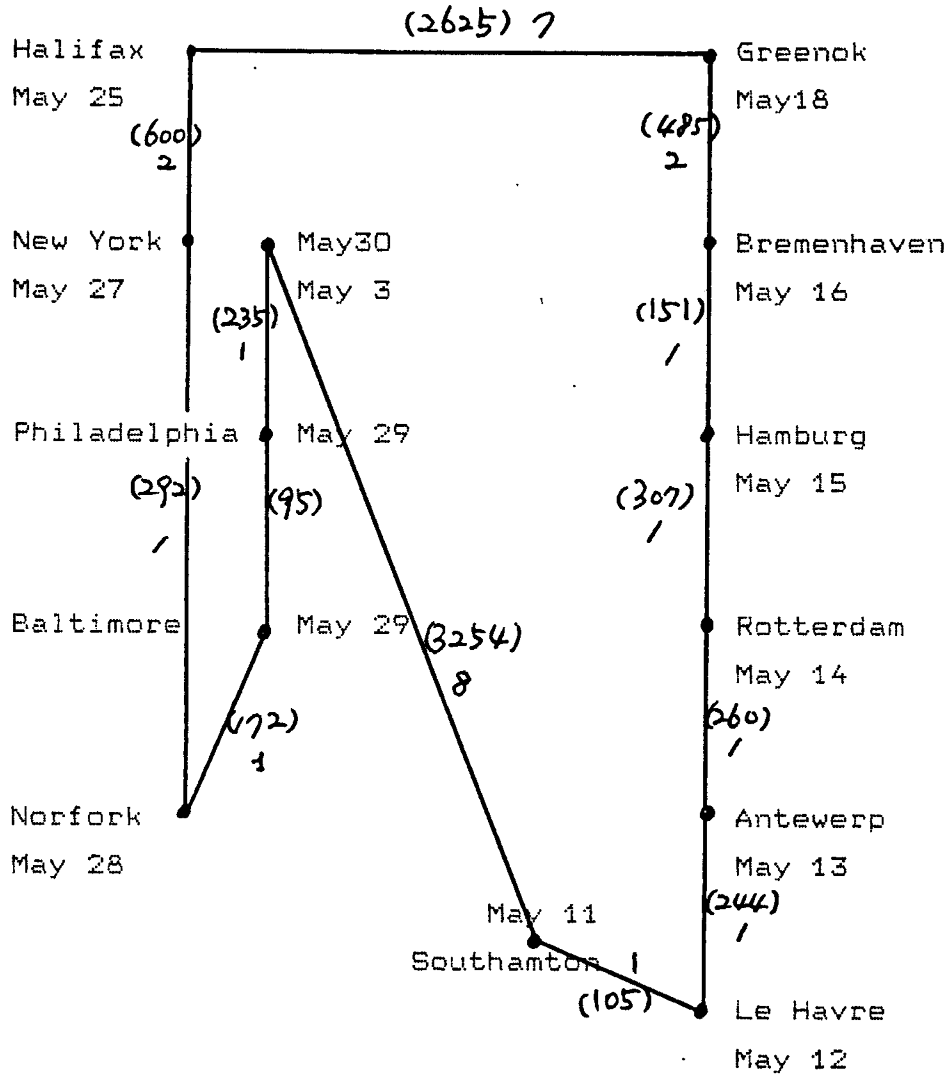
```
10 REM program W1%N
20 CLS:SCREEN 0:WIDTH 80:LOCATE 10,10:INPUT "T-EXT -or  G-RAPHIC  -->
30 LL[1]=3:LL[2]=9:LL[3]=15
40 DIM Q(100,4):J=1:REM USL
50 FOR NK=448.2  TO 4483 STEP 448.2
60 KS=11/365*(5247+10236)
70 KP=9*(63+NK*14/4482)*112+2*2.5*112+14/24*2.5*112:KP=KP/1000
80 KPOR=25
90 KDL=(NK*150+NK*80+9.059999*NK*9)/1000
100 TOT=KS+KP+KPOR+KDL
110 W1=TOT/NK:W2=TOT/(NK*11)
120 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
130 IF F$="G" THEN 150
140 PRINT NK;W1;W2*1000;TOT
150 NEXT NK
160 IF F$="T" THEN 360
170 SCREEN 1:COLOR 0,0:LINE(30,10)-(30,170),3:LINE(30,170)-(295,170),
180 FOR X=500 TO 5000 STEP 500
190 LINE (30+X*.05,170)-(30+X*.05,175),3
200 NEXT X
210 FOR Y=1 TO 7:LINE (25,170-Y*100*.5)-(30,170-Y*100*.5),3:NEXT Y
220 LOCATE 23,4:PRINT "0      20     40      60     80     100"
230 LOCATE 21,35:PRINT "% util"
240 LOCATE 3,10:PRINT "$/BOX"
250 LOCATE 4,10:PRINT "[ths]"
260 PP$="321":FOR L=1 TO 3:LOCATE LL[L],3:LL=LL+2:PRINT MID$(PP$,L,1)
270 X=55
280 Y=170-Q[1,2]*.5
290 LINE (X,Y)-(X,Y),1
300 FOR K=2 TO 10
310 X=K*25+30
320 Y=170-Q[K,2]*.5
330 LINE -(X,Y),1
340 NEXT K
350 REM hapag
360 J=1
370 FOR NK=259.4  TO 2595 STEP 259.4
380 A=(27+1/24)/365
390 KS=A*(3551+10734)
400 KP=(17+14/24)*(75+NK*17/2594)*112+(3+11/24)*48*112+(1+3/24)*5*112
3*112:KP=KP/1000
410 KPOR=7*10+5*15
420 KDL=(NK*300+NK*160+9.059999*NK*22)/1000
430 TOT=KS+KP+KPOR+KDL
440 W1=TOT/(NK*2)
450 W2=TOT/(NK*22)
460 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
470 IF F$="G" THEN 490
480 PRINT NK;W1;W2*1000;TOT
490 NEXT NK
500 IF F$="T" THEN STOP
510 X=55
520 Y=170-Q[1,2]*.5
530 LINE (X,Y)-(X,Y),2
540 FOR K=2 TO 10
550 X=K*25+30
560 Y=170-Q[K,2]*.5
570 LINE -(X,Y),2
580 NEXT K
590 LINE (200,27)-(230,27),1:LOCATE 4,31:PRINT "USL"
600 LINE (200,43)-(230,43),2:LOCATE 6,31:PRINT "HAPAG"
610 Z$=INKEY$:IF LEN(Z$)=0 THEN 610
```

Computer-Program for Voyage Cost Comparison :
(TEU Loaded Excluding Feedering Cost)

```
10 REM program W1N
20 CLS:SCREEN 0:WIDTH 80:LOCATE 10,10:INPUT "T-EXT  or  G-RAPHIC  --->
30 LL[1]=4:LL[2]=7:LL[3]=9:LL[4]=12:LL[5]=14:LL[6]=17:LL[7]=19
40 DIM Q(100,4):J=1:REM USL
50 FOR NK=100  TO 4482 STEP 100
60 KS=11/365*(5247+10236)
70 KP=9*(63+NK*14/4482)*112+2*2.5*112+14/24*2.5*112:KP=KP/1000
80 KPOR=25
90 KDL=(NK*150+NK*80+9.059999*NK*9)/1000
100 TOT=KS+KP+KPOR+KDL
110 W1=TOT/NK:W2=TOT/(NK*11)
120 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT:J=J+1
130 IF F$="G" THEN 150
140 PRINT NK;W1;W2*1000;TOT
150 NEXT NK
160 IF F$="T" THEN 350
170 SCREEN 1:COLOR 0,0:LINE(30,10)-(30,170),3:LINE(30,170)-(295,170),3
180 FOR X=500 TO 5000 STEP 500
190 LINE (30+X*.05,170)-(30+X*.05,175),3
200 NEXT X
210 FOR Y=1 TO 7:LINE (25,170-Y*100*.2)-(30,170-Y*100*.2),3:NEXT Y
220 LOCATE 23,4:PRINT "0     1000   2000    3000   4000   5000"
230 LOCATE 21,35:PRINT "BOXES":LOCATE 3,7:PRINT "$/BOX"
240 LOCATE 4,7:PRINT "[ths]"
250 PP$="7654321":FOR L=1 TO 7:LOCATE LL[L],3:LL=LL+2:PRINT MID$(PP$,L

260 X=Q[1,1]*250/5000+30
270 Y=170-Q[1,2]*.2
280 LINE (X,Y)-(X,Y),1
290 FOR K=2 TO J-1
300 X=Q[K,1]*250/5000+30
310 Y=170-Q[K,2]*.2
320 LINE -(X,Y),1
330 NEXT K
340 REM hapag
350 J=1
360 FOR NK=100  TO 2594 STEP 100
370 A=(27+1/24)/365
380 KS=A*(3551+10734)
390 KP=(17+14/24)*(75+NK*17/2594)*112+(3+11/24)*48*112+(1+3/24)*5*112+
3*112:KP=KP/1000
400 KPOR=7*10+5*15
410 KDL=(NK*300+NK*160+9.059999*NK*22)/1000
420 TOT=KS+KP+KPOR+KDL
430 W1=TOT/(NK*2)
440 W2=TOT/(NK*22)
450 Q[J,1]=NK:Q[J,2]=W1*100:Q[J,3]=W2*1000:Q[J,4]=TOT
460 J=J+1
470 IF F$="G" THEN 490
480 PRINT NK;W1;W2*1000;TOT
490 NEXT NK
500 IF F$="T" THEN STOP
510 X=Q[1,1]*250/5000+30
520 Y=170-Q[1,2]*.2
530 LINE (X,Y)-(X,Y),2
540 FOR K=2 TO J-1
550 X=Q[K,1]*250/5000+30
560 Y=170-Q[K,2]*.2
570 LINE -(X,Y),2
580 NEXT K
590 LINE (200,27)-(230,27),1:LOCATE 4,31:PRINT "USL"
600 LINE (200,43)-(230,43),2:LOCATE 6,31:PRINT "HAPAG"
```

Hapag-Lloyd's North Atlantic Multi-Port Itinerary



Note:Total Distance ---------- 8,825 kn

Numbers with Bracket-----Distance

Number without Bracket---Voyage Duration/Day

27 days for a round trip

The Plan of Senator Line to the RTW

1. Organizational and Management Aspects

   As the company is a pure management company, initiated by Mr.Karl-Heinz Saga,the management staff will be very limited and the management will concentrate mainly on marketing,chartering ships and containers as well as ships logistics.

   The main office will be in Bremen, Germany.

   The new service is to be inaugurated in next April.

2. Marketing Aspect

   Marketing network will be based on agencies in the main calling ports. It is expected to have an own office in Germany (Bremen),USA and Far East.

   The service will operate as an independent carrier in all market segments.

3. Service Configuration

   1)Fleet

   There will be between 24 and 26 ships employed in the RTW service.

   All ships will be on time charter.

   2) General Particulars of ships

   The ships will be container ships with the capacity of 1,300 TEU.

   All ships are not older than 5 years with crew about 20. The fuel consumption is known to be about 40 tons, mainly fuel, only a small percentage of diesel for the calling manoeuvres.

   The operational speed will be between 16 and 18 knots.

3) Calling ports

The service will operate east and westbound circum-navigation , therefore the ports have to be called at in both directions such as, Bremen, Rotterdam, Genua or Marseille, Jeddah, Bombay, Singapore, Hong Kong, Kaohsiung, Kobe or Pusan, Long Beach, Panama, Kingston, Savannah or Charlston, Norfolk, New York, Southampton and Bremen.

4) The service frequency is to be expected weekly,but in the phasing-in period of about 9 months it will be a fortnights and in the first stage a three week service.

5) Feeder System

The cargo should be attracted directly, therefore, there would be limited feeder possibilities with independent feeder services.