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Comparative study of logistics services in the container liner shipping market in the U.K. and South Korea

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A COMPARATIVE STUDY OF LOGISTICS SERVICES IN THE CONTAINER LINER SHIPPING MARKET IN THE U.K. AND SOUTH KOREA

by

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Copyright Statement

Abstract

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A COMPARATIVE STUDY OF LOGISTICS SERVICES IN THE CONTAINER LINER SHIPPING MARKET IN THE U.K. AND SOUTH KOREA

In line with the dramatic changes of business environment, certain liner shipping companies have claimed that what they are providing is a 'logistics service' rather than a 'traditional shipping service'. It was found that there is a shortage of discussion in existing literature related to the liner shipping industry regarding the introduction of logistics service and no empirical study on how the operation of such a logistics service has been perceived by shippers. The prime objective of the research is to provide a practical clarification to understanding an operation of logistics service in the liner shipping market.

The Delphi technique was used to investigate the difference between the features of traditional shipping service and those of logistics services. It also explored the driving forces, which appear to stimulate liner shipping service providers to adopt logistics service concepts into their business area. A mail questionnaire was developed to analyse shippers' perception of logistics service and measure the performance of logistics service operation with reference to the international shippers in the U.K. and South Korea.

An analysis of the survey revealed that there is a significant association between years in business and the perception of logistics service. With regard to the analysis of relationship between service providers' performance and choice of service providers, the research reached an answer by analysing the correlation between service providers' performance and the behaviour of choosing service providers. A positive correlation was found for transport, payment, and cargo related factors. On the other hand, no correlation was found for the document factor. With reference to these findings, service providers could initiate the target marketing for various classes of shippers. The comparisons between the U.K. and South Korean shippers were made in terms of the level of satisfaction on the service functions.

The Delphi technique indicated the exploratory findings related to the conceptualisation of logistics service in the liner shipping market. The research dealt with experts' points of view only, albeit in some depth. However, the conceptualisation would be more developed if the views of service providers and service consumers were also sought. Based upon the size of the sample, caution must be exercised when making any broad generalisation.

The research makes an original contribution to knowledge by applying a service function approach to a logistics service concept in the liner shipping context for the first time. The research findings could help explain consumers' assessment of their service provided in a wider variety of industries and therefore add to the understanding of perceptions and the assessment of the nature of logistics service operations.

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Author's Declaration

No part of this thesis has been submitted for any award or degree at any institute.

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award.

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CHAPTER 1

Introduction

This chapter aims to explain the reason and provide justification for researching 'logistics service' in the liner shipping market. Furthermore, it will detail the research objectives, the methodology used, and the structure of the thesis. This research is mainly concerned with the operation of logistics service in the container liner shipping market.

1.1 Research Background

When asked to remark something about shipping, people would probably mention either passenger ships or fishing boats. However, the importance of shipping to the business world is never in any doubt. Any one or company that is engaged in international trade should appreciate the role of shipping in the business world. In particular, for some countries relying heavily on international trade, it is inconceivable not to put a high priority on shipping.

The liner shipping industry has undergone many dramatic changes over recent years, stemming from the combined effect of more severe competition between carriers, greater containerisation penetration, developments in information technology and the emergence of world-wide strategic alliances. Considering these environmental changes, the traditional type and quality of shipping service may no longer be suitable for today's more demanding and sophisticated shippers. Therefore, liner vessel operators and ocean transport intermediaries, such as freight forwarders and non-vessel-operating-common-carriers (NVOCCs), appear to have sought to employ the logistics service concept into their business operations.

The provision of a logistics service by liner shipping service providers is a relatively new term. McKnight *et al.* (1997) argue that in the 1990s, major shipping lines began to claim that they provide a logistics service not just a traditional shipping service. It was claimed that, with a changing environment, shipping companies ought to do something new and question whether or not what they have claimed is yet matched by shippers' perception.

Despite its importance in liner shipping, the research about logistics service has not been extensively carried out. Most research previously carried out focuses solely on shippers' carrier selection (Brideweser and Paton, 1981; Brooks, 1984,1985,1990,1995; Collison, 1984; Lu and Marlow, 1999; Jamaluddin, 1995; Kent and Parker, 1999; Gibson *et al.*, 2002; Tiwari *et al.*, 2003). Those studies were primarily concerned with identifying 'elements' or 'attributes', which are chosen by either shippers or carriers. There has been very little research about how logistics service in liner shipping has been adopted, what has caused it to happen, and how shippers actually perceive this new service term. However, considering its importance to liner shipping, research about logistics service is definitely worthy of academic attention.

This research is carried out on the basis of a comparative study of U.K. and South Korea, strategically located at the gateway to Western Europe and to the Far East respectively. Both countries have been playing a major role in the shipping world. It would be quite interesting to find out the general aspects of liner shipping in the two countries and investigate the operation of logistics service from the perspective of international shippers. A comparison of international shippers' judgements on the logistics service in the liner shipping market is particularly worthwhile.

1.2 Research Objectives

Given the valid reasons discussed in the previous section as to why a 'logistics service' should be researched, the main objective of the research is to investigate the operation of a logistics service in the liner shipping market. The specific objectives are the following. First, this research aims to discover the driving forces, which can stimulate shipping service providers in the liner shipping market to employ the concept of logistics service into their business areas. Second, this research aims to investigate the difference between the features of traditional shipping service and those of logistics service. Third, this research aims to analyse shippers' perception about logistics service in terms of their various business characteristics and finally to investigate the relationship between the preferred choice of service providers about each logistics service function and the degree of satisfaction about each logistics service function.

1.3 Research Methodology

This research adopts a combined methodology by implementing Delphi methods to deal with the qualitative data and survey methods to deal with the quantitative data. In order to identify the functions of logistics service and obtain experts' opinion about the driving forces of logistics service and the difference between traditional shipping service and logistics service, qualitative research is thought to be the ideal approach to this research. Hence, the Delphi method is employed to obtain the most reliable consensus of opinion of a group of experts (Linstone and Turoff, 1975) and to "*counteract problems identified in getting collective opinions from expert groups*" (University of Manchester, 1994, p.4).

In order to analyse the operation of logistics service from international shippers' point of view, the required data should be obtained in a quantitative format. One of the most popular methods for obtaining quantitative data is a survey method. The justification for employing a survey method will be more discussed in Chapter 5. A mail questionnaire was

designed to analyse the shippers' perception about logistics service and the relationship between the degree of satisfaction and the preferred choice of service providers. A chi-square test, factor analysis, and one-way ANOVA were employed for the statistical analysis using SPSS computer statistical package (version 11.5.1).

1.4 Structure of Thesis

The thesis consists of 9 chapters. The first chapter provides an introduction and overview of the thesis.

Chapter 2 begins with exploring shipping in general, investigates the current situation in the liner shipping market and also reviews the liner shipping industry in the U.K. and South Korea, mainly focusing on the comparison of aspects of both countries' current development of the shipping industry. Particularly, research problem areas in the liner shipping market emerge in this chapter.

Chapter 3 as a whole reviews the disciplines of general logistics and international logistics in relation to shipping. In this chapter, an overview of logistics is presented, highlighting the explanation of relations with marketing, transport, and service. This chapter also deals with international logistics and finally, for the research, conceptualises a logistics service in a liner shipping context. The focused review on the research problem areas results in successfully identifying the research problems for the research.

Chapter 4 details the conceptual model and formulates the research hypotheses. The successful development of a conceptual model should properly link the literature review with the analysis of the data. The research objectives are re-emphasised in this chapter. Having illustrated each construct as a variable with a logical link, the research can

formulate several research questions. Based on the research questions, testable hypotheses are discussed and developed in this chapter.

Chapter 5 details the research methodology used in this study. This chapter discusses the data collection methodology. The Delphi technique and a survey method are detailed. This chapter also justifies why the research has adopted the Delphi technique and the survey method. Furthermore, the sampling method is also discussed. In order to improve the quality of the research, the issues of reliability and validity are discussed. Finally, the descriptions of the statistical techniques to be used will be presented.

Chapter 6 analyses the results of the Delphi technique. This chapter presents several important findings including the environmental motives for employing logistics service in liner shipping and the comparison of the features of logistics service and traditional shipping service, and finally refines logistics service functions previously identified from the literature review.

Chapter 7 presents the preliminary findings of the survey, illustrating the features of the data collected. Prior to the main analysis, the first step details the basic characteristics of each variable, including the shippers' company characteristics, the characteristics of the cargoes, and a profile of shippers' perception about logistics service. In addition, the characteristics of service providers and the degree of satisfaction about each logistics service function are also outlined.

Chapter 8 mainly deals with testing the research hypotheses formulated in Chapter 4. The techniques involve cross-tabulation, Chi-square tests, factor analysis, a one-way ANOVA, and T-test. In order to obtain the reliability of the data collected, a reliability test based on Cronbach's alpha was also performed.

Chapter 9 concludes the thesis with a summary of the research and a discussion of conclusions drawn from the findings of the study. In addition, this chapter presents the implications of the research in relation to both theory and practice, and the limitations of the study. Chapter 9 closes with suggestions for future research on the strategy of service improvement for liner shipping service providers.

CHAPTER 2

Overview of Liner Shipping

Despite its importance to the world economy, the liner shipping industry is little known to the general public. In practice, however, the liner shipping industry plays an important role in the growth of world trade, carrying about 60 per cent of the value of goods transported by sea (Drewry, 1996). It provides fast, frequent and reliable transport for various cargoes at a predictable charge.

This chapter aims to describe general aspects of liner shipping and identify the problems and issues with which the liner shipping industry is confronted. Prior to detailing the liner shipping market, this chapter also briefly deals with the general shipping market. However this chapter focuses mainly on the specifics of liner shipping.

2.1 The General Shipping Market

2.1.1 The importance of shipping

Shipping is one of the world's international industries. The shipping industry has provided the means for an extraordinary growth of world trade, as business has become more and more internationalised. Shipping has been regarded as the accelerator of economic development for a long time.

Adam Smith in 'The Wealth of Nations' sees shipping as one of the stepping stones to economic growth (Smith, 1983). He states that the defence of the country depends largely upon the volume of shipping. He adds that shipping is a source of cheap transport that could open up wider markets, by offering transport for most products at prices far below those that can be achieved by any other means. Cipolla (1970) describes the shipping

industry as one of the fundamental forces responsible for changing the business world from a national system to a globalised system. Frankel (1987) also states that the development of shipping industry is vital for international trade, with the majority of international cargoes transported by ships.

In the 1980s, there were many newly industrialised and advanced developing countries, which seem to depend heavily on trade with other countries, such as Singapore, South Korea and Taiwan. It is interesting to note that most newly industrialised countries put a high priority on shipping development as an essential element in contributing towards their trade and economic growth and, at that time, their economic growth rates were much higher than those of the developed countries. In order to support this discussion, information on the fleet ownership of major trading nations is provided in Table 2.1.

Table 2.1 Maritime engagement of 15 major trading nations (as at the end of 2000)

Country/Territory	Percentage share of world trade generated in terms of value	Percentage share of world fleet in terms of dwt
United States	15.7	7.87
Germany	8.1	4.11
Japan	6.6	12.74
United Kingdom	4.7	3.76
France	4.6	1.48
Italy	4.6	1.84
Canada	4.0	0.37
China	3.6	5.22
Hong Kong, China	3.2	5.49
Netherlands	3.1	0.85
Belgium-Luxembourg	2.9	0.99
South Korea	2.6	3.35
Taiwan	2.2	2.47
Singapore	2.1	5.14
Spain	2.0	0.71
Total	**69.0**	**56.39**

Source: Adapted from UNCTAD (2001)

As shown, the major trading nations are also major owners of tonnage. Therefore, it should be considered that maritime capabilities, specifically the ownership of substantial tonnage, are essential for the country's trade support and promotion.

Along with the development of technologies, the shipping industry still maintained its important position in the 1990s. King (1997, p.384) also notes that "*shipping is a key constituent of many supply chains and its pre-eminent role in international transport is unlikely to be challenged in the foreseeable future*".

2.1.2 Market classification by types of cargoes

The shipping market consists of two main sub-divisions, namely bulk shipping and liner shipping. They are classified in terms of types of cargoes handled. Bulk shipping provides transport for ship-loads of cargo on 'one ship one cargo' basis, whereas liner shipping deals with small cargo parcels on a common carrier basis.

2.1.2.1 Bulk cargo

Most bulk cargoes are generated from the trade in raw materials such as oil, iron ore, coal and grain, and these items are called bulk commodities. Stopford (1997, p.15) classifies the following as the four main categories of bulk cargo.

Liquid bulk: *requires tanker transportation. The main ones are crude oil, oil products, liquid chemicals such as caustic soda, vegetable oils, and wine. The size of individual consignments varies from a few thousand tons to half a million tons in the case of crude oil.*
The five major bulks: *covers the five homogeneous bulk cargoes - iron ore, grain, coal, phosphates and bauxite - which can be transported satisfactorily in a conventional dry bulk carrier or tweendecker.*
Minor bulks: *covers the many other commodities that travel in shiploads. The most important are steel products, cement, gypsum, non-ferrous metal ores, sugar, salt, sulphur, forest products, wood chips and chemicals.*
Specialist bulk cargoes: *includes any bulk cargoes with specific handling or storage requirements. Motor vehicles, steel products, refrigerated cargo and special cargoes, such as a cement plant or prefabricated building, fall into this category.*

2.1.2.2 Liner cargo

Liner cargo consists of consignments of less than ship or hold size. There is no particular rule on what forms liner cargoes but Stopford (1997, p.17) provides the following classification of liner cargoes.

Loose cargo: *individual items, boxes, pieces of machinery, etc., each of which must be handled and stowed separately. All general cargo used to be shipped this way, but now almost all has been unitised in one way or another.*
Containerised cargo: *standard boxes, usually 8 feet wide. 8 feet high and 20, 30, or 40 feet long filled with cargo. This is now the principal form of general cargo transport.*
Palletised cargo: *cargo packed onto a pallet for easy stacking and fast handling*
Pre-slung cargo: *small items such as planks of wood lashed together into standard-sized packages.*
Liquid cargo: *travels in deep tanks, liquid containers or drums.*
Refrigerated cargo: *perishable goods that must be shipped, chilled or frozen, in insulated holds or refrigerated containers.*
Heavy and awkward cargo: *large and difficult to stow.*

2.2 The Liner Shipping Market

In order to provide a more profound understanding of the liner shipping market, this section investigates the relevant facts related to liner shipping: its history, liner conferences, the main trade routes, the development of liner fleets, the competition with other transport modes, etc.

2.2.1 Liner shipping defined

Branch (1996, p.48) defines liner shipping as:

"where vessels ply a regular scheduled service between groups of ports. Liners sail on scheduled dates, irrespective of whether they are full or not"

In liner shipping operation, the regular scheduled service is the prime feature of the service offered, and it is, therefore, vitally important that every service operation should have punctual operation schedules. If any liners are not able to maintain these basic functions, their reputation in the market will decline and eventually they will go out of business.

Another particular feature is that the ships engaged in liner shipping are not supposed to wait until they are fully filled by cargoes. The ships must leave at a previously fixed time regardless of whether they are full or not. Therefore, the more cargoes shipped, the more operation profits guaranteed. This feature, therefore, leads to a higher degree of competition between liner shipping companies to secure as many cargoes as possible into their ships.

2.2.2 Historical background of liner shipping

Until the mid-nineteenth century, shipping companies were largely organised on an *ad hoc* basis (Deakin and Seward 1973). During that period, the shipping industry provided a service on demand basis for individual shippers since the shipping industry did not possess any capability to offer regular scheduled services.

In the 1870s, liners were first introduced to the shipping industry. Along with the new development of steamship technology, shipping companies were able to offer scheduled services (Frankel, 1987). In addition, the opening of the Suez Canal in 1869 led to a freight market boom, which created much demand for steamships to set up liner services (Stopford, 1997). Largely stimulated by these factors, the shipping industry established the fundamental structure for the future development.

Until the 1960s, the liner shipping industry mainly operated multi-purpose vessels, which were known as cargo liners, carrying most types of cargoes. Despite their flexible features such as multi-deck facilities, cargo liners were criticised as more labour and capital consuming. In the 1950s, labour became more expensive, productivity was thought to be more important than flexibility in the business world (Stopford, 1997). Until the mid-1960s, the labour-intensive nature of liner shipping operation was incapable of much

improvement (Gilman, 1983). Expensive cargo liners spent two-thirds of their time in port and cargo-handling costs had increased to more than one-quarter of total shipping cost (Rochdale Report, 1970). As a result, the expensive cargo liner system, which produced relatively poor delivery performance, could not attract shippers any more. Graham and Hughes (1985) also state that as the volume of cargo increased, liner operations found it increasingly difficult to provide the service that shippers required at an economic cost, and their profit margins were forcefully reduced. Therefore, carriers started to consider new systems, which could overcome this problem.

Searching for a resolution, containers were introduced as the standardisation of the cargo unit (Schirach-Szmigiel, 1979). In order to exploit the standardisation, a combined transport system was immediately required, leading to the emergence of purpose-built cellular container ships at sea, container handling facilities at port, and inland transport facilities capable of carrying containers on land.

In 1966, Sea-Land inaugurated the very first deep-sea container service on the North Atlantic. Following this revolutionary inauguration, the liner shipping market has been largely dominated by containerisation. McLellan (1997) notes that the structural expansion of world trade in general cargoes has encouraged the acceleration of containerisation as well as benefited from the containerisation. Cheap to operate and easy to handle, the widespread use of containers accounts for close to 60 per cent of sea-borne trade by value although only about 15 % by weight (UNCTAD, 1997).

2.2.3 Trends in global container liner shipping

2.2.3.1 Dominated by containerisation

The global container liner trade has increased every year since the introduction of unitisation to deep-sea routes, despite the highly fluctuating economic environment during this period. This phenomenal rate of container traffic growth is displayed in Table 2.2. Until the 1990s, this growth was largely sustained not only by any parallel increase in the size of the overall general cargo market (Drewry, 1996), but also by the twin factors of increasing penetration of that market by container operators and the rapid development of transhipment practices (Peters, 2001).

Table 2.2 The growth of world container trade 1982 to 2001

Year	Total Boxes (m. TEU)*	Annual Growth (%)
1982	43.8	4.5
1983	47.5	8.4
1984	54.6	14.9
1985	57.2	4.8
1986	62.2	8.7
1987	68.3	9.8
1988	75.4	10.5
1989	82.0	8.7
1990	87.4	6.6
1991	95.8	9.6
1992	105.2	9.9
1993	115.3	9.5
1994	126.7	9.9
1995	137.7	8.8
1996	147.3	7.0
1997	164.3	11.5
1998	183.6	10.5
1999	203.2	10.4
2000	231.7	14.0
2001	236.7	2.2

* Number of port handling movements, loaded and empty, including transhipment.
Source: Containerisation International Yearbook (various years)

However, the figures shown in Table 2.2 do not represent the actual paying cargoes. It is assumed that of these numbers an average of 20 per cent are empty boxes and a similar percentage represents transhipment containers. World container transhipment demand

alone is predicted to reach 103 million TEU to 115 million TEU by 2010, representing just over a fifth of all containers handled. This follows a doubling of transhipment traffic between 1995 and 2001, up to 54.6 million TEU, equivalent to 22% of all traffic handled that year (Dekker, 2003a). Taking these facts into account, the proportion of filled boxes handled stands at 60 per cent, representing both a loading and a discharging, in other words counting twice. In order to obtain a correctly estimated number of TEU actually shipped (ignoring transhipment moves and empties), only half of this figure, i.e. 30 per cent of the total world-wide moves, should be taken into account (Braam, 2000).

First of all, the reason why containerisation has become more competitive is that container loads have a relatively higher unit value than any other cargo. Jansson and Shneerson (1987) suggest containerisation not only saves labour for loading and discharging cargoes, but also eliminates the need for expensive break-bulk cargo handling at ports and at inland container depots. Furthermore, the container has unique characteristics which can be easily linked with rail and road transport.

According to the analysis of the Bremen-based Institute for Shipping Economics and Logistics (Fromme, 1996), there appear to be certain reasons why container volumes are expected to expand to a greater extent. First, the increasing exchange of higher value goods on a global scale can be performed in the form of container transport. Second, the transformation of fast-growing developing countries into industrial countries can result in greater volume of cargoes, which we have already observed through the examples of South Korea, Taiwan, Singapore, and now China.

Similarly, Peters (2001) suggests that global general cargo and container volumes will continue to grow for many years to come, referring to the increase in the volume of general cargo, the impact of trade liberalisation, and continuing increase in the incidence of

transhipment. Given these facts, the future of liner shipping markets will increasingly belong to the container carriers rather than the alternatives.

2.2.3.2 Liner conferences

Liner conferences have been the dominating feature of the liner shipping market so far. They were originally established to deal with the pricing problem in the 1870s. The UNCTAD (1974) defines a liner conference as:

> *"a group of two or more vessel-operating carriers which provides international liner services for the carriage of cargo on a particular route or routes within specified geographical limits and which has an agreement or arrangement, whatever its nature, within the framework of which they operate under uniform or common freight rates and any other agreed conditions with respect to the provision of liner services"*

Branch (1996) summarises the purposes of the liner conferences in four points: to provide a service adequate to meet the trade requirements, to avoid wasteful competition among members by regulation, to organise themselves so that the conference can collectively compete with other non-members, and to maintain a tariff by mutual agreement as stable as conditions permit.

2.2.3.2.1 Closed conferences

This type of conference is more common. It restricts membership, sets freight rates for the conference members and determines trade share for each member (Graham and Hughes, 1985). This allows the members to adjust capacity to meet demand and avoid duplication of port calls. Such closed conferences, however, have been criticised for the following reasons (Stopford, 1988). First, they may impose a semi-monopoly position. Second, the fixed trade share may eliminate the incentive to improve services. Third, they may respond slowly to any changes in the commercial environment because of the bureaucracy, an inevitable characteristic of conferences. Finally, such conferences are prone to be influenced by political interference and pressure.

2.2.3.2.2 Open conferences

Open conferences also set freight rates but, unlike closed conferences, do not restrict membership. Since there is no control over the volume of shipping operating on the route and no restraint on trade share or number of ships in service, these conferences are likely to be vulnerable to overtonnaging (Stopford, 1988).

Until the early 1980s, conferences were the dominant form of inter-organisational structure developed to control destructive competition in the liner shipping industry. However, the numbers of member lines in many conferences has fallen in the past two decades (Brooks, 2000a).

2.2.3.3 The liner fleet

2.2.3.3.1 Types of vessels

The fleet of ships operating in the liner trades consists of six different types of ships. Stopford (1997, p.373) describes the features of these ships in the following:

***Container ships**: Cellular 'lift on lift off' (Lo-Lo) container ships are now the biggest and most modern part of the fleet.*
***Multi-purpose vessels**: These ships are designed with a fast speed, good container capacity and the ability to carry break bulk and other unitised cargo.*
***Tweendeckers**: These flexible tramp vessels continued to be built until the 1980s and these ships are still in use.*
***General cargo liners**: They are fast with multiple decks, extensive cargo gear but poor container capacity.*
***Ro-ros**: Multi-deck vessels in which the holds are accessed by ramps in the bow, stern or side. Although these are similar in design to car ferries, they are designed primarily to carry cargo on deep-sea routes.*
***Barge carriers**: These carry 500 ton standard barges, which are floated or lifted, on and off the ship.*

2.2.3.3.2 Sizes of vessels

The size of container vessels employed in mainline trades has increased dramatically since 1970. Several studies, for example, Gilman (1983), Pearson (1988), Fossey (1994), and

Fossey (1997) classify the development of container ships into 'generations', i.e., as having characteristics typical of certain stages in container development. Table 2.3 shows increases in size measured as container handling capacity.

Table 2.3 Characteristics of container ships

Generations	Year	Maximum Capacity (TEU)
First Generation Container Ships	1964	1,000
Second Generation Container Ships	1972	1,500
Third Generation Container Ships	1980	3,000
Fourth Generation Container Ships	1984	4,500
Fifth Generation Container Ships	1995 -	over 6,000

Sources: Extracted from Gilman (1983), Pearson (1988), Fossey (1994), and Fossey (1997).

It has been unanimously claimed that the economies of vessel size lead to the fact that as vessel size increases, capital costs per container slot fall substantially, the ratio of crew members to carrying capacity declines and the cost of fuel per unit of cargo carried also tends to fall. The capacity of early cellular container vessels was under 1,000 TEU. Whilst the constraints of length and breadth imposed by the Panama Canal discouraged the ordering of container ships of over 3,800 TEU, major shipping lines ordered post-Panamax tonnage in the 1990s.

It was generally expected that post-Panamax will become the choice of vessel for those carriers in the mainline trades and that larger ships will dominate the liner shipping operation in the future (Fossey, 1994). The post-Panamax sector now represents 24 % of the cellular fleet, with 1.4 m TEU of capacity supplied by some major shipping lines (Containerisation International Yearbook, 2003).

It was reported that 481,348 TEU of slot capacity was ordered by the end of 2002 (Containerisation International Yearbook, 2003). This can represent a return in confidence for the global container trades. Twenty-seven new ships were contracted in December

2002 with a total of 121,798 TEU, which was the highest capacity ordered in a month for almost three years (Willmington, 2003). Partly due to recent slowdown in global trade, any ultra-Panamax tonnage of 9,000 TEU plus has not been ordered yet. However, once the market improves, it is expected that some ocean carriers will operate the next series of largest containerships in the world (Containerisation International Yearbook, 2003).

2.2.3.4 Liner shipping routes

As shown in Table 2.4, the liner shipping routes can be divided into two main groups. In 2002, the East-West trades recorded 26,667,000 TEU (Containerisation International, 2003a), which circle the globe in the Northern Hemisphere, linking the major industrial centres of North America, Western Europe and Asia. The North-South trades accounted for 11,613,000 TEU (Containerisation International, 2003b), operating mainly between the three major industrial areas and the countries in the Southern Hemisphere. Elsewhere, intra-regional routes operating in shorter haul and with smaller ships account for the remains of trade.

Table 2.4 Major liner routes and TEU transported, 2002

Route	TEU
East-West trades	
North America-South East Asia	1,818,000
North America-North East Asia	10,524,000
Europe-East Asia	8,280,000
Europe-West Asia	1,822,000
Europe-North America	4,223,000
Total	**26,667,000**
North-South trades	
Europe-Oceania	503,000
Europe-West Africa	666,000
Europe-Latin America	2,480,000
North America-Latin America	2,919,000
North East Asia-South East Asia	3,531,000
Asia-Oceania	1,514,000
Total	**11,613,000**

Source: (Containerisation International, 2003a and 2003b)

Among these two trade routes, the East-West trades dominate the liner market. Table 2.5 provides details on cargo movements in the three major container trade routes between 1997 and 2000. It is particularly noted that the growth rates for 1998 and 1999 in US-Asia and Europe-Asia were relatively lower than other routes in the same period. This particular market situation appears to have been caused by the crisis in Asian economies during those years.

Table 2.5 Cargo movements on the three major trade routes for 1997-2000

	Transpacific		Asia-Europe		Transatlantic	
	Asia-US	US-Asia	Asia-Europe	Europe-Asia	US-Europe	Europe-US
1997	4,600	3,610	3,290	2,730	1,270	1,556
1998	5,220	3,300	3,490	2,710	1,330	1,700
1999	5,840	3,370	3,950	2,850	1,340	1,710
2000	7,100	3,591	4,150	3,050	1,410	1,800

Source: UNCTAD (2000, p.55) Unit: thousands of TEUs

2.2.3.4.1 The Trans-Pacific trade

The biggest deep sea liner route is the trans-Pacific trade between North America and the Far East, representing 12.3 million TEU in 2002, equivalent to 22 per cent of the world total (Containerisation International Yearbook, 2003). The services operate between the North American ports on the East Coast, the Gulf and the West Coast, and the industrial centres of the Far East, with some services extending to the Middle East.

2.2.3.4.2 The North Atlantic trade

The North Atlantic was the first route containerised in the mid-1960s. Since then, it has linked the two major industrial centres of the world: East Coast North America and Western Europe. It had a trade of 4.2 million TEU, accounting for 8 per cent of the world container trade in 2002 (Containerisation International Yearbook, 2003).

2.2.3.4.3 Western Europe/Far East trade

This route covers the trade of North Europe, stretching from Sweden down to St Nazaire in France, to the Far East, comprising West Malaysia, Singapore, Thailand, Hong Kong, the Philippines, Taiwan, China, South Korea and Japan. It had a trade of 8.3 million TEU, accounting for 13 per cent of world container trade in 2002 (Containerisation International Yearbook, 2003).

Bearing in mind that the U.K. and South Korea are both located at the opposite ends of the Western Europe/Far East route, this research has a special interest in this route. Particularly, there have been many developments on the Western Europe/Far East route. The main features are the birth of new alliances between container carriers, the restructuring of services with increased emphasis on mainland China, a rapid increase in slot capacity, rising trade volumes and a severe trade imbalance between the two regions (Matthews, 2003).

2.2.3.5 Major operators

The concentration of liner shipping activity becomes apparent when examining the share of the largest operators in the total operational fleet (UNCTAD, 2001). As shown in Table 2.6, the top 20 lines account for almost 60 % of the total capacity. It is suggested that the growing contribution of Asia to the world economy is reflected in the power of Asian carriers, which are now in the majority (13 shipping lines) in the list of the 20 largest liner shipping companies. For the research, it was particularly noted that P&O Nedlloyd is ranked third with 145 ships and 392,065 TEU capacity and Hanjin is ranked fifth with 75 ships and 294,705 TEU capacity. Another South Korean line, HMM, is ranked 17th with 34 ships and 131,897 TEU capacity.

Table 2.6 Top 20 container service operators (August 2003) on the basis of number of ships and total shipboard capacity (TEUs)

Rank	Operator	Country/Territory	Number of ships	TEU Capacity
1	Maersk-Sea Land	Denmark	285	765,430
2	Mediterranean Shipping	Switzerland	205	490,404
3	P&O Nedlloyd	U.K./Netherlands	145	392,065
4	Evergreen Group	Taiwan	129	355,186
5	Hanjin	South Korea	75	294,705
6	APL	Singapore	81	269,732
7	Coscon	China	135	256,312
8	CMA-CGM Group	France	85	218,385
9	NYK	Japan	67	207,540
10.	CP Ships	Canada	87	201,472
11	K line	Japan	63	188,959
12	OOCL	Hong Kong, China	57	185,868
13	MOL	Japan	61	181,933
14	CSCL	China	87	169,363
15	Hapag-Lloyd Group	Germany	43	158,808
16	Yang Ming	Taiwan	53	148,452
17	HMM	South Korea	34	131,897
18	Zim	Israel	54	131,566
19	Wan Hai	Taiwan	59	84,404
20	PIL	Singapore	58	84,330
Total 1-20			**1,843**	**4,916,811**
World total			**7,271**	**8,147,713**

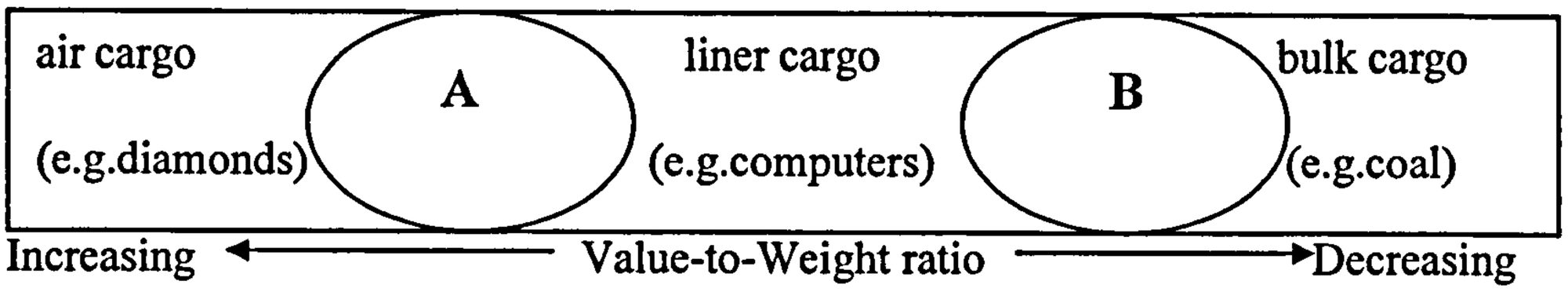
Source: Containerisation International Database (2003a).

2.2.4 Competition with other transport modes

Competition usually exists in most industries. Liner shipping also faces inter-modal and intra-modal competition. In other words, liner shipping competes with air transport and bulk shipping in the interest of securing their prospective customers. From the international shippers' point of view, they select the transport mode by considering the value of cargo, time sensitivity, other cargo characteristics, etc.

In Figure 2.1, some cargoes in oval A can be shipped by either containership or aircraft. Likewise, some cargoes in oval B can be shipped either by containership or bulk ship. It is quite safe to say that opportunities are equally presented for each transport mode. However, it will be a question of who can do better than their rivals to secure more cargoes.

Figure 2.1 Cargoes classified by transport mode (according to value)



Source: Author

2.2.4.1 Competition with air transport

Table 2.7 shows that cargoes transported by air equal about 0.28 % of the weight of ocean cargoes. However, this information could be misleading, since most seaborne trade is made up of bulk items, such as coal, grain, ore, oil and similar commodities. The nature of air cargo, mostly high-value, low-density items, brings the total value of air cargo up to nearly twenty percent of the world total (Lewis, 1994). Air cargoes include high-valued items such as computers and electronic equipment; perishables such as cut flowers and live seafood; time-sensitive documents and spare parts.

Table 2.7 World trade comparison in 2000

Trade Area	Metric Tons Ocean All Cargo	Metric Tons Air All Cargo	Air Tons as % of Ocean Cargoes
World total	5,434,000,000	15,462,000	0.28 %

Source: Institute of Shipping Economics and Logistics (2002) and IATA (2001)

The low transit time air transport provides is the greatest advantage for international transport. The speed of an aeroplane, combined with a high frequency of scheduled flights, has typically reduced transit times. Recently, the advantage of lower transit times has stimulated the development of international air transport services. On the other hand, liner shipping has had a price advantage in contrast with air transport. Air transport has high freight rates, which have prevented many shippers from transporting international

shipments by air. Generally, only highly valuable, highly perishable, or urgently needed commodities can bear the higher cost of airfreight (Coyle *et al.*, 1992).

In Figure 2.1, cargoes in oval A can be derived from two sources: (1) cargo that has been upgraded from direct seafreight; and (2) cargo that has been downgraded from direct airfreight (Raguraman and Chan, 1994). To determine the suitability of air transport or container transport, international shippers need to consider the level of service as well as their cargo characteristics.

2.2.4.2 Competition with bulk shipping

Since the early 1990s, increases in vessel size and consistent reductions in unit costs have enabled container vessel operators to offer sufficiently low freight rates to attract bulk and breakbulk cargoes. Cargoes transported by bulk are iron ore, coking coal, steam coal, bauxite, grain, soybean, and other minor bulks. Among these cargoes, minor bulks are the major target for ocean container carriers.

The growth in the minor bulk trades has not been spectacular, increasing from 640 million tonnes in 1990 to an estimated 715 million tonnes in 1998. It is noteworthy to compare this slow growth pattern with the container trades, which have doubled in movements from 249 million to 509 million TEU over the same period. Containerisation has already had significant penetration into the sugar, fertiliser, scrap, steel and forest product trades, which could be containerised (Flynn, 1998a).

This competitive advantage over bulk shipping was strongly supported by three key factors: service, fleet capacity, and cost. Container shipping possesses the well-known advantages of unitised shipments, including door to door service, better inventory control, greater speed (container ships average 18.8 knots versus 14.5 knots for handymax bulk

carriers) and reduction in delays for loading and discharging. For the fleets, containerships have the added advantage of newer vessels with an average age of 10 years, compared with 18 years for their bulk counterparts. With the emergence of bigger container vessels, costs have dropped even lower. For instance in 1998, a 1,000 TEU vessel cost US$3.25 per TEU per day. The deployment of a 3,000 TEU vessel saves 50% and that of a 6,000 TEU vessel saves 75% (Flynn, 1998a). The straight reduction in operating costs enables container shipping to attract a sizeable portion of containerised bulk cargoes. The competition with air transport lies in both directions, whereas a competition with bulk shipping can be regarded as going one way. With the advantages described above, liner shipping is in a pole position to attract even more bulk cargoes.

Hayuth (1985) extracts certain factors considered vitally important in the decision making process regarding freight transport mode choice. They are "*total transit time, client deadlines, commodity value per tonne, stock-related elements, freight rate charges, commodity-volume-weight ratio, product perishability, size of shipment, and reliability*". With the aid of these factors, shippers can decide which transport mode is the most appropriate for their cargoes.

2.2.5 New operational climate

During the last decade, the liner shipping industry has witnessed certain re-structuring efforts within the industry and changes in the service operations. These are summarised in the following.

2.2.5.1 Emergence of hub ports

It is likely that more port calls will attract more customers to those ports where port calls are already made. However, more port calls also incur extra costs and require longer transit times as far as shipping companies are concerned. Economic forces appear to be favouring

the emergence of super-hubs and the changing pattern of port calls (Trace, 1997). By limiting port calls to regional hub ports, shipping companies can reduce costs. It has been suggested that ports must have throughput of 5 million TEU and logistics facilities to support the efficient flow of cargo (Lloyd's List, 2002). For instance, in the Europe-Far East trade, Singapore and Hong Kong hold their competitive positions over other ports in the region. Cargoes served by a hub port can be handled either by feeder shipping or by land transport (Clegg, 1998).

2.2.5.2 Evolution of multi-leg service patterns

Prior to containerisation, most liner owners operated out-and-back services between ports in two or more countries. Today, however, a 'multi-leg' service operation, defined as "*the fusion of several legs in the same direction*" (Gardiner, 1997), has emerged as a result of the scale of cargo flows between the three major Northern Hemisphere cargo generating regions: North America, Western Europe and Far East Asia.

As one category of multi-leg service, round-the-world (RTW) services link these regions with vessels continually circling the globe in an eastbound or westbound rotation (Porter, 1998a). Gardiner (1997) describes its benefits by stating that it halves the number of calls, which would have to be made under three separate end-to-end operations and also eliminates often poorly-loaded trips between ports.

Another category, pendulum services typically operate from East Coast North America, via Europe and Asia to West Coast North America, returning via the same route. Since the vessels employed on pendulum services do not need to transit the Panama Canal, post-Panamax vessels can be used. The main advantage of this service is saving a duplication of port calls in the central part of the pendulum (Gardiner, 1997).

Trace (1997) states that RTW and pendulum services share a number of common features: both services are operated by vessels large enough to benefit from economies of vessel size; port calls are limited to regional hubs; regional cargoes are brought to and distributed from these hubs either by feeder services or road/rail connections.

Major shipping lines have sought to maximise the range of their services by developing various new service patterns beyond those traditionally offered. In order to maintain their newly operated services, it has been widely accepted to form new types of co-operation between carriers.

2.2.5.3 Strategic alliances and mergers/acquisitions

In general, customers are widely and diversely located. So, shipping companies need to cover all the regions where various customers are located. In order to provide a high frequency of service with minimum investment, one of the possible business strategies is to form alliances with other companies. Attention has been focusing on strategic alliances that enable small numbers of major lines to work closely together by sharing on-board capacity and other facilities and equipment, and hence achieve savings (Yoshino and Rangan, 1995). Co-operation between shipping companies has existed for many years in container shipping, with not only a price setting 'co-operation' within conferences, but also various operational alliances and consortia (Kadar, 1996).

In recent years, there has been a tendency of a number of shipping companies to operate container tonnage on a consortia basis. Container consortia were formed in the 1970s by lines concerned with the high capital cost of container operations. Typically, consortia services were collectively restricting the competitive freedom of member lines. Such arrangements are not necessarily ideal in the more market-oriented 21st century.

Therefore, there has been a need to develop new types of co-operation between carriers. In particular, major global liners have sought to form alliances in order to gain control over costs and service offerings (Brooks, 2000a). Strategic alliances at present differ in important ways from the consortia of the 1970s. While co-operation within a single trade was popular in the 1970s, lines are now forming multi-trade or global alliances. As of June 2003, there are four major global alliances between ocean carriers, presented in Table 2.8.

Table 2.8 Major alliances as of June 2003

Name	Members	Geographic scope
New World	Mitsui OSK Line APL HMM	Europe-Far East, transpacific and transatlantic trades. Maersk/Sealand provide services in the transatlantic trade, with CMA CGM slot chartering space.
Grand	NYK Hapag-Lloyd OOCL P&O Nedlloyd MISC	The transatlantic, transpacific and Europe-Far East. MISC only participate in the Europe-Far East Trade. Atlantic Container Line, Lykes and TMM Lines participate in the transatlantic trade.
United	Hanjin DSR-Senator UASC	Transpacific and Asia/Europe trades. Elsewhere, Evergreen slot-charter on the AMA service. UASC contribute all vessels to the AEC service.
CHKY	Coscon Hanjin K line Yang Ming	Asia-Europe Transpacific Transatlantic

Source: Adapted from various tables in Containerisation International Database (2003b)

New World Alliance

With a partnership of APL (part of Neptune Orient Lines), Mitsui OSK, and Hyundai Merchant Marine, the New World Alliance (NWA), as it has been reformed and renamed from the former Global Alliance, emphasises its two main features of global reach and close co-operation. The alliance agreements allow for the exchange of vessel space, co-ordinated vessel sailings, and co-operation in the use of port terminals and container equipment. The NWA covers the Transpacific, Asia/Europe and Asia/Mediterranean trades and additionally has a slot charter agreement with Evergreen, covering the US/Asia market.

Grand Alliance

The Grand Alliance is a partnership of five carriers: NYK, Hapag-Lloyd, NOL, P&O Nedlloyd, and Malaysia International Shipping Corporation. The main benefits are better utilisation due to a reduction in the overall vessel contribution and capacity of the five partners, and a broadening of the port range. The Grand Alliance encompasses the Transpacific, Transatlantic and Asia/Europe services. MISC only participates in the Europe-Far East Trade. ACL, Americana Ships (Lykes and TMM) and the Cosco/K-Line/Yangming consortium have agreements with the Grand Alliance covering the Transatlantic trades.

United Alliance

United Alliance was initially formed by Hanjin Shipping, the German DSR-Senator Lines (now a part of Hanjin with a 70% share holding), United Arab Shipping Co., and a fellow Korean company Cho Yang. However, the collapse of financially troubled Cho Yang in 2001 and Senator's withdrawal from the US market in 2002 forced Hanjin to operate effectively on most routes. Under the circumstance, Hanjin has been forced to seek for further co-operation.

CHKY Alliance

CHKY is the most recently formed alliance since September 2001. Consisting of four major shipping nations in the East Asian region, Coscon, Hanjin, K line, and Yang Ming have created a huge East-West network.

The Maersk Line and Sea-Land service have been working together in the liner trades since 1991. Starting in the Transpacific, the co-operation was gradually extended to include the intra-Asian, intra-European and intra-American routes. After Maersk Line's

acquisition of Sea-Land, this mega-company became to possess a tremendous power in the market. Elsewhere, Evergreen and Mediterranean Shipping Company (MSC) have also worked together but operate independently.

Boyes (1999) calculates that there had been at least 42 mergers and/or acquisitions within the liner shipping business between 1994 and 1999. The selected examples are: the successful creation of P&O Nedlloyd (P&ON) through the merger of P&O Containers and Nedlloyd Lines; NOL's purchase of APL; Hanjin's stake in DSR-Senator; CP Ship's successive acquisition of a string of mainly niche operators. Such things have resulted in the consolidation of capacity in the hands of fewer and larger companies (Bramm, 2000). By contrast, shippers may have to choose their service providers from fewer numbers while carriers certainly enjoy a low cost advantage, economies of scale and scope, and the development of global service networks.

2.2.5.4 Emergence of mega carriers and vessel sharing agreements

During the last decade, several liner shipping companies have made substantial investments to improve competitiveness in providing global transport and logistics services to international shippers. Semeijn and Vellenga (1995) refer to this new breed of global transport company as 'mega carriers' and their emergence has obviously been accompanied by a complex pattern of alliance formation and dissolution.

While several strategic alliances operate a combined fleet, seeking the savings in capital and operating costs, some carriers may also form alliances in the non-core, e.g. not vessel-owning or vessel-operating, part of business (Brooks, 2000a). Under such 'equipment sharing agreements', participating lines are allocated a percentage of the available space in vessels. In addition, members of an alliance can also share common landside facilities as well as inland distribution networks (Trace, 1997).

2.3 Liner Shipping Industry

As this research concerns the liner shipping markets in the U.K. and South Korea, it is, therefore, necessary to investigate the liner shipping industry in both countries. This section compares the liner shipping industry in the U.K. with that in South Korea, by covering the history of liner shipping, international trade, container traffic in both countries and unveils the business operations of the major liner shipping companies in the U.K. and South Korea.

2.3.1 The history of liner shipping

The following is a brief description of the history of liner shipping industry in the U.K. and South Korea. As a whole, British shipping has a long history, while South Korean shipping has a relatively short one. Since the scope of the research is confined to the container liner shipping, the history of liner shipping industry is limited to the period since the introduction of containers.

2.3.1.1 Outline of history of liner shipping in U.K.

In 1965 the American trucking company Sea-Land started to operate a container line carrying cargo across the north Atlantic. Shortly after this, four of Britain's largest liner companies - P&O, Blue Funnel (later Ocean Transport and Trading), British and Commonwealth and Furness Withy - established a new company, Overseas Containers Limited (OCL), formed with an initial share capital split equally between the four groups (Hope, 1990). At that time, British shipping was in the middle of the so-called 'container revolution' after a long depressed period.

In March 1969, OCL's *Encounter Bay*, the world's first fully purpose-built container ship for international trade, completed her first voyage from Rotterdam to Fremantle, thus

inaugurating the first fully cellular container service on the Europe to Australia trade (Hope, 1990).

From the 1960s until the early 1970s, British liner shipping established itself with government support, cheap money and a policy of positive discrimination (McConville, 1977). In 1960, eight large liner groups - P&O, Furness Withy, Cunard, British and Commonwealth, Ellerman, Blue Funnel, Vestey and Weir - owned over 80 per cent of the British liner tonnage and many other ships as well (Hope, 1990).

However, since then until the 1980s the situation changed totally. In 1973, the Organisation of Petroleum Exporting Countries (OPEC) reduced oil production and raised prices. In doing so, they triggered a world-wide recession in world economy, let alone shipping industry. During this recession, some liners were struggling to survive so they became part of, or acted with, international consortia, which operated over many of the world's trade routes, or were taken over by other companies. On the other hand, one prominent survivor, P&O, kept growing over this period and thus became one of the world's largest container ship operators.

2.3.1.2 Outline of history of liner shipping in South Korea

South Korea has established itself as a major nation in world shipping over the last two decades with its two major operators, Hanjin Shipping and Hyundai Merchant Marine, ranked within the top 20 in the world liner market according to container capacity. Compared with British liner shipping, South Korean liner shipping has a relatively short history. South Korea's shipping industry - bulk, container, general cargo and other sectors - has been greatly stimulated by the nation's booming trade in particular, and the region's booming trade in general (Ryoo, 1997)

The liner shipping industry in South Korea became globally competitive with government support. It is commonly believed that a shipping industry is largely supported by the national government. American commentators (Wood *et al.*, 1995) argue for government support of international carriers and point out that developing nations intend to use their own carriers as a 'rate equaliser' to make sure that they are not abused by the more developed nations. In practice, many nations simply put a high priority on the development of maritime transport.

In 1970 there was not a single containership in the Korean fleet. The first major international container liner service was inaugurated by the Korea Shipping Corporation (KSC) in 1975 on the Trans-Pacific route. The service was set up through a slot charter agreement with Orient Overseas Container Line (OOCL). Within two years, KSC had started operating in the Europe/Far East route as a member of both the Far Eastern Freight Conference (FEFC) and of the ACE consortium, which was operating within the FEFC (Ryoo, 1997).

South Korean liner shipping companies moved into the liner shipping market during a period of major changes, challenging the conference system with their cost advantage (Redding, 1997). Furthermore, there has been an increase in collaboration between Korean shipping companies and foreign companies in response to the liberalisation of domestic trade and the opening up of the market to foreign competition (Ryoo and Thanopoulou, 1999).

Due to the Asian economic crisis in 1997-1998, the Korean economy's general prospect was not exactly optimistic, which made the shipping sector's prospect low-spirited. Nevertheless, having successfully overcome the crisis, the liner shipping industry in South Korea appears to have been able to maintain its strong position in the world.

2.3.2 Fleet comparison

The ranking of 15 most important maritime countries in terms of the number of vessels and deadweight tonnage is presented in Table 2.9. As can be seen, South Korea and the U.K. are ranked in the 8th and the 10th place respectively in terms of deadweight tonnage. As for the number of vessels, South Korea has 903 vessels and the U.K. has 839 vessels.

Table 2.9 The 15 most important maritime countries and territories (1 Jan 2001)

	Numbers of Vessels	Deadweight tonnage	Total as percentage of world total (dwt)
Greece	3,261	143,107,034	19.09
Japan	2,931	98,733,950	13.17
Norway	1,698	60,040,909	8.01
United States	1,398	44,734,763	5.97
China	2,216	40,733,770	5.43
Hong Kong, China	551	35,701,571	4.76
Germany	2,107	32,872,646	4.39
South Korea	**903**	**25,665,219**	**3.42**
Singapore	756	20,632,147	2.75
United Kingdom	**839**	**19,316,035**	**2.58**
Taiwan	521	18,867,133	2.52
Denmark	736	18,123,637	2.42
Russian Federation	2,539	16,065,933	2.14
Italy	631	13,215,660	1.76
India	410	11,859,828	1.58
World Total	**30,508**	**749,599,346**	**100.00**

Source: UNCTAD (2001, pp.30-31)

2.3.3 International trade statistics

Jansson and Shneerson (1987) note that shipping is by far the most important mode of transport of international trade. Naturally, the liner shipping industry is also highly dependent on international trade. The following section presents the volume of port and container traffic in the two countries.

2.3.3.1 Port traffic

2.3.3.1.1 Port traffic for U.K.

Most international trade in the U.K. is transported by sea (about 95 %) (Department of Transport, 2002). Table 2.10 shows port traffic in the U.K from 1990 to 2001. 566.4 million tonnes of cargoes were handled at ports in the U.K. in 2001. This is an increase of 74.4 million tonnes or 15 per cent over 1990. Much of this increase relates to the rise in container traffic, which has risen from 86.62 million tonnes in 1990 to 135.90 million tonnes (24 % of total traffic) in 2001.

Table 2.10 U.K. port traffic (million tonnes)

	Total traffic	Container traffic	%
1990	491.97	86.62	17.6
1991	494.63	88.20	17.8
1992	495.65	94.13	19.0
1993	506.22	99.40	19.6
1994	538.13	108.38	20.1
1995	548.23	113.39	20.7
1996	551.24	115.06	20.9
1997	558.53	128.94	23.1
1998	568.50	132.12	23.2
1999	565.61	136.83	24.2
2000	573.50	137.77	24.0
2001	566.40	135.90	24.0

Source: Department of Transport (2002)

2.3.3.1.2 Port traffic for South Korea

The Korean economy has been highly dependent upon international trade. In volume terms, as much as 99.7 % of imports and exports is carried by sea in recent years (Korean Statistics Office, 2002). This phenomenon explains the important role of the South Korean shipping industry in national economic growth and development. 704.1 million tonnes of cargoes were handled at ports in South Korea in 2000. This is an increase of 420.3 million tonnes or 148 per cent over 1990. During the same period, container traffic rose from 44.26 million tonnes in 1990 to 129.79 million tonnes (15 % of total traffic) in 2000.

Table 2.11 South Korea port traffic (million tonnes)

	Total Traffic	Container Traffic	%
1990	283.70	44.26	15.6
1991	339.10	44.30	13.1
1992	371.44	44.48	12.0
1993	413.07	47.91	11.6
1994	471.12	57.60	12.2
1995	533.54	65.62	12.3
1996	582.07	72.54	11.1
1997	632.08	81.69	11.4
1998	589.93	81.45	12.1
1999	655.88	97.76	13.0
2000	704.07	129.79	15.6

Source: Korean Ministry of Maritime Affairs and Fisheries (2002)

2.3.3.2 Container traffic

2.3.3.2.1 Container traffic for U.K.

The container traffic of the U.K. in 2000 can be split into four distinct trading area sectors. The first of these, near sea traffic, comprising trade with the Republic of Ireland, France, Germany, the Netherlands, and Belgium, stood for 24 % of the total U.K. container traffic. Much of this consists of transhipment traffic. The second, short sea traffic, which covers the rest of Europe and non-European Mediterranean region, was 16 % of the total. However, deep sea, which relates to any country outside of Europe and the Mediterranean, had the bulk of the traffic, equating to a share of 55 %. Finally, domestic movement was just 5 % of the total (Department of Transport, 2000).

Table 2.12 Container traffic handled in the U.K.

Year	TEUs	Annual growth (%)
1991	4,065,000	6.9
1992	4.364,000	7.4
1993	4,509,000	3.3
1994	4,911,000	8.9
1995	5,360,000	9.1
1996	5,555,000	3.6
1997	5,996,000	7.9
1998	6,448,000	7.5
1999	6,880,000	6.7
2000	6,715,000	-1.4
2001	6,981,000	4.0

Source: Department of Transport (2002)

Table 2.12 presents the amount of container traffic handled in the U.K. between 1991 and 2001.

2.3.3.2.2 Container traffic for South Korea

Table 2.13 shows the number of TEUs handled in South Korea. The container traffic of South Korea in 2001 can be divided into four major trading areas and three minor trading areas. 44.6 % of container traffic was with China (28.5 %) and Japan (16.1 %), The trade with North America was equalled to 21.5 % of the total container traffic. The trade with the rest of Asia, comprising of the South East, West, and the Middle-East, was 14.9 %. The trade with Europe amounted to 9.2 %. The trade with the three minor trading regions, Africa, Oceania, and South America, totalled 7.5 %. Domestic movement was just 2.3 % of the total (KCTA, 2003). Table 2.13 presents the amount of container traffic handled in South Korea between 1991 and 2002.

Table 2.13 Container traffic handled in South Korea

Year	TEUs	Annual growth (%)
1991	2,637,000	5.7
1992	2,799,000	6.1
1993	3,132,000	11.8
1994	3,836,000	22.4
1995	4,488,000	16.9
1996	4,893,000	9.0
1997	6,019,000	12.0
1998	6,678,000	10.9
1999	7,688,000	15.1
2000	9,116,000	18.6
2001	9,990,000	9.6
2002	11,890,000	19.0

Source: KCTA (2003)

2.3.4 Comparison of two major ports in the U.K. and South Korea

Table 2.14 Port of Felixstowe and Port of Busan

	Felixstowe	Busan
Container Terminals	Trinity Landguard	Gamman, Gamcheon, Jasungdae, Shinsundae, Sin Gamman, U-AM
Annual handling capacity	2,800,000 TEU (2001)	8,072,000 (2001)
Number of berths	8	20
Liners' services between Europe and Far East	CSCL, Cosco, Hanjin, K Line, MSC, Maersk Sealand, Senator Lines, USAC, Yang Ming Line, Zim	Cosco, Hanjin, NYK, Hyundai, MSC, Senator Lines, Yang Ming, Zim, Maersk Sealand, K Line
Rail Link	Southern and Northern rail terminal close to the container terminals	Rail track connected to Korean Rail

Source: Containerisation International Yearbook (2003)

Port of Felixstowe (PFL) is the largest container port in the UK and is a member of the Hutchison Port Holdings Group. PFL owns two dedicated container terminals: Trinity and Landguard. Trinity Container Terminal is the largest container handling facility in the U.K. It has the longest continuous quay (2,084 metres) in the British Isles. Trinity has the deepest water close to the open sea. On its own the terminal can regularly handle over 200,000 TEU (20ft equivalent units) each month. The terminal has seven deep water berths varying in depth from 11.6 to 15 metres. Equipped with 21 ship to shore gantry cranes, eight ultra post-Panamax, nine post-Panamax and four Panamax, it gives Felixstowe the ability to handle the largest container vessels now in operation. A planned capacity is to handle 2.8 million TEU per annum. Landguard Terminal was the UK's first purpose built deepwater container port, providing particularly those specialising in servicing South America, East & West Africa and Mediterranean & Black Sea trades (Port of Felixstowe, 2004).

As the largest port in Korea as well as the world's third largest container port, Busan Port serves the role as a gateway connecting the Pacific Ocean and the continent of Asia. Busan Port processes 40% of total marine export cargoes and 81% of container cargoes in Korea. Busan Port owns six dedicated container terminals such as Gamman, Gamcheon, Jasungdae, Shinsundae, Sin Gamman, and U-AM. Currently, Busan Port is equipped with capacity to annually process 91 million tons of cargoes together with 26.8 km of quay wall facility enabling simultaneous facilitation of 169 vessels. Currently, it has a capacity of processing of 8.04 million TEUs containers per annum. In accordance with the increasing container volume, the development for New Busan Port is being promoted for completion in 2011, which will create 30 simultaneous berths (Port of Busan, 2004).

2.3.5 Major liner operations

Both countries retain some of the world's leading liner shipping companies, such as P&O Nedlloyd, Hyundai Merchant Marine, and Hanjin Shipping. In the following, a brief description of each company's profile will be provided.

2.3.5.1 P&O Nedlloyd

With effect from 1 January 1997 P&O Containers and Nedlloyd Lines merged virtually all of their container activities into a new independent company, P&O Nedlloyd Container Line. At the time of the merger, P&O Containers ranked seventh and Nedlloyd Lines fourth in the container line listings (ranked by TEUs carried annually). The company has been registered and domiciled in the U.K., but with their fleet management based in Rotterdam. (Gardiner, 1997). By capacity, P&O Nedlloyd is now the world's third largest container shipping company, operating with 157 vessels, totalling 407,000 TEUs (as of August 2003). P&O Nedlloyd's global liner network offers 84 service routes and provides connections to 235 main ports. Since its formation in December 1996, P&O Nedlloyd have

increased its volume by over 55 per cent and continues to build for the future (P&O Nedlloyd, 2003). Table 2.15 illustrates the recent 5 years statistics.

Table 2.15 5 years statistics of P&O Nedlloyd

Year	2002	2001	2000	1999	1998
World Ranking	3	3	2	2	2
TEU in Service	394,090	397,515	366,101	318,840	263,599
Total Ship Fleet	147	154	143	128	114

Source: Containerisation International Database (2003c)

In 1997, P&O Nedlloyd officially joined the Grand Alliance and has worked together with Hapag-Lloyd, NYK, OOCL, and Malaysia International Shipping Corp. In March 1998, P&O Nedlloyd took over the UK-based operator, Blue Star Line, thus increasing its capacity. Recently, P&O Nedlloyd purchased Tasman Express Lines and Farrell Lines. The company is also involved in a number of joint services and consortia and is a partner in the Grand Alliance (principally, trans-Pacific, Europe/Asia and Europe/US) and Saecs (Europe/southern Africa). It also works closely with Contship Containerlines (Europe/Australia, Europe/Indian Sub-Continent) and Mitsui OSK Lines (Asia/East Coast South America, Asia/East Africa) (Containerisation International Database, 2003c).

2.3.5.2 Hanjin Shipping

Hanjin Shipping Co., Ltd (hereafter referred as HJS) was first established in 1977, under the name of Hanjin Container Lines (HJCL) as a member of the Hanjin Group. Since then, HJS has grown rapidly as one of the newer global carriers in the industry with its main service in the trans-Pacific route. Following the merger with Korea Shipping Corporations (KSC) in 1988, Hanjin has expanded its operation and service offerings to virtually all aspects of global marine transport. Hanjin has also steadily diversified its business by introducing a series of new vessels and developing logistics operations in key service areas. In 1996, HJS purchased a majority stake in its struggling partner, DSR-Senator Line. Since then, HJS and its alliance partners formed the 'United Alliance', expanding their

service network to reach most regions of the world. Since February of 1998, HJS has shared the same schedules with Senator, Cho Yang and UASC but the alliance partners have maintained separate marketing and sales functions.

HJS operates 140 vessels including modern containerships and covers a global network, which includes 70 major ports in 35 countries on six continents, including extensive inland transport capabilities (Hanjin Shipping, 2003). The company operates 9 dedicated marine terminal facilities across its global network and maintains a presence in all of the main east/west trades and in the intr-Asia and Latin American markets. Most of the carrier's services are operated through its membership of CHKY Alliance (Containerisation International Database, 2003d). It was reported that HJS has been benefiting from the alliance, by expecting 220 million US$ in 2003. (Dekker, 2003b). Table 2.16 illustrates the statistics for the last 5 years.

Table 2.16 5 years statistics of HJS

Year	2002	2001	2000	1999	1998
World Ranking	5	7	7	7	8
TEU in Service	294,705	215,008	186,566	164,777	125,012
Total Ship Fleet	75	54	52	45	38

Source: (Containerisation International Database, 2003d)

HJS aims to satisfy demanding customers within the global network by adding value to its liner services and building a global logistics infrastructure based on marine terminal and container depot management, trucking and intermodal service operations and warehousing and distribution activities. HJS changed its service pattern from the *round-the-world (RTW)* to the *pendulum*, because the benefits of the round-the-world service were not as good as expected. Moreover, today's shippers want more express services and the pendulum type of service has the flexibility to enable HJS to do so. A pendulum service can double coverage and control any equipment imbalance between services.

2.3.5.3 Hyundai Merchant Marine

Hyundai Merchant Marine Co Ltd (hereafter referred as HMM) was established as a shipping arm of the Hyundai group. It owns a modern fleet including 18 units of post-Panamax containerships variously deployed in its mainline transpacific and Europe/Asia services. These services are operated in conjunction with APL and Mitsui OSK Lines. HMM has its own dedicated terminals in the US, South Korea, and Taiwan (Containerisation International Database, 2003e). Table 2.17 illustrates the statistics for the last 5 years.

Table 2.17 5 years statistics of HMM

Year	2003	2002	2001	1999	1998
World Ranking	18	18	13	16	12
TEU in Service	131,897	122,709	140,979	109,495	103,184
Total Ship Fleet	34	32	38	34	30

Source: (Containerisation International Database, 2003e)

In terms of co-operation with other lines, as a member of the New World Alliance (NWA), HMM has allied itself with the American President Line (APL) and Mitsui OSK Line (MOL). As a result, the company can offer its service with 54 ships and over 35,000 TEU space dedicated for the Trans-Pacific trade (Hyundai Merchant Marine, 2003). HMM is also present in the intra-Asia trades and the transatlantic, where, in addition to utilising NWA vessels, it charters further slots from the transatlantic routes of Maersk Sealand (Containerisation International Database, 2003e).

Additionally, local logistics centres and facilities have been placed at many container ports, providing links between the marine networks and the inland logistics networks ensuring faster and safer service. These logistics centres have been added to major Asian regions such as the Kaoshiung Terminal in Taiwan, opened in May of 1996, as well as USA terminals including Long Beach, California and Tacoma, Washington (Hyundai Merchant Marine, 2003). Despite a recent financial crisis within the company, it is expected that

HMM can return to stable profitability and a sound capital structure through a rigorous corporate restructuring process (Dekker, 2003c)

2.4 International Shipping Policy

International shipping policies have sought to deal with competitive matters practically in any way which might be considered anti-competitive in the broad sense of industrial anti-trust philosophy (Tomlinson, 1996). In other words, determining a carrier's ability to some extent is one of the main objectives of any policy. Therefore, carriers need to be fully aware of such policies and find a strategy to deal with them prior to engaging in business operations. It is, therefore, necessary to review the key shipping policies. The US shipping policy, which has a great impact on every maritime nation since the US market is bigger than any other market, will be dealt with first. To follow, the EU policy and the Korean policy will be discussed respectively.

2.4.1 The US policy (Ocean Shipping Reform Act 1998)

International liner trades have been faced with new regulatory developments since the introduction of the USA's Ocean Shipping Reform Act (OSRA) of 1998, a revision of the 1984 Shipping Act. The main provisions in the OSRA are depicted in Table 2.18.

OSRA's most prominent provision allows key terms of shipper-carrier service contracts to remain confidential. In practice this means that shippers are no longer able to demand service contract terms identical to those that carriers offer to similarly situated shippers. On the positive side for shippers, the new law, which allows individual carriers to be able to sign contracts with an individual shipper, gives both carriers and shippers new privileges to conduct one-on-one negotiations. This freedom to contract grants them much greater discretion to build long-term business relationships that utilise carriers' expertise and serve shippers' specific needs (Butz, 1998).

Table 2.18 Main provisions of the Ocean Shipping Reform Act of 1998

Service Contract	• Service contracts continue to be filed with the Federal Maritime Commission (FMC). • Carriers can negotiate service contracts individually or as a conference or alliance. • Carriers do not have to match service contract terms given to similarly situated shippers.
Contract Details	• Cargo, volume, origin and destination ports, and contract duration must be made public. • Freight rates, service commitments, inter-modal origin and destination points, and damages for non-performance can remain confidential.
Conferences	• Conferences cannot interfere with members' negotiation of service contracts, although conferences can issue voluntary guidelines. • Conferences cannot demand members to disclose confidential service contract terms, including rates.
Regulating Body	• FMC continues to regulate ocean liner shipping and administer carriers' tariffs.
Tariff	• Tariffs will no longer be filed with the FMC, but will be publicly available through private tariff services or carriers' Internet sites approved by the FMC.
Inland Carriers	• Groups of ocean carriers can jointly negotiate with inland carriers for rates and services, on the condition that this activity does not violate the antitrust laws.

Source: Bonney (1998, pp.8-12), Harrington (1999, p.48), and Richardson (1999, p.27).

2.4.2 The EU policy

The EU policy has different regulations governing different types of agreements: Regulation No.4056/86 for conferences, Regulation No.870/95 for consortia and Regulation No.1017/68 for inland transport (Damas, 1998).

The EU shipping policy allows carriers to have confidential service contracts and consortium/vessel sharing agreement between carriers and bans conferences rules, which prohibit individual service contracts and capacity agreement between carriers (Damas, 1998). The EU does not grant discussion agreements between conference and non-conference lines. Regarding the immunity of conferences' joint service contracts, the European Commission (EC) is more restrictive than the US one. Meanwhile, service

contracts between freight forwarders/NVOCCs and shippers are permitted in the EU policy. In EU policy, carrier agreements such as slot charter agreements, consortia and alliances have been given a formal exemption.

2.4.3 South Korean policy

Both the EU and the US policies mostly affect a large number carriers domiciled in South Korea. However, the Korean shipping policy itself regulates a part of the carriers' co-operation procedures and most practices of regional smaller operators.

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In the 1960s, the policy was mainly devoted to supporting a shipping industry through tax credits and financial subsidies. In the early 1970s, the focus was on fleet expansion and cargo reservation, resulting in a very rapid annual growth rate (18.4 per cent) in the national fleet (Hong, 1995). However, the oil shock subsequently led to the world-wide recession and resulted in the inevitable restructuring of the Korean shipping industry, reducing its 112 ocean carriers into 34 through mergers and a reduction in various subsidies in the 1980s (Flynn, 1998b). From the late 1980s until the late 1990s, the Korean government was under pressure from its trade and shipping partners. They demanded the removal of the discrimination policy against foreign shipping companies in order to achieve fairer competition. This situation reached a pinnacle point when South Korea entered the OECD in 1996.

Table 2.19 illustrates the whole series of deregulation policy measures implemented during that period. Moreover, the division between short-sea (Japan/Korea), near-sea (Korea/South East Asia) and deep-sea carriers, originally designed to protect a group of small and medium-sized Korean operators engaged in the shorter-haul trades, has been completely eliminated (Fossey, 1995). To follow, the Korea/East and South East Asia, the Korea/Russia Far East and Korea/China trades were fully opened up in 1994 (Flynn,

1998b). These changes have led to more intense competition in Korea's short-sea and near-sea liner markets. As a completion of the series of deregulation policy, the Maritime Transport Act was revised to eliminate 57 regulations and ease 19, which include qualification requirement, approval of transport agreements and limitations of the ocean-going cargo transport business (Flynn, 1998b).

Table 2.19 Key deregulation policy in relation to Korean liner shipping industry

Year	Deregulation Policy
1989	• Foreign shipping lines were permitted to establish their own offices and branches in South Korea
1991	• Foreign companies were allowed to run container drayage operations within the Busan area • Port service charges were equally imposed for both foreign and domestic carriers
1992	• Trucking deregulation was extended to include southern provinces of South Korea
1993	• Port and terminal development projects were opened to foreign capital • Foreign companies were allowed to invest – up to 100% - in the Korean freight forwarding and ship agency sectors
1994	• Licensing system for the South Korea/South East Asia trade lanes ended • Foreign shipping lines were allowed to make a direct contract with the rail authorities on condition that they establish a separate transportation entity in South Korea • Domestic container trucking market was completely opened, thereby allowing foreign companies to operate in the main routes such as Seoul and Busan route
1995	• Elimination of the nation's cargo waiver system • Abolition of licensing requirements for the Japan/South Korea liner market
1997	• As an intermediate step to privatising port operations, the Korean government created terminal operating companies in Busan and Inchon in January

Source: Fossey (1995, pp.50-51) and Flynn (1998b).

It has become clear from the review of the international shipping policies concerning the liner shipping market that today's carriers are generally expected to make significant effort in order to survive in the changing environment. Container lines have to cut their operating costs, improve their operating efficiency and increase their revenues by penetrating new trades and offering more sophisticated through service and logistics packages.

2.5 Problematic Issues and Research Direction

The research has so far reviewed the current situation and development in the liner shipping market. The comparison of liner shipping industry in the U.K. and South Korea has been made and the operations of major liner shipping companies in the U.K. and South Korea have also been investigated. In addition, shipping policies governing the shipping business have been discussed. This section aims to identify some of the issues or problems which liner shipping companies are facing and to decide the specific direction in which the research will focus.

2.5.1 Problematic issues in liner shipping

Firstly, one of the biggest issues in the liner market for carriers is the reduction in the amount of cargoes to the Asian region from Europe and the US. Outbound rates from Asia continue to rise to compensate for the imbalance and the problems of moving empty containers back to Asia are likely to be difficult (Cargonews Asia, 1998a). This trade imbalance has been considered to be one of the most serious concerns in the market. Since the Asian economic turmoil starting in 1997, this situation seemed to get worse. It was once believed that there would be positive economic improvements due to the prospect of the millennium boom (Fossey, 1999). However, it is expected that this situation will not be easily remedied since increasing numbers of manufacturing points are being constantly shifted to China these days.

Secondly, there are two main international shipping policies that largely affect the international liner shipping business: EU shipping policy and US shipping policy. Conflicts between parts of the U.S. and the EU policies make business more complicated. For example, joint service contracts of conferences, conference/non-conference discussion agreements, joint inland negotiations by ocean carriers are permitted in the US shipping policy but not in the EU policy. Under the EU policy, freight forwarder/NVOCC service

contracts with shippers are allowed but this is not allowed in the US policy (Damas, 1998). Furthermore, since the 1998 Ocean Shipping Reform Act (OSRA) became a law, both carriers and shippers have to adapt to the newly introduced regulation.

Thirdly, the liner shipping industry has delivered very poor financial results for a long time. There is evidence that the return on equity of the liner shipping industry was only about 2% on average from 1993 to 1997 (Amand, 1999). Kadar and Proost (1997) point out that many liner companies have recognised that a constant decline in rates driven by the combination of slow market growth and chronic over-capacity has resulted in the recent poor economic performance of the industry. Most evidence points to an average nominal decline of between 15% and 20% for the East/West trades over the years, and an even more dramatic reduction of between 30% and 40% on the North/South trades in the three years from 1994 to 1997 (Kadar and Proost, 1997). In any event, 'too many ships chasing too few cargoes' has become the theme tune of the liner shipping industry (Amand, 1999). During the 1990s, the liner shipping industry tried desperately to return to profitability through cost-cutting. Kadar and Proost (1997) add that a large number of shipping companies initially focused on the vessel operation and then made significant restructuring efforts such as decentralisation, expenses reduction, closing down offices, etc. The next expected steps were the cost-cutting measures such as the global alliances, and finally a number of mergers and acquisitions.

Alliances and mergers/acquisitions are still prominent in the container carrier business. Liners claim that by merging operations they can provide shippers with a better service product at more affordable levels. For instance, service commitments are improved to provide better port coverage and more frequent sailings. (Cargonews Asia, 1998b). Strategic alliances can be very successful when members of alliances are able to create additional value for each other, either through revenue growth or cost reduction. Revenue

gains can come not just from growth, but also from price increases aided by improved products or value added service components. Costs can be reduced in an alliance by more efficient use of capital assets and infrastructure, by bringing greater purchasing power to bear, and finally by achieving organisational or other operating efficiencies (Kadar, 1996).

Cost-saving moves such as mergers and alliances are probably to the advantages of carriers. However, there have been some apprehensive views of whether shippers can actually benefit from carriers' mergers and alliances (Porter, 1998b). As carriers become increasingly involved in service mergers, the progression towards an industry of a few lines becomes even more obvious (Cargonews Asia, 1998b). Consequently, the number of carriers will be further reduced and shippers are likely to receive fewer service ranges from the carriers. Porter (1998b) insists that shippers are not willing to accept this situation and therefore carriers should find an alternative business strategy, which makes both parties contented.

The investigation into the major liners' operation and their business philosophy has revealed that there is an issue of becoming a logistics company, rather than just a shipping line. In their initial stage of business, liners concentrated only on ship movements. However, the market situation has been changing constantly and customers wish to have more and better service ranges. Under these circumstances, the efforts by shipping lines to turn themselves into 'logistics companies' are not surprising at all.

2.5.2 Research direction

During the last two decades, the liner shipping industry has undergone a series of geographical expansion, an increasing range of operations, and an endless string of changes. The modern liner shipping market appears to be dominated by multi-modal transport, global logistics requirements and fast-growing computerised operations. It is

believed that certain factors such as the nature of markets, trade flows, operational patterns, liner companies' interaction and strategies have led to the remarkable development of the liner shipping market. Furthermore, there have been additional twin factors: more severe competition between carriers and a constant pressure from shippers.

Under these circumstances, focusing on saving costs only may not be adequate for a liner shipping company to survive in the strong competition to meet the demands from shippers. Kadar and Proost (1997) assert that the industry should make much more concentrated efforts on simultaneous improvement of the quality of service. These may include improved, more targeted, and more sophisticated marketing; better customer service management and customer franchise management; the development of more tailored services; and better and more sophisticated use of multiple sales channels. On this basis, it can be deduced that liner shipping companies need to take appropriate action to improve their level of service so as to satisfy the needs of more sophisticated shippers (Bergin, 1997).

One of the possible actions for liners to take is to increase their customer service networks through service marketing management. In the 1980s, Brooks (1984; 1985) proposed introducing the marketing concept into the liner business for the following three reasons. First, in the liner shipping market, it is difficult to standardise service so it is hard to measure service quality. Second, in the past, liners were often in a monopoly situation, but now it is more competitive than ever before. Third, product discrimination is not easy in the liner business. In the 1990s, it was suggested that liner shipping companies may need to introduce a more systematic business approach into their business in order to be able to satisfy their customers (Craig, 1996; Containerisation International, 1999b).

In response to this notion, there has been a tendency for the modern shipping industry to pursue a general logistics strategy reaching far beyond the area of maritime shipping (McKnight *et al.*, 1997). This can mean an integrated system, which involves all logistics areas related to the carriage and care of cargoes, such as trucking, railroad transport and warehousing services. As such, some liners appear to have incorporated logistical activities into their businesses. Hanjin Shipping, for instance, in step with this trend, takes full advantage of the other transport modes operated by the Hanjin group, which has been specialising in different types of transport for 50 years. Hanjin Shipping has already established a general logistics system of land, sea and air transport in co-operation with other related group affiliates such as Hanjin Transportation and Korean Air.

Conclusively, liners appear to have applied logistics concepts into their operations and, in doing so, expanded towards globalisation of their business. Some container liner shipping companies are claiming that they can meet specialised international shipping needs. However, what carriers are claiming has yet to be proved to their customers (McKnight *et al.*, 1997), although they are continuously striving to improve efficiency and attain effectiveness so as to meet their customers' more complicated demands than previously. Similarly, major liner companies in the U.K. and South Korea are also saying that they provide logistics service rather than just shipping service. But there is still some doubt whether such services can be said to be logistics services in real terms. Based on this discussion, the next chapter will review the logistics discipline in general terms and firmly investigate the relation of logistics to the specific context of liner shipping.

CHAPTER 3

Logistics Service in Liner Shipping

The previous chapter was devoted to outlining the general aspects of liner shipping and the liner shipping industry in the U.K. and South Korea and identifying the areas of research problems. It has been noted that, with rapidly changing circumstances, some liner shipping companies have made efforts to provide a wider range of services, arguably claimed as a logistics service, to their customers. As this research focuses on logistics service in liner shipping, a review of the logistics disciplines is required.

In this chapter, an overview of logistics is presented, particularly highlighting the still-emerging concept of supply chain management. After an investigation of its relations with marketing, transport and service, this chapter will further deal with international logistics, since liner shipping is an activity transcending national boundaries. Finally, this chapter will develop the conceptualisation of logistics services in a liner shipping context.

3.1 Logistics and International Logistics

3.1.1 Logistics

3.1.1.1 Logistics defined

The concept of logistics has developed with various changes over the years gone by. A number of logistics definitions have been proposed by several academics (La Londe, 1983; Heskett, 1983; Bowersox, 1983; Langley, 1986). It has been summarised by these academics that the logistics concept has succeeded in permeating activities throughout the whole industry and is likely to maintain its strong position in the future, affecting many aspects of the business world.

The Council of Logistics Management provides a definition of logistics (The Council of Logistics Management, 2003):

"Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements".

Fojt (1995) states that logistics, as the chain that connects product development, manufacturing and delivery to the customer, is a core capability, which enables companies to gain competitive advantage and thus maintain customer satisfaction. In fact, logistics plays an increasingly important strategic role for companies that strive to keep pace with market changes. As noted by Bowersox (1990) and LaLonde and Mason (1993), logistics is evolving due to external factors such as strategic alliances, technological changes, and an increasingly competitive environment.

3.1.1.2 Supply chain management

There are many terms associated with logistics such as business logistics, physical distribution, materials management, distributions engineering, logistics management, distribution management, marketing logistics, and supply chain management.

Supply chain management has been the latest addition to the logistics concept and it links logistics more directly with the total trading channel (Novack *et al.*, 1995). So far, there have been a number of definitions related to the concept of supply chain management. Coyle *et al.* (1996) state that the concept of supply chain management comprises managing the whole string of all supplier-to-customer material flow activities that can add value to the final product. Ellram and Cooper (1993) suggest that supply chain management is a harmonising concept to manage the total flow along the distribution channel from the supplier to the ultimate customer. More recently, Rich and Hines (1997) argue that the concept of supply chain management incorporates the development of a company-wide

collaborative culture and embraces the integration of all activities which control the efficiency and effectiveness of the flows of material, products, services, and related information.

3.1.1.3 The Growing importance of logistics

There has been a growing recognition of logistics in today's business world. This recognition has been accompanied by a fundamental shift in focus towards the marketplace, away from the more production and sales oriented business philosophy that previously dominated most industries (Fojt, 1995).

Livingstone (1992) claims that many of the most progressive and successful companies emphasise logistics as a competitive necessity. Logistics has a unique role in helping organisations become cost and value leaders, because effective logistics management can reduce cost and enhance service and has therefore succeeded in drawing attention to a number of companies. However, for the purpose of realising the real benefits, the logic of logistics, which optimises the flow of materials through the organisation, must be managed and understood from suppliers to final customers (Fojt, 1995). By employing the concepts of logistics into the all the activities within the company, the performance led by logistical minds can help gain and maintain profitable customers (Ellinger *et al.*, 1997).

It is therefore believed that any activities involving logistics can be advantageous to companies. For example, an internet based book selling company, widely known as Amazon.com, has been able to keep their profitable customers, by having their suppliers ship books ordered directly to the customers and therefore maintaining zero inventory or nearly zero. This logistical performance can save cost incurred in warehousing operation. This is why many companies have tried to adopt logistical concepts to their business operations. Liner shipping industry cannot be an exception to the rule. Logistics regarded

as a highly coherent and structured business approach focuses on the process that will lead to a successful integration of the activities involved.

The logistics approach in a company is concerned with how integrated materials management activities can maximise the time and place utilities of the goods to the customers (Stern *et al.*, 1993). Taking the company as a value-added entity in a business system, the logistics approach aims to integrate with purchasing, operations and marketing management in creating customer success in the supply chain (Fawcett and Fawcett, 1995).

From the manufacturing point of view, logistics services entail a wide range of specialist tasks in warehousing, information processing and distribution control for effective supply chain management (Fung and Wong, 1998). However, if we look at it from shipping's point of view, it can be different from its original context. Craig (1996, p.24) mentions that "*It is not shipping any more; it is logistics*". He also suggests that logistics service in shipping encompasses a broad scope of responsibilities extending from the vendor through to the customer. These responsibilities include five key issues of "*movement of product, movement of information, time service, cost, and integration*" (Craig, 1996, p.26).

3.1.1.4 Elements of a logistics system

Logistics is not a single activity but a system that combines several functions. These functions are often described as elements. Coyle *et al.* (1992) categorise these elements into order processing, materials handling, transport, storage, packaging, and customer service. The following is a brief description of each element.

3.1.1.4.1 Order processing

Order processing, which generally consists of activities involved with filling customer orders, can be a starting point in logistics. Ballou (1992) points out that order processing is

an important element as far as the total time is concerned in that customers always wish to receive goods or services as quickly as possible. For instance, if a company responds to customers' orders slowly, they will be less satisfied and therefore it will negatively affect the business relationship.

3.1.1.4.2 Materials handling

Materials handling is one of the prime concerns in the typical manufacturing industry. Materials handling can affect the movement of goods from a factory to a warehouse, the placement of goods in the warehouse, and finally the movement of goods from warehouse to a dock area for loading into ships and vice versa (Coyle *et al.*, 1996). Despite the complexity of other areas of logistics, materials still require physical handling. Forklifts, conveyors, racking systems all play an important part in the supply chain.

3.1.1.4.3 Transport

Transport alters the geographical position of the goods from the point of production to the point of consumption (Benson and Whitehead, 1985). In this sense, transport is a necessary element of the logistics system. One of the most important tasks in a logistics system is related to the physical movement or flow of goods, or to the network that moves the products. This network is composed of relevant transport parties, including shipping companies, road haulage operators, transport intermediaries, and some authorities managing infrastructures such as port, rail, airport, etc.

3.1.1.4.4 Storage

The storage function involves two separate but closely related activities: inventory management and warehousing. Warehousing and inventory management are integrally involved in four distinct supply chain processes: sourcing/inbound, processing/manufacturing, outbound distribution, and reverse logistics such as returns,

recycling, etc (Harrington, 1998). A vital correlation exists between the mode of transport used and the level of inventory and the number of warehouses required. For example, if a company employs a relatively slow mode of transport, it is essential to maintain higher inventory levels and require more warehousing space for this inventory. Therefore, the systematic approach within the logistics supply chain usually requires close co-ordination between transport and storage.

3.1.1.4.5 Packaging

Another element of interest to logistics is packaging. When the mode of transport is chosen, it will directly affect the packaging requirements for the raw materials and the product. For example, rail or water transport will usually require additional packaging expenditure due to the greater possibility of damage (Coyle *et al.*, 1996). The technology in this area is also evolving and improving to interface and keep pace with the overall developments in the field of logistics.

3.1.1.4.6 Customer service

Most business approaches, strategies and tactics revolve around customer service. The importance of customer service has been unanimously emphasised in the business world. Customer service levels join together with other logistics areas in many ways. For instance, by ensuring that the customer gets the right product at the right place and time, decisions about inventory, transport, and warehousing should relate to customer service requirements.

3.1.1.5 Logistics approach in service industries

The service sector in the business world is large and growing constantly (Ballou, 1992). It is also believed that the shift towards a more service-oriented economy is likely to continue. This means that an increasing percentage of economic activity will be devoted to

providing services rather than physical goods (Johnson and Wood, 1996). The implications of this trend for logistics can be significant. Since so much of logistics deals with inventories, it is important to note that service itself is difficult or even impossible to be stored. At this point, it is wise to consider and develop a different approach for service industries. Johnson and Wood (1996) continue by stating that the close relationship between the service provider and the service consumer is a key issue in the logistics of service industries. Applying their suggestion to the shipping industry, which is considered a service industry, maintaining close relationship between the carrier and the shipper will be a key issue for success.

3.1.2 International logistics and shipping

3.1.2.1 Global market place

The world is now often described as a 'global market', thanks greatly to the improvements in communication, the development of information technology and of transport technology. The term, 'global market' is a direct consequence of the acknowledgement and homogenisation of global needs and wants (Levitt, 1983a). The new and extensive communications technologies allow people in the world to learn of the availability of more and more choices of the same products and express more diverse and sophisticated desires for the products or services available.

The globalisation has resulted in widespread industrialisation and greater world-wide competitiveness. Levitt (1983b) insists that companies must learn to operate as if the world were one large market - ignoring superficial regional and national differences. In line with the growth and maturation of the ocean and air transport industries, distinct national and specific country-to-country international markets have been transformed into global businesses. In this kind of situation, international business should be performed in the way that can satisfy world-wide customers' preference for high-quality merchandise (Coyle *et*

al., 1996). International logistics can be particularly relevant for international businesses that involve more diverse, distant and numerous supply chains.

3.1.2.2 International logistics defined

International logistics can be defined in a similar way to that of logistics, but it obviously embraces international levels. As defined by Bagchi (1992, p.11), international logistics is:

> *"the process involved in managing uninterrupted flow of materials for a company from the source to the final destination independent of national boundaries".*

However, this is more likely to be an ideal rather than a practical situation, because national boundaries may still provide barriers to the free passage of transport, which, to some extent, stops the uninterrupted flow of materials. Thus, this process, including materials movement across oceans and continents, may have to face the different rules and regulations of the various handling agencies involved.

International logistics can occur in the following situations (Johnson and Wood, 1996, p.394).

- *A firm exports a portion of a product made or grown*
- *A firm imports raw materials.*
- *Goods are partially assembled in one country and then shipped to another, where they are further assembled or processed.*
- *Products are assembled in a foreign country for distribution in other foreign countries and in the firm's home country.*

The importance of international logistics has been widely recognised as more companies engage in international business. Companies are beginning to view the entire world as a potential market, a view that leads to increased demands on current logistics systems to supply products to distant portions of the world (Johnson and Wood, 1996). It is, therefore, generally predicted that international logistics will play a significant role in the trade world as long as more and more companies become involved with the globalised market. Users

and providers of international logistics services are striving to increase efficiency by incorporating new and innovative concepts into the world-wide logistics network (Coyle *et al.*, 1996). Such concepts as lean logistics, agile supply chain, fourth party logistics, efficient consumer responses (ECR), and so on have emerged in the last decade.

Although international logistics shares many characteristics with domestic logistics, it is different in certain ways. Various functions of logistics described in Section 3.1.1.4 can be performed rather differently in the case of international logistics as explained in the following.

3.1.2.2.1 Transport

As the distance between the point of origin and the point of consumption in international trade tends to become much longer than in domestic movement, transport occupies a much larger part of the international logistics process. In addition, a high quality transport service is essential in international trade, since the effects of late deliveries, lost or damaged goods, or misrouted international shipments will negatively influence the level of customer service (Gourdin and Clarke, 1990).

3.1.2.2.2 Inventory management and warehousing

Due largely to unexpected traffic delays at ports or roads, potential forecasting errors and timely order-filling requirements, inventory management is a necessary tool for daily international logistics operations (Min and Eom, 1994). To make the best use of inventory, techniques such as material requirements planning (MRP), which determines the amount of materials to purchase and when to purchase, and enterprise resource planning (ERP), which plans and monitors the flow of demand and supply, have been adopted in international logistics operations.

In international logistics, warehousing tends to use more valuable company resources such as space, equipment and operators, and incur higher distribution costs than in domestic logistics. The warehousing function in international logistics involves routine logistics operations such as inventory storage, freight consolidation, service enhancement and contingency protection (Andel, 1998). Maintaining good co-ordination between transport and warehousing can significantly improve the level of customer service.

3.1.2.2.3 Information technology

It is widely claimed that information technology can enhance a company's ability to be more competitive and profitable (Wilder, 1996). Designing an international logistics information system will also involve, at a minimum, the provision of a common database linked with all the country-specific information systems (Bagchi, 1992). This will enable users to obtain necessary information from the same source. The most crucial task in designing an international logistics information system is to standardise various protocols so that the free flow of information will be secured.

3.1.2.2.4 Customer service

Customers today want not just a product, but a total service (Walker, 1995). The prime requisite must be the capability to deliver to the customers what they order, on the promised date, and this principle has to be applied throughout the whole international logistics operations (Sharma *et al.*, 1995). The management of customer service involves the monitoring of service needs as well as performance and extends to the management of the entire supply chain - from placing the order through to the final delivery (Christopher, 1992).

3.1.2.2.5 Out-sourcing and partnerships

One of the greatest changes in global business today is the trend towards out-sourcing. Purchasing products or services from an external source has become increasingly popular and logistics has been a prime candidate for such outsourcing (Daugherty and Droge, 1997). This applies particularly in the provision of transport, warehousing and inventory control, which is increasingly subcontracted to specialists such as terminal operators, international freight forwarders, ocean carriers, non-vessel-owning common carriers, port authorities, information providers, and so on. However, due to the growing concern of inadequate communication between the users of out-sourcing service and the providers of out-sourcing service, there has been a need for an additional company or institution who can take responsibility of the all the out-sourced operations.

3.1.2.3 International transport

International transport is an area of growing interest and concern within international logistics. Particularly, the use of containers has become the most common form of international cargo movement in shipping. The international transport system may encounter some issues such as longer transport routes, multi-modal transport arrangements, increased documentation, differences in carrier liability, the use of foreign trade zones, two or more governments' jurisdiction over the movement of cargoes and so on (Ballou, 1992). The whole system seems to be even more complicated when we consider all the parties involved such as agents, freight forwarders, brokers, port authorities and other regulating bodies.

3.1.2.4 Role of shipping in international logistics

As the utilisation of international logistics increases, the use of international shipping also grows at the same time. Undoubtedly, shipping is a very important mode of transport, which undertakes one of the key functions in the international logistics supply chain. In

fact, most goods exported and imported internationally cannot be carried without using maritime transport. According to statistics, 99% of international cargoes measured by weight are transported internationally by maritime transport (OECD, 1998). The role of shipping in international logistics is very significant in several ways. The following describes the roles of shipping in international logistics.

3.1.2.4.1 Movement of goods

The most basic and primary role of shipping is to move goods from where they are loaded into a ship, via the ocean, to where they are unloaded at a port. Coyle *et al.* (1996) state that shipping is the physical string connecting the company's geographically scattered operations. For a company dealing with international trade, to operate their business without the aid of shipping is virtually inconceivable in today's globally integrated business world.

3.1.2.4.2 Influence on other logistics functions

Shipping can directly affect other logistics functions. For instance, using a container can reduce the cost for special export packaging, because, compared with conventional shipping, containerised packages are less likely to be exposed to shipboard moisture and the contents are not directly handled at the port. In other words, a container designed with a standard form can protect goods from damage (Twede, 1994). Likewise, the quality of the shipping service provided bears directly upon the inventory costs and storage cost at a facility as well as upon the cost of operating the facility (Coyle *et al.*, 1996). For instance, the uncertainty caused by poor quality of transport service can easily lead to unexpected extra cost.

3.1.2.4.3 Containerisation

The most spectacular role of shipping in today's international logistics supply chain has been the emergence and development of containerisation. The effects of containerisation have extended to releasing carriers from the past constraints on cargo handling and providing them with the ability to secure more substantial amounts of cargoes. Cargoes that are time-sensitive due to demand or value, or are sensitive to external elements such as weather are now likely to be moved via container ships (Goldsborough and Anderson, 1994). For this reason, virtually all retail products, industrial parts and assemblies, transport equipment, office equipment, computers, and many other products are moved by container vessels.

3.1.2.4.4 Saving cost

Shipping can play a great role in saving cost. The cost of shipping itself has fallen sharply thanks to a series of technological innovations, such as containerisation and the deployment of faster and bigger vessels in the field of liner shipping. As noted by Benson and Whitehead (1985), the operation of containerships can also reduce the overall transit time and therefore save costs incurred. Container shipping has led to the rapid improvement of efficiency in cargo handling at ports, which used to be one of the biggest obstacles to effective international trade activities. On the other hand, in the field of non-liner shipping, specialised carriers and larger ships have resulted in the use of cheaper transport than before as specialised ships such as chemical carriers, LPG, LNG, car carriers can carry large amounts of materials and cargoes (Gray and Kim, 2001).

In summary, shipping activity is an important component of the international logistics supply chain. More specifically, shipping can play a significant role as a link between international logistics activities. If shipping cannot perform its important function in the

international logistics supply chain, it may lead to a disruption of the international supply chain leading to substantial and unexpected costs (Levy, 1995).

3.1.3 Integration of parent disciplines

So far, the aspects of logistics in general and international logistics in particular have been reviewed in relation to shipping. Henceforth, this section aims to build a theoretical foundation upon which the research is based. The identification of an interactive connection or link between logistics and service marketing as well as between logistics and customer service can provide a sound and logical assumption that can explain how a concept of logistics has been introduced to the shipping area.

3.1.3.1 The interface between logistics and service marketing

The concept of service marketing has been introduced to the shipping industry (Brooks, 1984). As shipping can be regarded as a part of logistics, investigating how these two disciplines (logistics and service marketing) can interact with each other will be quite beneficial to the research. Service marketing is known as different from the marketing of manufactured goods (Shostack, 1977) and has unique characteristics not shared by the marketing of manufactured goods (Rust *et al.*, 1996). Turning attention to the interface between logistics and service marketing, Murphy and Poist (1996) tackle the interface between marketing and logistics, stating that logistics itself is often associated with the '4Ps' (product, price, place, promotion) of the marketing discipline and, specifically, logistics can provide place utility.

A concept of highly increasing importance and relevance to logistics is that of supply chain management. As discussed previously, supply chain management represents a multi-item system that involves the integration of various business processes and functions (Murphy and Poist, 1996). In order to operate the supply chain successfully, co-ordination between

the marketing and logistics functions will be one of the major prerequisites to the effective management of supply chains.

3.1.3.2 The interface between logistics and customer service

Customer service is a process for the provision of significant value-added benefits to the customers in the supply chain in a cost-effective way (La Londe *et al.*, 1988). Customer service serves as an integrating activity in two ways. First, co-operation between several different functional areas in a company is necessary to keep the company's customers satisfied. Second, developing special supplier-user relationships over a period of time helps integrate various activities within the logistics channel (Johnson and Wood, 1996).

It is sometimes suggested that the role of customer service is to provide 'time and place utility' in the transfer of goods and services between the buyer and the seller, since there is no value in a product or service until it is delivered to the customer or consumer (Coyle *et al.*, 1992). This is exactly what the philosophy of logistics is. In fact, the logistical approach can contribute heavily to the improvement of customer service, which is also a key component of the marketing discipline.

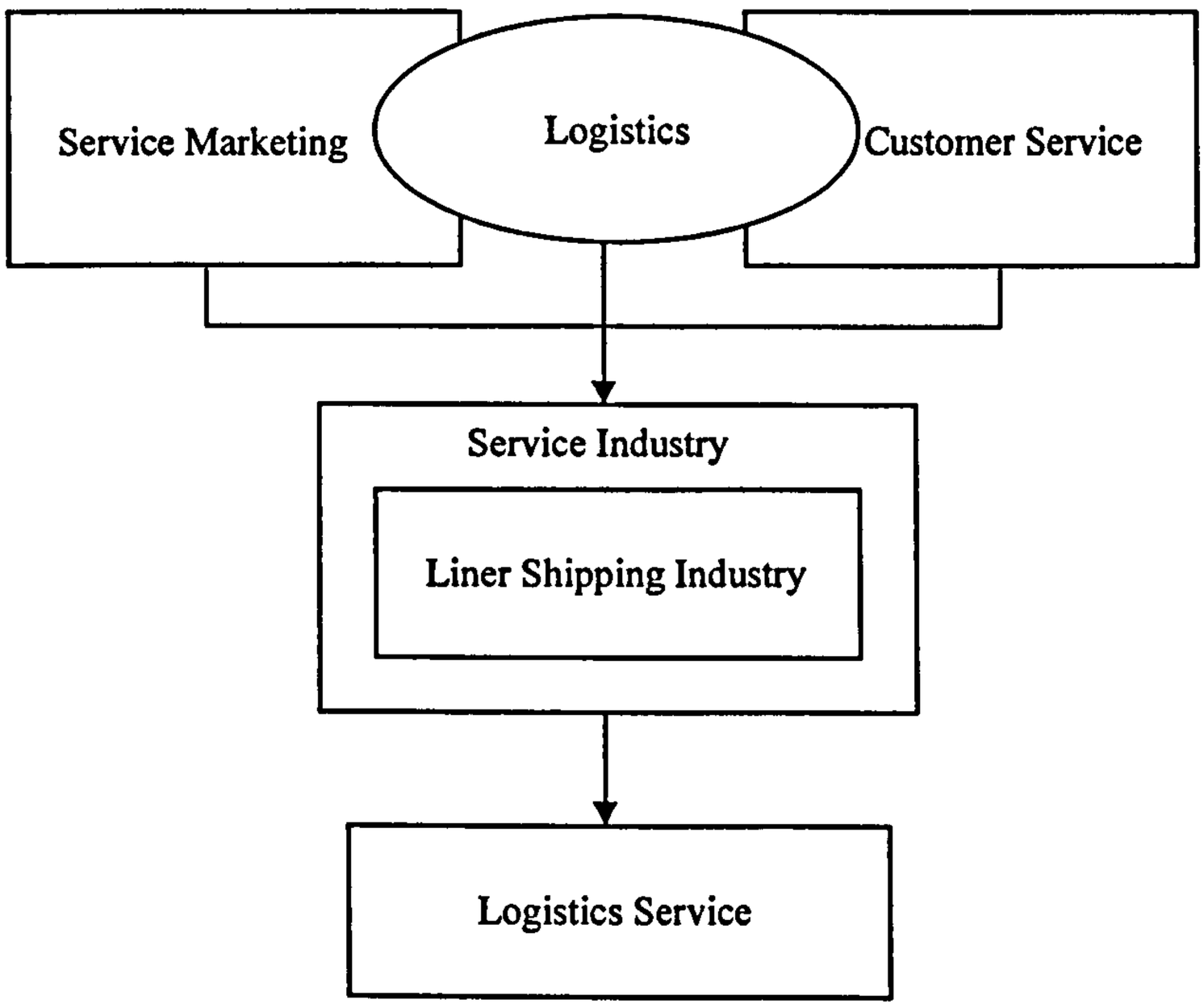
There is additional evidence for the interaction between logistics and customer service. Customer service includes a number of factors, which are considered to be important by customers. Some commentators (Christopher, 1992; Fawcett *et al.*, 1992; Marr, 1994; Sharma *et al.*, 1995) have identified various elements of customer service. The most commonly occurring seem to be: order cycle time, consistency and reliability of delivery, inventory availability, convenience of placing orders, invoicing procedures and accuracy, claims procedure, condition of goods, sales representatives' visits, and order status information.

Indeed, it could be said that, ultimately, customer service is determined by the interaction of all those factors that affect the process of making products and services available to the buyer (Christopher, 1990). In fact, most of these elements are also components of logistics.

3.1.3.3 Generating process of logistics service in liner shipping

Prior to moving on to the immediate discipline, logistics service, the research attempts to visualise all the parent disciplines mentioned previously and extract the logical assumption why liner shipping industry has introduced and employed logistics service in their business. Figure 3.1 illustrates the relationship between these disciplines and shows how this process takes place.

Figure 3.1 Generating process of logistics service in liner shipping



Source: Author

First of all, the liner shipping industry belongs to the service industries. Therefore, some efforts have been made by the shipping industry to adopt a service marketing approach to

their business operations (Brooks, 1984; 1985). It has been argued that logistics is closely related to service marketing (Murphy and Poist, 1996). Overall, logistics responsibility includes delivering the product or the service to the customers (Coyle *et al.*, 1992). Thus, a liner shipping company should make sure that the product reaches the customer in the desired quantity, at the right time, and in the right condition.

Second, once we know what levels of customer service are needed, logistics becomes an excellent tool to provide the necessary services. Christopher (1990) suggests that customer service is the thread that links logistics and marketing processes, because, in the end, the output of the logistics system is presented as a form of customer service. Harrington (1995) also points out that a well-managed logistics operation in a transport company is directly linked to customer service, reducing service times and costs in addition to keeping shippers satisfied.

Appreciating a notion that logistics service can help improve a company's competitive position in the marketplace, liner shipping sectors have attempted to provide a higher level of customer service. These efforts have been observed through the deployment of more speedy and bigger vessels, efficiently arranged intermodal transport, the improvement of information technology, and advanced documentation systems, etc. If a shipping company's logistics functions are well organised and managed, this will eventually help implement and operate a useful system aimed at delivering necessary services to customers.

In summary, the above-mentioned efforts of liner shipping companies in a fast changing environment have been named as so-called logistics service. It is believed that the operation of logistics service enables shipping companies to maintain competitive

advantage in the market. In the next section, the research will conceptualise 'logistics service' by synthesising both the service marketing approach and the transport approach.

3.2 Conceptualisation of Logistics Service

The previous section reviewed aspects of logistics and international logistics and visualised the theoretical background and the process of employing logistics by liner shipping service providers. The research will now be concerned with the conceptualisation of logistics service in a liner shipping context. The first step is to define 'service' in a general context, by exploring its definition, characteristics, classifications, and the dimensions of services. In addition, it is also necessary to define the liner shipping service itself. A full understanding of these two areas should be helpful in forming the concept of logistics service in liner shipping.

3.2.1 'Service' in general

3.2.1.1 Definition of service

Several authors have defined 'service' in general. Initially, in 1960, the American Marketing Association (Cowell, 1984, p.151) defines it as:

"Activities, benefits or satisfactions which are offered for sale, or are provided in connection with the sale of goods".

Cowell (1984), however, argues that the above definition does not particularly indicate the difference between goods and services by pointing out that goods are also offered for sale and provide benefits and satisfactions. Reflecting on this argument, the following refinement of the American Marketing Association definition is provided by Stanton (1981, p.441).

"Services are those separately identifiable, essentially intangible activities which provide want-satisfaction, and that are not necessarily tied to the sale of a product or another service. To produce a service may or may not require the use of tangible goods. However

when such use is required, there is no transfer of title (permanent ownership) to these tangible goods".

Kotler and Armstrong (1991, p.221) also provide a definition of service, focusing on the fact that a service in itself produces no tangible output.

"A service is an activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product".

Finally, Desmet *et al.* (1998) note that service should be characterised by two central notions: intangibility and simultaneity. As defined by Desmet *et al.* (1998, p.5), services are *"all those economic activities that are intangible and imply an interaction to be realised between service provider and consumer".*

3.2.1.2 Characteristics of services – traditional approach

Much of the interest and research with regard to services has focused on the differences that exist between physical goods and services (Desmet *et al.*, 1998). Findings from previous efforts have contributed to various classification schemes designed to organise service according to common service characteristics (Kotler and Armstrong, 1991). Table 3.1 provides a simple illustration of the basic differences between services and goods.

Table 3.1 Differences between services and goods

Services	Goods
• An activity or process • Intangible • Simultaneous production and consumption • Heterogeneous • Cannot be kept in stock	• A physical object • Tangible • Separation of production and consumption • Homogeneous • Can be kept in stock

Source: Desmet *et al.* (1998, p.5)

Walker (1995) also points out that services cannot be separated from their provider or stored in inventory. A number of characteristics have been suggested to help distinguish

goods and services. Many commentators, such as Cowell (1984), Lovelock (1984; 1991), Zeithaml *et al.* (1985), Mudies and Cottam (1993), Palmer (1994), and Rust *et al.* (1996), appear to agree that the most commonly stated characteristics of services are intangibility, inseparability, heterogeneity, and perishability.

3.2.1.2.1 Intangibility

In the literature on the differences between goods and services, the intangibility of services is the characteristic most frequently cited. Since services are essentially intangible, it is not usually possible to taste, feel, see, hear or smell them before they are purchased (Lovelock, 1991). Mudie and Cottam (1993) point out that the potential customer is unable to perceive the service prior to the service delivery and sometimes not even during and after.

In order to distinguish services and goods more clearly, Shostack (1977) proposes four categories. These four categories are presented in Table 3.2.

Table 3.2 Categorisation of services and goods

Pure tangible goods	The offer consists of pure tangible goods (e.g. sugar, toothpaste) with no explicit services accompanying it. The object of the sale is a tangible item.
Tangible goods with accompanying services	The offer consists of goods with accompanying services (e.g. a motor car, a computer). The object of the sale is a tangible item.
A service with accompanying goods	The offer consists of a service with accompanying goods (e.g. passenger air transport). The object of the sale is an intangible item.
A pure service	The offer consists of a service (e.g. teaching, legal consulting). The object of the sale is an intangible item.

Source: adapted from Shostack (1977)

Lovelock (1983) also develops the framework that classifies services according to whom or what they are directed and whether they are tangible or intangible in nature. Table 3.3 lists these classifications.

Table 3.3 Classification of services

Tangible actions directed at people's bodies	Health care, passenger transport, beauty salons, exercise clinics, restaurants
Tangible actions directed at goods and other physical possessions	Freight transport, janitorial services, laundry and dry cleaning, lawn care, veterinary care
Intangible actions directed at people's minds	Education, broadcasting, information services, theatres, museums
Intangible actions directed at intangible assets	Banking, legal services, accounting, securities, insurance

Source : Lovelock (1983, p.12)

3.2.1.2.2 Inseparability

Services are not supposed to be separated from the seller. Creating or performing service may occur simultaneously when full or partial consumption of the service takes place (Lovelock, 1984). Goods are produced, sold and consumed whereas services are sold and then produced and consumed simultaneously (Cowell, 1984).

3.2.1.2.3 Heterogeneity

Achieving standardisation of output in services is often difficult (Cowell, 1984). Simultaneous production and consumption will inevitably result in heterogeneity of service. Mudie and Cottam (1993) also note that the quality of the service may vary depending on who provides it, as well as when and how it is provided.

3.2.1.2.4 Perishability

The fourth characteristic distinguishing services from goods is their time dependence. Services are perishable and cannot usually be stored, since they are performed in real time. A service opportunity occurs at the time when it is made and, therefore, when it is gone, it is gone forever (Rust *et al.*, 1996).

3.2.1.3 Characteristics of service - Lovelock's (1996) approach

As explained above, much of the inaugural research on services pursues the difference between services and goods, focusing particularly on four generic characteristics. Despite their on-going use, there has been growing concern about whether these four characteristics are generally applicable to all types of services (Lovelock, 1996). Stell and Donoho (1996) also argue that the traditional classifications, in particular, prove difficult to apply in the case of retail services. In contrast, the following list in Table 3.4 of universal differences has been provided by Lovelock (1996) As illustrated in the table, this approach can be more helpful for distinguishing the characteristics of services from those of goods and provide more practical insights into the real nature of their differences.

Table 3.4 Characteristics of services

• Nature of product	Services often include tangible elements such as sitting in a passenger ferry or having faulty equipment repaired. Nevertheless, the performance of service is basically intangible.
• Customer involvement in production process	In creating service product, customers often actively get involved either by serving themselves (as in a fast-food restaurant) or by collaborating with service providers in some cases (hotels, hospital, or beauty shops).
• Quality control problems	Since services are consumed at the time when they are produced, fault and deficiency are harder to cover. These factors make it hard for service providers to control quality and offer a consistency.
• Hard to evaluate service prior to purchase	For goods, customers can determine, prior to purchasing a product, such as colour, style, shape, and price. By way of contrast, services may emphasise certain experience qualities, which can only be noticed after purchase or during consumption.
• No inventories for services	Since a service is perishable it cannot usually be stored. In particular, if customer's demands exceed service providers' capacity, no inventory can be available for such demands.
• Importance of time factor	Most services are delivered in real time. Customers have to be physically present to receive the service, for instance, airlines, beauty shops, and restaurants.
• Distribution channels	While manufacturing business requires distribution channels physically to move goods from the factory to customers, service business does not usually use distribution channels physically.

Source: adapted from Lovelock (1996)

McDougall and Snetsinger (1990), however, argue that services are not fundamentally different from goods and that no pure goods or services exist in today's market place.

3.2.1.4 Dimensions of services

Hill (1986) claims that service performance may be divided into a technical and functional dimension. Technical performance is the 'what' a customer receives, the core service, while functional performance is the way in which a consumer receives the technical service, the 'how', 'where' and 'when' of the service. For example, a cinema's technical performance can be a good quality viewing of a film, while its functional component may include a convenient booking system or sufficient space for parking cars. Gronroos (1980) also claims that service has two different levels, the general and the specific level. The former is an essential product being offered and the latter is an auxiliary product. For instance, in the case of a ferry passenger transport service, the movement of the ferry itself is the core service, while other services such as catering service, or the duty free shop can be examples of an auxiliary product. Similarly, Lovelock (1991) classifies service into the core and the supplementary service. Continuing with the cinema example, a good quality viewing of a film remains the core, while the supplemental services include booking service or in-house eating establishments. Walker (1995) also notes that services have a core component as well as surrounding components.

In summary, the aim of the review of 'service' in general was to create an extensive basis of understanding for the key concept of the research, logistics service in liner shipping. It has been noted that services have very different characteristics from goods. However, as suggested by Shostack (1977) and Lovelock (1983), services may range from a pure service to a service possessing characteristics of goods. In this categorisation, a liner shipping service is said to be a service with certain characteristics of goods. This section has also found that the approach by Lovelock (1996) can help explain the characteristics of

liner shipping service. In the next section, a liner shipping service will be defined and then characterised based on Lovelock's approach.

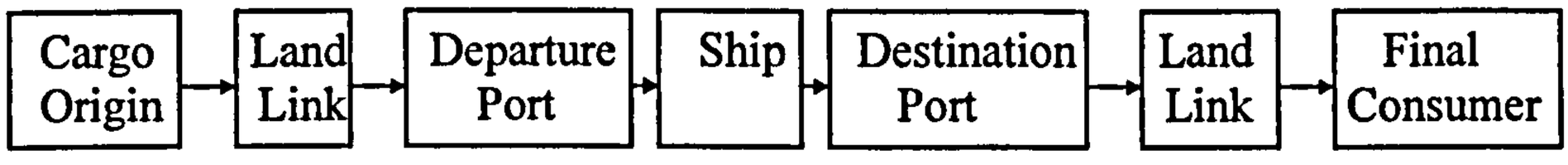
3.2.2 Liner shipping service

3.2.2.1 Liner shipping service defined

It may be useful to briefly consider the nature of transport service before dealing especially with liner shipping service. The nature of transport is a service and not a physical, tangible product. Time and place utility are the outcome of transport (Coyle *et al.*, 1994). When goods are moved to places where they have a higher value from where they originated, place utility is created. Time utility means that the service occurs when it is needed.

Muranaka (1988) insists that transport can be a process product that should be treated as a system and to be scheduled accurately. Liner shipping can also be described as a 'process product' since the shipping service is being processed from the shipper to the final consumer with the carrier's management. This process is shown in Figure 3.2.

Figure 3.2 Liner shipping as a process product



Source: Author

A liner shipping service is the transformation of cargoes in terms of time and space. This process usually entails not only shippers and carriers' involvement but also freight forwarders, port authorities, inland infrastructure and so on. In other words, a liner shipping service cannot be successfully completed without all the parties involved working together. Brideweser and Paton (1981) also argue for liner shipping services' inevitable attachment to other related functions such as a vessel movement, port and terminal facilities, cargo handling systems, etc.

From the carrier's point of view, the management of liner shipping services is very clear since the carriers place ships into operation on trade routes and carry shippers' cargoes at scheduled times (Jansson and Shneerson, 1987). On the other hand, shippers may wish to have a variety of shipping options and specific requirements for their cargoes, namely a unique origin, a unique destination, special care for fragile or hazardous cargo, a specific requirement for transit time and so on (Eller, 1994).

3.2.2.2 The characteristics of liner shipping service in a service marketing context

Much research on services has attempted to provide a clear identification of the nature of the service. However, this is not apparent in the liner shipping literature. Therefore, it is of critical importance to identify the characteristics of liner shipping service by adopting the approach previously described.

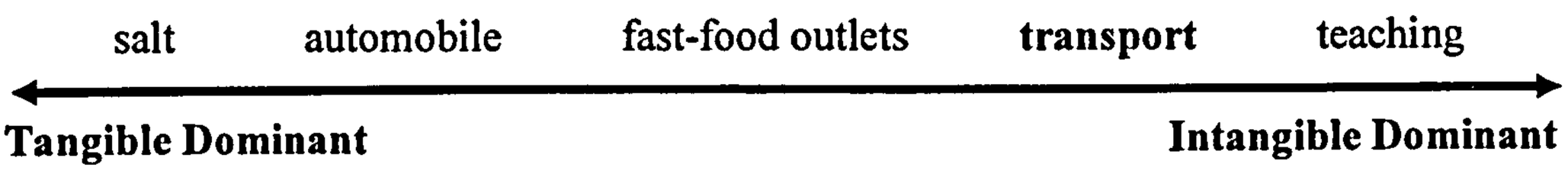
The approach adopted here is a combination of the two main characterising frameworks in the service marketing areas explained in section 3.2.1.2 and 3.2.1.3. One framework consists of four characteristics widely accepted by many scholars, namely, intangibility, inseparability, heterogeneity, and perishability. The other consists of the seven characteristics of service developed by Lovelock (1996). While the former is an approach for distinguishing service functions from those of goods, the latter is rather different in that it investigates the nature of service itself. Consequently, this research will apply these two approaches to liner shipping service to unveil its nature and characteristics.

3.2.2.2.1 Intangibility

Technically, most services are not tangible. Transport is a service but it has certain characteristics that make purchasing this service similar to buying physical goods (Coyle *et al.*, 1994). Lovelock (1983) classifies freight transport into a tangible action directed at

goods and other physical possessions. According to the continuum suggested by Shostack (1977), transport service is located at a point somewhere between fast-food outlets and teaching. This continuum can also be used to pinpoint where liner shipping can be placed. In Figure 3.3, a liner shipping service as a part of transport service can also be located at the same point at which transport is placed.

Figure 3.3 A goods-service continuum



Source : adapted from Shostack, (1977, p.77)

3.2.2.2.2 Inseparability

A liner shipping service is produced and consumed simultaneously. The container ship starts its journey at the same time or shortly after the cargoes are loaded. This means that a liner shipping service holds a strong degree of inseparability of production and consumption. However, much of the marketing effort of liner shipping services attempts to offer separation in some respect. Service can be deferred, if a booking in advance can be regarded as a part of consumption. For instance, some shippers, who retain relatively important or valuable cargoes, wish to ensure that their cargoes will definitely be shipped at the time of contract with carriers.

3.2.2.2.3 Heterogeneity

Heterogeneity is associated with the potential for variability in the performance of services (Zeithaml *et al.*, 1985). Ideally, the service operation in liner shipping would be homogeneous in every service transaction, otherwise it may not be reliable. However, the output of a liner shipping service is not always identical each time, and the performance of the service might be different in every service transaction. According to Desmet *et al.*

(1998), there are some possible sources, which make heterogeneity even greater. The surroundings may influence the shipper's perception of the service - for example, whether or not there is a long waiting time at the departure port and destination port and whether there is traffic congestion on the roads at a certain country. Such factors can make a huge difference to the shipper if it is not possible for the carrier to control these factors successfully.

3.2.2.2.4 Perishability

It is believed that liner shipping services are perishable and cannot be stored. In some respect, however, they can be stored in the form of an advance booking. Nevertheless, the principal function of liner shipping is to sail regularly, regardless of the vessel being fully loaded or not, and regular scheduled sailings can make it almost impossible for a liner to store its service for the future.

3.2.2.2.5 Characteristics of liner shipping service – Lovelock's approach

By means of an adoption of Lovelock's approach (1996), Table 3.5 summarises the characteristics of a liner shipping service. In addition to the traditional characteristics of service, this approach can successfully identify the nature of a liner shipping service.

Table 3.5 Characteristics of liner shipping services

• Nature of product	Although a liner shipping service often includes tangible elements, the service performance itself is basically intangible.
• Customer involvement in production process	Customers are not usually actively involved in helping to create the service product. However, when shippers demand some special services and carriers accept them, it could mean that customers can get involved in the production process.
• Quality control problems	It is difficult for service providers to control quality problems with the same precision as a manufacturer, even though continuous on-line monitoring is becoming more frequent. Unlike manufactured goods, the carrier cannot check the quality of service in advance as the consumption of service takes place when the services are produced.
• Hard to evaluate prior to purchase	Shippers can only evaluate service quality or value from indirect experience such as advertising and word of mouth. They are not able to choose the right service for themselves by checking the level of service before they purchase it. A particular feature of freight transport (unlike passenger transport) is that the consumer (i.e. the shipper) does not travel with the transport and therefore is unlikely to have direct experience of it, other than at the collection and delivery stages.
• No inventories for services	Since a liner shipping service is perishable it cannot be inventoried. However, when an advance booking is made, a service might be stored under the name of booking.
• Importance of time factor	Like all other transport services, shippers wish to see their cargoes move as quickly as possible.
• Distribution channels	A liner shipping service uses a physical distribution channel to move customers' cargoes.

Source: Author but inspired by Lovelock (1996)

3.2.2.3 Discussion

With reference to the discussion of a liner shipping service described in Section 3.2.2.1, a liner shipping service is processed at somewhere between the point of a cargo's origin and the point of final consumption. In this respect, it is more appropriate to accept that a liner shipping service can be acknowledged as a part of a larger process product, similar to the manufacturing process for commercial transactions.

However, it was suggested in section 3.2.2.2 that a liner shipping service possesses typical service characteristics, which are not amenable to it being standardised and homogenised. Take, for example, the well-known case of McDonald's fast food service, which

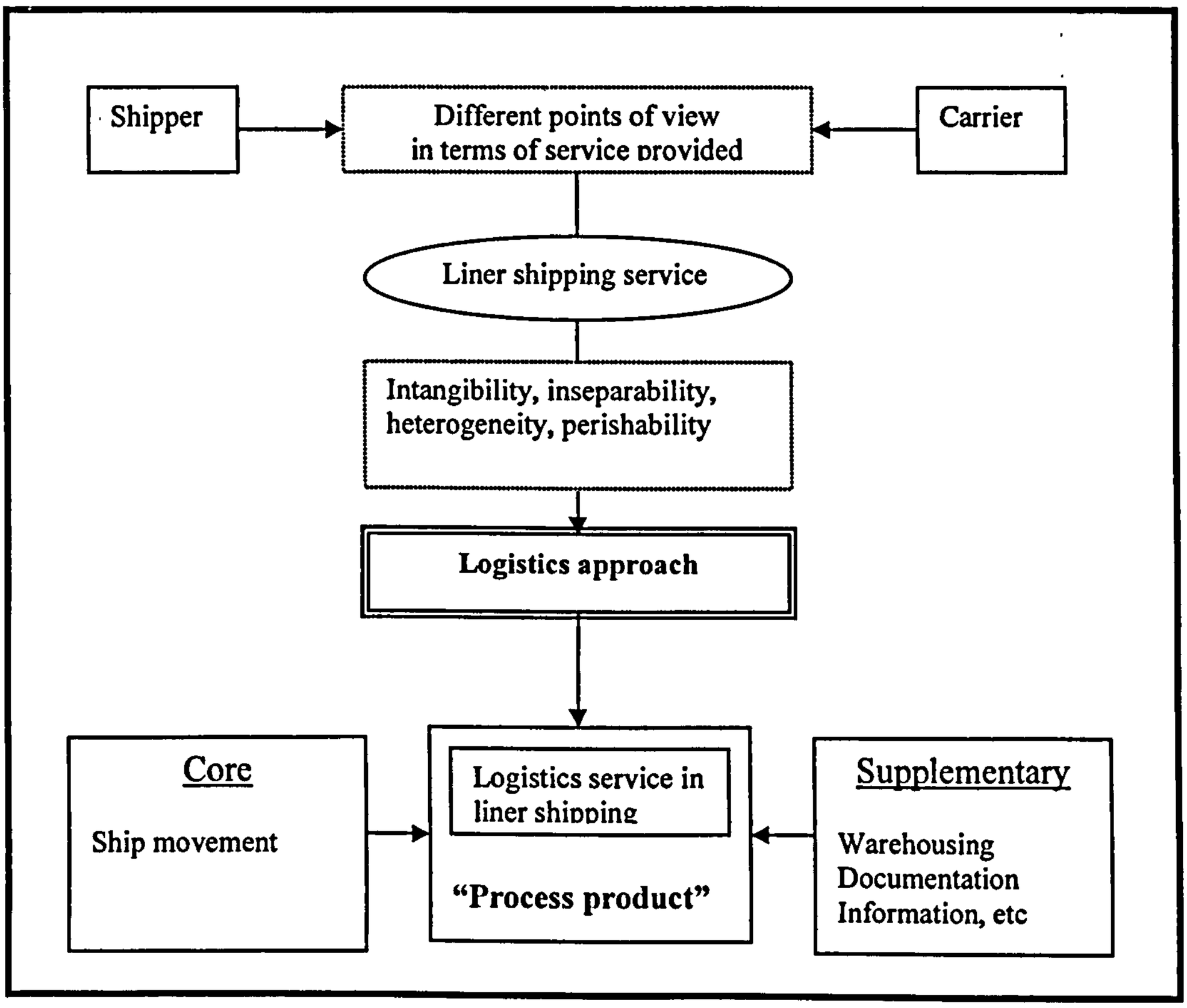
overcomes the problems of service characteristics by adopting just-in-time delivery, a highly standardised service offer, etc. Similarly, a liner shipping service can possibly avoid the variability of service characteristics by using well-managed business strategies such as logistics or service marketing.

3.2.3 Logistics service in liner shipping

3.2.3.1 Conceptualisation of logistics service

In order to conceptualise logistics service, three main disciplines: service marketing, liner shipping and logistics, have been previously reviewed, the results of which are illustrated in Figure 3.4.

Figure 3.4 Conceptualisation of logistics service in liner shipping



Source: Author

First of all, it has been widely claimed that the dissimilar conception on service between the service provider and the service consumer could be a significant issue in service industry (Zeithaml et. al., 1985; Parasuraman *et. al.*, 1988). In other words, they have different points of view of the quality of service and of the satisfaction of service performance. In the case of manufactured goods, although certain kinds of customer interaction, such as loyalty schemes and after sales service, are becoming more frequent, consumers do not usually develop a formal relationship with the provider (Lovelock, 1996). This feature makes it difficult to reduce the gap between the service provider and the service consumer. In the liner shipping service sector, on the other hand, the shipper and the carrier usually form a close relationship. For example, a carrier may provide the shipper with updated information such as a time schedule and any change in freight rates. These efforts will definitely reduce the gap and eventually lead to successful business for service providers.

Second, it has been noted that service retains four generic characteristics, which hinder an efficient and effective flow of liner shipping service. Therefore, a logistics approach, which could overcome the problems caused by service characteristics, can be adopted. Furthermore, it could be considered that a liner shipping service is a process product rather than either a good or a service (Muranaka, 1988) since shipping service is being processed from the point of cargo's origin to the final consumer.

Finally, the functions of logistics service in liner shipping can be classified into two categories: core function and supplementary function suggested by Lovelock (1991) and Walker (1995). The core function consists of international sea transport service itself, while the supplementary functions consist of inland transport, documentation, invoicing, warehousing, information, etc.

3.2.3.2 Driving forces of logistics service

This section aims to explain what factors in the business and economic environment make carriers in the liner shipping market employ the concept of logistics in their business. It restricts the discussion to these areas and does not discuss the social or ecological environment which are beyond the scope of this work. McKnight *et al.*, (1997, p.34) claim that liner shipping companies should respond to both survival and opportunity "*as pressure on one side from the consistent expansion of the container shipping business and on the other side from increasing shippers' demands for handling, processing, storage, and movement of goods*".

Boyes (1997) also argues that customers are no longer satisfied with simply getting their goods out of the despatch area, but are interested in the whole delivery process. To meet these requirements, shipping companies should be able to manage the entire process in the supply chain, by responding quickly and efficiently to their customers' changing requirements, maintaining what is necessary and eliminating what is not necessary and finally adding values to customers.

As Anscombe (1994) claims, differentiation of services between customers is the trend, which will shape the future of logistics. In the line shipping market, shippers have become more knowledgeable about the market and, consequently, demand a wider range of services. The emphasis is currently shifting from despatch to delivery. Services must fit in with customer needs and not those of the provider, and there must be control and continuous evaluation of the process.

In addition to the factors mentioned above, there have been some other environmental factors stimulating liner shipping companies and other logistics service providers to employ logistics service in their service operations. These are suggested by some

commentators (Gourdin and Clarke, 1990; Christopher, 1992; Min and Eom, 1994; Lloyd's List, 1997; McKnight *et al.*, 1997b; Cargo News Asia, 1998a) and can be classified as:

- Expansion of container business
- Emergence of *strategic alliances*
- More mergers and acquisitions
- Development of information technology
- Liberalisation trends in international trade
- Competition between service providers
- Higher demands from shippers
- Negative impact on customer service

3.2.3.3 Comparison with traditional shipping service

Carriers have rapidly expanded the scope of their services, which enable them to extend the range and depth of service to their customers (McKnight *et al.*, 1997). In recent years, a number of large container shipping companies have allegedly announced that they supply 'global logistics services' for international shipments.

At this point, it is valid to raise a question of terminology. Some liner shipping companies, as well as agents such as freight forwarders, use the term 'logistics' or 'global logistics' or 'logistics carrier' increasingly more often. Does this redefine their function in a specific way or is it merely a fashionable use of terminology? The question here is whether logistics service should differ from the traditionally performed service called as a traditional shipping service. In order to answer the question, the following discussion is presented, highlighting in particular the different interpretations of the word 'logistics' when associated with shipping.

3.2.3.3.1 Shipping model and logistics model

Yamada (1995) suggests that the container liner shipping industry has become a low-margin business and the price premium for quality service has disappeared. As container shipping has become a commodity, the traditional approach for the market may not be appropriate. He follows up with the contrast between the traditional shipping service and the logistics service in a liner shipping context.

The traditional shipping model can be characterised as follows. First, liner operators seek to offer premium service quality and price, and service providers seek to maintain high profitability. Second, customers are more interested in various attributes of the shipping product other than the price. According to Yamada, the logistics model can be described very differently. First, liner operators focus on reducing costs and maintaining low margins in a standardised industry. Second, they seek to have low, but constant profitability for all those involved. Third, customers intend to pay only the lowest rate irrespective of the supplier. Finally, there is a self-adjusting pricing mechanism where price is decided by the unit cost.

3.2.3.3.2 Port-to-port service and logistics service

While Yamada focuses on the approach associated with the entire industry, Graham (1998) identifies the differences between the traditional port-to-port service and the logistics service. According to Graham, the basic port-to-port service can be characterised by large, lumpy investment in vessels and containers, leading to joint fleet operation, whereas the logistics service is characterised by close individual carrier/shipper relations. With regard to the service functions offered, basic port-to-port service has the provision of vessels and containers, investment or contracts for terminals, and cargo handling. On the other hand, the logistics service performs different functions such as integration of deep-sea intermodal activity into customers' overall supply chain activity, close co-operation in

services tailored to the above, and the provision of logistics consultancy. Finally, the basic port-to-port service focuses on the cost-effective scale of vessels and terminals, greater frequency of service, shorter transit times, convenience, minimal delays and service alternations. The logistics service seeks to have a greater understanding of supplier potential and of customer problems and opportunities. It can be seen that this contrast differs greatly from that of Yamada (1995).

3.2.3.4 Logistics service providers in liner shipping market

Nowadays, the activities of the logistics service providers are performed by several types of institutions who call themselves under different names: e.g. liner shipping company, air cargo agent, road transport operator, non-vessel-owning-common-carrier (NVOCC), freight forwarder, and global logistics provider. The following describes the role of each institution in the liner shipping market.

3.2.3.4.1 Liner shipping company

The most popular type of service provider in the liner shipping market is the liner shipping company. With their existing advantages in breadth and depth of service, liner shipping companies have grown both internally and externally through alliances or mergers with other carriers. Some have concentrated on port-to-port services only, while others have extended their business by entering into other logistics activities such as inventory management, warehousing, land transport, etc. Some shippers think that liner companies should stick to their core business, whereas others see the potential for them to become global logistics providers. In this context, the scope of service provided by liner shipping companies to shippers is open to debate.

3.2.3.4.2 Freight forwarder

A freight forwarder is defined as a person or a company arranging transport and preparing shipping documents, and therefore acting as an intermediary who can facilitate trade (BIFA, 1997). In Europe, a freight forwarder is considered as a shipper but may also act as an agent for a carrier. In the US, since the OSRA became law, freight forwarders have been categorised as a type of ocean transport intermediaries (OTIs). Freight forwarders provide two main categories of service: moving goods out of the country on behalf of exporters and bringing goods into the country on behalf of importers. In addition, freight forwarders can be involved in many of the numerous activities related to transport. The following is a summary of the principal roles of a freight forwarder as provided by BIFA (1997, p.3)

- *Advice to customers on the most appropriate mode of transport;*
- *Choice of the most suitable carrier and conclusion of the transport contract;*
- *Provision of carriers and forwarders' documentation;*
- *Compliance with regulations and letter of credit requirements;*
- *Customs clearance;*
- *Advice to customers on packing;*
- *Insurance cover during transit;*
- *Advice to customers on warehousing and distribution;*
- *Supervision of the movement of goods.*

Currently, freight forwarders appear to have taken over much of the work traditionally done by the exporter or importer (Containerisation International, 2001). In practice, a number of shippers are more interested in outsourcing their import/export administration in order to concentrate on their core business. It may be worthwhile to look at an example of a freight forwarder, which will clearly illustrate their development in the market. Fritz, headquartered in San Francisco and established in 1933, is a global operator of logistics and forwarding services. From the late 1980s, Fritz started the process of transforming itself into a provider of integrated logistics services. At the same time the company was also expanding its role as a global freight forwarder, sustaining their efforts with

management and information technology. This simultaneous effort was largely attributable to the belief of the top management that the two roles can be interlocked (Containerisation International, 1999a).

It may be necessary to redefine the role of freight forwarders in a rapidly changing environment. Competition between other freight forwarders as well as liner shipping companies may force them to reassess their roles and determine what to do. Ideally, freight forwarders in the market should manage the integrated supply chain logistics with the objective of reducing overall supply chain costs and improving the quality of service provided.

3.2.3.4.3 NVOCC

NVOCC (Non-vessel-owning-common-carrier), which does not own vessels but uses the vessels of other companies, came forth as land and water intermodal traffic became popular (Mahoney, 1985). The Federal Maritime Commission (FMC) in the United States defines NVOCC as an institution that provides international transport on an intermodal basis, issues through intermodal bills of lading, and takes a responsibility for the cargo to be carried (Hayuth, 1987). It could be claimed that an NVOCC is merely another name for traditional freight forwarder. In the beginning, the NVOCCs failed to receive particular attention from customers since the US regulation prevented them from filing through joint rates with surface carriers (Hayuth, 1987).

NVOCCs, unlike asset-based operators that are impeded by the huge capital costs, are not committed to a specific trade route or conference. Thus, their advantages over other shipping companies are the wider choice of transport routes and the more flexible arrangements of intermodal transport. By positioning themselves between the shipper and

the carrier, the NVOCCs break the old tradition of direct contact between shipper and carrier in the sale of cargo space on vessels (Hayuth, 1987).

However, since the OSRA became law, NVOCCs have not been allowed to make direct contact with shippers and must charge shippers based upon their publicly posted tariffs. Moreover, they cannot discriminate among similarly situated shippers, but must charge each the same. However, NVOCCs are considered shippers in dealing with vessel operators and vessel operators are not required to offer each NVOCC the same contract rates. This new regulation enables large volume NVOCCs to obtain more favourable rates than small volume NVOCCs (Calderwood, 1999). This has obviously put NVOCCs in a disadvantageous position.

3.2.3.4.4 Global logistics provider

During the last ten years, several large carriers have made substantial investments to acquire the capability to provide global transportation and logistics service to international shippers (Semeijn and Vellenga, 1995). The term 'global logistics provider' has been increasingly used in the liner shipping market and can be defined as a company or a group of companies offering a broad range of logistics services including transport, warehousing, information, inventory management and other value-added services. The emergence of the global logistics provider was a signal for the disappearance of barriers between transport carriers and intermediaries.

For example, Maersk-Sea Land, with nearly 9.5 % of current container ship capacity (as of August 2003), claims to have become a global logistics service provider. This 'truly global player' has 35 individual services covering all the major routes, including Trans-Pacific, Trans-Atlantic, Central and South America services, Europe and Asia services, Africa services, Mid-east and Indian Sub-Continent, and Australia/New Zealand services.

However, it has been claimed that reduced competition will lead to less choice for shippers although they will still have many service options to select from (Containerisation International, 1999b).

Meanwhile, Mahoney (1985) introduces the issue of 'one-stop shopping' and interprets it as a "transport supermarket". In this context, shippers' needs can be met under one roof, in the same way as a consumer at a check-out counter in a supermarket. Semeijn and Vellenga (1995) also describe one-stop shopping as the process by which the a single company takes the responsibility of the entire supply chain starting from the shippers' premises and terminating at the shipments' final destination. Similarly, Vellenga *et al.* (1999) associate one-stop shopping with a shipper looking for a transport enterprise that will accept the shipment and choose the most efficient mode or modes of transport and also provide a variety of logistics services.

3.2.3.4.5 Discussion

Some experts in the transport and logistics industry believe that there are no obviously serious providers of global logistics services in the liner shipping market. McKnight *et al.* (1997) state that a global logistics provider must fulfil a number of criteria: to be able to provide all activities of the logistics supply chain; to offer virtually global coverage at a consistent quality; to provide seamless service between different parts of the service; to provide easily available and detailed information about shipments and inventory level. Since such requirements are very difficult to meet, it would be difficult for a single company to provide those services. It is therefore debatable whether a global logistics service provider is the best solution or whether each institution should specialise in each function of logistics service in the liner shipping market.

3.2.3.5 Review of previous research on liner shipping services

According to Heskett (1986; 1987), the systematic study of service must answer the following question. What are the important attributes of the service to be provided, stated in terms of results, produced for the customer and the provider? Reflecting on this idea, previous studies dealing with the attributes of liner shipping service have been reviewed in this research. The features in the previous studies vary significantly according to the methodologies used, the locations focused upon, and even the time when the research was conducted. Reviewing previous research will certainly be useful to identify the attributes of services. In the following, the results of the review are presented and discussed in the order of their publication.

Brideweser and Paton (1981) note that the quality of shipping service offered by a particular liner shipping company appears to depend upon the perspective adopted by carriers and shippers. The attributes stated as indicators of the quality of service by shippers are as follows (Brideweser and Paton, 1981, p.22).

Special facilitation of shipments
- *priority treatment of urgent cargoes*
- *accommodation of late cargoes*
- *special handling to avoid loss, pilferage, and/or damage*

Adherence to an announced schedule
- *low transit times*
- *high sailing frequency*

Rate accommodations
- *volume discounts*
- *no sudden or major increase*

Good access to the carrier's management

On the other hand, the attributes selected by carriers seem to be somewhat different from those indicated by shippers (Brideweser and Paton, 1981. p.23).

Maintenance of ships' sailing on the trade route
Maintenance of adequate sealift capacity
- *ship cargo deadweight & cube*
- *ship service speeds and seakeeping margins*

- *number of ships*
- *frequency of sailings*

Maintenance of commercially viable transit times, and sailing frequencies on the trade route by routing and schedule control

- *port rotations*
- *port to port transit times*
- *frequency of port calls*

Provision of a suitable cargo handling system

- *ship's cargo gear*
- *related hull design features*
- *port facilities & equipment*
- *cargo equipment*

Maintenance of rates

- *compensatory to the carrier*
- *commercially supportive of cargoes*

Collison (1984) investigates a liner shipping service, focusing on domestic liner trade in the United States. The attributes are classified into five categories, with a five-point scale used to measure the importance of each attribute. He notes that there are significant differences among the shipping line service attributes, depending upon the segment of shippers. The following are the shipping line service attributes used in his study (Collison, 1984, p.41).

Timeliness of Service

- *Overall average time in transit*
- *Frequency of sailing*
- *Schedule reliability*
- *Convenience of access to port facilities*

Facilities and Equipment

- *Ability to provide specialised equipment*
- *Condition of containers*
- *Availability of handling equipment*

Traffic Services

- *Completeness of through service*
- *Absence of loss or damage*
- *Quality of follow-up*

Pricing and Rates

- *Ability to quote door-to-door rates*
- *Ability to provide lower rates in special cases*

Marketing Services

- *Information value of sales promotional material*
- *Timelessness in the provision of schedule change*
- *Actual understanding of shipping requirements*

Brooks has reported on liner shipping services in several publications (Brooks, 1984; 1985; 1990; 1995; 2000a; 2000b). Brooks (1995) suggests that various factors can affect shippers' choice of transport and that there are certain factors important only for shippers in terms of liner shipping service, which are (Brooks, 1995, p.42):

Cost of service
The core service
- *Transit time door-to-door*
- *Availability of equipment*
- *Weekly fixed day departure*

Measurable attributes of the core service
- *On-time pickup and delivery*
- *Consistent timely pickup and delivery*
- *Quality of equipment*
- *Timely quotes*
- *Timely arrival notices*
- *Accuracy of bill of lading production*
- *Accuracy of invoicing*

Service delivery
- *Problem solving capacity of carrier personnel*
- *Telephone satisfaction*

Brooks concludes that the market is definitely not homogeneous in its requirements of carriers and that different elements surface as important both in identifiable geographical markets and customer groups.

Jamaluddin (1995) identifies five service factors to which shippers have attached most importance. The study was carried out with reference to Far East/Europe trade. The factors discovered are *freight rate, cargo care and handling, knowledgeability, punctuality, transit time and service frequency.*

Lu and Marlow (1999) summarise the previous body of liner shipping service literature and selected 39 service attributes. These service attributes are classified into 8 groups, which are the following (Lu and Marlow, 1999, pp.14-15).

- *Speed and reliability*
- *Value-added service*
- *Sales representative service*
- *Integrated service*
- *Freight rates*
- *Equipment and facilities*
- *Corporate image*
- *Promotion*

Kent and Parker (1999) examine the difference in the perceptions of 18 carrier selection factors between import shippers, export shippers, and international containership carriers. They have found some significant differences between these three groups. The results of their study presented with 18 transport selection factors are as follows:

- *Reliability*
- *Equipment availability*
- *Service frequency*
- *Rate changes*
- *Operating personnel*
- *Transit time*
- *Financial stability*
- *Loss and damage*
- *Expediting*
- *Tracing*
- *Service changes*
- *Rates*
- *Scheduling flexibility*
- *Carrier salesmanship*
- *Linehaul service*
- *Special equipment*
- *Pick up and delivery*
- *Claims*

Elsewhere, Gibson *et al.* (2002) examine the similarities and differences with the rankings of factors between the shipper and carrier groups. Furthermore, the results highlight the various levels of satisfaction between the two groups. Most recently, Tiwari *et al.* (2003) adopt a somewhat different approach from the previous studies in order to investigate shippers' carrier selection behaviour. They develop the shipping line's characteristics as well as the shippers' characteristics that can also influence shippers' decision regarding

shipping line choices. The characteristics of shipping lines used in their study are *the total TEU handled and the fleet size*, and the characteristics of shippers are *the distance of shippers from port, the distance of foreign port, and the type of trade* (Tiwari, 2003, p.33).

3.2.3.6 Summary of attributes of liner shipping service

Having summarised the attributes discovered in the previous studies, the research has been able to classify them into four main categories, namely: timing, reliability, communication, and convenience. This classification process was encouraged and guided by several other studies (La Londe *et al.*, 1988; Coyle *et al.*, 1992, 1996; Johnson and Wood, 1996; Schary and Skjott-Larsen, 2001; McKinnon *et al.*, 2002).

3.2.3.6.1 Timing

The timing factors usually revolve around transit time, particularly from the service provider's point of view. On the other hand, the shippers usually refer to the time service element as lead time, replenishment time or order cycle time (Coyle *et al.*, 1992). Successful logistics operations offered by shipping companies today involve a high degree of time management, including order processing, order preparation, and order shipment (McKinnon *et al.*, 2002). The attributes of liner shipping service in terms of timing can be itemised as port-to-port transit times, door-to-door transit times, on-time pickup and delivery, etc (Johnson and Wood, 1996).

3.2.3.6.2 Reliability

Reliability refers to delivering a customer's order with regularity, consistency, and safety in harmony with the quality of items the customer has ordered (Coyle *et al.*, 1996). As far as a shipper is concerned, reliability is often more important than the actual lead time (La Londe *et al.*, 1988). Customers can minimise their inventory levels, provided that the lead time is fixed in advance. For example, if customers are informed with a 100 per cent

certainty that the lead time is two weeks, they can successfully adjust their inventory levels to correspond to the average demand during the two weeks. The attributes of liner shipping service in terms of reliability are reliability of time keeping, schedule reliability, reliability of administration, weekly fixed day departure, consistent pickup and delivery, etc (Johnson and Wood, 1996).

3.2.3.6.3 Communication

Communication with customers makes it necessary to monitor customer service levels and is essential to the design of logistics service levels. The communication channel must be constantly open and readily accessible to all customers (Coyle *et al.*, 1996). Without consistent contact with shippers, a shipping company is unable to provide the most efficient and satisfactory service. The carrier must be able to transmit vital customer service information to the shipper. For example, the carrier should be able to inform the shipper of all the necessary information needed so that the shipper can respond effectively to them. The attributes of liner shipping service in terms of communication have been summarised as timely quotes, timely arrival notices, monitoring service of cargo tracking, etc (Johnson and Wood, 1996).

3.2.3.6.4 Convenience

Convenience is the accommodation of customers' different requirements (Coyle *et al.*, 1996). Another way of defining convenience is that the customer service level must be flexible (La Londe *et al.*, 1988). Service providers usually divide their customers into segments based on different requirements. This segmentation enables a shipping company to recognise customer service needs and to attempt to meet those demands successfully. In an ideal situation, having one or a few standard service levels that can be applied to all customers would be more economical. However, it should assume that all customers' demands are homogeneous, which is not the case in reality. For example, one customer

may require the service provider to transport all cargoes by rail, while another may require lorry delivery only and still others may request yet another form of special delivery. Basically, logistics service requirements differ with regard to transport mode, routes, and customers' other requirements (Schary and Skjott-Larsen, 2001). The attributes of liner shipping service in terms of convenience are availability of equipment, special treatment for dangerous cargoes, frequency of port calls, good access to port facilities, etc (Johnson and Wood, 1996). Nevertheless, a liner shipping service cannot offer too much customisation, otherwise it will not be cost-effective. The success of business is largely attributable to standardisation, most notably the use of ISO (International Organisation for Standardisation) standard containers and scheduled sailings. The range of ISO container sizes can be seen as a compromise between customer convenience and standardisation.

3.2.3.7 Logistics service functions

It appears that most previous research on liner shipping services has only focused on identifying the main determinants or attributes affecting shippers' carrier selection. An analysis of previous studies on such selection indicates an emphasis on statistical comparisons of the mean scores of various selection factors (Murphy *et al.*, 1997). In other words, they tend to enumerate elements of services, some of which are solely related to the shipper's point of view (Collison, 1984; Brooks, 1995), while others are related to both the shippers' and the carriers' points of view (Brideweser and Paton, 1981; Kent and Parker, 1999).

The review of previous studies also clearly shows a lack of measurement and explanation of the service itself. It could be said that identifying the nature of liner shipping service is an important stage before the research conceptualises the logistics service in liner shipping. Previous research on the nature of liner shipping appears to have been mainly on an *ad hoc* basis and not grounded in any theory associated with logistics concepts. However, this

research focuses not on service elements but on service functions. For the research, logistics service in liner shipping was defined as 'the synthesised functions of each sub-function within the service delivery process'. Initially, logistics service functions are to be identified and selected by reviewing the relevant studies. These functions will be used as the variables to measure key aspects of logistics service operation in the shippers' survey. In order to justify the initial selection of service functions, the functions discovered will be verified by a panel of experts at a later stage using the Delphi technique. Logistics service functions extracted from the literature review will be detailed in Chapter 6.

3.3 Conclusion

In summary, there is certain evidence that the container liner shipping market is being transformed as a result of a changing situation, including more sophisticated shippers' demands, the development of information technology, the emergence of new shipping regulation and depressed freight rates or profits of liner shipping companies. Consequently, liner shipping companies as well as other transport intermediaries appear to have realised that they need to include a wider range of service functions in their business offer. These efforts have been labelled as the operation of logistics service.

This chapter has reviewed logistics and other related disciplines. As a result, the research has sought to present a sound theoretical background of how research problems have emerged in the liner shipping market. Furthermore, significant efforts were made to define the research problems. Based on these findings, the next chapter will develop a conceptual model and formulate the research hypotheses.

CHAPTER 4

Conceptual Model Development

In the previous chapters, the review of relevant literature regarding shipping and logistics was carried out, enabling the research areas to be narrowed and the research problems to be identified. This chapter evolves a conceptual model that may be used to provide a possible way of analysing logistics service operation in the liner shipping market. In what follows, the research questions are put forward and the testable hypotheses are derived.

4.1 Research Objectives

The research objectives need to be reviewed at this stage. Besides reviewing the relevant literature, the research contains the following objectives. First, this research aims to discover the driving forces, which appear to stimulate logistics service providers in the liner shipping market to employ the logistics service concept in their business operations. Discovering these environmental factors can provide a sound starting point for the research. Second, this research aims to investigate the difference between the features of a traditional shipping service and those of a logistics service. Identifying those differences can help us establish the underlying reasons why service providers intend to employ the concept of logistics service. Third, this research aims to analyse shippers' perceptions of logistics service with reference to shippers' and cargoes' characteristics. As a real user of the service provided, it is vital to analyse the shipper's perception in the first place. Finally, the research aims to analyse the relationship between the preferred choice of service providers for each logistics service function and the degree of satisfaction therein.

4.2 Conceptual Model

This section aims to define a conceptual model in general and discuss the following two relationships: model – theory and model - hypothesis.

4.2.1 Conceptual model defined

Among scholars, a model can be defined as an abstracted portrait of real life, or a simplified representation of some phenomena or situations (Buzzell, 1964; Naert and Leeflang, 1978; King *et al.*, 1994). A concept is "*an idea expressed as a symbol or words*" (Neuman, 1994, p.35). Conceptualisation refers to the process of specifying "*what we mean when we use particular terms*" (Babbie, 1998, p.114).

After reviewing the relevant literature, a certain degree of judgement may be required to balance the need to show familiarity with the literature of the parent discipline and to focus on the link between the research problem and its immediate discipline. One way of doing this is to develop a 'mind blueprint' such as a new classification model of the body of knowledge showing how concepts can be grouped together according to schools of thought (Perry, 1995). Sekaran (1992, p.91) defines a conceptual model as "*a theoretical framework of how one theorises the relationships among the several factors that have been identified as important to the problem*". A desirable conceptual model should include any key factors, constructs or variables, and the relations between them in a format that can subsequently be transformed into a scientific analysis.

Reviewing the relevant literature should allow the research to clearly identify what to study. In other words, the literature review identifies the research problems to be solved. The relationship between the literature review and the conceptual model can be illustrated by stating that the former provides a solid foundation for the development of the latter, which should be properly developed to provide sound guidelines for further analysis.

Therefore, a conceptual model can be regarded as a bridge that links the literature review with a further analysis.

Aaker and Weinberg (1975) claim that the development of a model that adequately describes the real situation should be simple enough to use but focused enough to complete the exploration. Similarly, in developing an appropriate model for this research, it is of paramount importance to clearly outline the aspects of logistics service operation and logically demonstrate the relationship between the variables concerned.

4.2.2 The relationship between models and theory and hypotheses

As discussed in the previous section, the development of a conceptual model should be based on some underlying theoretical assumptions. The testing of the relationship between the variables discovered in the conceptual model can prove whether the underlying theory does exist in the relationship, thus providing a basis for the validation of the model (Aaker *et al.*, 1995). The underlying theory in this research is an instrument that can successfully explain the employment of a logistics service in the liner shipping market.

Just as the literature review sets the stage for the conceptual model, a good conceptual model, in turn, provides the logical base for developing hypotheses (Sekaran, 1992). Burnett and Chonko (1980) state that the first step in testing a theory empirically is the development of research hypotheses that are operationalisable. As a result, the model in this research underpins the proposition of four theoretical hypotheses.

4.3 Conceptual Model Development

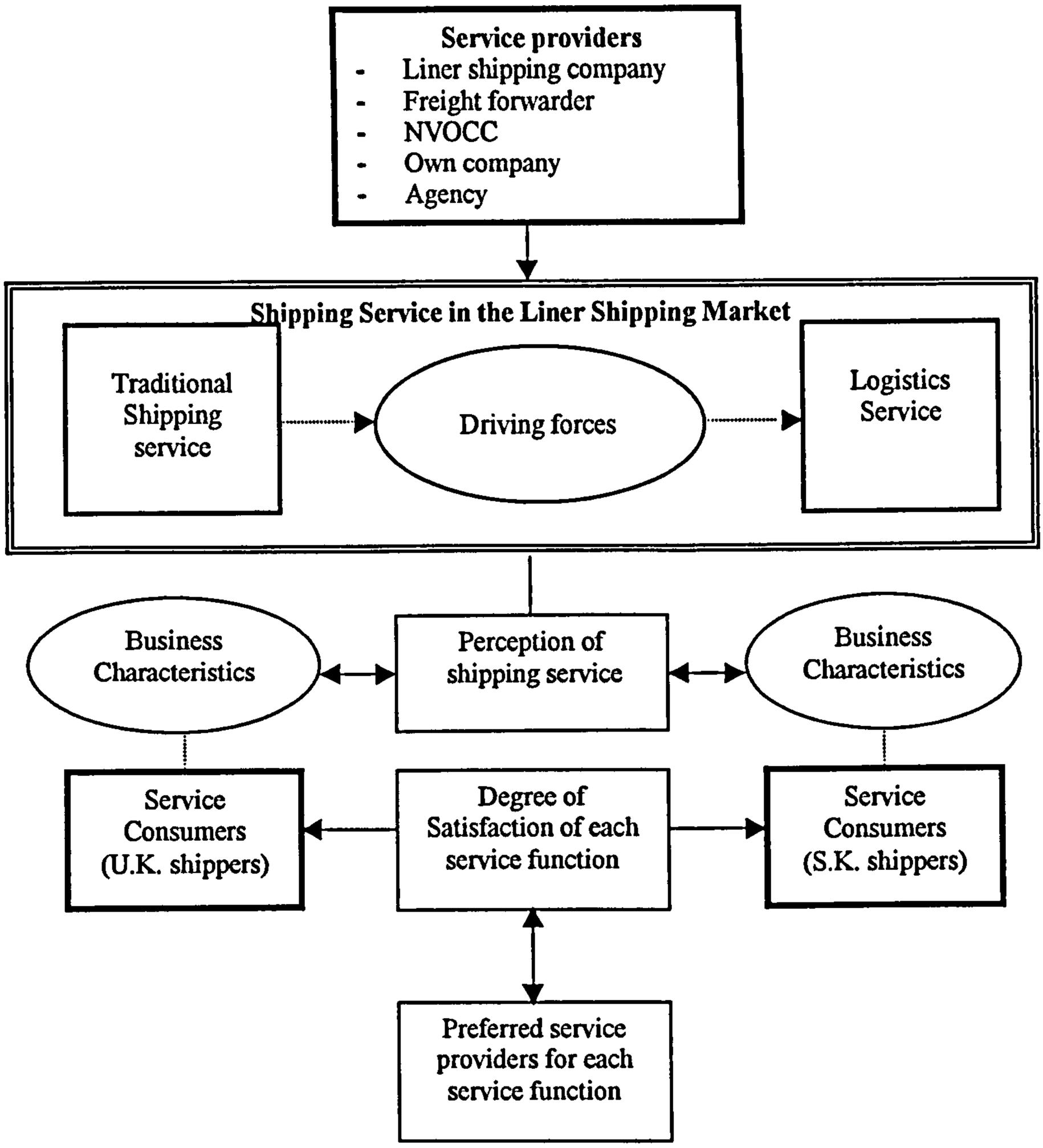
As stated above, the development of the conceptual model should be strictly based on the discussion and findings in the literature review. The conceptual model for the research is based on the following assumptions. Firstly, the operation of logistics service in the liner shipping market may be stimulated by certain circumstantial factors. Secondly, shippers' perceptions of logistics service may be different according to the characteristics of the shippers and the cargoes. Finally shippers' satisfaction levels on each service function may be correlated to their preferences of service providers.

Sekaran (1992) provides the appropriate procedures for developing the conceptual model. First, one should identify the problem by reviewing the relevant literature. Second, it is necessary to identify the variables that contribute to the research problem. After identifying these variables, the next step is to elaborate the network of associations among them. Finally, the relevant hypotheses can be developed and subsequently tested.

Bearing in mind the procedures above, the conceptual model for the research is illustrated in Figure 4.1. The model involves an investigation of the background to the employment of logistics service and an evaluation of the application of logistics service.

On the other hand, an investigation of the background to the employment of logistics service does not test causal relationships. Rather, it aims to particularly examine the generating process of logistics service in the liner shipping market, by investigating the motives for employing logistics service, by comparing it with a traditional shipping service, and by identifying and classifying service functions. An evaluation of the application of logistics service seeks to analyse shippers' service perception according to their business characteristics, and to test the relationship between the preferred choice of service providers and the degree of satisfaction.

Figure 4.1 Conceptual model



Source: Author

4.3.1 Service providers versus service consumers

In the liner shipping market, service providers can be a liner shipping company, freight forwarder, NVOCC, and shipper's own company or agency. Service consumers identified in this research are the shippers in the U.K. and South Korea. Firstly, the research has noted that the interaction between service provider and service consumer appears to be a very significant issue. In reality, they have different perceptions of the quality of service and judgement on the performance of service providers (Lovelock, 1996). As noted by Lovelock (1991) and Lascelles and Dale (1989), there have always been a variety of issues

on satisfaction and quality between providers and consumers over the products or services provided.

Some scholars have investigated these issues and suggested that the means of overcoming this problem may be the development of measurement instruments (Oliver, 1980; Parasuraman *et al.*, 1988; Bolton and Drew, 1991). One notable research pursued in South Korea (Kim, 1995) also attempts to develop a measurement technique by surveying bulk, tanker, and container shippers. A study on the liner shipping service can be lacking if it does not consider the shippers' views on the service provided. Like any other industrial service, the liner shipping industry is very keen to value service consumers' views as a realistic guideline that can be used to tackle the problems caused by the different perceptions of satisfaction and quality between service providers and service consumers.

4.3.2 Environmental factors

The development of the conceptual model in this research practically begins with the recognition of the assumption that a traditional shipping service may have been transformed into a logistics service in the liner shipping market. In this transition process, the research notes that some driving forces appear to have stimulated the liner shipping service providers to employ logistics service into their business areas. These driving forces were obtained from the review on relevant literature (Gourdin and Clarke, 1990; Christopher, 1992; Min and Eom, 1994; Lloyd's List, 1997; McKnight *et al.*, 1997; Cargo News Asia, 1998a;) as presented in Section 3.2.3.2. These factors are: the ongoing expansion of the container shipping business, the greater degree of mergers and alliances between container carriers, the development of information technology, increased levels of national protectionism in international trade, more intense competition between carriers, and increasing levels of demand by shippers for better service. The Delphi technique will

be used to explore whether these environmental factors have actually been the main cause behind the employment of logistics service.

4.3.3 The difference between logistics service and the traditional shipping service

Livingstone (1992) and Stern *et al.* (1993) define a logistic service as a competitive discriminator. Generally speaking, a logistics service involves a wide range of tasks in warehousing, information flow management and distribution control for effective and efficient supply chain management (Fung and Wong, 1998). Similarly, Craig (1996) suggests that a logistics service in shipping should embrace a broad range of responsibilities between the service providers and service consumers.

Recently, there has been a debate emerging in the liner shipping market. A number of large container shipping companies have declared that they now provide 'logistics services' for their shippers beyond the range and depth of traditional shipping service. The research needs to investigate that whether what has been claimed is actually accepted by customers or whether it is just a change of name without any service discrimination or improvement, in order to attract more customers. This issue derives from the discussion presented in Section 3.2.3.3.

Therefore, the research has sought to compare the features of a logistics service with those of a traditional shipping service. This will enable the research to investigate whether there are any substantial differences between the two. Initially such differences were found from the literature review (Yamada, 1995; Boyes, 1997; Graham, 1998) and are to be verified by the Delphi technique.

4.3.4 Functions of logistics service

Given the discussion provided in Section 3.2.3.1, logistics service in liner shipping can be defined as a process product with a combination of core and supplementary functions (Muranaka, 1988; Lovelock, 1991; Walker, 1995). The core function here is the ship operation and the supplementary functions consist of intermodal transport, warehousing, documentation, invoicing, information, etc.

Table 4.1 Logistics service functions in liner shipping

Category	Functions
Ship operation service	• Ship operation • Reserving cargo at port • Container handling at port • Booking vessel space
Inter-modal transport Service	• Inter-modal co-ordination • Consolidating shipments • Local collection and delivery • FCL transport • LCL transport • Route planning
Logistics Centre Service	• Warehousing • Inland container depot management • Export packaging • Consolidation • Sorting and filtering cargo • Special treatment for fragile cargo • Labelling • Scanning product at warehouse
Information Service	• Tracking/tracing • Scheduling information
Documentation and Invoicing Service	• Quoting rates • Printing document • Issuing Bill of Lading • Preparing Certificates of Origin • Preparing commercial invoice • Preparing consular invoice • Obtaining proof of delivery • Obtaining export licence • Obtaining insurance policy
Customer Service	• Paying freight • Paying port charges • Paying insurance premiums • Paying customs duties • Paying taxes • Customs clearance • Monitoring inventory level • Logistics consulting service

Initially, 37 service functions were obtained from the relevant literature in the liner shipping area and are to be refined by utilising the Delphi technique. The reason for extracting such functions is that these functions can be used in the survey on shippers in order to analyse their degree of satisfaction and the preferred choice of service providers on each service function. These service functions are classified into the categories shown in Table 4.1.

So far, the first part of the conceptual model demonstrates that the research intends to investigate the motives for the adoption of a logistics service, compare it with traditional shipping service, and finally identify the logistics service functions. The next part of the model is to deal with the operation of logistics service, which will lead to the statistical analysis of the variables concerned.

4.3.5 Perception of logistics service

A vast majority of service providers in the liner shipping market have claimed that they are providing not just a basic shipping service (traditional ship movement) but total logistics services including ship operation, inland transport, documentation, information service, customer marketing service, and possibly more. It is, therefore, necessary to find out how a logistics service operation has been perceived by the shippers who actually use this service. In order to analyse such perceptions, an analysis of shippers' perceptions of what has been claimed above will be performed. The subsequent analysis will be made of the shippers' description of the service currently received in the market. Such perceptions will be related to circumstantial variables such as the characteristics of cargoes shipped and the shippers themselves.

4.3.6 Degree of satisfaction versus preferred choice of service providers

Once the analysis of shippers' perceptions has been carried out, the next step is to examine to what degree they are actually satisfied with the service provided. First of all, the comparison of satisfaction degree on each service function between the U.K. shippers and South Korean shippers will be performed. Furthermore, it is of importance to analyse how the shippers' perceived degree of satisfaction could be influenced by certain variables. This part of the research can be seen as belonging to a long-standing research tradition that analyses the relationship between the level of service satisfaction and repurchase behaviour (Robinson *et al.*, 1967; Oliver, 1980; Bolton and Drew, 1991). The other variable applied in this research is the preferred choice of service providers on each service function. The research will, therefore, analyse the correlation between the preferred choice of service providers for each service function and the degree of satisfaction on each logistics service function, and draw conclusions for the future from this analysis.

4.4 Research Hypotheses

The following four research hypotheses are formulated based on the discussion in the literature review and the conceptual model.

4.4.1 Hypothesis 1

The first main hypothesis has been formulated based on the relevant literature review. The main objective of Hypothesis 1 is to investigate the difference between a traditional shipping service and a logistics service. According to Graham (1998), Boyes (1997), and Yamada (1995), the main features of these two services appear to be rather different. The hypothesis formulated below will be tested by the judgement of the panel of experts in the Delphi study.

H1: <u>The operation of a logistics service involves different considerations from that of a traditional shipping service.</u>

4.4.2 Hypothesis 2

The review of logistics service in the liner shipping market revealed that the major driving forces to employ logistics service are derived from very changeable environmental factors (McKnight *et al.*, 1997; Cargo News Asia, 1998a; Christopher, 1992; Min and Eom, 1994; Lloyd's List, 1997; Gourdin and Clarke, 1990). The objective of Hypothesis 2 is to explore to what extent these environmental factors may affect the employment of logistics service. In order to test the hypothesis developed below, the Delphi technique will be used.

H2: <u>Environmental changes in the liner shipping market stimulate service providers to provide logistics service to shippers.</u>

4.4.3 Hypothesis 3

Hypothesis 3 aims to examine shippers' perceptions of shipping service with reference to business characteristics to which shippers and cargoes are related. Collison (1984) suggests that shippers' business characteristics appear to be an important deciding variable when shippers show different preferences for service functions in the shipping market. Granzin and Bahn (1989) also note that service perception could differ from case to case according to shippers' business conditions. Taking these suggestions into account and adopting a service gap model (Parasuraman *et al.*, 1988), Kim (1995) tests the perception of shipping service quality depending upon shippers' and carriers' characteristics in South Korea. As a result, it was discovered that certain differences in shippers' perceptions of service quality on certain variables exist. Based on the discussions above, the following hypothesis can be created for the research.

H3: <u>Shippers' perceptions of logistics service may differ according to the characteristics of shippers and cargoes.</u>

Hypothesis 3 can be further developed into two sub-hypotheses. It has been claimed by the service providers in the liner shipping market that they provide their customers with a logistics service, not just a shipping service. This research seeks to prove whether or not their claims are supported by their customers and, subsequently, to investigate if there is any significant relationship observed between shippers' service perception and some demographic variables related to the shippers' business. Moreover, it may be important to analyse the perception of the service actually received from the service providers and then compare this perception with the one above. In so doing, the research can clearly identify the gap between the service providers' claim and service consumer's claim. Consequently, the following two sub-hypotheses can be formulated. Chi-square test and cross-tabulation are used to test these hypotheses.

<u>H3-1: Shippers' service perceptions of what the service providers claim will not be different according to cargoes' characteristics and shippers' characteristics.</u>

<u>H3-2: Shippers' service perceptions of what they actually receive regardless of what service providers claim will not be different according to cargoes' characteristics and shippers' characteristics.</u>

4.4.4 Hypothesis 4

Previous service marketing literature such as Oliver (1980) and Bolton and Drew (1991) and liner shipping literature such as Brooks (1984; 1985) and Kim (1995) suggest that service consumers' degree of satisfaction can affect their purchasing behaviour in their research. The focus was on the correlation between the degree of satisfaction and service

purchasing behaviour, whereas this research focuses on the possible correlation between the preferred choice of service providers and the level of satisfaction on each service function. In so doing, the research can identify shippers' choice of service providers based on the performance of service providers. The following hypothesis can be formulated to analyse it. One-way ANOVA is used to test this hypothesis.

H4: <u>Shippers' perceived degree of satisfaction on each logistics service function may be correlated to the preferred choice of the service providers on each service function.</u>

4.5 Conclusion

The conceptual model for the research was developed basing on the premise that the liner shipping market has been in the middle of a transitional period. As the market has become more and more complicated with more service providers, changing legislation, the restructuring of the industry itself, and so on, the notable changes in terms of service provided have also been noticed. This change also appears to have been prompted by shippers' more sophisticated demands.

The conceptual model developed in this chapter will be empirically elaborated through the collection of data from some experts in the shipping and logistics areas and from international shippers, who use container liner shipping service in the U.K. and South Korea. The next chapter will explore the research methodologies required to collect the data. Since the research contains both exploratory and explanatory aspects, a suitable way of combining methodologies will be considered and discussed.

CHAPTER 5

Research Methodology

So far the research has set up the tasks to be resolved. It is now time to discuss how to solve these problems. The aim of this chapter is to design and implement the methodology by which the research hypotheses specified in the previous chapter will be tested.

This chapter discusses the data collection methodology: the relative merits of quantitative and qualitative approaches and the justification of employing the Delphi technique and a survey method. A sampling method is subsequently discussed as well as the issues of reliability and validity. Finally, analytical techniques for statistical analyses are discussed and the uses of such techniques are rationalised.

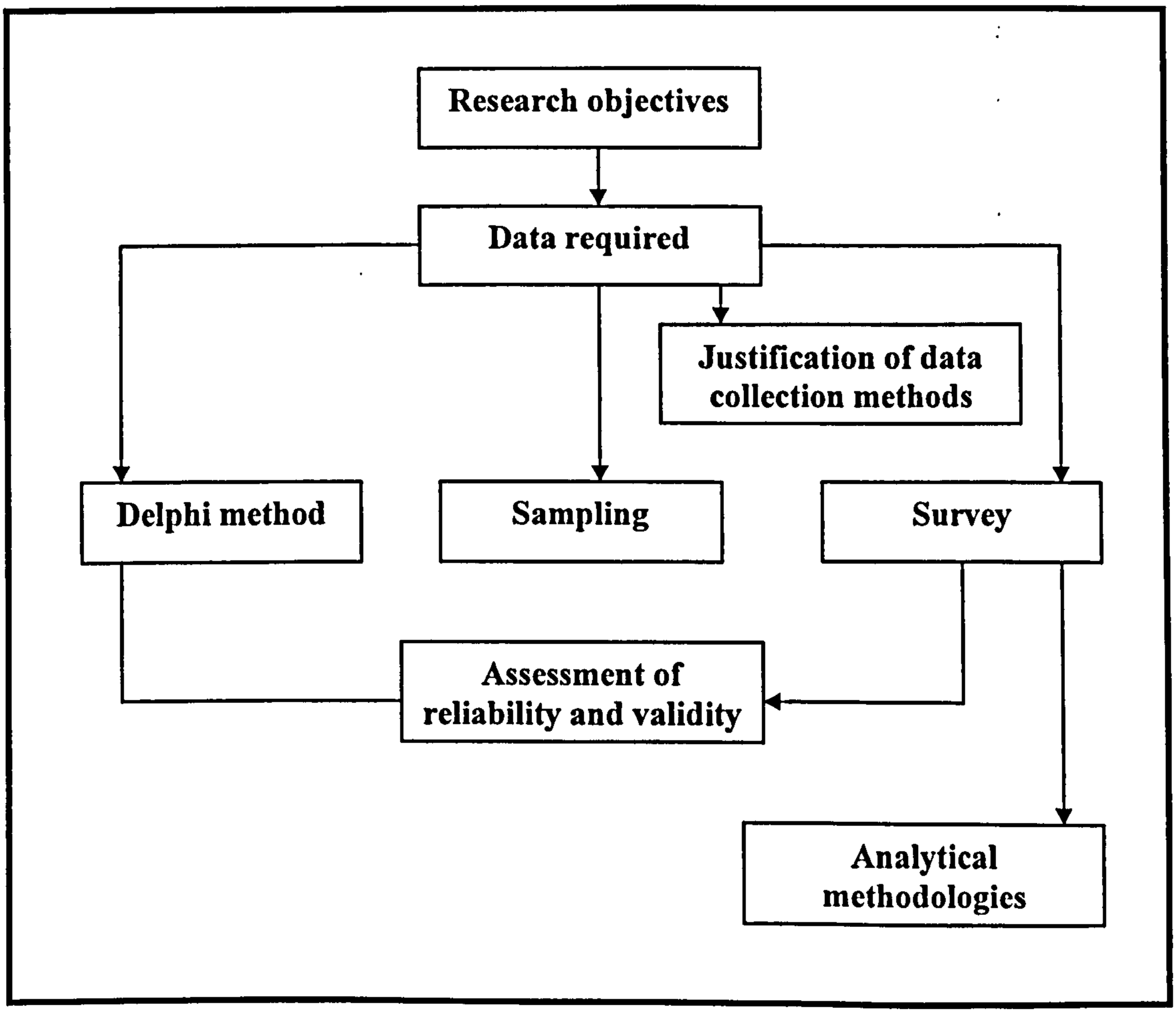
5.1 Operationalisation

The concept of operationalisation was originally derived from the principles of operationalism developed in the 19th century, which suggest that "*a concept can be identical with its measurement*" (Sarantakos, 1993, p.116). For example, intelligence is identical with the IQ measurement. Operationalisation is often seen as an essential step to follow conceptualisation. In this respect, operationalisation is employed when converting vague, imprecise or abstract concepts into synonymous empirical measurements and quantifying variables for the purpose of measurement (Sarantakos, 1993). The minimisation of errors and biases during data collection is crucial in operationalisation in order to gain higher reliability and validity.

However, there is also another way of determining operationalisation. Babbie (1998, p.139) defines operationalisation as "*the development of the specific research procedures (operations) that will result in empirical observations representing those concepts in the real world*". Likewise, operationalisation can be regarded as a research design that involves various issues relating to decisions regarding the purpose of study, types of investigation, measurement scales, unit of analysis, sampling, and data collection method (Denzin and Lincoln, 1994).

Designing the research should be guided by research objectives, since the choice of research methodology must be led by the objective of the research (Howe and Eisenhart, 1990). The research methodology for this research is illustrated in Figure 5.1.

Figure 5.1 Research methodology

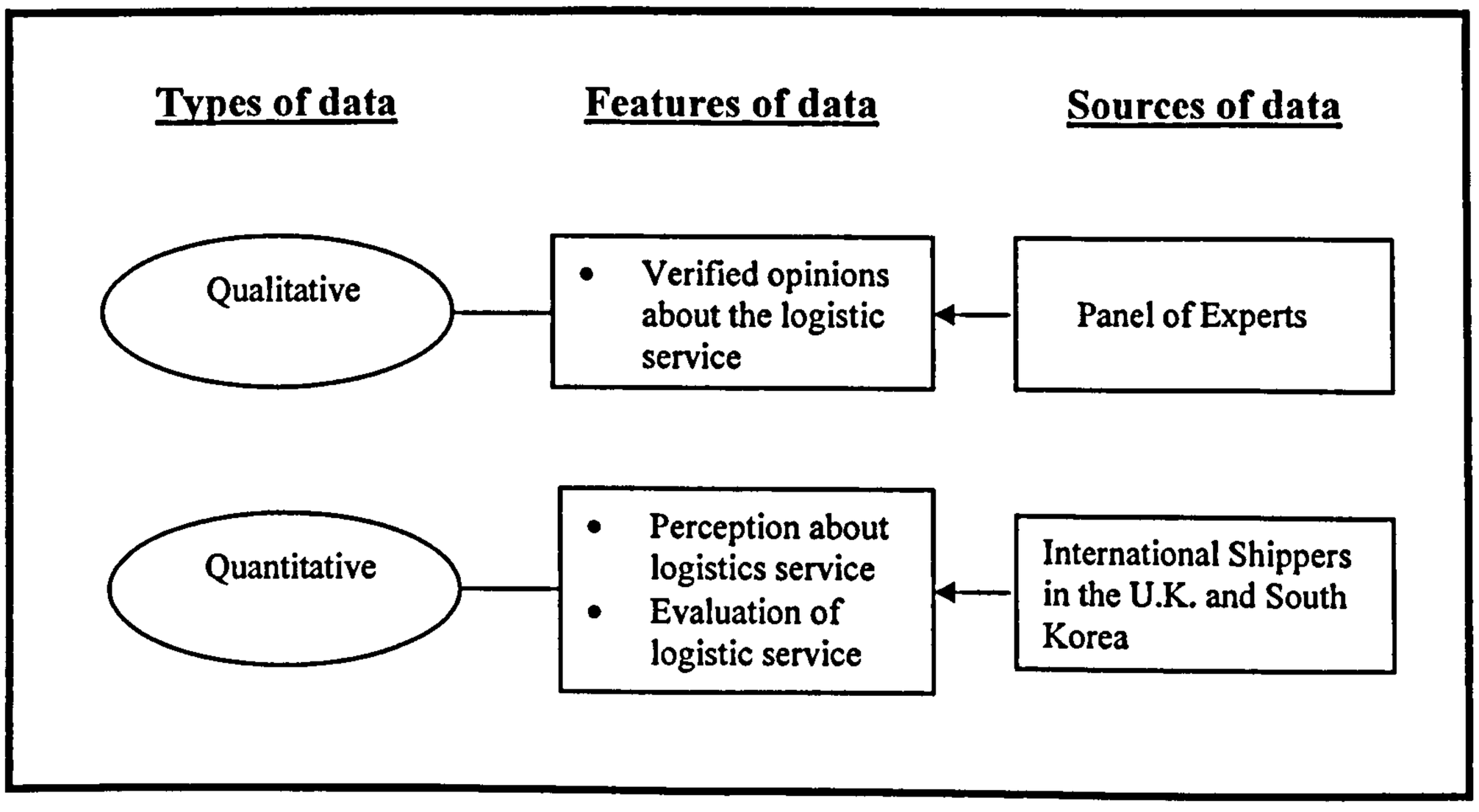


5.2 Data Required

In order to achieve the research objectives, certain types of data are required. Figure 5.2 illustrates the data required for the research. First of all, the qualitative data for verifying the motives for employing logistics service, the differences between traditional shipping service and logistics service, and the functions of logistics service, is required. As seen from the investigation carried out in Chapter 3, the initial information gathered from the literature review is to be verified by a panel of experts currently specialised in the liner shipping area. This panel consists of managers in shipping companies, government officers in relevant department, trade journalists and academics in maritime institutions in the U.K. and South Korea.

Having obtained the data from the panel of experts, for the purpose of analysing the logistics service operation in the liner shipping market, the research needs quantitative data from international shippers in the U.K. and South Korea. The detailed methods of data collection will be further discussed in Section 5.4 and 5.5.

Figure 5.2 Data required



5.3 Discussion of Data Collection Methods

Once the research has decided what data to collect, it is necessary to decide which data collection methods can be adopted. In social science, there are two main streams of research methodologies based on qualitative and quantitative data. For the research, it is essential to discuss both of these methods in order to choose the appropriate one for the research.

5.3.1 Qualitative and quantitative: classification

A qualitative approach to research can be described with the following basic characteristics: it is subjective, dynamic, and flexible with broader database, and is highly dependent upon researchers' skills. (Gordon and Langmaid, 1988). It is also normally characterised by small sample size and non-structured data collection procedures such as participant observation and unstructured interview. On the other hand, a quantitative approach to research is objective and involves large representative samples of a target population and structured data collection procedures such as questionnaires, interviews, data files, etc. It is used to measure data since "*quantitative data arise as numbers*" (Kent, 1993, p.25). In a quantitative research, the sample should well represent a target population and a strong degree of statistical reliability and validity are required (Neuman, 1994).

In terms of the contribution of research results, the qualitative research methods provide an initial understanding of the research topics in an exploratory way (Parasuraman, 1991). This approach also provides input to further stages of research, e.g. identifying variables that are essential in the subsequent quantitative approach. On the other hand, the methodology of the quantitative approach is related to the conclusiveness of the research. In short, the goals of the qualitative approach are the development of a theory, description,

and understanding, while those of a quantitative approach are testing of hypotheses in empirical ways.

It is commonly known that a qualitative approach is concerned with a general understanding of research, while a quantitative approach is concerned with the analytical part of research (D'Onofrio, 1999). The results of the qualitative research can increase understanding the issues, expand knowledge relevant to the subject of the research, clarify the real issues, explore and explain the market conditions (Aaker *et al.*, 1995). Because of this, the qualitative methodology is particularly suited for satisfying the first and second hypotheses, i.e. identifying the driving forces and the difference between traditional shipping service and logistics service. In this context, the qualitative approach to research is concerned with understanding the market rather than measuring it. By using a quantitative approach, measuring the market gives better results for reaching a conclusion. Therefore, the quantitative methodology can be used to measure shippers' perception of logistics service and the level of satisfaction on each service function.

5.3.2 Qualitative versus quantitative: a debate

Many fields of the social sciences have been engaged in the 'quantitative-qualitative' debate. First of all, the debate concerns itself with the question: which of the approaches is more appropriate for explaining social phenomena, and to what degree the two can be integrated (Hentschel, 1999). Pedersen (1992, p.39) argues against the usefulness of quantitative methods by stating that "*the complex network of factors is lost in the search for establishing empirical generalisations for the sake of presenting reliable results*". Sarantakos (1993) also argues that while quantitative approaches may provide greater objectivity and reliability, they are not able to explain many important, more complex organisational realities.

on the relative strengths and weaknesses of qualitative and quantitative data. Patton (1990) states that qualitative methods permit the evaluator to study selected issues in depth and detail. Chadwick *et al.*, (1984) also lists some weaknesses of the qualitative methodology in terms of collecting data. According to him, it carries a risk of collecting meaningless and useless data, it is very time consuming, and, finally, it has problems of representativeness and generalisability. On the other hand, Mintzberg (1979) argues that statistical data lack the richness of qualitative data that allows descriptive capability.

The debate has shifted considerably towards a broad mainstream, calling for a sensible integration of quantitative and qualitative approaches. Along this line, Mechance (1989, p.154) maintains a strong view that "*research questions should dictate methodology*" and, in particular, advocates the ideas of "*combining the advantages of a survey (its scope and its sampling opportunities) with the smaller qualitative study*". This research adopts the combined methodology by employing the Delphi technique (qualitative) and a survey (quantitative) together.

5.3.3 Combining methodology

Despite the views supported by the proponents of both qualitative and quantitative methods, all methods tend to have their strengths and weaknesses (Peshkin, 1993). Both quantitative and qualitative methods have long been used as research tools for social scientists. According to Sarantakos (1993), there is no 'right' methodology. The right research methodology should be chosen according to the given research conditions, the research questions, the available resources, and, above of all, the types of data required.

The use of both methods is acceptable since qualitative and quantitative methods are not mutually exclusive (Van Maanen, 1979), and can be mixed and matched (Reichardt and

Cook, 1979). In the service marketing area, research can be carried out by mixing the two methodologies (Cooper *et al.*, 1993). For instance, Hofstede *et al.* (1990) use a combined methodology, through the acquisition of data from in-depth interviews of selected informants and a survey of a stratified random sample of the population. In the shipping research, there have been also calls for multi-method approaches, where quantitative and qualitative methods can be employed in the same study to facilitate a more extensive investigation of complex and vigorous strategic issues (Hawkins, 1997).

In order to identify what environmental factors are considered to be decisive in stimulating the emergence of logistics service and discover the differences between the features of logistics service and those of traditional shipping service, qualitative research is thought to be more desirable. This particular type of research is rather exploratory and a qualitative methodology is therefore suitable (D'Onofrio, 1999; Sarantakos, 1993). Furthermore, a qualitative methodology will be well-suited for the verification of logistics service functions as these functions will later be utilised to formulate the questionnaire in the shippers' survey.

Depending upon a researcher's involvement in the research project, the action research, observation, case study, in-depth interview, or Delphi technique could be used (Checkland, 1981; Neuman, 1994). Action research is not appropriate for this research as this method is mainly used to improve the current situation (Elliott, 1981). Observation may not be the right one since this method is commonly utilised to observe the social phenomena (Sarantakos, 1993). Case study usually involves the use of documents, archival records, interviews, and direct observation or participant observation (Yin, 1994; Stake, 1995). This method would be successfully used if a research project can employ skilled and experienced researchers who are able to design the research and organise the research settings. A

frequent criticism of case study methodology is that its dependence on a single case renders it incapable of providing a generalising conclusion (Yin, 1993). Therefore, this research is left with two options: the in-depth interview and Delphi technique. The in-depth interview could be used but there are certain barriers to use with regard to money and time concerns for the PhD project as this will need to invite all the experts in one particular location (Perry, 1995). Therefore, the Delphi technique has been employed for this research and the justification of using this method is discussed in section 5.4.5.

On the other hand, in order to analyse the perception and the operation of logistics service, it is more appropriate to employ a quantitative methodology. One of the most frequently used methods for obtaining quantitative data is a survey method in which the respondents will be asked to provide their answers in numeric forms, which will be used to test hypotheses. In summary, this research will adopt a combined methodology by implementing the Delphi technique as a qualitative data collection method and a survey method as a quantitative data collection method. In the next section, the Delphi method is introduced and discussed.

5.4 Delphi Method

5.4.1 Delphi defined

The Delphi method has been extensively applied in a large number of different studies. Linstone and Turoff (1975, p.3) define the Delphi method in a broad sense:

"Delphi may be characterised as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem"

Although there are many variations of Delphi in the literature, Sackman (1976, p.444) provides the definition of conventional Delphi methods as "*an iterative opinion*

questionnaire technique, with anonymous statistical feedback after each iteration, applied to a panel of experts until optimal consensus is reached among the panellists".

5.4.2 Objective of Delphi

The main objective of the Delphi method is to obtain the most reliable consensus of opinion among a group of experts (Linstone and Turoff, 1975). The Delphi technique is developed to attempt "*to counteract problems identified in getting collective opinions from expert groups*" (University of Manchester, 1994, p.4). This can be achieved through the procedure of administering a series of questionnaires with controlled opinion feedback (Dalkey and Helmer, 1963).

5.4.3 Main characteristics of Delphi

In the Delphi method there are the following three fundamental characteristics, which clearly distinguish it from other similar techniques such as in-depth interviews.

5.4.3.1 Anonymity

When participants are approached by either mail or telephone contact and requested to participate in completing questionnaires, 'anonymity' can be achieved. Participants are not supposed to be influenced by dominant individuals because face-to-face encounters between participants can be avoided unlike in a group meeting (Woudenberg, 1991). As a result, bias can be significantly reduced. Participants can change their original opinions freely without having to be less respected when they receive better arguments from other participants (Fadda, 1997). Thus, it can reduce the tendency to follow the opinion leader and reduce the 'bandwagon effect' common in a group meeting that tends to encourage agreement with the majority (Linstone and Turoff, 1975). The advantages of anonymity have been generally acknowledged through the strong level of satisfaction that participants typically show (Boje

and Murnighan, 1982; Miner, 1979). Nevertheless, the use of anonymous questionnaires has been criticised by others because of the possibility of a lower sense of responsibility by the participants (Scheibe *et al.*, 1975).

5.4.3.2 Iteration

'Iteration' is a sequence of rounds that are to be carried out. The number of rounds can vary from two to ten (Green *et al.*, 1990; Clark and Friedman, 1982), although it rarely exceeds beyond two iterations (Brockhoff, 1975). However, in most studies utilising Delphi, iteration is usually determined according to a measure of consensus reached by the group of participants. Even though a certain level of improvement with iteration is found in most Delphi studies, the main improvements usually occur between the first and the second rounds (Nelms and Porter, 1985; Dalkey, 1969; Bardecki, 1984). After the second round only a few studies show much further improvement (Erffmeyer *et al.*, 1986). Indeed, some have found no improvement at all after the second round (Gustafson, *et al.*, 1973).

5.4.3.3 Controlled feedback

Linstone and Turoff (1975) state that 'controlled feedback' occurs between rounds, during which the responses from each participant are collected and the results of the whole group on the previous round are distributed to all participants. In the next round, the respondents are asked to reconsider their previous opinions and to revise their ratings (Shneiderman, 1988) on each question (for instance, on a scale of 1, 2, 3, 4 or 5 for assessment of the participant's own degree of expertise on each question). The feedback procedure assures that only questions directly relevant to the panel of experts should be asked (Woudenberg, 1991; Hakim and Weinblatt, 1993).

In the Delphi method, feedback consists of a statistical summary of the group response (Ariel, 1989) and the arguments from deviating participants. Feedback aims to share the total information available to a group of individual experts. If the participants have a good argument for a 'deviant' opinion, they tend to preserve the original estimates and defend them (Helmer, 1968). According to Best (1974), it was noted that a slight increase in accuracy over rounds is found in several Delphi studies. Consensus is, however, almost always at the maximum level after the second round (Dalkey and Helmer, 1963).

5.4.4 Advantages and disadvantages

According to Shneiderman (1988), the main advantages of Delphi are the lower level of conformity, and the lower majority pressure on the individual experts, thus avoiding effects so common in a group discussion. In the Delphi method, the 'bandwagon effect' which encourages agreement with the majority, can be reduced, and also biases are eliminated due to the anonymity of the participants. The other advantages of the Delphi method include the facts that: (i) there is no restriction on the number of participants; (ii) geographical dispersion does not create much difficulty; and (iii) the participants are not required to meet at a common time in a common location (Garde and Patel, 1985).

In common with all research methods, the Delphi technique also has its limitations. As acknowledged by Sackman (1975) and Goodman (1987), the Delphi technique is not necessarily a substitute for all types of data collection techniques or a solution for unexpected and unanticipated phenomenon in the future. Goldschmidt (1975) argues that the effectiveness of the Delphi technique has never been scientifically demonstrated as the result of analysis is not based on traditional empirical methodology. Furthermore, the members of the panel do not have to meet face-to-face, and therefore there might be a lower degree of responsibility when it comes to providing opinions (Sackman, 1975;

Woudenberg, 1991). Similar to all the other survey methods, there may also be concern in terms of representativeness of population if the number of respondents are far too small (Goodman, 1987).

5.4.5 Justification of using Delphi

The justification for adopting the Delphi technique in this research can be based on the discussions by Linstone and Turoff (1975) and Delbecq *et al.* (1975). They point out that the Delphi technique can be used in the following circumstances.

- The problem is not suitable for analytical techniques, but could gain benefit from subjective and collective judgements;
- Interaction of a number of individuals is required;
- Frequent group meetings are impractical due to time and cost restriction;
- There is an insufficient amount of empirical data, and;
- By drawing up the current knowledge of experts, a more updated scientific or technical information can be obtained.

Considering the nature and the conditions of the research, the following are claimed to be the main reasons for employing the Delphi technique as a data collection method for a qualitative data.

5.4.5.1 Difficulty of frequent group meetings

The first reason for using Delphi is the difficulty in arranging frequent group meetings. In this research, the target experts for a panel are located over a wide-spread area. It would be impossible to bring them together in one place on several occasions because it would cost a lot of money and the members of the panel are all too busy with their own work and so on. With the resources allocated for a PhD project, such a procedure would not be advisable.

5.4.5.2 Lack of empirical data

Previous studies dealing with logistics service in the field of liner shipping have not been dominated by empirical effort. Most empirical studies in this area have mainly dealt with carrier selection. In other words, little empirical work has been conducted relating to logistics service in liner shipping. As noted by Nanus *et al.* (1973), Delphi can be used for exploratory purposes. To obtain more valuable and proper information for the research, the Delphi technique can therefore be used in this research.

5.4.5.3 Necessity of updated information

As suggested in the literature review, the concept of logistics service is relatively new in the liner shipping industry. As stated previously, very few attempts have been made to investigate this particular aspect. Therefore, previous research relevant to this topic does not actually provide enough information on the current situation. As more up-to-date data for the research needs to be attained, the Delphi technique is seen as the most appropriate method for data collection.

5.4.6 Panel judgement: consensus

In order to establish a criterion for decision making, the Delphi technique uses the judgement of a panel for a level of consensus. Achieving a consensus on statements provided is an important issue in the Delphi study. As noted by Witt and Moutinho (1989), consensus of opinion does not necessarily mean 100 per cent agreement among the participants in the panel. In the Delphi procedure, consensus means a majority of responses (Kapoor, 1987; Abdel-Fattah, 1997). William and Webb (1994) point out that there have been some kinds of uncertainty over the meaning of consensus. It is, therefore, important for the successful application of the Delphi technique to establish what consensus means exactly. Therefore, the research intends to fully comprehend the definition of consensus, by investigating the meaning of consensus provided by major dictionaries as shown in Table 5.1.

Table 5.1 Definition of consensus provided by major dictionaries

Dictionary	Meaning
Oxford Advanced Learner's Dictionary (2000)	An opinion that all members of a group agree with
Cambridge Advanced Learner's Dictionary (2003)	A generally accepted opinion or decision among a group of people
Webster's Dictionary (2002)	General agreement: unanimity; the judgement arrived by most of those concerned
Dictionary of Contemporary English (1978)	General agreement; the opinion of the most of the people in group

The next issue is concerned with the timing of making decision. In many Delphi studies, the decision on a level of consensus is usually made after the data have been collected and analysed. William and Webb (1994) criticise some Delphi studies for not making a decision on a level of consensus before the Delphi study begins. They insist that the research should decide at which level the panel agreement becomes consensus prior to the actual process. On the other hand, many other studies such as Kapoor (1987), Abdel-Fattah (1997) and Fadda (1997) have chosen the traditional method that determines the level of consensus

after obtaining the data. The current research also employs this method since it is believed that making a decision with the responses from the panel is more logical.

Concerning a level of consensus, Kapoor (1987, p.248) claims that "*any arbitrary figure could be used to determine whether or not the consensus has been achieved*" but that the choice of an arbitrary figure "*can never be fully justified, but some justification of the choice can be achieved*" (Kapoor, 1987, p.258). Consequently, the method of 'the average percentage of the majority opinions (APMO)' was developed as shown below. For the current research, APMO will be used as a 'cut-off' point to decide a level of consensus.

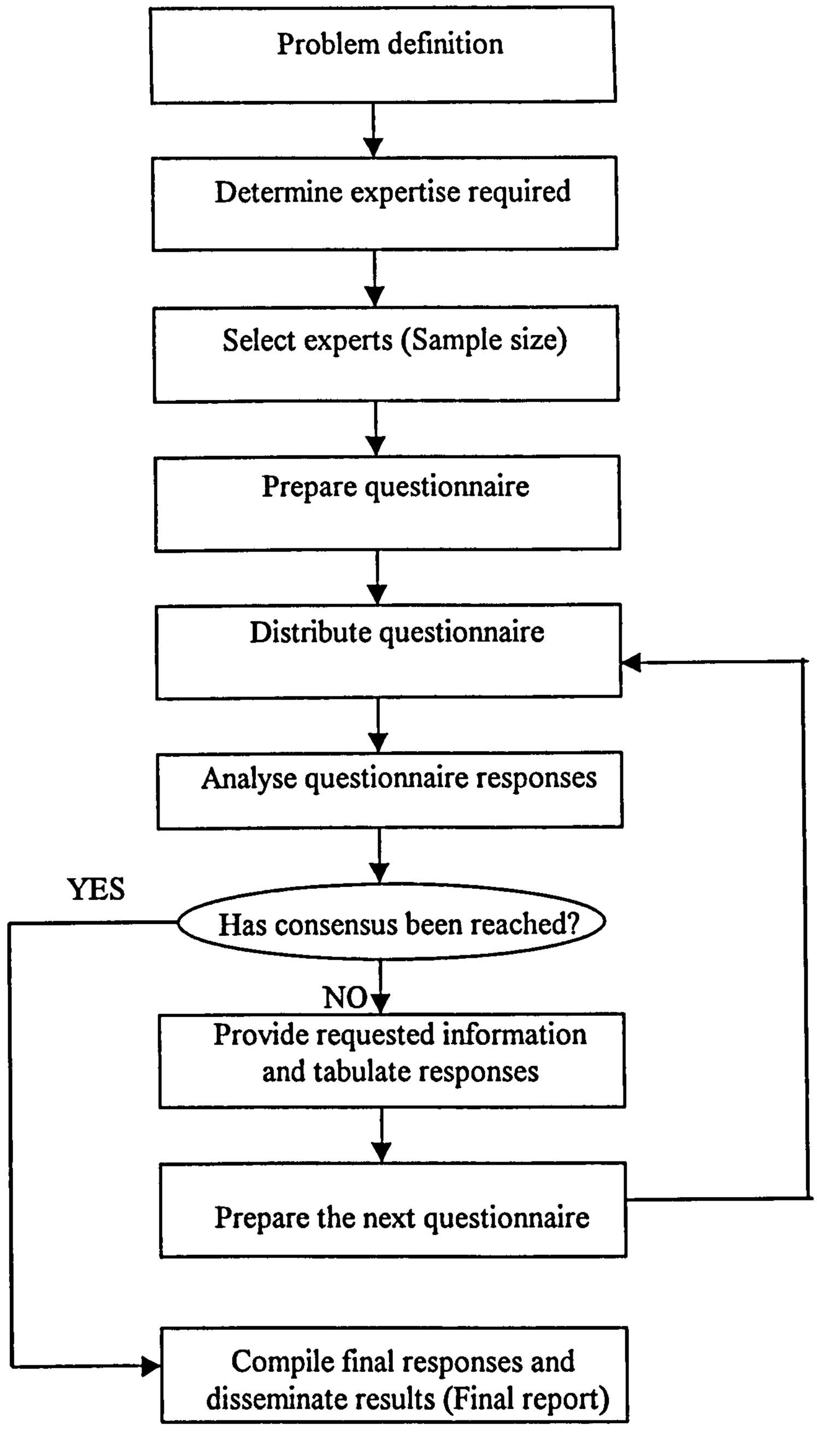
Average Percent of Majority Opinions (APMO) =

(Majority Agreements + Majority Disagreements)/ Total Opinions Expressed

5.4.7 Delphi process

The Delphi study can be carried out through the procedure of conducting a series of questionnaires. The procedure may vary significantly depending on the type of the intended application. However, Tersine and Riggs (1976) provide a basic process of Delphi, illustrated in Figure 5.3. Based on this procedure and bearing in mind the nature of the current research, the Delphi study will be carried out step by step. The actual process and the results are presented in the next chapter.

Figure 5.3 The procedure of Delphi study



Source: Tersine and Riggs (1976, p.53)

5.5 Survey

In the subsequent stage of data collection, a mail survey to the international shippers in the U.K. and South Korea is carried out to obtain the data for the analysis of shippers' perceptions of logistics service and the operation of logistics service. Recalling one of the main research objectives, it is suggested that the operation of logistics service assessed by shippers should be measured in the format of quantitative rather than qualitative data. It is believed that the most frequently used method for obtaining quantitative data is a survey method. The justification for conducting a survey for the research was also discussed in section 5.3.3.

5.5.1 Survey defined

Surveys are the most commonly used method of data collection in social science. In general, surveys are "*methods of data collection in which information is gathered through (oral or written) questioning*" (Sarantakos, 1993, p.157). Oral questioning is known as an interview and written questioning is known as a questionnaire.

5.5.2 Types of survey

Once it has been decided that a survey is the most appropriate data collection method for tackling the research problem, the next step is to consider which types of survey method can be the most advantageous. Typically, there are three survey approaches: telephone, face-to-face, and mail. More recently, surveys have been conducted by email or through the Internet. Combinations of any of these are also possible. Table 5.2 briefly compares the advantages and disadvantages of each method.

Table 5.2 Comparison of survey methods

	Advantages	Disadvantages
Telephone survey	• High response rates • The length of the data collection period is shorter	• Questions and the choices of answer should be short and simple, not suitable for complicated academic issues.
Personal interview	• High response rate • Highest quality of response	• Most expensive way • Taking great amount of time
Mail survey	• The least expensive • Successful in collection of data about sensitive topics • High response rates when the topic is highly salient to the respondent	• Response bias

Source: adapted from Cooper and Emory (1995) and Czaja and Blair (1996).

As described above, there is no one 'best' survey method. Each method has its own strengths and weaknesses. With reference to the merits and drawbacks of each method, any decisions on selecting the type of survey must be made by type of research (Czaja and Blair, 1996) and the context of the research problem.

Czaja and Blair (1996) also suggest that three categories of factors for choosing a survey method should be considered: administrative or resource factors, questionnaire issues, and data-quality issues. Firstly, regarding administrative and resource factors, the researcher needs to consider how much time there is available to carry out the intended research and how much money can be used to employ interviewers, purchase supplies, and buy or construct a list of the population to be sampled and interviewed. Secondly, questionnaire issues include how many and what kinds of questions need to be asked to adequately attain the research objectives. It is, therefore, necessary to make sure that the method used to collect the data is more cost-effective and yields fewer reporting errors than any other method (Czaja and Blair, 1996). Finally, the researcher needs to consider data-quality issues. It should be asked whether or not more respondents are likely to co-operate with the

selected method than any other method. It is also essential to ensure that more accurate and complete answers are obtained.

As this research intends to analyse logistics service operation from the international shippers' point of view, there should be a very high probability of having a large number of target units. Furthermore, it is necessary to keep the costs of the survey within the budget available. For these reasons, personal interviews or the telephone survey may not be suitable for this research. After a careful consideration of all the pros and cons of each survey method, a mail survey is believed to be the most appropriate for the research and hence selected.

5.5.3 Survey design

The survey design can vary from research to research. The process of questionnaire construction comprises a number of interconnected steps. Sarantakos (1993, p.173) provides a useful approach that consists of the following nine major steps of questionnaire construction.

- *Preparation*
- *Constructing the first draft*
- *Self-critique*
- *External scrutiny*
- *Re-examination and revision*
- *A pilot study*
- *Revision*
- *Second pre-test*
- *Formulation of the final draft*

The researcher usually decides upon the type of questionnaire and the way it is conducted. By pursuing a questionnaire used in a similar context, the researcher can either modify it for the research or use it as a guide to develop a new one for the research. On condition that no similar questionnaire is available, a completely new questionnaire can be developed. After

that, the researcher formulates a number of questions, usually "*a few more than necessary, including questions directly related to aspects of the research topic, questions testing reliability and wording*" (Sarantakos, 1993, p.173). The questions formulated are now checked for relevance to the research topic, clarity, and simplicity (Sekaran, 2000). In order to obtain scrutiny and suggestions, the first draft is then submitted to the previously contacted people who possess the theoretical or practical expertise in the relevant area. Upon receiving the comments from the experts, some questions might be re-phrased or removed, while new questions might be included. This process of revision should be continued until a satisfactory result is achieved. The next step is to undertake a pilot study to check the suitability of the questionnaire. A small sample is selected for this purpose and requested to complete the questionnaire. Having obtained the responses, the results are then analysed and interpreted. As a result of the pilot study, the researcher might have to change the questionnaire. On condition that these changes are minor, the researcher can proceed to the development of the final draft. But if the changes are major the second pilot test is required. In the final step, in addition to fulfilling the requirements generated from the pilot test, the researcher finally checks for "*spelling mistakes, legibility, instructions, layout, space for responses, pre-coding, scaling issues, and general presentation of the questionnaire*" (Sarantakos, 1993, p.174). The questionnaire is now ready for distribution.

5.5.4 Sampling

With the survey design completed, it is essential to design the sampling method that enables the researcher to investigate a small number of units in place of the whole target population.

5.5.4.1 The nature of sampling

The basic idea behind sampling is that by selecting part of the elements in a population, conclusions about the entire population may be obtained (Emory and Cooper, 1995). A population refers to the total set of elements that the researcher wishes to investigate and make some inferences about. An element is the subject on which the measurement is being taken. It is the unit of study. A sample is a subset of the population. It comprises some members selected from the population.

The reasons for using a sample are obvious in that it will be practically impossible to collect data from the whole population and even if it were possible, it would not be so ideal due to the time and cost restriction, particularly for a PhD project. Bailey (1994) provides an important principle for successful sampling. It is necessary that the full range of data or information in the population should be represented in the sample. For example, should we select a sample from the students registered at university and ask each student in the sample for his or her views on whether the university library should increase the amount of books it holds. It is not necessary that all students have the same opinion. For example, if only 10 per cent of these students think that more books should be purchased, sampling can still be made successfully. However, it is obviously imperative that this 10 per cent not be neglected, and nor over-represented. How to do this is dependent on the type of sampling chosen, which is described in more detail below.

5.5.4.2 Types of sampling

5.5.4.2.1 Non-probability sampling

As the researcher usually decides which sample units should be chosen, the process in this method is less strict than in probability sampling and the sample chosen cannot be said to be representative of the population. It is usually employed in exploratory research,

observational research, and qualitative research. Therefore, this method is not considered for this research.

5.5.4.2.2 Probability sampling

Probability sampling employs strict probability rules in the selection process: every unit of the population has an equal probability of being selected in the sample (Sarantakos, 1993). This method is usually characterised as more expensive, more time consuming and relatively more complicated than non-probability sampling, since it requires a large sample size. However, it allows the computation of the accuracy of selection, and offers a high degree of representativeness (Bailey, 1994). Probability sampling is commonly associated with survey-based research where the research needs to make inferences from the sample about a population to answer research questions (Saunders *et al.*, 1997). Therefore, the research will employ one type of this method based on the consideration of the research. Table 5.3 briefly explains each type of probability sampling with its advantages and disadvantages. The simple random sampling method is chosen for this research since it is the most efficient to use.

Table 5.3 Types of probability sampling

	Description	Advantages	Disadvantages
Random sampling	All elements in the population are considered and each element has an equal chance of being selected as the subject.	High generalisability of findings.	Not as efficient as stratified sampling.
Systematic sampling	Every *n*th element in the population is chosen starting from a random point in the population frame.	Easy to use if population frame is available.	Systematic biases are possible.
Stratified random sampling	Population is first divided into meaningful segments; thereafter subjects are drawn: in proportion to the original numbers, sampled and comparisons made.	Most efficient among all probability designs.	Stratification *must* be meaningful. More time-consuming than simple random sampling or systematic sampling.
Cluster sampling	Groups that have heterogeneous members are first identified; some are chosen at random; all the members in each of the randomly chosen groups are studied.	In geographic clusters, costs of data collection are low.	The least reliable and efficient among probability sampling designs since subjects of clusters are more homogeneous than heterogeneous.

Source: Adapted from Sekeran (2000, p.281).

5.5.4.3 The process of sampling

According to Saunders *et al.* (1997, p.126), the process of sampling can be carried out by considering the following four stages.

(i) Identify a suitable sampling frame based on research questions or objectives
(ii) Decide on a suitable sample size
(iii) Select the most appropriate sampling technique and select sample
(iv) Check that the sample is representative of the population

The sampling frame is a means of representing the elements of the population. A sampling frame is required if the researcher employs a probability sampling method. Tull and Hawkins (1993, p.538) state that "*a perfect sampling frame is one in which every element of the population is represented once but only once*". The selected sampling frames for international shippers in the U.K. and South Korea are obtained from two web-sites:

www.tradepartners.gov.uk and www.kidb.co.kr. Both web-sites contain a well-represented shipper database in which a large number of international exporters and importers in the U.K. and South Korea are registered.

A suitable sample size is related to the nature of the population as well as that of the study. Due to the limited availability of time and resources for a PhD research, a large sample is hard to justify. If the research deals with a quantitative aspect and wishes to select a sample that will be representative of the target population, the estimation of the correct sample size can be obtained by performing certain statistical operations (Sekaran, 2000). However, in order to use this method, it is essential to identify the exact number of the whole population. This is not the case for this research. Considering the target population (international shippers in the U.K. and South Korea), we can assume that the total population would be very large and therefore the ideal size of sample should not be too small. For determining sample size, Roscoe (1975) proposes that, as a rule of thumb, one larger than 30 and smaller than 500 is appropriate for most research.

The simple random sampling method is chosen since this method is seen as the most efficient for this research. In order to achieve the ideal sample size, it has been decided to distribute approximately 1,000 questionnaires for each country. Considering the fact that about 30 % is the usual response rate to a mail questionnaire (Sekaran, 2000), approximately 300 replies per country will be expected. In social science, it is commonly accepted that 100 returns can provide a meaningful result from statistical analysis. Further details on the response rate will be given in Chapter 7.

In social science research, one of the hardest things to achieve is to maintain a high sampling representativeness of the population. As discussed previously, the limited

resources available for a PhD project may cause low representativeness, which could also be seen as a limitation of the research.

5.6 The Goodness of Measures

The previous sections were mainly concerned with the data collection methods. From the data collected, it is important to ensure that the research measures only the values that truly indicate the characteristics of interest. In other words, a careful effort to reduce the measurement errors should be required. The goodness of measures should be established through securing validity and reliability. In every research, securing reliability and validity is a very crucial task. Sarantakos (1993) insists that attainment of validity and reliability is one of the basic principles of social research. The results of any research can only be as good as the measures that tap the concepts in the conceptual model (Sekaran, 1992). A discussion of reliability and validity test will be presented in the following sections.

5.6.1 Validity of research instrument

In a general sense, validity asks the question: 'Does the instrument used actually measure what it is trying to measure?' Validity concerns the relationship between a concept and the indicator of that concept (Carmines and Zeller, 1979). Phillips (1971, p.197) also highlights the importance of validity by suggesting "*in scientific usage, a measurement of a given phenomenon (as designated by a given concept) is viewed as a valid measure if it successfully measures the phenomenon*". Bailey (1994, p.67) gives two sets of the definition of validity: the first, "*the measuring instrument is actually measuring the concept in question, and not some other concept*"; and the second, "*the concept is being measured accurately*". It is not possible to obtain the second one without satisfying the first one, because the concept cannot be measured accurately if some other concept is being measured.

In easy terms, validity is a question of measuring "*what is supposed to be measured*" (Sarantakos, 1993, p.74). Assessing validity is always concerned with the intended purpose of the measuring instrument. The reason is that a measuring instrument developed might be valid for measuring a specific research subject, but invalid for measuring other types of research subjects (Carmines and Zeller, 1979). Validity is normally determined by non-statistical means (Sekaran, 1992). Cited by many researchers in social science, there are three main tests that can be grouped to assess the validity of a concept: content validity, criterion validity, and construct validity. Each of these tests is discussed with reference to the subject of the research.

5.6.1.1 Content validity

Content validity refers to the fact that the measure includes "*an adequate and representative set of items that tap the concept*" (Sekaran, 2003, p.206). An example of the test for content validity can be observed when a group of experts evaluates the measurement tool designed to measure a certain type of concept (Kidder and Judd, 1986). From the literature review, the research obtained 37 logistics service functions. Such functions are reviewed and refined through several Delphi rounds by a panel of experts, which can obviously increase the content validity of the research. The resulting refined logistics service functions are then used in the questionnaire in order to analyse the operation of such service functions

5.6.1.2 Criterion validity

Criterion validity, also referred to as predictive validity, is concerned with the ability of the measurement scale to differentiate among individuals on a criterion it is expected to predict (Sekaran, 2000). Nunnally (1978) notes that predictive validity could be crucial when the

research seeks to make decisions on certain problems. Carmines and Zeller (1979) also argue that it is very difficult to develop clear and apparent criteria for the assessment of the instrument. The test of this validity is not undertaken for this research due to the inherent difficulties and criticisms stated above.

5.6.1.3 Construct validity

Construct validity is concerned with how well the results obtained from the use of the measure conform to the theory (Sekaran, 2000). This validity can be assessed by specifying the theoretical relationships between the concepts, examining the empirical relationship between the measures of the concepts and, finally, interpreting the empirical evidence in terms of how it clarifies the construct validity of the measure (Carmines and Zeller 1979). The concept developed in this research is that liner shipping service providers have provided a 'logistics service' rather than a 'traditional shipping service' and that this service may have been prompted by certain circumstantial factors. Another concept developed is that the new service might have been perceived differently depending upon international shippers' characteristics. In order to test the validity of these concepts, a research conceptual model has been designed to collect the appropriate data. The hypothesised relationships between the constructs are then tested by means of the Delphi technique and survey analysis. On condition that the hypotheses are accepted, the construct validity of the concept will be achieved.

5.6.2 Reliability of data

When a measurement scale is developed, there is another important question that should be asked, namely: 'Is it reliable?' The question of reliability addresses the issue of whether this measurement scale will create the same results each time it is administered to the same person in the same setting (George and Mallery, 2001). Reliability can be defined as "*the*

extent to which an experiment, test or any measuring procedures yield the same results on repeated trials" (Carmines and Zeller, 1979, p.11). In simpler terms, reliability refers to the ability of an instrument to produce consistent results (Sarantakos, 1993). Thus, a measurement scale is said to be reliable if it produces the same results whenever it is used or whoever does it. It is, therefore, a matter of consistency and accuracy.

In social science research, two types of reliability can be considered: stability reliability and consistency reliability. The former, which is related to time, is concerned with whether a measure produces reliable findings if it is employed several times. It is also called test-retest reliability. With the limited time and resources available for a PhD project, it would be impractical to employ this test since the research will have to survey the exactly same respondents as the first one. On the other hand, consistency reliability, which is related to indicators in operationalisation procedures, is interested in whether the measure in question produces consistent results across indicators (Sarantakos, 1993). In order to test consistency reliability, the coefficient of reliability alpha and the split half method are commonly used.

5.6.2.1 The coefficient of reliability alpha – Chronbach's alpha (α)

Chronbach's alpha is the most commonly used estimate of internal consistency (Carmines and Zeller, 1979). Alpha is measured on the same scale as a correlation coefficient and varies between 0 and 1. A value indicates a scale in which some items measure the opposite of what other items measure (George and Mallery, 2001). The closer alpha is to 1.0, the greater is the internal consistency of items in the instrument being assessed (Sekaran, 2000). However, in social science, values higher than 0.6 can be regarded as reliable (Craig, 1981). The detailed results of this test will be presented in Chapter 8.

5.6.2.2 Split half method

Split-half reliability reflects the correlation between the two halves of an instrument. Split-half reliability estimates would vary depending on how the items in the measure are split into two halves. Split-half reliabilities should be higher than Cronbach's alpha only in the circumstance of there being more than one underlying response dimension tapped by the measure and when certain other conditions are met as well (Campbell, 1976). Hence, in almost all cases, Cronbach's alpha can be considered a perfectly adequate index of the inter-item consistency reliability.

At this point, it is important to note that reliability is a necessary but not a sufficient condition for the test of goodness of a measure. For example, one could quite reliably measure a concept establishing high stability and consistency, but it may not be the concept that one set out to measure. Validity ensures the ability of a scale to measure the intended concept.

5.7 Analytical Methodologies

This section discusses the analytical techniques employed to test the hypotheses developed in Chapter 4. In the following, cross-tabulation, chi-square test, T-test, factor analysis, and one-way ANOVA are discussed.

5.7.1 Cross-tabulation and Chi-square test

In order to test hypothesis 3, Cross-tabulation and chi-square test are used. Cross-tabulation is known as the most commonly used method of demonstrating the relationship between the categorical variables. A concerning issue in cross-tabulation is the question of whether there really is a relationship between the two variables or the relationship has arisen by chance (Bryman and Cramer, 1997). In order to deal with this issue, the chi-square (χ^2) test is

widely used in conjunction with contingency tables. Chi-square test is a test of statistical significance to ascertain the probability that the observed relationship between two variables may have arisen by chance (George and Mallery, 2001).

The chi-square test statistic is calculated by comparing the observed frequencies in each cell with the expected frequencies. If there is a large discrepancy between the observed values and the expected values, χ^2 statistic would be large, suggesting a significant difference between observed and expected values. However, Chi-square statistic could be misleading in some cases, depending upon the number of dimensions and sample size. In order to control this problem, Cramer's V is commonly used to measure of the strength of association between variables in a chi-square analysis (Bryman and Cramer, 1997). Cramer's V varies strictly between 0 and 1 and a value close to 1 indicating a strong association between variables. Along with this statistic, a probability value (p value) is also computed. With $p < 0.05$, it is commonly accepted that the observed values differ significantly from the expected values and that the two variables are not independent of each other (George and Mallery, 2001).

A number of points about the chi-square test should be discussed in order to facilitate an understanding of its strengths and limitations. First, chi-square is not a strong statistic in that it does not convey information about the strength of a relationship (Bryman and Cramer, 1997). Second, chi-square test can only be used when either both variables are nominal (categorical) or when one is nominal and the other is ordinal. It was noted that the two variables in hypothesis 3 are measured with the nominal scale and therefore the use of this method is fully justified. Third, chi-square can be unreliable if expected cell frequencies are less than five, although this is a source of some controversy (George and Mallery,

2001). If each cell containing less then five exceeds 20 % of the whole cell, the analysis cannot be reliable (Bryman and Cramer, 1997).

5.7.2 Multivariate analysis

By identifying the nature of variables in the hypothesis 4, the use of some multivariate analysis techniques is deemed appropriate. Prior to making use of multivariate analysis techniques, the following three questions need to be answered (Hair *et al.*, 1995, p.17): (1) Can the variables be divided into independent and dependent variables based on some theory? (2) If yes, how many variables are treated as dependent in a single analysis? (3) How are the variables measured? The researcher should select the appropriate multivariate technique, basing upon the answers to these three questions.

First, the researcher needs to detect whether a dependence or interdependence relationship between the variables can be found. If a dependence relationship exists between the variables, a dependence technique can be used. A dependence technique is where the dependent variable is explained or predicted by other variables known as independent variables. For example, this technique can be used when a researcher intends to study on the relationship between the amount of advertisement in newspaper and the changes in volume of sales. Depending upon the number of dependent variables and the type of measurement scale employed by the variables, the types of dependence techniques should be determined. Regression analysis, discriminant analysis and multivariate analysis of variance (MANOVA) are the examples of dependence technique. In contrast, if an interdependence relationship exists between the variables, a researcher can use an interdependence technique, where no single variable or group of variables is defined as being independent or dependent. Rather, the procedure involves "*the analysis of all variables in the set simultaneously*" (Hair *et al.*, 1995, p.20). If the structure of variables is to be analysed, then factor analysis is the

appropriate technique. If cases or respondents are to be grouped to represent structure, then cluster analysis is selected.

Among the multivariate analyses, this research employs a factor analysis in order to test the hypothesis 4 developed in Chapter 4. Since the research assesses the difference between three groups of dependent variable, in the first place, the one-way ANOVA is believed to be the appropriate technique. Prior to performing the one-way ANOVA, the research intends to reduce the number of the variables to be included in one-way ANOVA. Therefore, factor analysis is adopted to make subsequent analysis a lot simpler and easier. In the following, the review of these two techniques is presented and the further justification is provided.

5.7.3 Factor analysis

Factor analysis addresses "*the problem of analysing the structure of the interrelationships (correlations) among a large number of variables by defining a set of common underlying dimensions*" (Hair, *et al.*, 1995, p.367). The general purpose of the factor analysis is to find a way of condensing (summarising) the information contained in a number of original variables into a smaller set of new, composite dimensions or factors with a minimum loss of information (Hair, *et al.*, 1995). In other words, it is to search for and define the fundamental constructs or dimensions assumed to underlie the original variables. When there are many variables in a research design, it is often helpful to reduce the variables to a smaller set of factors. In this research, there are 31 variables used in the questionnaire. If these variables can be grouped into interpretable set of factors, which should embrace the nature of variables.

More specifically, factor analysis techniques can be used on the condition that they can meet any of the following four objectives. First, factor analysis can be used to identify the

structure of relationships among variables. It can examine the correlation between the variables. Second, factor analysis also may be applied to a correlation matrix of the individual respondents based on their characteristics. Third, factor analysis can be used to test the reliability of data collected. Last, factor analysis can be employed to create an entirely new set of variables, much smaller in number, to replace the original set of variables for inclusion in subsequent techniques. The research adopts factor analysis for this particular reason.

The most common type of factor analysis is referred to as R factor analysis. This analyses a set of variables to identify the dimensions that are latent (not easily observed). One particular objective of this research is to find out the characteristics of the variables and justify the group of variables already chosen based on previous studies. If factor analysis is applied to a correlation matrix of the individual respondents, Q factor analysis can be used. However, Q factor analysis is not used very frequently because of computational difficulties (Hair, *et al.*, 1995). Instead, cluster Analysis can be used to group individual respondents. Therefore, this research will conduct R type factor analysis. Further discussion of factor analysis is given in Appendix A.

5.7.4 One Way ANOVA

When the hypothesis contains an independent variable measured on a nominal scale and a dependent variable is measured with a metric scale, a T-test or one-way ANOVA can be employed. A T-test can be used when there are only two groups classified in the independent variable. However, a one-way ANOVA can be used to analyse if there are significant differences within any of the comparisons of three or more groups in the sample. If there are multiple independent variables and multiple dependent variables, multivariate

analysis of variance (MANOVA) can be used. Further discussion of one-way ANOVA is given in Appendix B.

5.7.5 T-test

As one of the research objectives is to compare the U.K. shippers and South Korean shippers in terms of operation of logistics service. T-test would be the most appropriate technique as it is used to test any significant mean difference between two groups. There are three types of t tests: independent-samples t test, pared-sample t test, and one-sample t test. The research intends to compare the degree of satisfaction on logistics service functions between the two countries and the data obtained are two independent samples. Therefore, an independent sample t test can be employed for the research.

The t-test takes into consideration the means and standard deviations of the two groups on the variable and examines if the numerical difference in the means is significantly different from each other (Sekaran, 2003). Even though there is a relatively big difference in the means, it does not necessary mean two means are different. The decision of whether they are significantly different can be made only by the interpretation of p value calculated in the test. The p value is the probability that the difference between the two means is caused by chance. It is commonly accepted that if this probability is less than 0.05, that the difference is 'significant' and is not caused by chance. For the interpretation of the results, two different results are calculated, namely: Equality of Variances and Equality of Means. It is commonly believed that the former can create a slightly more powerful statistic (George and Mallery, 2001).

5.8 Conclusion

This chapter has reviewed the research methodology. A discussion of quantitative and qualitative research methodologies was provided. As a means of data collection, a combined methodology was proposed. As a result, the Delphi technique for analysing qualitative data and a survey method for analysing quantitative data were chosen. In addition, a review of sampling methods was introduced and specifically applied to the current research. The concepts of validity and reliability were presented. An assessment of validity and reliability was conducted to support the quality of the research results. Finally, the analytical techniques, which are used to test the research hypotheses, were introduced and discussed.

The next chapters will provide the results of the Delphi technique over three rounds and the survey analysis. Some valuable findings will be presented in terms of achieving the objectives of the research.

CHAPTER 6

Delphi Results

In the previous chapter, it was decided to adopt the combining methodologies to collect data. Consequently, two data collection methods have been chosen: a Delphi technique for acquiring qualitative data from a panel of experts and a mail survey for acquiring quantitative data from international shippers in the U.K. and South Korea. This chapter deals with the collection of qualitative data from a panel of experts.

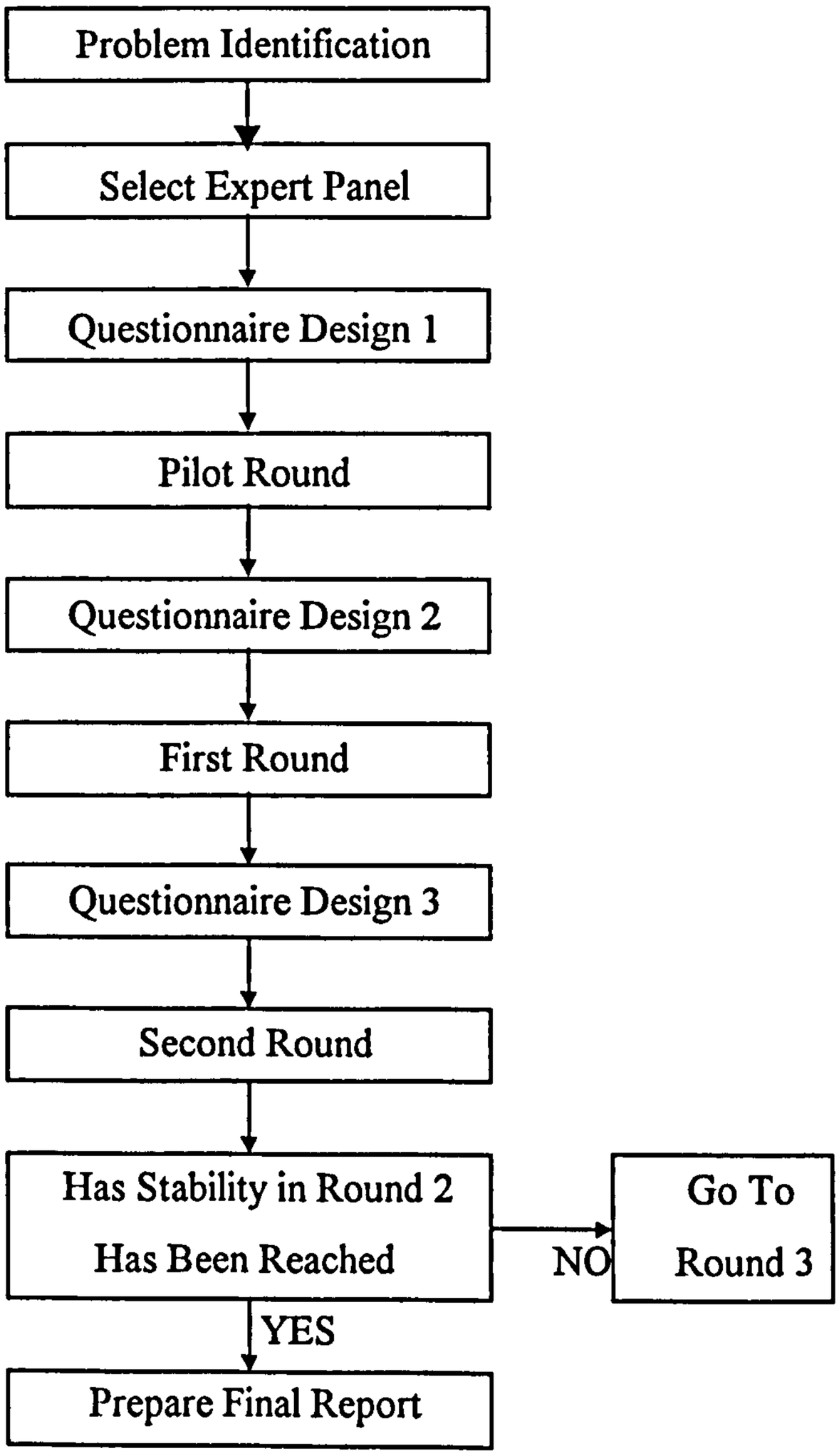
Delphi is known to the public as a systematic procedure for soliciting and organising expert opinion about the future (Sullivan and Claycombe, 1977). In some studies (Ariel, 1989; Yeong *et al.*, 1989; University of Manchester; 1994; Fadda, 1997), the Delphi technique has been mainly employed to predict likely events in the future. However, in this research the Delphi technique is employed not to deal with what is going to happen in the future, but rather to investigate the current situation. Some other studies such as Nanus *et al.* (1973), Anderson and Schroeder (1994), Meier *et al.* (1998) have used the Delphi technique to investigate the current situation for exploratory purposes. It is therefore justified that the Delphi technique can be used for a variety of circumstances as long as the form of Delphi technique applied in particular research features three basic characteristics such as anonymity, iteration, and controlled feedback. In what follows, the practical procedure for the Delphi survey and the results of the three rounds of survey are presented.

6.1 Delphi Procedure

As guided by Tersine and Riggs (1976), the Delphi survey for the research is conducted step by step. The application of the Delphi method in this research is a variation of the

'conventional' Delphi (Sackman, 1976). The main objectives of the Delphi technique are to investigate some findings in the literature regarding 'logistics service' in the liner shipping market. The overall process consists of a pilot round and three rounds of iterative questionnaire with a controlled anonymous opinion feedback. The whole process has been entirely organised by the researcher and therefore each member of the panel should not know each other. The whole Delphi process is presented in Figure 6.1, which is adapted from Figure 5.3.

Figure 6.1 The Delphi procedure for the research



Source: Author

6.2 Problem Identification

In the first place, the problem should be formulated and clearly stated to allow for no confusion or doubt during the whole Delphi process. The problems specified for the Delphi technique are based on the conceptual model developed in chapter 4.

The conceptual model clarifies that there are different satisfaction and quality gaps between shippers and carriers. In order to reduce this gap and secure their competitive position in the liner shipping market, carriers appear to be operating 'logistics service' rather than 'traditional shipping service'. Thus, the first research problem to be tackled in the Delphi study is whether there is any substantial difference between 'logistics service' and 'traditional shipping service'. Secondly, the conceptual model assumes that there may be some kinds of stimulating factors, which stimulate the liner shipping service providers to adopt the concept of logistics service. The Delphi technique seeks to verify some factors already obtained from the literature review. Finally, in order to measure carriers' performance of logistics service operations, the functions of logistics service need to be obtained. The functions of logistics services have been initially identified in the literature review (see section 3.2.3.7), but these may not be automatically appropriate if used in the shippers' survey without refinement and modification. The reason is that these functions have been cited not only in the shipping area but also in the general logistics area. It is, therefore, necessary to prove whether or not these functions are appropriate to the liner shipping context. The Delphi technique is used to obtain the determinant functions, which can also be regarded as performance indicators of logistics services.

In summary, a Delphi survey is conducted to solve the following problems: i) to investigate the difference between traditional liner shipping service and logistics service, ii) to ascertain

the environmental factors affecting the employment of logistics service, and iii) to confirm the functions of logistics service in liner shipping.

Those problems stated above are investigated by operating the questionnaire answered by the panel of experts carefully selected. Participants are asked to provide their opinions about the problems formulated above.

6.3 Selection of A Panel of Experts

6.3.1 Importance of selecting a panel

The second step in the Delphi technique is the selection of a panel of expert members for the study. This step is very crucial because this panel can lend content validity to the research (Jolson and Rossow, 1971; Tersine and Riggs, 1976). Kaplan *et al.* (1950) define an expert as a person who has reputation, influence, skills in managing interpersonal relations. Moreover, Ludlow (1971, p.26) provides a more specific definition of experts, namely "*individuals whose reputation, education, or experience indicate that they are in a relatively advantageous position to make a judgement relative to the question or decision of interest*". Therefore, a panel of experts is selected on the basis of the required expertise, which varies with the nature of the problem investigated (Tersine and Riggs, 1976).

6.3.2 Expertise requirements for selecting experts

Even though several studies such as Sackman (1975) and Welty (1974) suggest that high levels of expertise are not necessary for quality forecasting, Martino (1983) argues that the participants' expertise and knowledge on a subject matter are the most important elements of a Delphi study, and therefore the current study seeks to secure the best experts possible in the relevant area.

Farmer and Richman (1970, p.332) provide some rules for the selection.

i) a basic expertise of the study field, capability to apply that knowledge
ii) evidence of a great performance in their specific field
iii) a high degree of objectivity and rationality
iv) the time available to participate in succeeding rounds of questionnaires
v) a willingness to dedicate part of their time and endeavour to participate in the questionnaire survey.

Helmer (1966, p.13) also suggests "*the determination of which categories of expertise are needed*", *and "the identification of those among the available persons*", let alone that they are the most expert in each category. Therefore, for the success of such a study, it is critical to secure participation of the right kinds of experts, who understand the issues, have a vision, and represent a substantial variety of viewpoints (Czinkota and Ronkainen, 1997). In this respect, the research also requires experts who really understand both liner shipping and logistics disciplines and also possess a great deal of knowledge and experience on this subject.

6.3.3 Sample size

There is no fixed rule as to the number of experts required in order to form a panel. The size of Delphi panels reported in past studies covers a very wide range from tens to hundreds (Yeong *et al.*, 1989). The choice depends on the nature as well as the scope of the study. In order to achieve reasonable accuracy in a Delphi study, Dalkey (1969) shows that fifteen to twenty members is the minimum panel size required. However, if the panel is homogeneous, Tersine and Riggs (1976) suggest that a number between ten and fifteen respondents should be satisfactory to produce effective results. Given this suggestion, this research contacted initially twenty expert members as a possible panel for the study.

6.3.4 Source of selection

Taking all these principles above into account (section 6.3.2 and 6.3.3), the current Delphi study makes an effort to select the expert panel based on the selection criteria. In the beginning, twenty expert panel members covering both academic and industry fields were invited to participate. The panel of experts invited for the Delphi survey has representatives in different groups of working areas as follows.

- Government departments
- Academics in institutions
- Liner shipping companies
- Trade journalists

6.4 Questionnaire Design

After selecting a panel of experts, the questionnaire distributed to the participants should be designed. Sackman (1975) calls attention to some important aspects regarding questionnaire design. First, it should be based on careful review of the relevant literature about the problem area. Second, construct validity for the particular area should be investigated. Third, the questionnaire should represent a systematic sampling of items.

The first questionnaire to be distributed to the participants was in the mixed form of open-ended and closed-ended style, called a semi-structured questionnaire. The use of open questions will allow participants to define and describe a situation or event in detail. Moreover, an open question is designed to encourage the interviewee or respondents to provide an extensive and developmental answer and may be used to reveal attitudes or obtain facts (Grummitt, 1980). Therefore, the panel of experts is able to provide their expert opinions on the subject. In short, the major advantage of open-ended question lies in

the respondents not being restricted by the researcher's preconceived ideas (Emory and Cooper, 1995) and they can choose to say anything they wish. Particularly, the respondents can provide some crucial points of which the researcher may not be aware.

On the other hand, a closed-ended style is also needed. Initially, the literature review was used to structure a primary pool of statements representing the functions of logistics service in liner shipping, from which the panel of experts was to decide which functions are selected or discarded.

6.5 Pilot Round

6.5.1 Securing the validity of the research

For a pilot round, a small number of experts were approached to investigate the problems formulated. According to the University of Manchester (1994), the reason for administering a pilot round is to decide the key questions to be asked and to consider how to derive and communicate with a panel of experts. Another reason for performing a pilot round is to maintain content validity. Content validity is determined by expert judgement (Gay, 1987), and it is a non-statistical type of validity (Kaplan and Saccuzzo, 1989). Therefore, the questionnaire will require participants' views on this issue and then the participants can point out as many other issues as possible that they consider to be of importance to the researcher.

6.5.2 Selecting a panel for pilot round

Some academics from the Institute of Marine Studies at the University of Plymouth and the Hong Kong Maritime Polytechnic University were invited to participate in order to determine whether the questionnaire covered adequately both the content and the objectives of the research. Furthermore, they were requested to provide their own views on

subjects they thought should be examined by the current research, making any suggestions as to any additions or deletions that could lead to improving the questions. Participants were also requested to make their own comments about the questionnaire response format, to search for accuracy, clarity and conciseness in the questions formulated, and to verify the ambiguity of any questions.

6.5.3 Designing the questionnaire

The questionnaire consists of three sections. Section I was designed to deal with the difference between traditional shipping service and logistics service and contains four statements to be answered. Section II was designed to tackle the environmental factors that can stimulate service providers to employ the concept of logistics service in their business operation. Section II included ten statements to be answered. Section III was designed to verify the logistics service functions already extracted from the relevant literature review. Initially, 37 service functions were provided. In order to make it simple for the respondents to answer, these functions were divided into six categories. The whole questionnaire for the Pilot Round is presented in Appendix C. On the 9th of September 1999, the preliminary questionnaire was passed to a group of participants, who were contacted in advance. What the questionnaire obtained from a pilot round is discussed in the next section.

6.5.4 Comments from the participants

Four participants were actively involved to go through the whole questionnaire, as if they were actually participating in the survey. As a result, some invaluable comments were obtained, covering not only the format of questions but also some technical points. The panel pointed out that some questions seem to be double-barrelled and confusing in terms of terminology. Those questions were re-phrased and re-formulated. Terminology was more clearly defined in order to make more sense to the respondents. As for the measurement of

respondents' level of confidence, a Likert scale from one to five was also suggested. Consequently, a greatly improved questionnaire for the first round was constructed.

6.6 First Round

6.6.1 Creating the panel of experts

Taking the comments from the pilot round into account, the modified format of the questionnaire was constructed. The next step was to contact potential panel members with a short letter accompanying the questionnaire. The covering letter should include an objective of the study, the problems to be solved, their importance in the Delphi process for reaching solutions, clear instructions, and finally the deadline for their submission (Fadda, 1997). This letter is presented in Appendix D.

Bearing in mind the discussion in section 6.3.2, twenty potential members of the panel were initially approached. However, six members dropped out or declined during the Delphi process for various reasons. Some of them were too busy to participate; others just did not reply. Consequently, fourteen members of the panel agreed to participate. The profile of the actual participants in Table 6.1 indicates the location and source of panellists contributing to this study.

Table 6.1 Profile of expert panels

	U.K.		South Korea	
	Contacted	Participated	Contacted	Participated
Government	1	0	2	2
Industry	4	2	4	2
Academic Institution	3	3	4	4
Journalism	2	1	0	0

6.6.2 Questionnaire design

A questionnaire for the first round was reformulated based on careful feedback from the pilot round. The list of fourteen statements and thirty seven logistics service functions were used to formulate the first round Delphi questionnaire, which is presented in Appendix E. The questionnaire was originally written in English and was not translated into Korean for the South Korean Panel. The participants did not need a Korean version, because all of the panellists in South Korea already possessed a good command of English.

6.6.3 The Delphi process

The first round of the Delphi process took place between May 2000 and July 2000. On 9th May 2000, the first questionnaire was sent out to the pre-contacted members of the panel. By the end of June 2000, the completed questionnaire from eleven members of the panel was received. For the rest of the members who did not respond, a follow-up letter or e-mail reminder was sent. As a result, three more completed questionnaires were received by the end of July. As explained earlier, six members eventually did not participate and the panel size was therefore reduced to fourteen from twenty.

6.6.4 Analysis of the response to first round

The first round responses were analysed in the following way. First, the average percentage of majority opinions was calculated. As discussed in section 5.4.6, in order to determine whether consensus has been achieved or not, any arbitrary figure could be used (Kapoor, 1987 and Williams and Webb, 1994). To determine whether the response supports the statements or not, the average percent of majority opinions (APMO) can be used (Abdel-Fattah, 1997). Since the number of participants was not big enough to calculate the APMO separately for two countries (U.K.: 6 and South Korea: 8), the calculation of the APMO is made by combining the two panels into one category.

The APMO for the first round was 70.5 % as shown in Table 6.2, and therefore, 71 % was chosen as the 'cut-off' point for the analysis. If the percentage of statements agreed records an APMO or higher it means that consensus is achieved with agreement, and if the percentage of statements disagreed records an APMO or higher it means that consensus is achieved with disagreement. Any statements lower than APMO with agreement or disagreement were reformulated based on the comments and used for the next round.

Table 6.2 Average percent of majority opinions for first round

	U.K. and South Korea Total
Majority Agreements	88
Majority Disagreements	34
Total Opinions Expressed	173
Average Percent of Majority Opinions	70.5 %

In order to find out the panel member's expertise on the answer for the first round, the respondents were asked to rate their confidence between 1 (least confident) and 5 (most confident) on answering each question. The confidence level was quite high on most statements (higher than 4.00). This fact proves that the members of the panel possess the required expertise on this area. Together with the degree of expertise on each statement, the entire analysis of replies for the first round is presented in Appendix F. Meanwhile, Table 6.3 and 6.4 illustrate the analysis of opinions about the statements for the first round.

Table 6.3 Analysis of opinion expressed in Section I (First round)

Statements	Agree	Disagree
1. Logistics services are characterised by a close relationship based on individual suppliers and customers, while the traditional shipping service can be characterised by a remote relationship between shipper and liner company based on just ship movement.	46.2 %	53.8 %
2. While liner companies are prepared to accept lower profitability in a logistics service context, liner companies are seeking to maintain a high profitability in a traditional shipping service context.	33.3 %	66.7 %
3. While shippers are interested in the whole delivery process in a logistics service context, shippers are interested in simply getting their goods out of the despatch area in a traditional shipping service context.	46.2 %	53.8 %
4. While logistics services are more concerned with a greater understanding of supplier potential and customer problems and opportunities, traditional shipping services are concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time.	69.2 %	30.8 %

Table 6.4 Analysis of opinion expressed in Section II (First round)

Statements	Agree	Disagree
1. Ongoing expansion of the container shipping business measured in TEUs will lead to the provision of logistics services by liner companies.	66.7 %	33.3 %
2. Mergers and acquisitions between major liner companies will lead to the provision of logistics services by liner companies.	66.7 %	33.3 %
3. Strategic alliances between major liner companies will lead to the provision of logistics services by liner companies.	41.7 %	58.3 %
4. The development of information technology will lead to the provision of logistics services by liner companies.	85.7 %	14.3 %
5. More liberalisation trends in international trade will lead to the provision of logistics services by liner companies.	66.7 %	33.3 %
6. More competition between suppliers of liner shipping services will lead to the provision of logistics services by liner companies to shippers.	91.7 %	8.3 %
6-1. Liner companies offer ever lower freight rates. This will lead to greater provision of logistics services by them to increase profits.	41.7 %	58.3 %
6-2. Competition between liner companies to secure more container cargo will lead to the provision of logistics services by liner companies.	91.7 %	8.3 %
7. Increasing demand by shippers for handling, processing, storage, and movement of goods to and from all parts of the world will provoke liner companies to provide logistics services to shippers.	92.9 %	7.1 %
8. The negative impact on customer service of increases in late deliveries, lost or damaged goods, or misrouted international shipments will lead to the provision of logistics services by liner companies.	61.5 %	38.5 %

Table 6.5 shows the selected functions of logistics service. A total of 37 service functions were presented to obtain approval from the panel of experts. The functions were originally classified into six categories. Participants were asked to mark their importance on the each service function with a five point Likert scale. The average mean of importance of total service functions is 3.84 out of 5.00. Therefore, those functions with a score of less than 3.84 were deemed to be discarded. As a result, 31 service functions emerged after

eliminating some functions, merging two functions into one function and dividing one function into two functions. The detailed analysis for selecting service functions can be seen in Appendix G.

Table 6.5 Logistics service functions

Category	Functions
Ship operation related service	Ship operation Reserving cargo at port Container handling at port Booking vessel space
Inter-modal transport Service	Inter-modal co-ordination Consolidating shipments FCL transport LCL transport Route planning
Logistics Centre Service	Warehousing Inland container depot management Export packaging Export cargo sorting and filtering Import cargo sorting and filtering Special treatment for fragile cargo Labelling
Information Service	Tracking/tracing Scheduling information
Documentation and Invoicing Service	Printing document Issuing Bill of Lading Preparing Certificates of Origin Preparing invoice Obtaining proof of delivery Obtaining export license Obtaining insurance policy
Customer Service	Paying freight Paying port charges Paying insurance premiums Paying customs duties Customs clearance Monitoring inventory level

6.6.5 Delphi results of first round

Analysis of the first round responses shows that only four statements clearly achieved a consensus by the panel of experts. Some statements received a relatively high percentage of 'Unable to comment', and some members of the panel pointed out that the use of

terminology was ambiguous and therefore did not provide their opinions on those particular statements. Such statements were reformulated for the second round.

6.7 Second Round

6.7.1 Questionnaire design

For the second round, the Delphi questionnaire was reconstructed based on the feedback of the first round. Having considered all the comments about the statements, the total number of statements were reduced to twelve. Four statements about the difference between the logistics service and traditional shipping service remained with only a minor change. However, the statements about the environmental factors that stimulate the service providers to employ the concept of logistic service were reduced to eight statements from the original ten statements. The questionnaire for the second round with modified statements is presented in Appendix H.

The second round aims to obtain professional opinions about the statements, by clarifying the reasons for agreement or disagreement. The second round questionnaire includes the twelve statements to seek a consensus across the panel of experts.

6.7.2 The Delphi process

The second round of the survey took place between September 2000 and October 2000. On the 9th of September 2000 the questionnaires were sent out to the respondents and were returned with a 100 % response rate by the end of the October 2000. Unlike the first round, all the participants were more positively involved with the survey, mostly showing a very high interest in this project.

6.7.3 Analysis of the response to the second round

The second round responses were analysed by calculating the average percentage of majority opinions (APMO) which was 82.4 % (see Table 6.6.)

Table 6.6 Average percent of majority opinions for second round

	U.K. and South Korea Total
Majority Agreements	100
Majority Disagreements	31
Total Opinion Expressed	159
Average Percent of Majority Opinions	82.4 %

The respondents were asked to rate their confidence on answering each question. Similar to the result of the first round, the level of confidence on all the statements was higher than 4.00, suggesting the expertise on the statements was secured. The entire analysis of replies for the second round is fully presented in Appendix I. Meanwhile, Table 6.7 and 6.8 illustrates the analysis of opinions expressed about the statements. The replies were analysed using the APMO as applied for the first round.

In the next round, the respondents are asked to reconsider their previous opinions and to revise their ratings (Shneiderman, 1988) on each question (for instance, on a scale of 1, 2, 3, 4 or 5 for assessment of the participant's own degree of expertise on each question).

Table 6.7 Results of the second round (Section I)

Statement	Agree	Disagree
1. Traditional shipping service is based on a remote relationship between service providers and service consumers, while logistics service is based on a close relationship between service providers and service consumers.	92.9 %	7.1 %
2. Traditional shipping service providers were seeking to maintain a high profitability within the conference system, while logistics service providers are prepared to accept lower profitability with new types of co-operation such as strategic alliances.	38.5 %	61.5 %
3. Shippers are interested in just ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.	46.2 %	53.8 %
4. Traditional shipping service providers are mainly concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time, while logistics service providers are concerned with customers' problems and opportunities generated in the whole delivery process.	92.9 %	7.1 %

Table 6.8 Results of the second round (Section II)

Statements	Agree	Disagree
1. Mergers/acquisitions and strategic alliances between major liners are still very prominent in the liner shipping market. As a result, the emergence of the mega container operator which can exploit the economies of scale and utilise the 'in-house' global logistics resources enable them to operate logistics service.	**92.3 %**	7.7 %
2. The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.	41.7 %	58.3 %
3-1. Intense competition between liner shipping companies arising in the liner shipping market has led to liner shipping service providers to operate logistics services.	**100 %**	0 %
3-2. Competition between liner shipping companies and ocean transport intermediaries (freight forwarders, non-vessel-operating-common-carriers) to secure more container cargoes is leading to the provision of logistics services.	**92.9 %**	7.1 %
4. The constant decline of freight rates in liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.	30.8 %	69.2 %
5. In these days, shippers' demands are very diverse and sophisticated in terms of cargo handling, processing, storage, movement, and actually everything related to cargoes. This fact is leading to the provision of logistics services.	**90.9 %**	9.1 %
6. Decline of the end-to-end/port-to-port liner conference system and the development of the hub and spoke global container network will enable liner shipping service providers to provide logistics service.	**85.7 %**	14.3 %
7. Continuing improvements in the global infrastructure, e.g. port modernisation, the provision of new and enlarged ports, the development of road and rail networks serving the ports, are allowing liner shipping service providers to operate logistics service.	**92.9 %**	7.1 %

6.7.4 Results

The analysis of the second round responses reveals that eight statements reached a consensus, but that four statements still did not achieve a consensus.

6.7.4.1 The difference between traditional shipping service and logistics service

Statement 1

Thirteen members of the panel appeared to agree with this statement and only one member did not, making 93 % of agreement. One particular comment with disagreement was that "*remote is too harsh and logistics has a closer relationship but traditional shipping service are still based on a close relationship*". However, with a higher rate of agreement from most members of panel, this statement was thought to be reaching a consensus.

Statement 2

For this statement, five members of the panel agreed and eight did not, resulting in 61.5 % of disagreement, lower than the APMO. Therefore, this statement will go on to the next round. The comments from the disagreeing members of the panel were mainly concerned with the period of accepting lower profit. For instance, logistics service providers may give up high profits for a while but they will gradually put the price up or want to make up for it from other areas.

Statement 3

Regarding this statement, six members agreed and seven did not, resulting in a majority opinion of 53.8 % of disagreement. Again, this figure is lower than the APMO and will be forwarded to the next round. One of the comments from the panel was "*the shippers in the traditional shipping context are also interested in the whole delivery process*". Another point was that "*most traditional shipping services offer inland haulage and shippers expect it*".

Statement 4

Similar to statement 1, 93 % of agreement was recorded. No particular comment was made in relation to this statement. Given this agreement rate, it was decided to regard this statement as having achieved consensus.

6.7.4.2 Factors affecting the operation of logistics service

There are eight statements presented to identify whether or not these factors actually stimulate the operation of logistics service in the liner shipping market. A consensus with agreement has been achieved for six statements. Two statements will go on to the next round to search for a consensus.

Statement 1

This statement is concerned with the effect of mergers/acquisitions and alliances on the operation of logistics service. Twelve members of the panel agreed with the statement and only one member did not. A 92.3 % majority opinion was obtained and, therefore, a consensus was achieved for this statement.

Statement 2

This statement relates to the development of information technology in the shipping field. Five members of the panel agreed with the statement and seven members expressed their disagreement. The majority opinion was 58.3 % disagreement and therefore, a consensus was not achieved. Members of the panel that disagreed appeared to suggest similar points: namely these technologies can assist shipping service providers in meeting customers' demands but do not actually trigger off the operation of logistics service. Since a consensus was not achieved, this statement is included in the next round.

Statement 3.1

The issue in this statement is the competition between liner shipping companies. This factor turned out to be the most obvious cause for the employment of logistics service. All the panel members agreed with this statement. Uniquely, 100 % agreement was obtained and therefore a consensus was achieved.

Statement 3.2

Similar to the statement above, this statement was also highly supported by the panel of experts. The competition between the shipping companies and the ocean transport intermediaries, such as freight forwarders and NVOCCs, is the key issue. 92.9 % agreement

and 7.1 % disagreement were obtained. A consensus was, therefore, achieved for this statement.

Statement 4

This statement is relevant to the constant decline of freight rates in the liner shipping market. Nine members of the panel disagreed with this statement and four members agreed. The majority opinion was 69.2 % disagreement and, therefore, a consensus was marginally not achieved. The main comments behind disagreement can be summarised by the belief that the operation of logistics service aims to hold onto existing customers, rather than halt a decline of rates. This statement will be included in the next round searching for a consensus.

Statement 5

This statement is related to the increasing demands of shippers. Ten members of the panel agreed and only one member did not. The majority opinion is 90.9 % agreement and therefore a consensus was achieved.

Statement 6

The issue of this statement revolves around the system and network of the liner shipping market. Twelve members of the panel provided their opinions of agreement and two members did not agree. 85.7 % agreement was obtained and, therefore, a consensus was achieved.

Statement 7

This statement is connected with the global infrastructure that allows liner shipping service providers to operate logistics service. Thirteen members of the panel agreed with this

statement and only one disagreed. 92.9 % of agreed opinions were given and a consensus was achieved.

6.8 Third Round

6.8.1 Questionnaire design

The third round was necessary because the consensus for four statements was not achieved in the previous round. For the third round, the Delphi questionnaire was reconstructed based on the feedback of the second round. Having achieved a consensus for eight statements previously, four statements that did not obtain a consensus (less than 82.4 %) are presented in the third round questionnaire. Two statements are related to the difference between logistics service and traditional shipping service and other two are concerned with the environmental factors that stimulate the service providers to employ the concept of logistic service.

The third round questionnaire includes the original statements, a number of sub-statements, which are the comments received from the panel in the second round as reasons for disagreement with the original statements. Each sub-statement should be answered with either agree or disagree or unable to comment. If agreed, the panel is asked to mark the degree of importance (1 = not important; 2 = important; 3 = very important) on the particular statement. The panel was also requested to leave their comments regarding these sub-statements if they wish. The third round questionnaire is presented in Appendix J.

6.8.2 The Delphi process

The third round of the survey took place between January 2001 and February 2001. On 5th of January, the third round questionnaire was sent out to the members of the panel. By the end of January, ten questionnaires were returned so that the chase-up email was sent to the

rest of the members of panel. Eventually, by the middle of February, all the questionnaires were received, and thus a 100 per cent response rate.

6.8.3 Questionnaire development

Based on the analysis of the second round questionnaire, the statements supporting the hypothesis were obtained and the statements with some objections to the original statement were found. However, for those statements, which had less than 82.4% (APMO in second round) consensus among the experts, it was decided to analyse the importance of the objections generated by individual experts. As a result, the third round questionnaire, which converted these objections into sub-statements, was designed to ask the panel to consider each sub-statement and provide their importance scale on it if they agreed with the objection raised.

However, it is not satisfactory enough to classify those sub-statements solely based on the level of importance allocated by the respondents. In order to enhance the analysis, Ludlow (1971) developed 'A Delphi Index' for the classification of responses.

6.8.4 Screening criteria

The answers from the experts were analysed individually guided by the following elements. The criteria for analysing the third round questionnaire are discussed.

- The total number who agreed with the statement = A
- The number of disagreements = D
- The number of 'unable to comment' replies = U
- The mean of importance scale = X
- The standard deviation of agreements on the importance scale = SD

Respondents were asked to indicate the importance of an objection only if they agreed with it, using a three-level importance scale (1 = Not Important, 2 = Important, 3 = Very Important). The statement which had the highest mean value (X) was ranked 1 and the others were ranked in descending order according to the value X. The unanimity among the respondents was worked out. The statement that had the lowest value of the standard deviation (S.D.) was ranked 1 and the others were ranked in descending order. The total number of respondents who agreed with a sub-statement was summed to give the value A. The agreement (A) among the respondents was determined by the value of A. The statement that had the highest value of agreement was ranked 1. The certainty of a sub-statement was worked out by determining the number of 'unable to comment'. The statement that had the lowest number of 'unable to comment' was ranked 1.

Taking all the elements mentioned above, The Delphi Index (D.I.) was then calculated as follows: D.I = Sum of Rankings of Importance, Unanimity, Agreement and Certainty Scales / 4. Therefore, the statement that has a D.I. closer to 1 would be a statement, which is important, on which a majority of the experts agree, where the majority of the experts are unanimous in their choice of its importance, and finally where there is certainty.

Ludlow (1971) in his Delphi study used screening criteria based on importance, panel competence and consensus. According to his criteria, any sub-statement which had a mean value (X) of less than 2 (important) was dropped from consideration in this round because the consensus of opinion was that the objection raised could be regarded as 'not important' [1 = not important; 2 = important; 3 = very important]. If 50% or more (i.e. > 7) experts expressed 'Unable to Comment' on a particular sub-statement it was also dropped from consideration as its certainty is in doubt.

6.8.5 Analysis of the response to the third round

In the following, the analysis of each statement is provided according to the rules adopted above.

Original statement

1. Traditional shipping service providers were trying to maintain a high profitability within the conference system, while logistics service providers are prepared to accept relatively lower profitability with new types of co-operation such as strategic alliances.

Disagreed opinions

1.1 Logistics service providers may accept lower profitability in some areas but have to make up for it in others or they would not survive.

1.2 Since liner shipping industry is characterised as a fixed freight rate system, there is no way of telling whether this industry is seeking high or low profitability.

1.3 It is true within the short-term. As far as the long term objectives of such companies are concerned, they are planning to maintain high profitability.

1.4 Logistics service providers also want high profitability but are willing to accept less in order to establish permanent relationships for future business.

Table 6.9 Analysis of statement No. 1

Statement Number	**1.1**	**1.2**	**1.3**	**1.4**
Agree (A)	11	5	10	12
Disagree (D)	2	1	2	0
Unable to comment (U)	1	8	2	2
Mean (X)	2.27	1.40	2.70	2.33
Standard Deviation (SD)	0.79	0.55	0.48	0.78
Agreement	*2*	*4*	*3*	*1*
Importance	*3*	*4*	*1*	*2*
Unanimity	*4*	*2*	*1*	*3*
Certainty	*1*	*4*	*2*	*2*
Delphi Index	**2.50**	**-**	**1.75**	**2.00**

The statement 1.2 was dropped from calculating the Delphi Index, because it has more than 50 % of 'unable to comment' and the mean value is less than 2.00. From the analysis it appears that logistics service providers are also concerned with the long term profit objectives even though they could accept lower profit in the short term. This result can actually support the decision made in the Second round.

Original statement

2. Shippers are interested in just ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.

Disagreed opinions

2.1 Most traditional shipping services also offer inland haulage and shippers expect it.

2.2 The shippers in a traditional shipping service context are also interested in the whole delivery process.

2.3 Shipping service providers in both contexts must be concerned with the total movement in order to be competitive in today's market place.

Table 6.10 Analysis of statement No. 2

Statement Number	**2.1**	**2.2**	**2.3**
Agree (A)	3	8	11
Disagree (D)	9	2	2
Unable to comment (U)	2	4	1
Mean (X)	2.33	2.38	2.82
Standard Deviation (SD)	0.58	0.74	0.40
Agreement	3	2	1
Importance	3	2	1
Unanimity	2	3	1
Certainty	2	3	1
Delphi Index	**2.50**	**2.50**	**1.00**

From the analysis, statement 2.3 was vastly supported (D.I. = 1.00). It is very strongly believed between the members of panel that shipping service providers in both contexts are interested in the total movement of cargoes in order to be competitive in the market.

Original statement

3. The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.

Disagreed opinions

3.1 Logistics services were being provided manually – EDI and computers have made it easier and cheaper.

3.2 New technologies assist shipping companies to be able to meet customer expectation, but are not the main cause for providing logistics service.

3.3 The development of new technology happens not only in the shipping business but also in the industry as a whole. This technology thing is nothing to do with the provision of logistics service.

Table 6.11 Analysis of statement No. 3

Statement Number	**3.1**	**3.2**	**3.3**
Agree (A)	12	11	8
Disagree (D)	2	0	2
Unable to comment (U)	0	3	4
Mean (X)	2.33	2.73	1.88
Standard Deviation (SD)	0.78	0.47	0.64
Agreement	*1*	*2*	*3*
Importance	*2*	*1*	*3*
Unanimity	*3*	*1*	*2*
Certainty	*1*	*2*	*3*
Delphi Index	**1.75**	**1.50**	**2.75**

The statement 3.3 was dropped from calculating the Delphi Index, because the mean value is less than 2.00. From the analysis it appears that new technologies such as EDI and electronic based cargo tracking systems allow liner shipping service providers to be able to meet customer expectations more easily and cheaply, but are not the main reason for providing logistics service.

Original statement

4. The constant decline of freight rates in the liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.

Disagreed opinions

4.1 The motive of operating logistics service is to attract customers rather than halt decline of rates.

4.2 In order to stay competitive, shipping lines must operate logistic service, but the expectation is to increase profitability.

4.3. Providing logistics service is to improve the total service quality, not to get over the decline of freight rates. Even though liner shipping companies suffer from lower freight rates, they can still make a profit with more customers.

Table 6.12 Analysis of statement No. 4

Statement Number	**4.1**	**4.2**	**4.3**
Agree (A)	12	7	13
Disagree (D)	0	4	0
Unable to comment (U)	2	3	1
Mean (X)	2.75	2.29	2.85
Standard Deviation (SD)	0.45	0.76	0.38
Agreement	*2*	*3*	*1*
Importance	*2*	*3*	*1*
Unanimity	*2*	*3*	*1*
Certainty	*2*	*3*	*1*
Delphi Index	**2.00**	**3.00**	**1.00**

From the analysis, it was noted that statement 4.3 was outstanding. It appears that the main reason for providing logistics service is to improve the overall quality of service provided, not to stop the decline of freight rates.

6.9 Final Report

This section considers the entire survey of three rounds. As with the analyses of these three rounds, the results are considered according to three categories.

6.9.1 The difference between logistics service and traditional shipping service

Initially there were four statements to investigate the difference between the features of logistics service and those of the traditional shipping service. Having completed all three rounds, the panel did support two statements, which obtained more than 82.4 % agreement between the panel. However, the panel could not achieve consensus for two other statements. Table 6.13 shows the statements and the percentage of agreement or disagreement is shown at the end of each statement

Table 6.13 Delphi results - Consensus

Statements	Consensus
1. Traditional shipping service is based on a remote relationship between service providers and service consumers, while logistics service is based on a close relationship between service providers and service consumers.	93% Agreement
2. Traditional shipping service providers seek to maintain a high profitability within the conference system, while logistics service providers are prepared to accept relatively lower profitability with new types of co-operation such as strategic alliances.	Consensus not achieved
3. Shippers are interested in just the ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.	Consensus not achieved
4. Traditional shipping service providers are mainly concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time, while logistics service providers are concerned with customers' problems and opportunities generated in the whole delivery process.	93% Agreement

6.9.2 The environmental factors

Initially there were ten statements presented to investigate the difference between the features of logistics service and those of the traditional shipping service. However, after the first round, the number of statements was reduced to eight. Having completed all three rounds, the panel was able to reach a consensus for six statements, which obtained more than 82.4 % agreement between the panel. However, two statements failed to achieve

consensus. Notably, statement 4 obtained 70 % disagreement, which is still not high enough to be close to the cut-off point. Table 6.14 shows the statements and whether or not they are supported or not supported.

Table 6.14 Delphi results - Consensus

Statements	Consensus
1. Mergers/acquisitions and strategic alliances between major liners are still very prominent in the liner shipping market. As a result, the emergence of the mega container operator which can exploit the economies of scale and utilise the 'in-house' global logistics resources enable them to operate a logistics service.	92% Agreement
2. The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.	Consensus not achieved
3.1. Intense competition between liner shipping companies arising in the liner shipping market has led liner shipping service providers to operate logistics services.	100% Agreement
3.2. Competition between liner shipping companies and ocean transport intermediaries (freight forwarders, non-vessel-operating-common-carriers) to secure more container cargoes is leading to the provision of logistics services.	93% Agreement
4. The constant decline of freight rates in the liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.	Consensus not achieved (but, 70% disagreement)
5. Nowadays, shippers' demands are very diverse and sophisticated in terms of cargo handling, processing, storage, movement, and actually everything related to cargoes. This fact is leading to the provision of logistics services.	91% Agreement
6. Decline of the end-to-end/port-to-port liner conference system and the development of the hub and spoke global container network will enable liner shipping service providers to provide logistics service.	86% Agreement
7. Continuing improvements in the global infrastructure, e.g. port modernisation, the provision of new and enlarged ports, the development of road and rail networks serving the ports, are allowing liner shipping service providers to operate logistics service.	93% Agreement

6.9.3 Logistics service functions

In the first round questionnaire, 37 service functions were presented for confirmation as logistics service functions. Having received responses from the panel of experts, the 31 service functions shown in Table 6.5 were accepted but 6 service functions were discarded or merged with other functions. The average mean of importance of total service functions is 3.84 out of 5.00. Therefore, those functions which scored less than 3.84 were supposed to be discarded. Meanwhile 'preparing consular invoice' and 'preparing commercial invoice' have been combined into 'preparing invoice'. The entire list of accepted and eliminated functions can be found in Appendix K.

6.10 Conclusion

The first round of the Delphi survey pursued the panel's opinion in terms of 'agree', 'disagree', or 'unable to comment' for the statements provided. Due to the ambiguities of some statements, the modified second round was conducted. Statements that fail to reach a consensus (measured by APMO) are included in the third round questionnaire, with comments received from the panel. The original statements were reconsidered and opinions regarding the validity of the comments was also be provided. The results were collected and analysed.

The Delphi research has identified that there are clear differences between a 'traditional shipping service' and a 'logistics service'. In particular, it was found that a logistics service is concerned with a closer relationship between service providers and service consumers. Furthermore, it was also found that service providers' interest is not only with just the ship's operation but also with the total delivery process. In other words, today's liner shipping service providers cannot survive with a traditional business strategy focusing on just ship's movement. This is why liner shipping service providers are turning themselves into logistics service providers.

On the other hand, the research shows that logistics service operation is little to do with tolerating lower profitability. It was suggested that they may accept lower profit in some areas but have to make up for it in others.

The research suggests that there are certain environmental factors which may have stimulated liner shipping service providers to adopt a logistics service concept into their business operation. Competition between carriers, arguable disadvantages of strategic

alliances and mergers and acquisition to the shippers, and more sophisticated shippers' demand are such factors. However, it was found that there is no universal agreement as to whether the development of information technology such as EDI has little to do with stimulating the operation of a logistics service. It was suggested that EDI and computerised vessel operation have made things cheaper and easier. The constant decline of freight rates was initially thought to be a stimulating factor, but this particular statement was not supported by the panel of experts.

Having identified the differences between 'traditional shipping service' and 'logistics service' as well as logistics service functions, the next chapter will deal with the analysis of the shippers' survey.

CHAPTER 7

Preliminary Results of Survey

In order to achieve the objective of the research, a quantitative data was collected from the postal survey. The data includes the characteristics of the respondents (shippers), the characteristics of cargoes transported, shippers' perceptions of service providers' claim about the service offered and the actually received service, as well as structured data with regard to current service providers and preferred service providers on 31 service functions. This chapter focuses mainly on the comparisons of these demographic findings between the two countries. A preliminary assessment of the data is required prior to a more detailed analysis. The first step details the frequencies associated with each variable and some descriptive statistics are included.

7.1 Survey Process

7.1.1 Questionnaire development

The development of the postal questionnaire was guided by several scientific methodological discussions (Churchill, 1991; Sekaran, 1992; Sarantakos, 1993). The questions in the questionnaire were formulated on the purpose of attaining research objectives. The researcher initially developed a questionnaire and then it was reviewed by some members of staff in the Institute of Marine Studies at the University of Plymouth in the U.K. and in the Korea Maritime University in South Korea. The questionnaires for the U.K. shippers (See Appendix L) and South Korean shippers (See Appendix M) consisted of a covering letter, a five-page questionnaire, and a postage-paid return envelope. The covering letter characterised the objectives of the survey, requested the respondent's co-operation, reassured the respondent's privacy, and provided sender's contact details. The questionnaire contains 4 sections;

- Section I : General information about shipper and cargo details
- Section II : Perceptions about logistics service in liner shipping
- Section III : Logistics service providers
- Section IV : Degree of satisfaction with logistics service

7.1.2 Pilot survey

Perry (1995) argues that a pilot survey in a survey process is very crucial, especially when it comes to PhD dissertation level. The objectives of conducting a pilot survey are well described by Sarantakos (1993). First, it is expected to obtain the scrutiny of the survey. Second, the researcher can predict the percentage of response. Third, there is a possible improvement in terms of contents of questionnaire. Therefore, 20 shippers from each country were initially contacted and asked to fill in the questionnaire. A total of 5 questionnaires were returned, representing 2 for the U.K. and 3 for South Korea. The total response rate was 12.5 %. Based on the comments from respondents, the questionnaire for the main survey was changed slightly.

7.1.3 Selection of the sample

The sampling method this research adopted was probability sampling. As discussed in Section 5.5.4.2, this method was thought to be the most appropriate one for the research. Probability sampling is most widely used with survey-based research, where the research seeks to make inferences from the sample about a population in order to answer research questions (Saunders *et al.*, 1997). Due to the need for a high degree of representativeness in sampling design, the research has adopted the random sampling method.

The unit of analysis for this survey is 'international shippers who currently use container shipping services in the U.K. and/or South Korea'. The sample for the survey of U.K.

shippers was chosen based on the official database of U.K. international exporters and importers (www.tradepartners.gov.uk). The sample for the survey of South Korean shippers was chosen based on the database of South Korean international exporters and importers (Korean Industrial Data Base and www.kitamember.net).

7.1.4 Questionnaire distribution

The questionnaires were distributed to international shippers in the U.K. and South Korea. The distribution of questionnaire started on 01/05/01 and was completed on 31/07/01, taking a total of three months therefore. A total of 988 shippers were discovered for the U.K. and 945 shippers for South Korea. For the U.K. shippers, 89 questionnaires were returned and 72 were classified as usable. For South Korea, 105 questionnaires were returned and 96 were identified as usable.

Table 7.1 Response rate

	U.K.	SOUTH KOREA
Total distributed	988	945
Total received	89	105
Usable responses	**72**	**96**
Response rate	9.0 %	11.1 %
Usable response rate	**7.3 %**	**10.2 %**

The reason for classifying the responses into usable and unusable is that some questionnaires were returned but were not filled in or incomplete. As shown in Table 7.1, the overall response rate for this survey was 9.0 % for the U.K. shippers and 11.1 % for South Korean shippers. However, after tabulation, usable response rates for both countries are 7.3 % and 10.2 % respectively.

Formally, response rate is defined as "*the number of completed interviews with the responding unit, divided by the number of eligible responding units in the sample*"

(Wiseman and Billington, 1984, p.337). The usual response rate for mail surveys is typically not so high. Sekaran (2000, p.234) states that "*a 30 % response rate is considered acceptable*".

However, this response rate can be totally dependent on several factors. The relatively low response rate in this survey can be explained by looking at the following considerations. Firstly, some of the respondents with no answers sent letters saying that they received so many requests to take part in such surveys, but that their heavy work load and frequent travel schedule did not allow them the time to complete the questionnaire. Too many business surveys seem to discourage them to participate. Secondly, some respondents' businesses were identified as irrelevant to this research. For example, they are not dealing with container shipping since they have been engaged in international trade business by using air transport. Thirdly, some questionnaires were just returned with an 'address unknown' stamp. It is possibly explained by the fact that some of them changed their address or that they are no longer engaged in the business even though their details were listed in the database used in this research.

In fact, it has been claimed that the response rate in business surveys is becoming lower and lower, as there seems to have been a so-called 'flooded business surveys' (Finer and Hundt, 2001). In order to increase the response rate, a monetary or non-monetary reward can be considered (Schneider and Johnson, 1995; Armstrong and Yokum, 1994). Along with the development of Internet use, surveys using electronic mail could also be employed (Nebenzahl and Jaffe, 1995).

7.2 Profile of Shippers and Cargoes

7.2.1 Business category

Table 7.2 illustrates whether shippers are engaged in export or import or both at the time when they responded to the questionnaire. In the U.K. about 46 % of respondents are engaged in both export and import. 18.1% of respondents are doing import only and 36.1% of respondents are doing export only. For South Korea, the majority of respondents are doing both export and import with 58.3 %, 9.4% of respondents are doing import only and 32.3 % of respondents are doing export only. It was immediate noted that a relatively lower percentage of import only shippers was sampled. The probable reason for a low proportion of import only shippers in South Korea may be explained by the fact that this questionnaire was mainly distributed to small and medium sized shippers that are more engaged with export business.

Table 7.2 Business category

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Export only	26	31	36.1	32.3
Import only	13	9	18.1	9.4
Both	33	56	45.8	58.3
Total	72	96	100	100

7.2.2 Types of cargoes

Table 7.3 and 7.4 illustrate export cargoes and import cargoes, which are transported by container ships. The classification of the cargo was guided by SITC (Standard Industrial Trade Classification). There are 10 types of products classified in SITC. However, this research has only classified these products into 4 different types: food and drinks, materials and chemicals, manufactured goods, and machinery and transport equipment.

When the sampling was carried out, other product categories such as grain, coal, cars, oil, etc were excluded from the sample because these products are not usually transported by

container ships. In fact, more than 60 percent of container cargoes are manufactured goods such as electrical goods, consumer goods, household items, etc (UNCTAD, 2000). In addition, there are hardly any products that can be classified into categories other than the four categories above.

Table 7.3 Export cargoes

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Food and drinks	6	4	10.2	4.6
Materials and chemicals	4	11	6.8	12.7
Manufactured goods	36	57	61.0	65.5
Machinery and transport equipment	13	15	22.0	17.2
Total	59	87	100	100

Since 13 shippers do not deal with the export business, a total of 59 shippers are engaged in export business for the U. K. As much as 61 % of export cargoes carried by container ships are revealed as manufactured goods. 22 % of cargoes are classified as machinery and transport equipment. Food and drinks are 10.2 % and materials and chemicals are 6.8 %.

The total number of shippers engaged in export business for South Korea is 87. About 66 % of export cargoes are manufactured goods. 17.2 % of cargoes are classified as machinery and transport equipment. Food and drinks are 4.6 % and materials and chemicals are 12.7 %.

Table 7.4 Import cargoes

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Food and drinks	2	7	4.4	10.8
Materials and chemicals	6	19	13.0	29.2
Manufactured goods	31	29	67.4	44.6
Machinery and transport equipment	7	10	15.2	15.4
Total	46	65	100	100

A total of 46 shippers are engaged in import business in the U.K.. About 67 % of import cargoes carried by container ships are classified into manufactured goods. About 15 % of

cargoes are machinery and transport equipment. Materials and chemicals are 13 % and food and drinks are 4.4 % each. A total of 65 shippers are engaged in import business in South Korea. Unlike the U.K. example, just less than half of import cargoes are revealed as manufactured goods. Materials and chemicals are almost 30 %. Machinery and transport equipment are about 15 % and food and drinks are about 11 %.

These figures reflect on the fact that the South Korean economy has been heavily dependent on an export driven policy encouraging industry to import materials and chemicals to produce manufactured goods for export. According to national trade statistics (Korean Statistics Office, 2001), there are about 52 % of manufactured goods imported and 32 % of materials imported in South Korea. For the U.K. (Stationery Office, 2001) about 82 % of manufactured goods were imported and 12 % of materials and chemicals were imported. These figures are somewhat similar to the figures in the sample. In this respect, the sample can be said to be well representative for the population.

7.2.3 Years in business

Table 7.5 shows the number of years in business for the shippers participating in this survey. For the U.K., about 63 % of the shippers in the sample entered international trade between 10 and 29 years ago, with 25 % engaged in business for less than 10 years and about 12 % for more than 30 years. For South Korea, about 77 % of the shippers in the sample entered international trade between 10 and 29 years ago, with about 13 % of shippers engaged in business for between 5 and 9 years, and 10 % for more than 30 years.

It is notable that the U.K sample contains four shippers with more than 50 years experience, whereas the South Korean sample has no shippers within this category. This can be explained by the fact that the South Korean economy practically started its real international business after the 1970s due to its political and economic instability until the

1970s. Therefore, most exporters and importers in South Korea tend to have relatively shorter experience than in the U.K. Moreover, there is no one with less than five years experience in South Korean sample, which can be partly attributable to the economic crisis started in 1997.

Table 7.5 Years in business

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Greater than 50 years	4	0	5.6	0.0
30-49	5	10	6.9	10.4
10-29	45	74	62.5	77.1
5-9	12	12	16.7	12.5
less than 5 years	6	0	8.3	0.0
Total	72	96	100	100

7.2.4 Volume of cargo per tonne

The information for the volume of cargo on a per tonne basis was initially included in the questionnaire. However, due to significantly low responses from respondents, the research has decided to eliminate this variable. As a rule of thumb, where there have been more than 15 % of missing answers, it is best that they are eliminated for more reliable analysis (George and Mallery, 2001).

7.2.5 Value of cargo per tonne

Table 7.6 and 7.7 show the value of cargoes transported by container ships. In order to unify the currency involved, the unit of currency (U.K. Sterling and South Korean Won) has been converted to US dollars. To begin with, the exchange rates for the very first date of each month from 01/05/01 until 31/07/01 were calculated to obtain an average exchange rate (Lloyd's List, 2001a, b, c). The value of cargo is a continuous variable but it was categorised into several groups to provide easier understanding.

The value of cargo is a good reflection of each country's trade pattern. As shown in Table 7.6, the U.K. sample has relatively higher value export cargoes than South Korea, when we compare about 37 % of upper middle and high value cargo in the U.K. with about 6 % of those in South Korea. It is clearly noted that South Korea import relatively lower value cargoes than the U.K., when we compare about 85 % of lower middle and low value cargo in South Korea with about 26 % of those in the U.K. This is somewhat similar to each country's trade statistics, suggesting that the sample of this survey well represents the population's characteristics.

Table 7.6 Value of export cargoes per tonne (Unit US$)

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Less than 1,000	7	10	11.9	11.5
1,000-4,999	6	29	10.2	33.3
5,000-14,999	24	43	40.7	49.4
15,000-49,999	17	5	28.8	5.7
More than 50,000	5	0	8.5	0.0
Total	59	87	100	100

Table 7.7 Value of import cargoes per tonne (Unit US$)

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Less than 1,000	8	13	17.4	20.0
1,000-4,999	4	42	8.7	64.6
5,000-14,999	30	4	65.2	6.2
15,000-49,999	4	2	8.7	3.1
More than 50,000	0	4	0.0	6.1
Total	46	65	100	100

7.2.6 The total volume of traffic transported annually

This figure allows the research to determine the size of the shippers' businesses. There were two missing answers on this variable so that the total frequency is 166. Applying a similar grouping method adopted in section 7.2.5 to this figure, size can be grouped as small, medium small, medium, medium large, and large. Table 7.8 appears to suggest that

small and medium sized shippers were mainly included in the sample and that there were no particular differences between the two countries.

Table 7.8 Total amount of cargo transported annually in TEUs

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Less than 10	2	12	2.8	12.8
10-49	34	30	47.2	31.9
50-149	22	36	30.6	38.3
150-499	7	10	9.7	10.6
More than 500	7	6	9.7	6.4
Total	72	94	100	100

7.2.7 Trade route

Table 7.9 and 7.10 respectively illustrate the major trade routes frequently used by the U.K shippers and South Korean shippers.

Table 7.9 Major trade routes used by the U.K. shippers

	FREQUENCY	PERCENTAGE
Within Europe	32	32.7
Europe/Far East	28	28.6
Trans-Atlantic	16	16.3
Europe/Africa and South America	12	12.2
Europe/the rest of Asia	10	10.2
Total	98	100

The most frequently used route for the U.K shippers is within Europe, whereas, for South Korean shippers, it is within Asia. For South Korea, the fact that there has been a large amount of trade with Japan and China is reflected in this figure. The Europe/Far East route is revealed as one of the major routes for both countries.

According to statistics concerning trade areas (IMF, 2002), the largest trade takes place within Europe, the second largest is the Far-East route and the third largest is the Trans-

Atlantic route for the U.K. For South Korea, the largest is within Asia, the second is the Trans-Pacific, and the third is Far Eat/Western-Europe. Given this, the sample observations on this variable are identical to these statistics, and it is further support for the validity of the sample.

Table 7.10 Major trade routes used by South Korean shippers

	FREQUENCY	PERCENTAGE
Within Asia	56	42.1
Trans-Pacific	31	23.3
Europe/Far East	27	20.3
Far East/Austral-Asia	11	8.3
Far East/Middle East and S. America	8	6.0
Total	133	100

7.2.8 Respondents' positions in company

Table 7.11 illustrates the respondents' positions in their companies. The vast majority of the questionnaires was completed by a higher level in the company, with only one answered at supervisor level. The database used for this survey contained the names of directors or partners in the selected companies, and therefore the mail survey was sent directly to them. Interestingly, there was a great similarity in terms of the positions in companies between the two countries.

Table 7.11 Respondents' positions in company

	FREQUENCY		PERCENTAGE	
	U.K.	S.K	U.K.	S.K
Supervisor level	0	1	0.0	1.0
Manager level	21	31	29.2	32.3
Director level	42	54	58.3	56.3
Answer not provided	9	10	12.5	10.4
Total	72	96	100	100

7.3 Profile of Service Provider

Table 7.12 tabulates which types of institution are currently offering service for each service function between the U.K. and South Korean shippers. As explained in Chapter 4, logistics service providers in liner shipping can be categorised into shipping lines, freight forwarders, and NVOCCs. However, some shippers have used their own company or agencies as service providers for the entire service functions or a part of them. It was also noted that some shippers have used more than two service providers for some particular functions.

It was observed that a shipping line is the major player for ship operation and inland container depot management in the U.K. and ship operation, reserving cargo at port, container handling at port, inland container depot, scheduling information, and issuing of Bill of Lading in South Korea. Non-transport related functions, such as export packaging, labeling, paying freight, paying insurance premiums, preparing certificate of origin, preparing invoice, obtaining export license, obtaining insurance policy and monitoring inventory level, seem to be mainly dealt with by the shipper's own company. Particularly in the Korean sample, agency is the major service provider for customs clearance and own company is the major service provider for paying customs duties, suggesting that services related to customs are thought to be not so straightforward by shippers in Korea. NVOCCs do not seem to play a major role in the liner shipping market even though their activities appear to be more active in South Korea. It is quite clearly shown that freight forwarders are the main service providers for many of service functions. Finally, multiple service providers for service functions are not so popular between the two countries.

Table 7.12 Current logistics service providers selected by shippers (%)

	1 S.L. UK	SK	2 F.F. UK	SK	3 NVOCC UK	SK	4 Agency UK	SK	5 O.C. UK	SK	6 1+2 UK	SK	7 2+5 UK	SK	8 4+5 UK	SK	N/A UK	SK
Ship operation	47	41	36	32	1	14	6	7	3	0	1	6	0	0	0	0	6	0
Inter-modal co-ordination	19	10	50	48	1	7	11	17	3	9	1	3	1	0	0	0	13	5
Reserving cargo at port	24	33	40	27	1	6	11	17	3	1	3	2	1	0	0	0	17	14
Container Handling at port	32	37	47	34	1	3	8	10	0	0	1	2	0	0	1	0	8	14
Booking vessel space	17	21	56	37	1	7	10	12	1	9	3	1	3	0	4	0	6	14
Consolidating shipments	13	9	47	41	1	9	10	14	3	7	3	0	0	0	3	0	21	20
FCL transport operation	31	21	42	42	1	10	11	8	0	0	3	4	0	0	0	0	13	8
LCL transport operation	17	18	42	50	1	12	13	10	1	1	3	2	3	0	0	0	21	7
Route planning	17	12	32	26	1	7	6	6	13	25	4	2	4	0	1	0	22	22
Warehousing	13	12	38	32	1	6	7	9	24	17	0	0	3	0	0	0	15	24
Inland container depot management	31	35	31	18	1	6	7	14	6	0	0	1	0	0	0	0	25	26
Export packaging	1	0	25	9	0	1	7	16	35	56	0	0	1	0	1	2	29	16
Import cargo sorting and filtering	0	3	24	19	1	3	8	16	7	14	0	0	0	0	0	1	60	45
Special treatment for fragile cargo	6	3	22	17	1	12	4	5	6	8	1	0	1	0	1	0	57	55
Labelling	4	1	18	4	0	0	8	15	40	63	0	0	1	0	1	1	26	17
Tracking/Tracing	21	23	38	27	1	5	13	13	14	12	1	1	1	0	0	0	11	20
Printing document	26	13	33	25	1	5	6	13	15	27	0	2	0	0	1	0	17	16
Scheduling information	21	32	39	24	1	7	10	13	7	12	1	1	1	0	1	0	18	12
Export cargo sorting and filtering	7	6	17	12	1	2	7	15	18	42	1	1	1	0	0	0	47	23
Paying freight	7	8	39	19	0	5	7	18	32	47	1	1	3	1	1	0	10	1
Paying port charges	11	5	38	23	0	4	8	22	24	38	0	1	1	0	1	0	17	7
Paying insurance premiums	3	2	26	15	0	1	7	16	43	60	0	1	3	0	1	0	17	6
Paying customs duties	6	2	43	14	0	1	7	27	28	44	0	1	0	0	0	0	17	12
Issuing of Bill of Lading	32	40	44	33	1	12	8	7	4	1	0	2	0	0	0	0	10	5
Preparing Certificate of Origin	4	3	27	9	1	4	13	14	28	46	0	1	0	0	0	0	31	23
Preparing invoice	8	2	18	8	1	2	10	15	40	60	0	1	0	0	1	0	21	12
Obtaining proof of delivery	3	4	28	9	0	2	13	23	19	27	1	1	3	0	0	0	33	33
Obtaining export license	15	2	0	10	1	1	10	31	25	37	0	1	0	1	1	0	47	17
Obtaining insurance policy	1	2	25	5	1	1	7	22	50	53	0	1	0	0	0	0	15	16
Customs clearance	3	2	54	15	1	2	13	46	17	26	1	1	0	0	0	0	11	8
Monitoring inventory level	0	2	17	2	0	0	4	10	43	56	0	1	0	0	0	0	36	28

* S.L. = Shipping Line, F.F. = Freight Forwarder, NVOCC = Non-Vessel-Operating-Common-Carrier, O.C. = Own Company

Table 7.13 shows shippers' preferred choice of service providers for each service function in the U.K. and South Korean shippers.

Table 7.13 Preferred logistics service providers selected by shippers (%)

	1 S.L. UK	SK	2 F.F. UK	SK	3 NVOCC UK	SK	4 Agency UK	SK	5 O.C. UK	SK	6 1+2 UK	SK	7 2+5 UK	SK	8 4+5 UK	SK	N/A UK	SK
Ship operation	51	57	29	25	0	6	4	8	1	0	1	3	0	0	1	0	11	0
Inter-modal co-ordination	24	37	40	26	0	7	7	15	8	9	1	1	0	0	1	0	18	5
Reserving cargo at port	28	50	32	21	0	4	8	12	4	1	3	1	1	0	1	0	22	12
Container handling at port	33	54	43	22	0	3	7	9	3	0	1	2	0	0	1	0	11	9
Booking vessel space	25	41	49	24	0	2	6	12	4	9	3	0	3	1	4	0	7	12
Consolidating shipments	22	35	40	27	0	5	7	13	6	6	3	0	0	0	3	0	19	14
FCL transport operation	39	48	35	27	0	4	7	9	3	0	3	2	0	0	1	0	13	9
LCL transport operation	28	43	35	34	0	4	8	12	4	1	3	1	3	0	1	0	18	5
Route planning	21	35	35	23	0	4	3	10	11	10	4	0	3	0	3	0	21	17
Warehousing	24	29	32	25	0	4	6	6	21	17	0	0	3	0	1	0	14	19
Inland container depot management	35	43	28	22	0	4	6	9	6	0	0	1	0	0	1	0	25	21
Export packaging	10	10	24	8	0	0	3	19	35	48	0	0	1	0	3	1	25	14
Import cargo sorting and filtering	7	14	22	14	0	2	7	17	4	10	0	0	0	0	1	0	58	44
Special treatment for fragile cargo	11	15	19	13	0	2	4	18	8	8	1	0	1	0	3	0	51	45
Labelling	11	10	17	5	0	1	8	19	33	51	0	0	1	0	3	1	26	13
Tracking/Tracing	29	41	36	19	0	2	11	15	8	8	1	1	1	0	1	0	11	15
Printing document	32	32	31	16	0	2	7	16	13	21	0	0	0	0	3	0	15	14
Scheduling information	28	50	38	20	0	4	8	10	7	6	1	0	0	0	1	0	17	9
Export cargo sorting and filtering	14	24	21	10	0	2	7	16	14	26	1	1	1	0	1	0	40	21
Paying freight	11	21	38	18	0	2	8	23	26	33	1	1	3	0	1	0	11	2
Paying port charges	19	18	35	18	0	5	8	22	22	28	0	1	1	0	1	0	13	8
Paying insurance premiums	8	13	22	17	0	1	7	22	40	41	0	1	2	0	2	0	17	6
Paying customs duties	11	14	42	16	0	0	7	22	22	38	0	1	0	0	1	0	17	10
Issuing of Bill of Lading	36	48	42	28	0	5	6	10	6	2	0	1	0	0	1	0	10	5
Preparing Certificate of Origin	13	16	25	12	0	1	13	14	26	39	0	1	0	0	1	0	22	19
Preparing invoice	15	12	17	10	0	1	11	17	40	50	0	1	0	0	1	0	15	9
Obtaining proof of delivery	10	17	31	10	0	2	14	19	14	27	1	1	3	0	1	0	26	24
Obtaining export license	8	13	18	13	0	2	8	29	22	30	0	1	0	0	3	0	40	13
Obtaining insurance policy	10	12	22	12	0	0	8	23	43	41	0	1	0	0	1	0	15	13
Customs clearance	11	17	51	19	0	1	11	39	12	19	1	1	0	0	1	0	11	5
Monitoring inventory level	7	7	18	12	0	0	6	19	38	55	0	1	0	0	1	0	31	23

* S.L. = Shipping Line, F.F. = Freight Forwarder, NVOCC = Non-Vessel-Operating-Common-Carrier, O.C. = Own Company

From the Table 7.13, it was particularly noted that non-transport related functions are still preferably dealt with by agencies or own companies. Meanwhile, shipping companies or freight forwarders are preferred for transport related functions.

The research can create other tables by manipulating Tables 7.12 and 7.13. First, Table 7.14 provides the average percent of preferred service providers of the two countries. Guided by Table 7.14, for instance, the majority of shippers appears to use shipping lines as their service providers for such service functions: ship operation, reserving cargoes at port, container handling at port, FCL transport, LCL transport, inland container depot, tracking/tracing, printing document, scheduling information, and issuing of Bill of Lading. Freight forwarders seem to play a major role in service functions such as intermodal co-ordination, booking vessel space, consolidating shipments, route planning, warehousing, import cargo sorting and filtering, special treatment for fragile cargo, and customs clearance. It is interesting to note that non-transport related functions appear to be self-arranged by shippers themselves. These functions are export packaging, labelling, export cargo sorting and filtering, paying freight, paying port charges, paying insurance premiums, paying customs duties, preparing certificate of origin, preparing invoice, obtaining proof of delivery, obtaining export licence, obtaining insurance policy, and monitoring inventory level.

In addition, the research is seeking to identify the difference between the current and the preferred service providers. This can be calculated by deducting the percentage of the current service providers from the percentage of preferred providers as shown in Table 7.15. A positive score means that more shippers prefer to use that particular service provider on that service function. On the other hand, a negative score suggests that fewer shippers prefer to remain loyal to their original service providers. The higher the positive score the stronger the bond with current service providers. Interestingly, it was found that there is very high consistency of positive scores for shipping lines and negative scores for other service providers. This can suggest that the performance of other transport intermediaries has not been perceived as being as good as shipping lines.

Table 7.14 Preferred logistics service providers (average % of two countries)

	1 S.L.	2 F.F.	3 NVOCC	4 Agency	5 O.C.	6 1 + 2	7 2 + 5	8 4 + 5	N/A	Total
Ship operation	54.0	27.0	3.0	6.0	0.5	2.0	0.0	0.5	5.5	100
Inter-modal co-ordination	30.5	33.0	3.5	11.0	8.5	1.0	0.0	0.5	11.5	100
Reserving cargo at port	39.0	26.5	2.0	10.0	2.5	2.0	0.5	0.5	17.0	100
Container handling at port	43.5	32.5	1.5	8.0	1.5	1.5	0.0	0.5	10.0	100
Booking vessel space	33.0	36.5	1.0	9.0	6.5	1.5	2.0	2.0	9.5	100
Consolidating shipments	28.5	33.5	2.5	10.0	6.0	1.5	0.0	1.5	16.5	100
FCL transport operation	43.5	31.0	2.0	8.0	1.5	2.5	0.0	0.5	11.0	100
LCL transport operation	35.5	34.5	2.0	10.0	2.5	2.0	1.5	0.5	11.5	100
Route planning	28.0	29.0	2.0	6.5	10.5	2.0	1.5	1.5	19.0	100
Warehousing	26.5	28.5	2.0	6.0	19.0	0.0	1.5	0.5	16.5	100
Inland container depot management	39.0	25.0	2.0	7.5	3.0	0.5	0.0	0.5	23.0	100
Export packaging	10.0	16.0	0.0	11.0	41.5	0.0	0.5	2.0	19.5	100
Import cargo sorting and filtering	10.5	18.0	1.0	12.0	7.0	0.0	0.0	0.5	51.0	100
Special treatment for fragile cargo	13.0	16.0	1.0	11.0	8.0	0.5	0.5	1.5	48.0	100
Labelling	10.5	11.0	0.5	13.5	42.0	0.0	0.5	2.0	19.5	100
Tracking/Tracing	35.0	27.5	1.0	13.0	8.0	1.0	0.5	0.5	13.0	100
Printing document	32.0	23.5	1.0	11.5	17.0	0.0	0.0	1.5	14.5	100
Scheduling information	39.0	29.0	2.0	9.0	6.5	0.5	0.0	0.5	13.0	100
Export cargo sorting and filtering	19.0	15.5	1.0	11.5	20.0	1.0	0.5	0.5	30.5	100
Paying freight	16.0	28.0	1.0	15.5	29.5	1.0	1.5	0.5	6.5	100
Paying port charges	18.5	26.5	2.5	15.0	25.0	0.5	0.5	0.5	10.5	100
Paying insurance premiums	10.5	19.5	0.5	14.5	40.5	0.5	1.0	1.0	11.5	100
Paying customs duties	18.0	29.0	0.0	14.5	30.0	0.5	0.0	0.5	13.5	100
Issuing of Bill of Lading	42.0	35.0	2.5	8.0	4.0	0.5	0.0	0.5	7.5	100
Preparing Certificate of Origin	14.5	18.5	0.5	13.5	32.5	0.5	0.0	0.5	20.5	100
Preparing invoice	13.5	13.5	0.5	14.0	45.0	0.5	0.0	0.5	12.0	100
Obtaining proof of delivery	13.5	20.5	1.0	16.5	20.5	1.0	1.5	0.5	25.0	100
Obtaining export license	10.5	15.5	1.0	18.5	26.0	0.5	0.0	1.5	26.5	100
Obtaining insurance policy	11.0	17.0	0.0	15.5	42.0	0.5	0.0	0.5	14.0	100
Customs clearance	14.0	35.0	0.5	25.0	15.5	1.0	0.0	0.5	8.0	100
Monitoring inventory level	7.0	15.0	0.0	12.5	46.5	0.5	0.0	0.5	27.0	100

* S.L. = Shipping Line, F.F. = Freight Forwarder, NVOCC = Non-Vessel-Operating-Common-Carrier, O.C. = Own Company

Table 7.15 The difference between the current logistics service providers and the preferred logistics service providers (Table 7.13 – Table 7.12)

	1 S.L. U.K. S.K	2 F.F. U.K. S.K	3 NVOCC U.K. S.K	4 Agency U.K. S.K	5 O.C. U.K. S.K	6 1 + 2 U.K. S.K	7 2 + 5 U.K. S.K	8 4 + 5 U.K. S.K
Ship operation	4 16	-7 –7	-1 –8	-2 1	-2 0	0 –3	0 0	1 0
Inter-modal Co-ordination	5 27	-10 –22	-1 0	-4 –2	5 0	0 –2	-1 0	1 0
Reserving cargo at port	4 17	-8 –6	-1 –2	-3 –5	1 0	0 –1	0 0	1 0
Container handling at port	1 17	-4 –12	-1 0	-1 –1	3 0	0 0	0 0	0 0
Booking vessel space	8 20	-7 –13	-1 –5	-4 0	3 0	0 –1	0 1	0 0
Consolidating shipments	9 26	-7 –14	-1 -4	-3 –1	3 –1	0 0	0 0	0 0
FCL transport operation	8 27	-7 –15	-1 –6	-4 1	3 0	0 –2	0 0	1 0
LCL transport operation	11 25	-7 –16	-1 –8	-5 2	3 0	0 –1	0 0	1 0
Route planning	4 23	3 –3	-1 –3	-3 4	-2 –15	0 –2	-1 0	2 0
Warehousing	11 17	-6 –7	-1 –2	-1 –3	-3 0	0 0	0 0	1 0
Inland container depot management	4 8	-3 4	-1 –2	-1 –5	0 0	0 0	0 0	1 0
Export packaging	9 10	-1 –1	0 –1	-4 3	0 –8	0 0	0 0	2 –1
Import cargo sorting and filtering	7 11	-2 –5	-1 –1	-1 1	-3 –4	0 0	0 0	1 –1
Special treatment for fragile cargo	5 12	-3 –4	-1 –10	0 13	2 0	0 0	0 0	2 0
Labelling	7 9	-1 1	0 1	0 4	-7 –12	0 0	0 0	2 0
Tracking/Tracing	8 18	-2 –8	-1 –3	-2 2	-6 –4	0 0	0 0	1 0
Printing document	6 19	-2 –9	-1 –3	1 3	-2 –6	0 –2	0 0	2 0
Scheduling information	7 18	-1 –4	-1 –3	-2 –3	0 –6	0 –1	0 0	0 0
Export cargo sorting and filtering	7 18	4 –2	-1 0	0 1	-4 –16	0 0	0 0	1 0
Paying freight	4 13	-1 –1	0 –3	1 5	-6 –14	0 0	0 –1	0 0
Paying port charges	8 13	-3 –5	0 1	0 0	-2 –10	0 0	0 0	0 0
Paying insurance premiums	5 11	-4 2	0 0	0 6	-3 –19	0 0	-1 0	1 0
Paying customs duties	5 12	-1 2	0 –1	0 –5	-6 –6	0 0	0 0	1 0
Issuing of Bill of Lading	4 8	-2 –5	-1 –7	-2 3	2 1	0 –1	0 0	1 0
Preparing Certificate of Origin	9 13	-2 3	-1 –3	0 0	-2 –7	0 0	0 0	1 0
Preparing invoice	7 10	-1 2	-1 –1	1 2	0 –10	0 0	0 0	0 0
Obtaining proof of delivery	7 13	3 1	0 0	1 –4	-5 0	0 0	0 0	1 0
Obtaining export licence	-7 11	18 3	-1 1	-2 –2	-3 –7	0 0	0 –1	2 0
Obtaining insurance policy	9 10	-3 7	-1 –1	1 1	-7 –12	0 0	0 0	1 0
Customs clearance	8 15	-3 4	-1 –1	-2 –7	-5 –7	0 0	0 0	1 0
Monitoring inventory level	7 5	1 10	0 0	2 9	-5 –1	0 0	0 0	1 0

* S.L. = Shipping Line, F.F. = Freight Forwarder, NVOCC = Non-Vessel-Operating-Common-Carrier, O.C. = Own Company

** A positive score means that more shippers prefer to use that particular service provider on that service function. On the other hand, a negative score suggests that fewer shippers prefer to remain loyal to their original service providers. The higher the positive score the stronger the bond with current service providers.

7.4 Qualitative Findings from Respondents

In the following sections, the opinions and comments collected from international shippers are discussed according to the issues raised by them.

7.4.1 Comments from South Korean shippers

First, some shippers in South Korea acknowledged that the most suitable service providers for the liner shipping market are likely to be freight forwarders. Even the big trading companies, such as Hyundai and Samsung, arrange their transport service providers through freight forwarders as a method of outsourcing. On the other hand, some shippers wish to see a 'one-stop' system for the whole export process because they have experienced very inconvenient administrative procedures for exporting business in South Korea.

Some exporters pointed out that they hardly receive a high level of service from their perspective when service providers are arranged by importers. It was said that consolidating, booking container space, and most of all, issuing of the bill of lading are very difficult service functions when they are arranged by shippers themselves. The delay in issuing a bill of lading normally results in a delay in bank negotiation, which can eventually cause an inappropriate cash flow in a shipper's company. For exporters, obtaining a bill of lading within a reasonable amount of time is of paramount importance.

A sizeable number of shippers complained about inland transport arrangements. They highlighted that the difficulty in arranging road transport becomes worse in peak seasons when a large amount of cargoes are to be carried. The trucking companies usually charge shippers heavily during the peak season, and it was strongly suggested by shippers that there should be some kind of regulation.

There were some sceptical views about the role of freight forwarders and NVOCCs based in South Korea. Some shippers prefer to deal with foreign freight forwarders or NVOCCs headquartered in the USA or Western Europe, because they believe that South Korean ones do not possess enough power to compete with other larger international players.

Finally, the quality of shipping service provided by liner shipping companies and freight forwarders is regarded as a 'very ordinary shipping service' by many of shippers.

7.4.2 Comments from U.K. shippers

It was revealed that some small sized companies are not interested in major shipping logistics but in the domestic movement of small amounts of goods quickly and safely. A sizeable number of shippers prefer to deal with a freight forwarder which sometimes can offer a competitive service, rather than with a big shipping company.

It seems that service providers say they provide such services but some shippers never receive visits or calls from them and they have to arrange all of their own customs clearance and inland transport services independently. It was stated that the whole service process should work like clockwork, but one does need a proper understanding of how the system works.

The view was also put forward that the container shipping facilities within Europe by road/rail/sea are very poorly developed and very expensive in relation to intercontinental movements; particularly inadequate are North Europe – Mediterranean and vice versa. This can create a big gap in the market there.

A very valuable comment on the service function was obtained. For many underdeveloped countries, pre-shipment inspection by an international agency is an important aspect of

imports. It was also suggested that the movement of hazardous cargo is becoming increasingly difficult, i.e. because of regulation. These two service functions - pre-shipment inspection and the movement of hazardous cargo – should be included in further research.

7.5 Conclusion

The preliminary analysis provides a substantial insight into the structure of shippers' details, cargoes' details, routes, years in business, current and preferred service providers. These demographic findings were mainly presented with the measure of comparison between the two countries. Profiling the details of the sample helped largely support the validity of the research, by discovering certain matches between the character of the population and that of the sample. The identification of the current and preferred service providers can certainly provide a theme of 'who is offering what' and 'who should offer what'. Finally, the comments from the some respondents are very useful information in order to have a good insight into the market.

The next chapter analyses the difference in service perception depending upon the countries, and other shippers' and cargoes' characteristics. It also investigates the relationship between the degree of satisfaction and the choice of service provider. In addition, more comparisons between the two countries will be made in terms of their perceived level of satisfaction on each service function. These analyses are conducted through the application of chi-square tests, factor analysis, one way analysis of variance, and T-test.

CHAPTER 8

Main Analysis of Survey

Having obtained a good understanding of the data acquired, this chapter aims to test the hypotheses developed for the research in Chapter 4. First, shippers' perceptions of logistics service are analysed by performing cross-tabulations together with the Chi-square test. Second, in order to analyse the relationship between the service purchase behaviour and the degree of satisfaction, factor analysis is employed for the purpose of data reduction and, subsequently, a one-way analysis of variance (ANOVA) is also employed. Finally, the comparisons of the level of satisfaction on the service offered between the two countries will be made.

8.1 Analysis of Shippers' Service Perceptions

For the purpose of analysing the perception of logistics service in the liner shipping market, two separate questions were included in the questionnaire. Firstly, in section II of the shippers' questionnaire, a statement was presented to respondents in order to investigate the way in which international shippers in the U.K. and South Korea regard the co-called 'logistics service' claimed by service providers in the market. This statement was formulated after investigating the current market situation and summarising the remarks made by some of the service providers in the liner shipping market. Respondents were expected to mark their answers with either 'agree' or 'disagree' or 'unable to comment'.

Statement

'Today's liner shipping companies are providing not just a basic shipping service (traditional ship movement) but total logistics services (e.g. ship operation, inland transport, documentation, information service, customer marketing service, and possibly more)'

Secondly, the respondents were also asked to describe the type of service they currently receive from their service providers. The answers obtained were either 'logistics service' or 'shipping service'.

From the literature review, it was noted that liner shipping service providers have claimed that they provide their customers with a logistics service, not just a shipping service. This research seeks to prove whether or not service providers' claims are supported by their customers and to find out if there is any significant relationship between shippers' service perception and some demographic variables related to the shippers' business operations.

The research has chosen five shippers' and cargoes' characteristics for this purpose. For testing this hypothesis, the chosen demographic variables are: (i) the shippers' country of business; (ii) the years in business; (iii) the types of business; (iv) the total volume of traffic; and (v) the value of cargoes. The use of demographic variables has been originated from the questionnaire. The demographic variables were put in the questionnaire in order to assist in the classification of respondents, and are typical of many business surveys. The other variables are shippers' perception of what service providers offer (which is claimed to be 'logistics service') and what shippers actually get. As a result, the following two hypotheses were therefore formulated

H3-1: Shippers' service perceptions of what the service providers claim will not be different according to cargoes' characteristics and shippers' characteristics.

H3-2: Shippers' service perceptions of what they actually receive regardless of what service providers claim will not be different according to cargoes' characteristics and shippers' characteristics.

In order to test these hypotheses, cross-tabulations and Chi-square tests were used. The null hypothesis should be described as 'two variables are independent of each other' which is equivalent to 'there is no different shippers' service perception between British shippers and Korean shippers', for instance. The alternative hypothesis then can be described as 'two variables are associated' which is equivalent to 'there is different shippers' service perception between British shippers and Korean shippers', for instance. In the following, a series of chi-square tests was carried out. For each test there is a table showing the test statistic, the level of significance, and Cramer's V.

8.1.1 Country by shippers' service perception

The first step in this analysis is to find out whether there is any association between country and shippers' service perception. The country is either U.K. or South Korea. The responses to the statement in section 8.1 are dichotomous, either agree or disagree. The cross-tabulation of these two variables is presented in Table 8.1.

Table 8.1 Country by perception of logistics service

	Agree with the statement	Disagree with the statement	Total
South Korea	42	54	96
U.K.	41	31	72
Total	83	85	168

Chi-square 2.865, Cramer's V 0.131, Significance 0.090

Having analysed the relationship between the two variables, it was found that there was no association between country and perception of service, meaning that a significant difference in service perception according to country was not found. First, it is noticed that the Chi-square statistic is not large, second, Cramer's V is 0.131, and finally the level of significance is 0.09. The null hypothesis is accepted when the level of significance is greater than 0.05.

Table 8.2 illustrates a cross-tabulation between country and currently received service as described by shippers. It was found that there was no particular association between these two variables according to Chi-square statistics and the level of significance ($p > 0.05$).

Table 8.2 Country by currently received service as described by shippers

	Logistics service	Traditional shipping service	Total
South Korea	20	76	96
U.K.	20	52	72
Total	40	128	168

Chi-square 1.094, Cramer's V 0.081, Significance 0.296

Conclusively, referring to Tables 8.1 and 8.2, it appears to be clear that service providers' claim about the level of service has not quite succeeded in attracting the attention of the shippers.

8.1.2 Years in business by shippers' service perception

Another important element possibly interacting with the service perception variable (statement in section 8.1) is years in business of each shipper company. The research sought to examine whether there is any particular relationship between the two variables (see Table 8.3 and 8.4).

Table 8.3 Years in business by perception of logistics service

	Agree with the statement	Disagree with the statement	Total
Greater than 30 years	17	2	19
10 – 29	49	70	119
Less than 10 years	17	13	30
Total	83	85	168

Chi-square 16.060, Cramer's V 0.309, Significance 0.000

In this analysis, the null hypothesis is rejected ($p<0.05$), meaning that there is a strong association between years in business and service perception. In particular, a majority of shippers ranged between 10 and 29 years disagreed with the statement in section 8.1. Furthermore, shippers with relatively short (less than 10 years) business experience show tend to agree with the statement. However, shippers with more than 30 years' experience have very favourable opinion for service providers.

Table 8.4 Years in business by currently received service as described by shippers

	Logistics service	Traditional shipping service	Total
Greater than 30 years	11	8	19
10 – 29	22	97	119
Less than 10 years	7	23	30
Total	40	128	168

Chi-square 14.030, Cramer's V 0.289, Significance 0.001

It was discovered that there is a significant association between years in business and service perception about currently received service. Shippers with more than 30 years in business tend to describe the service they receive as a logistics service, whereas the majority of shippers with between 10 and 29 years describe the service received as a shipping service. It appears that older companies are larger and therefore have a more professional approach and very new companies are more modern in their outlook and more logistics oriented. Companies in the middle age category are perhaps the most traditional.

8.1.3 Type of business by shippers' service perception

It was found that there is a relatively low degree of association between types of business and service perception (level of significance is just under 0.05). As illustrated in the Table 8.5, shippers engaged in both export and import tend to agree with the statement more than shippers who are engaging in either only export or import. This result can be analogous with the result of section 8.1.2 (years in business). It is conceivable that older companies

can more easily diversify their business areas. Therefore, companies with both export and import business are more likely to be older than those companies with only export or import business.

Table 8.5 Type of business by perception of logistics service

	Agree with the statement	Disagree with the statement	Total
Both	52	37	89
Export only	22	35	57
Import only	9	13	22
Total	83	85	168

Chi-square 6.197, Cramer's V 0.192, Significance 0.045

Table 8.6 illustrates a cross-tabulation between the type of business and currently received service, with no significant difference.

Table 8.6 Type of business by currently received service as described by shippers

	Logistics service	Traditional shipping service	Total
Both	23	66	89
Export only	10	47	57
Import only	7	15	22
Total	40	128	168

Chi-square 2.214, Cramer's V 0.115, Significance 0.331

8.1.4 Total volume of traffic by shippers' service perception

Table 8.7 illustrates a cross-tabulation between total volume of traffic and perceptions of logistics service. The null hypothesis is accepted ($p > 0.05$) in this analysis. It was, nevertheless, noted that shippers, who have a small amount of total cargo shipped, tend to agree with this statement compared to other shippers, who ship a larger amount of cargo. It could be explained by the fact that shippers, with a greater amount of cargo to be dealt with by various service providers, may find it more difficult to arrange each service operation and experience more problems. Therefore, they may not be satisfied with the service

providers' performance. For small shippers, their cargoes may be dealt with by single or fewer service providers and face fewer problems.

Table 8.7 Total volume of traffic by perception of logistics service

Unit: TEU	Agree with the statement	Disagree with the statement	Total
Less than 50	44	34	78
50 – 149	27	31	58
More than 150	11	19	30
Total	82	84	166

Chi-square 3.668, Cramer's V 0.149, Significance 0.160

Table 8.8 illustrates a cross-tabulation between total volume of traffic and currently received service as described by shippers. The null hypothesis is accepted ($p > 0.05$) and therefore there is no particular association found.

Table 8.8 Total volume of traffic by currently received service as described by shippers

	Logistics service	Traditional shipping service	Total
Less than 50	22	56	78
50 – 149	10	48	58
More than 150	7	23	30
Total	39	127	166

Chi-square 2.225, Cramer's V 0.116, Significance 0.329

8.1.5 The value of cargo by shippers' service perception

The problem for this analysis is that the survey could not obtain a sufficient number of data for the value of cargo. The missing answer technique could be used, however, there are too many missing answers to be properly analysed. Therefore, it was decided to exclude this particular analysis.

8.2 Analysis of Shippers' Choice of Service Providers

The research analyses the relationship between the degree of satisfaction and the choice of service providers in order to test hypothesis 4. One-way ANOVA is primarily used in order to see whether shippers' choice of service providers is correlated to the degree of satisfaction on each service function. In the first place, the questionnaires contain 31 variables (service functions) that mark each shipper's choice of preferred service providers and the degree of satisfaction. However, this research aims to classify these functions into a certain group of meaningful factors and then perform a one-way ANOVA. Therefore, as a prerequisite step, these variables need to be reduced to a manageable number, by means of reduction procedures involving the replacement of missing values, Cronbach's Alpha test, and factor analysis.

8.2.1 Securing the reliability of the data

8.2.1.1 Replacement of missing values

Prior to proceeding to analyse the operation of logistics service from shippers' point of view, the responses in the questionnaire from shippers are analysed. If unreliable answers about variables in the questionnaire get included in the analysis, the result can easily deteriorate. In order to improve the reliability of the data collected, the measurement scale in the questionnaire needs to be refined.

Firstly, the replacement of missing values was conducted. An often-used rule of thumb suggests that it is acceptable to replace up to 15 % of data by the mean of the distribution with little damage to the resulting outcomes (George and Mallery, 2001). The total number of responses was 168 and 15 % of the total would be 25. So the variables that contain more than 25 missing answers should be excluded from the analysis. It was found that 9 variables contained more than 15 % of missing value and it was therefore decided to drop

these variables. Table 8.9 illustrates the remaining variables and those dropped after the replacement of missing value.

Table 8.9 Variables dropped and remaining after the replacement of missing values

Dropped variables	Number of missing value	Remaining variables	Number of missing value
Export packaging	48	Ship operation	9
Import cargo sorting and filtering	90	Inter-modal co-ordination	19
Special treatment for fragile cargo	87	Reserving cargo at port	23
Labelling	52	Container handling at port	20
Export cargo sorting and filtering	60	Booking vessel space	22
Preparing Certificate of Origin	50	Consolidating shipments	20
Obtaining proof of delivery	57	FCL transport operation	19
Obtaining export license	48	LCL transport operation	21
Monitoring inventory level	61	Route planning	20
		Warehousing	24
		Inland container depot management	24
		Tracking/Tracing	23
		Printing document	23
		Scheduling information	23
		Paying freight	11
		Paying port charges	22
		Paying insurance premiums	21
		Paying customs duties	23
		Issuing of Bill of Lading	11
		Preparing invoice	24
		Obtaining insurance policy	23
		Customs clearance	18

As a result, the research has 22 variables to be used in the subsequent analysis. The main reason for having 9 variables dropped could be explained by the fact that the questionnaire was universally designed for shippers who engage in either export or import business. Thus, shippers who deal with only one of these might not be able to answer certain questions such as export packing, import cargo sorting and filtering, and export cargo sorting and filtering, etc. It was also noted that some service functions are only related to particular products such as fragile cargoes. It could also be that some functions (e.g. export packaging, monitoring inventory level) are not always perceived as logistics functions.

8.2.1.2 Reliability test

For the research, high reliability should be obtained. Cronbach's alpha test was performed on data collected on a five point rating scale of shippers' satisfaction of logistics service

functions (Section IV in the questionnaire). Cronbach's alpha was calculated in order to decide whether or not these variables are reliable to be used. If the variables have Alpha greater than 0.6 (Craig, 1981), in social science it is acceptable. Table 8.10 shows the initial test of reliability.

Table 8.10 Reliability analysis 1 – Cronbach's alpha

Scale	Scale Mean If item deleted	Item-total Correlation	Alpha If item deleted
Ship operation	68.4596	.6680	.9009
Inter-modal co-ordination	68.7044	.6715	.9007
Reserving cargo at port	68.6118	.5344	.9039
Container handling at port	68.4875	.5353	.9040
Booking vessel space	68.5310	.6323	.9018
Consolidating shipments	68.8118	.4761	.9054
FCL transport operation	68.5433	.5752	.9030
LCL transport operation	68.6961	.5983	.9025
Route planning	68.7172	.3673	.9081
Warehousing	68.6035	.3292	.9085
Inland container depot management	68.5618	.4880	.9050
Tracking/Tracing	68.4394	.4563	.9057
Printing document	68.6187	.4971	.9048
Scheduling information	68.4877	.3938	.9070
Paying freight	68.3596	.6920	.9004
Paying port charges	68.4899	.6865	.9008
Paying insurance premiums	68.4512	.5661	.9032
Paying customs duties	68.4601	.6251	.9019
Issuing of Bill of Lading	68.6908	.4887	.9055
Preparing invoice	68.4021	.4248	.9064
Obtaining insurance policy	68.3152	.5354	.9039
Customs clearance	68.6051	.4872	.9051

Number of Cases = 168 **Number of Items = 22** **Alpha = .9080**

From the table, it was noted that 2 variables are relatively less correlated with other variables: Route planning 0.3673 and Warehousing 0.3292, and if we delete these two items, overall reliability would be increased. Therefore, it was decided to eliminate these two variables. It was also found that the variables eliminated contained significantly unreliable answers from the shippers in the questionnaire.

Table 8.11 shows the second reliability test and newly calculated alpha.

Table 8.11 Reliability analysis 2 – Cronbach's alpha

Scale	Scale Mean If item deleted	Corrected Variance If item deleted	Item-total Correlation	Alpha If item deleted
Ship operation	62.1567	102.2714	.6675	.9017
Inter-modal co-ordination	62.4015	101.4538	.6758	.9014
Reserving cargo at port	62.3089	104.9444	.5222	.9053
Container handling at port	62.1845	105.2532	.5260	.9053
Booking vessel space	62.2280	103.1373	.6296	.9027
Consolidating shipments	62.5089	104.9419	.4543	.9073
FCL transport operation	62.2404	103.5058	.5865	.9037
LCL transport operation	62.3932	103.3026	.5990	.9034
Inland container depot management	62.2589	106.9307	.4615	.9067
Tracking/Tracing	62.1364	105.9660	.4436	.9073
Printing document	62.3158	104.9530	.4870	.9063
Scheduling information	62.1847	107.3094	.3863	.9086
Paying freight	62.0566	102.1402	.6919	.9012
Paying port charges	62.1869	102.7901	.6946	.9014
Paying insurance premiums	62.1483	103.7374	.5817	.9039
Paying customs duties	62.1571	103.0565	.6299	.9027
Issuing of Bill of Lading	62.3878	102.4615	.5144	.9061
Preparing invoice	62.0991	106.2322	.4306	.9076
Obtaining insurance policy	62.0123	104.4248	.5609	.9044
Customs clearance	62.3022	104.5652	.4961	.9061

Number of Cases = 168 **Number of Items = 20** **Alpha = .9090**

As a result, the overall reliability was slightly improved from 0.9080 to 0.9090. Thus, the research finally obtained 20 variables to be used in the factor analysis. Cluster analysis could be used if the objective of the research is to classify individual shippers into several groups, since it can be useful to explain certain types of behaviour of the different groups of respondents. However, the aim of the research is to reduce the large number of service functions to a smaller set of factors and then with the aid of those factors the subsequent analysis (One-way ANOVA) will be performed.

8.2.2 Conducting factor analysis

Five basic steps are required to a conduct a factor analysis (George and Mallery, 2001):

- Appropriateness test
- Calculate a correlation matrix of all variables to be used in the analysis
- Extract factors
- Rotate factors to create a more understandable factor structure
- Interpret results

8.2.2.1 Appropriateness test

Prior to conducting a factor analysis, a pre-analysis should be conducted to determine the appropriateness of factor analysis. A Bartlett test of sphericity and measure of sampling adequacy (MSA) are employed for this research.

The measure of sampling adequacy (MSA) is a method of determining the appropriateness of factor analysis. In this analysis, 0.894 is very good (See Appendix A). The Bartlett's test of sphericity tests whether the correlation matrix is an identity matrix (factor analysis would be meaningless with an identity matrix). In this case, a significant value < .05 indicates that these data do not produce an identity matrix and are therefore acceptable for factor analysis. Table 8.12 shows the results of these tests.

Table 8.12 KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.894
Bartlett's Test of Sphericity	Approx. Chi-Square	1071.894
	Degree of freedom	190
	Significance level	.000

8.2.2.2 Correlation matrix

Calculating a correlation matrix of all variables of interest is the starting point for factor analysis. This starting point provides some initial clues as to how factor analysis works. After conducting correlations between variables in this research, the factors are extracted. The entire correlation matrix between the variables can be found in Appendix N.

8.2.2.3 Factor extraction

Based on the discussion in Appendix A, the eigenvalue criterion and the scree test were used to decide the number of factors to be extracted. As shown in Table 8.13, it was noted

that there are four factors with eigenvalues larger than 1.0 and they account for almost 60 % of the total variance. The result of the scree test can be seen in Appendix O.

Table 8.13 Total variance explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	7.542	37.712	37.712
2	1.705	8.523	46.235
3	1.203	6.016	52.250
4	1.123	5.615	57.866
5	.971	4.854	62.719
6	.923	4.614	67.333
7	.785	3.923	71.256
8	.722	3.610	74.866
9	.691	3.456	78.322
10	.626	3.132	81.454
11	.536	2.682	84.136
12	.518	2.592	86.728
13	.480	2.401	89.129
14	.415	2.073	91.202
15	.368	1.838	93.040
16	.341	1.705	94.746
17	.321	1.607	96.353
18	.289	1.446	97.799
19	.244	1.220	99.019
20	.196	.981	100.000

Extraction method: Principal component analysis.

8.2.2.4 Factor rotation

Once factors have been selected, the next step is to rotate them. Rotation is needed because the original factor structure is mathematically correct but is difficult to interpret (George and Mallery, 2001). As discussed in Appendix A, the initial unrotated factor matrix may or may not provide a meaningful patterning of variable loadings. Table 8.14 suggests that the initial factor matrix is not meaningful.

Table 8.14 Component matrix

	Component			
	1	2	3	4
Ship operation	.726	.191	-.125	-.099
Inter-modal transport	.726	.324	-.053	.014
Reserving cargo at port	.580	.492	-.146	-.026
Container handling at port	.580	.430	-.019	-.095
Booking vessel space	.678	.385	.014	-.005
Consolidating shipments	.507	.437	-.138	.200
FCL transport operation	.647	.026	-.343	.153
LCL transport operation	.655	.053	-.116	.001
Inland container depot management	.517	.008	.211	-.272
Tracking and tracing	.494	.103	.464	-.372
Printing document	.531	.065	.587	.014
Scheduling information	.430	-.155	.441	.442
Paying freight	.751	-.222	-.127	-.125
Paying port charges	.758	-.368	-.189	-.130
Paying insurance premiums	.651	-.459	-.210	-.098
Paying customs duties	.694	-.404	-.116	-.150
Issuing Bill of Lading	.569	-.175	-.128	.370
Preparing invoice	.470	-.061	.159	.612
Obtaining insurance policy	.616	-.368	.131	.076
Customs clearance	.553	-.157	.214	-.224

Extraction method: Principal component analysis

Generally, rotation is desirable because it simplifies the factor structure and provides more meaningful factor solutions. In most cases, factor rotation improves the interpretation by reducing some of the ambiguities that can often be found in initial unrotated factor solutions. Factor rotation with the VARIMAX method was carried out to obtain the more easily interpretable results shown in Table 8.15.

Table 8.15 Rotated component matrix

	Component			
	1	2	3	4
Ship operation	.401	.609	.230	.060
Inter-modal transport	.268	.693	.237	.163
Reserving cargo at port	.108	.755	.138	.020
Container handling at port	.112	.667	.269	.022
Booking vessel space	.176	.689	.284	.149
Consolidating shipments	.054	.681	.003	.202
FCL transport operation	.496	.519	-.103	.189
LCL transport operation	.425	.468	.155	.149
Inland container depot management	.293	.238	.492	.013
Tracking and tracing	.139	.215	.736	.007
Printing document	.073	.196	.654	.401
Scheduling information	.130	.041	.278	.709
Paying freight	.692	.317	.231	.111
Paying port charges	.815	.231	.180	.108
Paying insurance premiums	.809	.108	.105	.108
Paying customs duties	.774	.143	.223	.107
Issuing Bill of Lading	.458	.272	-.081	.467
Preparing invoice	.169	.227	-.007	.738
Obtaining insurance policy	.568	.064	.276	.367
Customs clearance	.413	.140	.477	.092

Extraction method: Principal component analysis
Rotation method: Varimax with Kaiser normalization.

8.2.2.5 Interpreting results and final selection

As discussed in Appendix A and considering the size of the sample for the survey, the factor loading we need is greater than 0.40. According to this rule, the final factor selection is shown in Table 8.16. It was noted that the lowest acceptable factor loading is .467 (Issuing Bill of Lading) and most variables are greater than .60, which means that the obtained factor loadings are considered very significant.

Table 8.16 Final selection of factors

No	Factor	Variables	Factor loadings
1	Transport related function	Ship operation	.609
		Inter-modal transport	.693
		Reserving cargo at port	.755
		Container handling at port	.667
		Booking vessel space	.689
		Consolidating shipments	.681
		FCL transport operation	.519
		LCL transport operation	.468
2	Payment related function	Paying freight	.692
		Paying port charges	.815
		Paying insurance premiums	.809
		Paying customs duties	.774
		Obtaining insurance policy	.568
3	Cargo related function	ICD management	.492
		Tracking and tracing	.736
		Printing document	.654
		Customs clearance	.477
4	Document related function	Scheduling information	.709
		Issuing B/L	.467
		Preparing invoice	.738

Now, it is necessary to name the factor depending upon the variables selected. Recalling the initial classification developed in Chapter 6, six groups of functions were identified. They were ship operation related service, intermodal transport service, logistics centre service, information service, documentation and invoicing service, and customer service. However, after performing factor analysis, 4 factor groups were obtained and need to be renamed.

Factor 1 mainly consists of functions related to ship operation, activities at port, and inland transport. Therefore, factor 1 can be called 'transport related function'. Factor 2 contains the functions of payment and can be called 'payment related function'. Factor 3 includes the functions related to cargo transported and can be called 'cargo related function'. Finally factor 4 has functions related to transport documents and can be called 'document related function'.

8.2.3 Conducting one-way ANOVA

As discussed in Chapter 4, it was claimed that the level of the performance of service providers affect service purchasing behaviour (Oliver, 1980). Bolton and Drew (1991) also developed the multistage model with which service performance can be measured by the difference score between the perception of service and the expectation of service. Cronin and Taylor (1992) and Kim (1995) supported this assumption and measured the correlated relationship between service providers' performance and service purchasing behaviour.

The current research, however, aims to investigate the dependence between a service providers' performance as measured by a level of satisfaction on each service factor and a service purchasing behaviour as measured by a preferred choice of service providers on each service factor. In previous research in the literature, the independent variable is typically service providers' performance and the dependent variable is service purchasing behaviour. In contrast, this research aims to analyse this relationship in the opposite direction and therefore assumes that an independent variable can be 'the preferred choice of service providers on each factor' and a dependent variable can be 'the mean scores of satisfaction of each factor'.

8.2.3.1 Hypothesis development for one-way ANOVA

The research has set up hypothesis 4 and it is intended to test the any correlation between the preferred choice of service providers and the overall degree of satisfaction on the logistics service functions. The values of independent variables are classified into three categories (1: 'stick to original' 2: 'change completely', and 3: 'mixed choice'). These classifications were originally developed by Robinson *et al.* (1967) and have been widely adopted to measure the service consumers' service purchasing behaviour. The values 1, 2, and 3 do not contain any metric value, but are merely used to categorise three different groups. The dependent variable contains the mean values of satisfaction level on each

factor. Each factor developed from factor analysis contains combinations of twenty original variables.

The original hypothesis 4 is 'Shippers' choice of service providers is correlated to the degree of shippers' satisfaction of each service factor'. Since the research develops four service factors, a total of four sub-hypotheses can be developed as presented in Table 8.17.

Table 8.17 Hypotheses to be tested by one-way ANOVA

No	Hypothesis
4-1	*Shippers' preferred choice of service providers on the transport factor is correlated to shippers' level of satisfaction on transport related factor*
4-2	*Shippers' preferred choice of service providers on the payment factor is correlated to shippers' level of satisfaction on payment related factor*
4-3	*Shippers' preferred choice of service providers on the cargo factor is correlated to shippers' level of satisfaction on cargo related factor*
4-4	*Shippers' preferred choice of service providers on the document factor is correlated to shippers' level of satisfaction on document related factor*

However, for the statistical analysis, hypothesis 4 is reformulated as follows:

- *Null hypothesis: There is no significant difference of satisfaction scores among the three different groups*
- *Alternative hypothesis: There is significant difference of satisfaction scores among the three different groups*

The null hypothesis will be accepted if the p value is greater than 0.05 and the alternative hypothesis will be accepted if the p value is less than 0.05 after performing the analysis.

8.2.3.2 Data coding

The research has obtained four factors from factor analysis. Therefore, the research needs four separate sets of ANOVA tests. Table 8.18 shows the method of data coding for one-way ANOVA for Factor 1. The same procedure was carried out for Factors 2, 3, and 4.

Table 8.18 Example of data coding for one-way ANOVA

	Mean scores of Factor 1	Choice of Service Providers On Factor 1
Case 1	3.23	1 (stick to original)
Case 2	2.22	2 (completely new)
Case 3	1.56	3 (mixed choice)
-	-	-
-	-	-
Case 168	2.57	2

8.2.3.3 Results

8.2.3.3.1 Transport factor

The descriptive statistics are presented in Table 8.19. It was noted that 104 shippers would stick to original service providers with a mean of 3.3437 on the transport factor. At the same time, 40 shippers would change their service providers completely and 24 shippers would have a mixed choice.

Table 8.19 Descriptive statistics for mean of transport factor

	N	Mean	Std. Deviation	Minimum	Maximum
Stick to original	104	3.3437	.58130	1.38	4.75
Completely new	40	2.9320	.78483	1.38	4.51
Mixed choice	24	3.0792	.34940	2.38	3.76
Total	168	3.2079	.63337	1.38	4.75

The most important element of interest in the ANOVA table is to identify the p value ($p = .001 < .05$). In addition, the F statistic is 7.713 in the table and larger than 3.00 from the F distribution table, when the alpha value is decided (0.05). In other words, there is a significant difference within comparisons of factor scores among the three different shippers' choice of service providers on the transport factor. Therefore, the sub-hypothesis 4.1 is accepted based on the Table 8.20.

Table 8.20 ANOVA table for transport factor

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.359	2	2.680	7.173	.001
Within Groups	61.635	165	.374		
Total	66.994	167			

The method adopted for comparisons of each possible pair of levels of the categorical variable is the Tukey test. For instance, the research is interested in whether one group scores significantly higher than another. This applies to scores for 'stick to original' shippers versus scores for 'completely new' shippers; scores for 'stick to original' versus 'mixed choice'; and scores for 'completely new' versus 'mixed choice'. Table 8.21 shows the results of multiple comparisons among groups. It was noted that there are significant differences in the mean between the 'stick to original' shippers and 'completely new' shippers with reference to significance level .001.

Table 8.21 Multiple comparisons among three groups

	(I) Choice of transport service providers	(J) Choice of transport service providers	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Stick to original	Completely new	.4117(*)	.11371	.001	.1427	.6806
		Mixed choice	.2645	.13841	.139	-.0628	.5918
	Completely new	Stick to original	-.4117(*)	.11371	.001	-.6806	-.1427
		Mixed choice	-.1472	.15781	.621	-.5204	.2261
	Mixed choice	Stick to original	-.2645	.13841	.139	-.5918	.0628
		Completely new	.1472	.15781	.621	-.2261	.5204

* The mean difference is significant at the .05 level.

8.2.3.3.2 Payment factor

The descriptive statistics for the payment factor are presented in Table 8.22. It was noted that 115 shippers would stick to original service providers with a mean of 3.4955 on the payment factor. Meanwhile, 30 shippers would change their service providers completely and 23 shippers have a mixed choice.

Table 8.22 Descriptive statistics for mean of payment factor

	N	Mean	Std. Deviation	Minimum	Maximum
Stick to original	115	3.4955	.64560	2.20	5.00
Completely new	30	3.0560	.79054	1.20	5.00
Mixed choice	23	3.3643	.66639	2.00	5.00
Total	168	3.3990	.69228	1.20	5.00

Based on a p .007 < .05 in Table 8.23, the null hypothesis is rejected. In addition, the F statistics of 5.063 in the ANOVA table is greater than 3.00 from the F distribution table. Therefore, there is a significant difference within comparisons of factor scores among the three different shippers' choice of service providers on the payment related factor. Therefore, the sub-hypothesis 4.2 is accepted.

Table 8.23 ANOVA table for payment factor

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4.628	2	2.314	5.063	.007
Within Groups	75.408	165	.457		
Total	80.035	167			

Table 8.24 shows the results of multiple comparisons among groups. It was noted that there is a significant difference of means between the 'stick to original' shippers and 'completely new' shippers with reference to significance level .005.

Table 8.24 Multiple comparisons among three groups

	(I) Choice of payment service providers	(J) Choice of payment service providers	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Stick to original	Completely new	.4395(*)	.13859	.005	.1117	.7673
		Mixed choice	.1311	.15442	.673	-.2341	.4963
	Completely new	Stick to original	-.4395(*)	.13859	.005	-.7673	-.1117
		Mixed choice	-.3083	.18736	.230	-.7515	.1348
	Mixed choice	Stick to original	-.1311	.15442	.673	-.4963	.2341
		Completely new	.3083	.18736	.230	-.1348	.7515

* The mean difference is significant at the .05 level.

8.2.3.3.3 Cargo factor

The descriptive statistics for the cargo factor are presented in Table 8.25. It was noted that 102 shippers would stick to their original service providers with a mean of 3.3889 on cargo factor. Meanwhile, 19 shippers would change their service providers completely and 47 shippers have a mixed choice.

Table 8.25 Descriptive statistics for mean of cargo factor

	N	Mean	Std. Deviation	Minimum	Maximum
Stick to original	102	3.3889	.56489	1.50	5.00
Completely new	19	2.8979	.67978	1.75	4.75
Mixed choice	47	3.1232	.62915	1.75	4.75
Total	168	3.2590	.61820	1.50	5.00

Based on a p .001 < .05 in Table 8.26, the null hypothesis is rejected. In addition, the F statistic of 7.113 in the ANOVA table is greater than 3.00 from the F distribution table. Therefore, there is a significant difference within the comparisons of factor scores among the three different shippers' choice of service providers on the cargo related factor. Therefore, the sub-hypothesis 4.3 is accepted.

Table 8.26 ANOVA table for cargo factor

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.066	2	2.533	7.113	.001
Within Groups	58.756	165	.356		
Total	63.822	167			

Table 8.27 shows the results of multiple comparisons among groups. It was noted that there is a significant difference in the mean between the 'stick to original' shippers and 'completely new' shippers with reference to significance level .003. Furthermore, there is a significant difference of mean between the 'stick to original' shippers' group and 'mixed choice' shippers' group with reference to significance level .033. However, by comparing the figures in the lower and upper bound, there is a more significant difference between 'stick to original' and 'completely new'.

Table 8.27 Multiple comparisons among three groups

	(I) Choice of cargo service providers	(J) Choice of cargo service providers	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Stick to original	Completely new	.4910(*)	.14911	.003	.1384	.8437
		Mixed choice	.2657(*)	.10520	.033	.0169	.5145
	Completely new	Stick to original	-.4910(*)	.14911	.003	-.8437	-.1384
		Mixed choice	-.2253	.16223	.349	-.6090	.1584
	Mixed choice	Stick to original	-.2657(*)	.10520	.033	-.5145	-.0169
		Completely new	.2253	.16223	.349	-.1584	.6090

* The mean difference is significant at the .05 level.

8.2.3.3.4 Document factor

The descriptive statistics for the document factor are presented in Table 8.28. Unlike the previous three analyses, it was noted that only 57 shippers would stick to original service providers with the mean 3.4261 on the document factor. Meanwhile, 49 shippers would change their service providers completely and a total of 62 shippers indicated a mixed choice of service providers.

Table 8.28 Descriptive statistics for mean of document factor

	N	Mean	Std. Deviation	Minimum	Maximum
Stick to original	57	3.4261	.70608	1.67	5.00
Completely new	49	3.1743	.67855	1.67	5.00
Mixed choice	62	3.2376	.70168	2.00	5.00
Total	168	3.2831	.70042	1.67	5.00

Table 8.29 shows the calculated F statistic and a level of significance. According to the p value .148 > .05 and the F statistic of 1.932, which is smaller than 3.00, the null hypothesis is accepted. Therefore, there is no significant difference within comparisons of factor scores among the three different shippers' choice of service providers on the document related factor. Therefore, the sub-hypothesis 4.4 is rejected.

Table 8.29 ANOVA table for document factor

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.875	2	.937	1.932	.148
Within Groups	80.053	165	.485		
Total	81.928	167			

Table 8.30 shows the results of multiple comparisons among groups. The research could not find any significant difference of mean scores between each pair of group.

Table 8.30 Multiple comparisons among three groups

	(I) Choice of document service providers	(J) Choice of document service providers	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Stick to original	Completely new	.2519	.13569	.155	-.0691	.5728
		Mixed choice	.1886	.12782	.305	-.1137	.4909
	Completely new	Stick to original	-.2519	.13569	.155	-.5728	.0691
		Mixed choice	-.0633	.13314	.883	-.3782	.2516
	Mixed choice	Stick to original	-.1886	.12782	.305	-.4909	.1137
		Completely new	.0633	.13314	.883	-.2516	.3782

* The mean difference is significant at the .05 level.

The ANOVA results can suggest the following theoretical explanation on the service consumers' preferred choice of service providers. The research has found that the preferred service providers for transport, cargo, and payment related factors are the ones shippers tend to choose based on the level of satisfaction they comprehend. In contrast, it is revealed that the preferred service providers with regard to the document related factors are those which service consumers appear to choose regardless of the level of satisfaction. Further details based on the findings will be presented in Chapter 9.

8.3 Comparisons of Satisfaction between the U.K. and South Korea

As the research was carried out from the perspective of international shippers in the two countries, comparison of the overall satisfaction of logistics service functions between the two countries is necessary. The comparisons can be made by means of examining the profiles of the degree of satisfaction for both countries and performing a T-test in order to see if there is any significant difference in empirical results between the two countries.

8.3.1 Profile of degree of satisfaction

Table 8.31 illustrates the degree of satisfaction on the initial 31 service functions. The table actually presents percentages, meaning that missing answers have been included in the calculation.

Overall, U.K. shippers appear to be more satisfied than South Korean shippers, as noted in the average percentage scores at the bottom of the table. In particular, for the U.K., FCL transport operation, LCL transport operation, route planning, warehousing, ICD management, printing documents, issuing of Bill of Lading, and customs clearance functions, were marked as relatively unsatisfactory and tracking/tracing and paying freight were marked as highly satisfactory with more than 50 % in the two highest satisfaction categories.

For South Korea, intermodal co-ordination, consolidating shipments, LCL transport operation, scheduling information, issuing of Bill of Lading, and customs clearance were marked as fairly unsatisfactory and ship operation, preparing invoices, obtaining export licenses, and obtaining insurance policy were marked as fairly satisfactory with about 40 % in the two highest categories.

Table 8.31 Satisfaction degree marked by shippers (percent)

	Very low U.K. S.K	Low U.K. S.K	Medium U.K. S.K	High U.K. S.K	Very high U.K. S.K	N/A U.K. S.K	Total U.K. S.K
Ship operation	0 4	10 16	36 34	35 39	8 6	11 1	100 100
Inter-modal co-ordination	1 5	4 32	50 24	24 22	4 9	17 7	100 100
Reserving cargo at port	1 5	10 16	31 44	28 24	6 6	25 5	100 100
Container handling at port	3 2	8 14	32 39	38 29	7 5	13 12	100 100
Booking vessel space	3 3	4 19	38 33	36 25	7 6	13 14	100 100
Consolidating shipments	3 14	4 24	40 30	25 25	6 3	22 4	100 100
FCL transport operation	3 4	11 13	38 39	29 26	10 6	10 13	100 100
LCL transport operation	3 4	13 24	35 32	28 26	4 5	18 8	100 100
Route planning	14 4	10 16	35 33	29 26	4 6	8 15	100 100
Warehousing	0 5	11 19	31 39	32 20	10 5	17 13	100 100
Inland container depot management	3 2	11 9	33 47	29 27	4 4	19 10	100 100
Export packaging	3 1	8 18	19 21	28 30	10 4	32 26	100 100
Import cargo sorting and filtering	1 2	1 14	19 19	13 16	3 2	63 48	100 100
Special treatment for fragile cargo	4 2	4 17	17 19	17 9	7 1	51 52	100 100
Labelling	0 0	3 9	26 35	18 24	15 5	38 26	100 100
Tracking/Tracing	3 3	6 15	33 33	33 27	17 4	8 18	100 100
Printing document	6 3	11 18	32 37	25 26	13 3	14 14	100 100
Scheduling information	0 1	6 23	32 38	32 21	13 7	18 10	100 100
Export cargo sorting and filtering	1 0	6 12	26 35	18 17	6 6	43 30	100 100
Paying freight	0 0	4 18	31 48	35 23	18 9	13 2	100 100
Paying port charges	0 1	6 18	35 46	31 19	11 7	18 9	100 100
Paying insurance premiums	3 1	6 18	31 40	31 25	11 9	19 7	100 100
Paying customs duties	0 3	6 17	35 39	28 24	14 7	18 10	100 100
Issuing of Bill of Lading	1 16	11 18	33 33	31 23	14 6	10 4	100 100
Preparing Certificate of Origin	1 1	4 9	26 41	19 17	15 5	33 27	100 100
Preparing invoice	1 5	6 9	33 36	24 35	15 6	21 9	100 100
Obtaining proof of delivery	1 1	7 10	33 30	19 19	7 4	32 35	100 100
Obtaining export licence	1 2	7 10	21 33	21 26	6 12	44 17	100 100
Obtaining insurance policy	0 2	7 8	33 42	26 25	15 13	18 10	100 100
Customs clearance	4 3	10 21	36 38	31 19	10 8	10 12	100 100
Monitoring inventory level	1 1	4 8	26 29	22 14	11 10	35 38	100 100
AVERAGE	**2.1 3.2**	**7.1 15.9**	**31.5 35.0**	**27.0 23.4**	**9.7 6.1**	**24.0 19.6**	**100 100**

8.3.2 T-test results

In order to secure the reliability of the data, only 20 service functions acquired from the Section 8.2.1.2 were forwarded for the T-test. Table 8.32 tabulates the results of t-test.

Table 8.32 T-test result of comparing means between the U.K. and South Korea

	Mean U.K.	Mean South Korea	Mean difference	P value (Variance)	P value (Mean)
Ship operation	3.456	3.275	0.181	0.067	0.185
Intermodal co-ordination	3.268	2.987	0.281	0.000*	0.037*
Reserving cargo at port	3.314	3.115	0.199	0.267	0.126
Container handling at port	3.360	3.187	0.173	0.341	0.208
Booking vessel space	3.438	3.163	0.275	0.497	0.036*
Consolidating shipments	3.264	2.802	0.462	0.000*	0.001*
FCL transport operation	3.387	3.229	0.159	0.831	0.251
LCL transport operation	3.362	3.143	0.219	0.430	0.117
Inland container depot management	3.354	3.224	0.130	0.476	0.283
Tracking/Tracing	3.587	3.212	0.375	0.174	0.007*
Printing document	3.235	3.355	-0.120	0.152	0.405
Scheduling information	3.351	3.100	0.251	0.402	0.040*
Paying freight	3.723	3.249	0.474	0.712	0.000*
Paying port charges	3.530	3.166	0.365	0.960	0.003*
Paying insurance premiums	3.487	3.266	0.221	0.503	0.103
Paying customs duties	3.564	3.193	0.371	0.607	0.005*
Issuing of Bill of Lading	3.456	2.870	0.587	0.172	0.000*
Preparing invoice	3.255	3.445	-0.190	0.087	0.160
Obtaining insurance policy	3.298	3.494	0.196	0.451	0.158
Customs clearance	3.340	3.107	0.223	0.573	0.109
AVERAGE	**3.401**	**3.179**			

* : significance level 0.05

As noted by the average percentage scores at the bottom of the Table 8.32, the U.K. shippers appear to be more satisfied than South Korean shippers. This result is similar to the information acquired from the Table 8.31. When comparing the means of individual service functions between the two countries, it was noted that the U.K. shippers show higher mean for most service functions. However, printing document, preparing invoice,

and obtaining insurance policy are the only three service functions that show higher mean for South Korean shippers. In particular, for the U.K., paying freight was marked as the highest and printing document was marked as the lowest. For South Korea, obtaining insurance policy was the highest and consolidating shipments was the lowest. When it comes to the statistical significance, the Table provides the following discussions. First, the test for Equality of Variances indicates that variances for the U.K. and South Korean shippers differ significantly from each other in intermodal co-ordination, and consolidating shipments (at 0.05 level). Second, the test for Equality of Means indicates that intermodal co-ordination, booking vessel space, scheduling information, consolidating shipments, tracking/tracing, paying freight, paying port charges, paying customs duties and issuing of Bill of lading (at 0.05 level) are those which show significant differences between the U.K. shippers and South Korean shippers.

From the statistical standpoint, intermodal co-ordination and consolidating shipments are revealed as the functions, which truly show the significant difference between the two countries since both Equality of Variances and Means showed the significance. On the other hand, issuing of Bill of Lading shows the largest mean difference but no difference in terms of the variance of each country. This can be explained by the assumption the variance of satisfaction of this function may largely be overlapped between the two countries.

8.4 Examples of Change in Logistics Provision

The aim of this section is to reflect the factors that emerged from the survey analysis. By taking some examples of what major shipping lines have been doing in terms of providing logistics service in the last decade this section provides support to the findings of the survey.

Maersk established consolidation services in Taiwan, Singapore and Hong Kong under the name of Mercantile in 1977. Maersk Logistics, a subsidiary of Maersk-Sealand offers vendor management, labelling, packing and consolidation through to preparing and issuing the necessary paperwork, fast clearance through customs, warehouses, and cross-docking facilities (Power, 2003). Furthermore, this company now provides a visibility system of customers' end-to-end supply chain including manufacturing, international transport, storage, final delivery and replenishment (Power, 2004).

Elsewhere, P&O Nedlloyd launched Value Added Services currently working with a number of multiple retailers and managing both the logistics processes and ocean carriage on their behalf. NYK Line launched an e-commerce system which enables customers to monitor and manage on-line their supply chains and established a company called New Wave Logistics (Europe) which consolidates and distributes cargoes in the region. HMM set up Hyundai Inter-modal (US) that provides standard road and rail inter-modal service. OOCL established Cargo System that manages the shipping, logistics and value-added services of imported products. Hanjin Shipping own a total of ten exclusive marine container terminal facilities linked with rail, barge and truck transport and a total of six off dock container yards.

It can be summarised that most major shipping lines appreciate this logic of logistics and, therefore, offer an additional range of services such as inter-modal co-ordination, consolidation, warehousing, etc., which may now be regarded practically as a mandatory service operation. This situation is somewhat similar to the findings of this research. Furthermore, some companies such as Maersk and NYK now provide the entire package of "supply chain solutions" and many others will follow (Dekker, 2004). However, Power (2003) raises an important question. For those who provide the entire functions of logistics service, will the profitability of their logistics divisions justify the investment? It was also

claimed by some chief executives in major shipping lines that lines should stick to what they know the best (Thorby, 2001). This issue is one in need of investigation in the future.

8.5 Conclusion

The tests of hypotheses were conducted to analyse shippers' service perception and the relationship between the preferred choice of service providers and the level of satisfaction on service function. The chi-square tests were employed to analyse how shippers in the U.K. and South Korea have acknowledged the perception of logistics service in liner shipping market, which a majority of liner shipping service providers claim to offer. As a result of chi-square tests, it was found that there is a significant association between years in business and the type of business and perceptions of logistics service. No particular association was found between the shippers' country and perceptions of logistics service. With regard to the currently received service described by shippers, it was found that the only variable (years in business) appears to be associated with service perception.

A reliability test was carried out to improve the reliability of variables. 20 variables with 0.9090 of Cronbach's alpha were obtained. Factor analysis was conducted to find a factor, which can successfully classify the variables. As a result, four factors, namely: transport related, payment related, cargo related, and document related, were extracted. These factors were used in the subsequent analysis to test hypothesis 4. One-way ANOVA was employed to test hypothesis 4. Since there are four factors, four separate ANOVA tests were conducted. It was found that the level of satisfaction on transport, payment, and cargo related factor was correlated to the preferred choice of service providers on these factors. However, on the document related factor, no significant correlation was found. More detailed discussion of the results of the analyses conducted is presented in the next chapter.

The T-test was conducted to compare the degree of satisfaction on the service functions between the U.K. shippers and South Korean shippers. As a result, the test statistically confirms the significant difference between the two countries in intermodal co-ordination and consolidating shipments.

CHAPTER 9

Discussion and Conclusions

9.1 Introduction

In order to obtain a clearer understanding of the operation of logistics service in the liner shipping market, a combined methodology was used for the research. Having reviewed the relevant literature in liner shipping, service marketing, and logistics, the Delphi technique was employed to investigate the driving forces of logistics service and the factors that prompt liner shipping service providers to adopt the concept of logistics service into their business area. Furthermore, the functions of logistics service were reviewed and refined by a panel of experts during the Delphi rounds. The subsequent investigation was carried out through the use of a questionnaire survey, which was completed by 168 international shippers based in the U.K. and South Korea. The data collected from the shippers' survey was used to analyse the practical application of logistics service in the liner shipping market.

This chapter discusses the findings of the study and the implications of the research in terms of theory as well as practice. It examines the hypotheses tested and draws conclusions based on the results of the findings. Finally, consideration will be given to the limitations of this study, and the concluding section contains areas for future research suggested by the results of this study.

9.2 Findings from Hypotheses Tests

This section reviews the specific hypotheses and subsequent test findings and then presents conclusions based on the results of both the Delphi technique and the postal questionnaire. It was found that there is a shortage of discussion in existing literature related to the liner

shipping industry regarding the introduction of logistics service and no empirical study on how the operation of such a logistics service has been perceived by shippers. The literature concerning liner shipping service tends to focus on shippers' selection of their carriers, and the nature of service attributes such as reliability, convenience, safety, etc.

The research developed four hypotheses to be tested. The first and second hypotheses were tested through a qualitative method relying on the opinions of a panel of experts. On the other hand, the third and fourth hypotheses were tested by a quantitative method and, therefore, the acceptance or rejection of hypotheses was decided on the basis of an assumed level of significance.

9.2.1 Difference between logistics service and traditional shipping service

The Delphi technique indicated that there are clear differences between a 'traditional shipping service' and a 'logistics service'. In particular, it was suggested that a logistics service is concerned with a closer relationship between service providers and service consumers, whereas a traditional shipping service is based on a more remote relationship between service providers and service consumers. Furthermore, it was also found that traditional shipping service providers are mainly concerned with efficient operation of ships, a higher frequency of sailings and shorter transit times, while logistics service providers are concerned with customers' problems and opportunities generated in the whole delivery process. In short, today's liner shipping service providers, who focus merely on the movement of ship, may not be able to compete in the market. However, it is evident that liner shipping service providers are turning themselves into logistics service providers.

The Delphi research concluded that logistics service operation is little to do with tolerating lower profitability. It was suggested that lower profits may be acceptable in the short term

within some areas of their business but many have to compensate for it in other areas. In addition, it was revealed that shippers are interested in the whole delivery process of cargo movement.

9.2.2 Driving forces stimulating logistics service

The review of logistics service in the liner shipping market revealed that the major driving forces for employing logistics service may be derived from certain environmental factors described in the literature.

The result of the Delphi study indicated that there are certain environmental factors, which may have stimulated liner shipping service providers to adopt a logistics service concept into their business operation. The strongest motivating factor occurring to the panel was related to the service competition between service providers in the liner shipping market. Competition between liner shipping companies and ocean transport intermediaries to secure more cargoes was also believed to be a leading factor. It was also found that shippers' more diverse and sophisticated demands was one of the motivating factors, as was the emergence of the mega-container operator generated by mergers/acquisitions and strategic alliances.

It was concluded from these findings that two more stimulating factors, namely, the development of the hub and spoke global container network, and continuing improvements in the global infrastructure, e.g. port modernisation, the provision of new and enlarged ports and the development of road and rail networks serving ports, also appeared to motivate service providers to employ logistics service. However, the development of information technology such as EDI and computerised vessel operations did not impress the panel as a motivating factor and consensus was not achieved. It was claimed that such new technologies assist liner shipping service providers in meeting customer expectations,

but are not the main cause of logistics service provision. Finally, it was widely suggested that the provision of logistics service is aimed at improving the total service quality, not to overcome the decline in freight rates.

9.2.3 Shippers' service perception

From the literature review, it was noted that liner shipping service providers have claimed to provide a logistics service and not just a shipping service. The research sought to prove if shippers supported what service providers claimed. As suggested by Collison (1984) and Granzin and Bahn (1989), an analysis, of whether there is any significant relationship between shippers' service perception and the variables related to shippers' business conditions, was conducted. Two separate tests were carried out: 'what service providers claim' and 'actually received service'.

Overall service providers claims were not entirely supported by their customers, suggesting that there has been a tendency to use fashionable terms by service providers in order to attract customers. It was found that there was no association between country and perception of logistics service, meaning that 'significant difference on service perception according to country was not found'. There was a significant association between years in business and perception of logistics service. Particularly, the majority of shippers engaged in their business between 10 and 29 years tend to disagree with the service providers' claim. Furthermore, shippers with relatively short (less than 10 years) business experience showed general agreement with the statement. However, shippers with more than 30 years experience have a very favourable opinion of current service providers. This result may suggest that the very old companies and the very young companies are more logistics oriented. A relatively lower degree of association was also found between types of business and the perception of logistics service. For instance, shippers engaged in both export and import tend to show more agreed opinion than shippers engaged in either only

export or import. This result can be justified by the assumption that shippers engaged in both export and import may have more business experience and are more accustomed to the concept of logistics. No association was found between the total volume of traffic and the perception of logistics service. It was, nevertheless, noted that shippers, who have a small amount of cargo shipped, tend to agree with this statement compared to other shippers, who ship a larger amount of cargo. It can be explained by the fact that shippers with large amount of cargoes may have to come across more difficulty in arranging service operation dealing with a variety of service providers. For small shippers, they only have to deal with single or fewer service providers and face fewer problems. No association was found between the country (U.K. and South Korea) and service perception.

Concerning the perception of actually received service, it was clearly suggested that there was very little improvement of service in the liner shipping market. It was found that there was no particular association for the country, types of business, and the total volume of cargo with the perception of currently received service. However, the research found a significant association between years in business and service perception of currently received service. For instance, the majority shippers of more than 30 years in business seem to describe the service they currently receive as a logistics service, whereas the majority of shippers, with years in business between 10 and 29 years, describe the service provided by service providers as a shipping service. This particular situation could be explained by the notion that older companies are usually larger in size and therefore might have developed a more professional approach with their service providers over the years and very new companies are more modern in their outlook and more logistics oriented. Companies in the middle age category are perhaps the most traditional.

Summarising the results of the analysis of shippers' perception of logistics service, it was particularly noted that 'years in business' was identified as a deciding variable among

other variables. This result clearly supports the assertion claimed by Collison (1984) and Granzin and Bahn (1989) that service perception can be different from case to case depending on shippers' characteristics and market characteristics.

9.2.4 Shippers' choice of service providers

In the relevant literature, it was claimed that the level of the performance of service providers may affect service purchasing behaviour (Oliver, 1980; Bolton and Drew, 1991; Cronin and Taylor, 1992; Kim, 1995). Similarly, the current research aims to investigate the relationship between the preferred choice of service providers and the level of satisfaction. Whereas the previous research analyses this relationship on each service attribute or groups of attributes, the current research seeks to analyse it with reference to each service factor group developed from the factor analysis.

In previous research, the independent variable is service providers' performance and a dependent variable is service purchasing behaviour. Unlike the hypothesis developed by previous research, this research makes an effort to analyse this relationship in the opposite direction. As a result, the hypothesis developed by this research assumes that an independent variable can be 'the preferred choice of service providers on each factor' and a dependent variable can be 'the mean scores of satisfaction of each factor'. The research sought to identify any correlations between the preferred choice of service providers and the overall degree of satisfaction on the logistics service functions. Since the research dealt with four factors extracted from a factor analysis, four sub-hypotheses were developed and tested by performing one-way ANOVA.

As for the transport factor, it was found that there is a significant difference within comparisons of factor scores among the three different classes of shippers' choice of service providers on the transport related factor. The result indicates that shippers, who

show a higher tendency to choose their original service providers on transport related functions such as ship operation, intermodal transport, consolidating shipments, and so on, appear to rate higher scores of satisfaction on this factor. Furthermore, this result is more noticeably verified between 'stick to original' shippers and 'completely new' shippers.

For the payment factor, it can be claimed that there is a significant difference when comparing factor scores among the three different classes of shippers' choice of service providers on the payment related factor such as paying freight, port charges, and customs duties, and so on. Particularly, this factor group shows that the largest numbers of shippers among the four factor groups would stick to original service providers with the highest mean scores. The result implies that shippers sticking to their original service providers would be more satisfied with service providers on this factor.

With regard to the cargo factor, it was found that there is a significant difference within comparisons of factor scores among the three different classes of shippers' choice of service providers on the cargo related factor. In particular, this factor group shows that the smallest numbers of shippers (19) among the four factor groups would change their service providers completely despite the lowest mean scores (2.8979). Similar to the results for the transport factor and payment factor, the result for the cargo factor also suggests that the mean scores of satisfaction level is positively correlated to the choice of service providers on this factor. With regard to multiple comparisons among groups, there is significant differences of means between the 'stick to original' shippers' group and 'mixed choice' shippers' group. More convincingly, however, it was found that there was a more significant difference of mean between the 'stick to original' shippers and 'completely new' shippers.

Finally, there was no significant difference within comparisons of factor scores among the three different types of shippers' choice of service providers on the document related factor. Unlike the other factor groups above, it was noted that only 57 shippers would stick to original service providers on the document factor. In contrast, 49 shippers would change their service providers completely and a total of 62 shippers indicated a mixed choice of service providers. In addition, the research could not find any significant difference of mean scores between each pair of groups with regard to the results of multiple comparisons among groups.

The results of Hypothesis 4 test can raise some issues related to the analysis of the relationship between service providers' performance and choice of service providers. First, it is possible to say that as a whole, the result of this research supports the results of previous research. One notable exception was found on the document related factor. It is commonly believed that service consumers choose service providers based on the level of service providers' performance. In other words, if shippers are satisfied with the performance of service providers, they would stick to their original ones and if not, they would change. The service functions included in document related factor are scheduling information, issuing Bill of Lading, and preparing invoice.

9.3 Comparison of U.K. and South Korea

This section aims to summarise the similarities and differences between the two counties based on the findings from the literature review and survey analysis. In terms of the shipping industry in the U.K. and South Korea, there are some similarities regarding the size of industry and the pattern of trade. Differences can be found in the history of the shipping industry. The U.K. has a long history reflecting the earlier establishment of a shipping industry and South Korea has a short history due to the instability of national politics and the economy after the civil war. No significant difference was found on the

pattern of service operation from major shipping lines, suggesting that most shipping lines in the world have similar business approaches and strategies due to the growth of globalisation and the fast development of information technologies, etc.

Qualitative findings from the survey indicated very different views on the role of the freight forwarder. It was reported that a sizeable number of shippers in South Korea are not entirely convinced with the role of freight forwarders and NVOCCs based in South Korea. Shippers claimed to prefer to deal with foreign freight forwarders or NVOCCs headquartered in the USA or Western Europe, because they believe that South Korean ones are not competitive enough to compete with other larger international players. On the other hand, a large number of shippers in the U.K. mentioned that they prefer to deal with a freight forwarder that can offer a competitive service. This difference can be explained by the fact that the South Korean shipping industry has acquired a reputation in the size and quantity of industry, but when it comes to the quality and experience, there are some definite things, such as an understanding of how the system works, improving communication skills, securing more qualified individuals, etc, to be resolved in the future.

Regarding perceptions about shipping service, the quality of shipping service provided by service providers has been regarded as a 'very ordinary shipping service' by a large number of shippers in both countries. This fact suggests that liner shipping service providers have failed to attract shippers although service providers' attempts to improve the level of service have been intensively made. Therefore, shipping service providers should review the situation and find the solution.

Findings from the analysis of current service providers have given the evidence of the dominant roles of shipping companies and freight forwarders in the market. For transport related functions, these two are the obvious main players. Non-transport related functions

such as packaging, labelling, paying taxes are mainly provided by shippers' own companies or through agencies. In terms of the preferred service providers, some differences are found in the roles of NVOCCs. The U.K. shippers showed hardly any preference for them but some South Korean shippers showed low but consistent preferences for them. For both countries, freight forwarders are more preferred than shipping companies for most service functions.

In relation to the level of satisfaction on the logistics service functions, the U.K. shippers appear to be more satisfied than South Korean shippers. In particular, for the U.K., paying freight was rated as the highest and printing documents was rated as the lowest. For South Korea, obtaining insurance policy was rated the highest and consolidating shipments was the lowest. When it comes to statistical significance, intermodal co-ordination and consolidating shipments are revealed as the functions, which truly show the significant mean difference between the two countries. Notably, issuing of the Bill of Lading shows the largest mean difference between the two countries, suggesting that South Korean shippers seem to be apprehensive with increased concerns about untimely issuing of the B/L, consequently leading to the improper flow of money.

9.4 Implication of the Research for Theory and Practice

This section details the contribution of the current research to existing theory and practice.

9.4.1 Contribution to Theory Development

On the whole, the current research provided a basic groundwork for theoretical development and extensions to the existing body of knowledge in the areas of shipping, logistics, and service marketing management. In particular, this research contributed to the general understanding of the following four areas:

- The device for defining logistics service in the liner shipping context.
- The use of the service function approach in studying liner shipping service.
- The development of the extraction of valid factors from logistics service functions.
- The analysis of logistics service operation assessed by international shippers.

Little of the previous academic literature on logistics service identified in this research is associated with the shipping area, but is mainly associated with the manufacturing industry. Graham (1998) and Yamada (1995) made some effort to distinguish between a traditional shipping service and logistics service in relation to the shipping industry. The results of the Delphi analysis indicated that the conclusions about the differences in service operation suggested by Graham (1998), Boyes (1997), and Yamada (1995) were not entirely supported by the panel of experts in this research. An obvious conclusion is that, in some aspects, there is a distinct dividing line between logistics service and traditional shipping service. However, significant numbers of the panel agreed that certain aspects, such as an interest in the whole delivery process, were commonly shared ideas by both logistics service and traditional shipping service. These findings could provide clear guidelines for future research, which seeks to define the newly introduced concept in any service industry.

Competition between carriers, arguable disadvantages of strategic alliances and mergers and acquisition to shippers, as well as more sophisticated shippers' demand appear to be the motivating factors that stimulate service providers to employ a logistics service. However, it was found that there is no universal agreement as to whether the development of information technology such as EDI has stimulated the operation of a logistics service. It was suggested that EDI and computerised vessel operation have made things cheaper and easier. The decline of freight rates was also not regarded as a stimulating factor. These findings were not consistent with previous research. These findings, however, confirmed

that the adoption of logistics service was stimulated by certain factors related to the business environment. Such findings add to the few studies on the motives for operating a logistics service in the liner shipping industry, and provide a basic foundation for future research.

Most research in the area of liner shipping service has mainly been conducted to discover the elements or attributes of liner shipping service, namely shippers' carrier selection. Those studies put a high priority on determining the service elements. There appears to have been no research that has employed the service functions approach in the area of liner shipping service. It could be said that finding out the most important attributes for shippers is important in one way. However, today's market has become more diversified and, therefore, identifying the exact needs, depending upon individual circumstances, is even more important. Liner shipping service is regarded as a highly standardised service, but the measurement of exactly what service is received is debatable. While most previous research measures the performance of service providers, based on attributes such as reliability, time, convenience, etc, the current research seeks to measure performance according to each service function. It was found in this research that there are certain preferences of service providers for certain functions regardless of the degree of satisfaction of that service function. The current research is probably the first attempt to apply the service function approach to the liner shipping industry.

This research also provided a general framework for the identification of reliable service functions based upon a reliability analysis. The research was able to obtain four factor groups extracted from a factor analysis. The factors are transport-related, payment-related, cargo-related, and document-related. These factors can be used as a guideline in a similarly designed research in the future.

Finally, the research attempted to employ one-way ANOVA in order to analyse the possible correlation between the preferred choice of service providers and the level of satisfaction on each factor. The empirical confirmation of theoretical hypotheses included in the research can be used to link existing service assessment theory in other industries to service assessment in the liner shipping industry.

9.4.2 Contribution to Practice

The research provided the typology of how shippers choose their service providers depending on each service function. Four groups of service functions are obtained from the factor analysis. The research reached an answer by analysing the correlation between service providers' performance and the behaviour of choosing service providers. As a result, a positive correlation was found for transport, payment, and cargo related factors. On the other hand, the findings from the document factor imply that shippers still intend to change their service providers on this factor and therefore carriers' more sophisticated efforts to improve service quality of these functions will be needed.

At the beginning of the study, the single most important question in this study was put forward: 'who offers what?'. Along with the confirmation of correlation between the preferred service providers and the degree of satisfaction on each service function, and drawing from the findings of this study, can create an even more complicate question: 'who should offer what?'. If service providers are able to answer these two questions successfully, more precise strategies to attract possible customers can be developed. With reference to these findings, service providers could initiate the target marketing for various classes of shippers.

The service function approach this research has adopted could provide useful insights to researchers who intend to study the measurement of service performance in any service

industry. By looking at the difference between the current and preferred service providers on each service function as well as referring to the level of satisfaction between the two countries and opinions from international shippers, and liner shipping service providers, who engage particularly in the U.K. and/or the South Korean market, will stand to benefit from the findings from the analysis of the survey.

9.5 Limitation of the Research

This section outlines some limitations of the current research. The results of the Delphi technique indicated the exploratory findings related to the conceptualisation of logistics service in the liner shipping market. The research dealt with experts' points of view only, albeit in some depth. However, the conceptualisation would be more developed if the views of service providers and service consumers were also sought.

The focus of the survey was the application of logistics service, and the assessment of logistics service in the liner shipping market. The research setting for this study was limited in two ways. First, it focused only on shippers' views. Second, another limitation of the survey is related to the sample. Data were collected from a limited number of only 168 international shippers in the U.K. and South Korea, and caution must be exercised when making any broad generalisations based on this sample.

The empirical evidence included in this research was conclusive only in relation to the perception of logistics service and the preferred choice of service providers, and the degree of satisfaction of logistics service operation. Additional studies of liner shipping service in other settings would be required to confirm the findings of this study. Nevertheless, the methodology used for this study can be deemed as a valid option for expanding future research.

9.6 Suggestions for the Future Research

This section provides some suggestions for future research. Firstly, although current research was limited to examining the shippers' evaluation within the two nation's context, it is believed that the research findings could help explain service consumers' assessment in a wider variety of industries. Inspired by the idea of comparative studies, an expanded set of research design, e.g. a comparison between Asian shippers and European shippers or American shippers versus Asian shippers, could be made.

Criticising the measurement instrument used in most previous research, a measurement scale developed for this research was 'logistics service functions'. It is not appropriate to judge which instrument is better, just as in the debate between qualitative research and quantitative research. A combined instrument, which will use 'service attributes' and 'service functions' in the shipper's questionnaire in order to analyse shippers' perception on a service function (e.g. inland transport operation) measuring with service attributes (e.g. reliability, convenience, timing, communication, etc) simultaneously, is strongly recommended.

Furthermore, future studies of liner shipping service could consider carriers' service operation patterns and how they may differ from one carrier to another. This information would be useful for the understanding of perceptions and the assessment of logistics service operations. By focusing on the specific route in the liner shipping market or choosing the particular shipping line, more detailed investigation with regard to service operation can be carried out.

Another suggestion can be made by the observation that there are two dominant players in the market: shipping lines and freight forwarders often referred as ocean transport

intermediaries. A research, which thoroughly investigates their strengths and weaknesses, could be worthwhile for more elaborate understanding of carrier' side.

The service function approach designed in this research can be used in other similarly situated sectors of the transport industry. Passenger ferries and airlines are always concerned with service improvement. It would be vital for them to be fully aware of what customers want. By employing the service function approach, service providers can identify which service functions are most important to the customers and should be further improved in order to keep their customers satisfied.

APPENDICES

APPENDIX A

The Discussion of Factor Analysis

Before conducting a factor analysis, some types of pre-analysis should be conducted to determine the appropriateness of factor analysis. Such analyses are Bartlett's test of sphericity and measure of sampling adequacy (MSA). Bartlett's test of sphericity is a statistical test for the presence of correlations among the variables. It provides the statistical probability that the correlation matrix has significant correlations among at least some of the variables. The factor analyst must note, however, that increasing the sample size causes the Bartlett's test to become more sensitive to detecting correlations among the variables (Hair *et al.*, 1995).

Measure of sampling adequacy (MSA) is a method of determining the appropriateness of factor analysis. Th research should first examine the MSA values for each variable and exclude those falling in the unacceptable range. Once the individual variables achieve an acceptable level, then the overall MSA can be evaluated and a decision made on continuance of the factor analysis. The measure can be interpreted with the following guidelines: 0.90 or above, marvellous; 0.80 or above, meritorious; 0.70 or above, middling; 0.60 or above, mediocre; 0.50 or above, miserable; and below 0.50, unacceptable (Kaiser, 1970). The MSA increases as (1) the sample size increases, (2) the average correlations increase, (3) the number of variables increases, or (4) the number of factors decreases (Kaiser, 1974). For the research, both methods are employed to test the appropriateness of factor analysis.

The conceptual assumptions underlying factor analysis deal with the set of variables selected and the sample chosen. A basic assumption of factor analysis is that some underlying structure does exist in the set of selected variables. It is the responsibility of the factor analyst to ensure that the observed patterns are conceptually valid and appropriate for study with factor analysis, because the technique has no means to determine appropriateness other than the correlations among variables. The researcher must also ensure that the "*sample is homogeneous with respect to the underlying factor structure*" (Hair *et al.*, 1995, p.375).

The most crucial task for conducting factor analysis could be the decision on factor extraction. How do we decide on the number of factors to be extracted? An exact quantitative basis for deciding the number of factors to extract has not been developed. However, the following stopping criteria for the number of factors to extract are currently being utilised.

The most commonly used technique is the eigenvalue criterion. This technique is simple to apply to either components analysis or common factor analysis. Only the factors having latent roots or eigenvalues greater than 1 are considered significant; all factors with latent roots less than 1 are considered insignificant and are disregarded. Hair *et al.* (1995) suggest that using the eigenvalue for establishing a cut-off is probably most reliable when the number of variables is between 20 and 50.

A priori criterion is a simple yet reasonable criterion under certain circumstances. When applying it, the analyst already knows how many factors to extract before undertaking the factor analysis. The analyst simply instructs the computer to stop the analysis when the desired number of factors has been extracted. This approach is useful if the analyst is testing a theory or hypothesis about the number of factors to be extracted. It also can be justified in instances where the analyst is attempting to replicate another researcher's work and extract the same number of factors that was previously found.

The percentage of variance criterion is an approach in which the cumulative percentages of the variance extracted by successive factors are the criterion.

The scree test is used to identify the optimum number of factors that can be extracted before the amount of unique variance begins to dominate the common variance structure (Cattell, 1966). The scree test is derived by plotting the latent roots against the number of factors in their order of extraction, and the shape of the resulting curve is used to evaluate the cut-off point. As a general rule, the scree test results in at least one and sometimes two or three more factors being considered significant than does the eigenvalue criterion (Cattell, 1966).

In practice, most factor analysts seldom use a single criterion in determining how many factors to be extracted. Instead, they initially use a criterion such as the latent root as a guideline for the first attempt at interpretation. After the factors have been interpreted, the practicality of the factors is assessed and factors included or excluded from another attempt at interpretation may be retained.

It is essential to be very cautious when selecting the final set of factors. There are negative consequences for selecting either too many or too few factors to represent the data..If too few factors are used, then the correct structure is not revealed and important dimensions may be omitted, whereas if too many factors are retained, the interpretation becomes harder when the results are rotated.

There are two basic methods to obtain a factor solution. They are known as common factor analysis and component analysis. Component analysis is used when the objective is to summarise most of the original information in a minimum number of factors for prediction purpose. In contrast, common factor analysis is used primarily to identify underlying factors or dimensions reflecting what the variables share in common.

The initial unrotated factor matrix is computed to assist in obtaining a preliminary indication of the number of factors to extract. The unrotated factor solution may or may not provide a meaningful patterning of variable loadings. Generally, rotation will be desirable because it simplifies the factor structure and it is usually difficult to determine whether unrotated factors will be meaningful or not. Therefore, employing a rotation method to achieve simpler and theoretically more meaningful factor solutions. In most cases rotation of the factors improves the interpretation by reducing some of the ambiguities that often accompany initial unrotated factor solutions (Hair *et al.*, 1995).

The goal of rotation is to achieve what is called simple structure, that is, high factor loadings on one factor and low loadings on all others. Factor loadings vary between either + or – 1.0 and indicate the strength of relationship between a particular variable and a particular factor (George and Mallery, 2001).

There are usually two types of rotation methods: an orthogonal rotation and an oblique rotation. This research uses an orthogonal rotation method since this method is more widely used and an oblique rotation is still subject to considerable controversy. Furthermore, if the researcher wants to reduce a large number of variables to a smaller set of uncorrelated variables for subsequent use in a multiple regression and multiple discriminant analysis, the orthogonal one is the best (Hair *et al.*, 1995).

Three major orthogonal approaches have been developed: QUARTMAX, VARIMAX, and EQUIMAX. Most computer programs have the default rotation of VARIMAX.

In interpreting factors, a decision must be made regarding which factor loadings are worth considering. The following discussion presents three suggestions to aid in the interpretation of factor loadings. A factor loading represents the correlation between an original variable and its factor.

The first suggestion is not based on any mathematical proposition but relates more to practical significance. It is a rule of thumb that has been used frequently by factor analysts as a means of making a preliminary examination of the factor matrix. In short, factor loadings greater than 0.30 are considered to meet the minimal level; loadings of 0.40 are considered more important; and if the loadings are 0.50 or greater, they are considered practically significant. Thus the larger the absolute size of the factor loading, the more important the loading in interpreting the factor matrix.

Research by Cliff and Hamburger (1967) suggests that factor loadings have substantially larger standard errors than typical correlations; thus factor loadings should be evaluated at considerably stricter levels. Guidelines for identifying significant factor loadings based on sample size was provided by BMDP Statistical Software Inc (1992). As the size of the sample for the survey is 168, the required factor loading is 0.40.

Hair *et al.*, (1995) summarise the criteria for the significance of factor loadings, and the following guidelines can be stated: (1) the larger the sample size, the smaller the loading to be considered significant; (2) the larger the number of variables being analysed, the smaller the loading to be considered significant; (3) the larger the number of factors, the larger the size of the loading on later factors to be considered significant for interpretation.

APPENDIX B

The Discussion of ANOVA

The main objective of performing one-way ANOVA is to determine "*the probability that differences in means across several groups are due solely to sampling error*" (Hair *et al.*, 1995, p.262). There are two independent estimates of the variance for the dependent variables: within-groups estimate of variance (MSw: mean square within groups) and between-groups estimate of variance (MS_B: mean square between groups).

Within-groups estimate of variance is an estimate of the random respondent variability on the dependent variable within a treatment group and is based on deviations of individual scores from their respective group means, but not the differences between group means (Guenther, 1964).

Between-groups estimate of variance is the estimate of variance, which is the variability of the treatment group means on the dependent variable. It is based on deviations of group means from the overall grand mean of all scores. Under the null hypothesis of no treatment effects, this variance, like MSw, is a simple estimate of the sampling variance of scores. However, this variance estimate, unlike MSw, reflects any treatment effects that exist; that is, differences in treatment means increase the expected value of MS_B (Guenther, 1964).

MSw and MS_B represent independent estimates of population variance. Therefore, the ratio of MS_B to MSw is a measure of how much variance is attributable to the different treatments versus the variance expected from random sampling (Lindman, 1974). The ratio MS_B to MSw produces a value for an F statistic. Because group differences tend to inflate MS_B, large values of the F statistic lead to rejection of the null hypothesis, which means there is no difference in means across groups.

In order to determine if the F statistic is large enough to support rejection of the null hypothesis, it is necessary to decide the critical value first. The research will use .05 level because this level is most commonly used in social science. Then we need to find the F statistic by referring to the F distribution with $(k - 1)$ and $(N - k)$ degrees of freedom for a specified level of alpha (k = number of groups, N = a number of total case). If the value of the calculated F statistic exceeds F value in the distribution, the null hypothesis is rejected (there is no difference). Furthermore, to decide whether or not the null hypothesis is accepted, the comparison between p value specified and p value calculated in the ANOVA table is needed. If the calculated p value is less than .05 (already decided), the null hypothesis is rejected (Hair *et al.*, 1995).

While the F statistic test assesses the null hypothesis of equal means, it does not address the question of which means are different (Hair *et al.*, 1995). For example, in a three-group situation, all three groups may differ significantly, or two may be equal but differ from the third. To assess these differences, the analyst can employ post hoc tests. LSD, Duncan method, and the Tukey test can be used. For the research, the Tukey test is considered because it is the most appropriate method when there are 3 groups in the independent variable. Tukey calculates a number that represents the minimum difference between mean values to identify a significant difference (George and Mallery, 2001).

APPENDIX C

The Questionnaire of Pilot Round Delphi

Pilot Round Delphi Questionnaire

Background

To become more competitive, some liner shipping companies are not just providing the delivery of goods but also logistics services to their shippers. This development has implications not only for shippers and carriers, but also for other related parties such as freight forwarders in the liner shipping market.

This questionnaire has been designed to find out if there are any substantial differences between the features of a traditional shipping service and those of a complete logistics service, and confirm circumstantial factors affecting the provision of logistics service. Furthermore, the functions of logistics services extracted from previous studies are to be refined.

Instruction for Section I & II

Please state your opinion about the following statements in each section. Mark one of the choices of 'Agree', 'Disagree', or 'Unable to comment' for each statement with a √. If you agree or disagree, please justify your choice by including your comments and by circling your level of confidence.

Section I The difference between traditional shipping service and logistics service

1. While logistics services are characterised by a close relationship based on individual suppliers and customers, traditional shipping service can be characterised by a remote relationship between shipper and liner company based on just ship movement.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number

Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. While liner companies are prepared to accept lower profitability in a logistics service context, liner companies are seeking to maintain a high profitability in a traditional shipping service context.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3. While shippers are interested in the whole delivery process in a logistics service context, shippers are interested in simply getting their goods out of the despatch area in a traditional shipping service context.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. While logistics services are more concerned with a greater understanding of supplier potential and customer problems and opportunities, traditional shipping services are concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

Section II Changes stimulating the provision of logistics services

1. Ongoing expansion of the container shipping business will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. Mergers and alliances between major liner companies will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3. The development of information technology will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. More liberalisation trends in international trade will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

5. More competition between suppliers of liner shipping services will lead to the provision of logistics services by liner companies to shippers.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

5-1. Liner companies offer ever lower freight rates. This will lead to greater provision of logistics services by them to increase profits.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

5-2. Competition between liner companies to secure more container cargo will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

6. Increasing demand by shippers for handling, processing, storage, and movement of goods to and from all parts of the world will provoke liner companies to provide logistics services to shippers.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

7. The negative impact on customer service of increases in late deliveries, lost or damaged goods, or misrouted international shipments will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

Section III. Logistics Service Functions

Background and Instruction

The following service functions are extracted from logistics and liner shipping literatures. They are classified into 5 groups. These functions will be used to ask international shippers for evaluating the operation of logistics service. Each group of service function has its own attributes. With respect to these attributes, please mark your opinion about whether these attributes are appropriately selected or not.

Transport Service Functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Ship movement	1------ 2------3------4------5
Inter-modal co-ordination	1------ 2------3------4------5
Securing cargo reserving space at port	1------ 2------3------4------5
Container handling at port	1------ 2------3------4------5
Booking vessel space	1------ 2------3------4------5
Consolidating shipments	1------ 2------3------4------5
Local collection and delivery	1------ 2------3------4------5
FTL or FCL transport	1------ 2------3------4------5
LTL or LCL transport	1------ 2------3------4------5
Route planning	1------ 2------3------4------5

Please leave your comments and state any other functions which you think should be included.

Logistics Centre Service Functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Warehouse or inland container depot	1------ 2------3------4------5
Export packaging	1------ 2------3------4------5
Consolidation	1------ 2------3------4------5
Special treatment for fragile cargo	1------ 2------3------4------5
Labelling for each cargo	1------ 2------3------4------5

Please leave your comments and state any other functions which you think should be included.

Information Service Functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Tracking/tracing	1------ 2------3------4------5
Quoting rates	1------ 2------3------4------5
Printing document	1------ 2------3------4------5
Scheduling information	1------ 2------3------4------5
Sorting and filtering shipment data	1------ 2------3------4------5
Scanning the product at the warehouse for container shipments.	1------ 2------3------4------5

Please leave your comments and state any other functions which you think should be included.

Customer Marketing Service Functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Logistics consulting service	1------ 2------3------4------5
Managing customers' product on a just-in-time basis	1------ 2------3------4------5
Monitoring shippers' inventory level	1------ 2------3------4------5
Customs clearance	
Paying freight charges	1------ 2------3------4------5
Paying port charges	1------ 2------3------4------5
Paying insurance premiums	1------ 2------3------4------5
Paying customs duties	1------ 2------3------4------5
Paying taxes	1------ 2------3------4------5

Please leave your comments and state any other functions which you think should be included.

Documentation and Invoicing Service Functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Issuing Bill of Lading	1------ 2------3------4------5
Preparing certificates of origin	1------ 2------3------4------5
Preparing commercial invoice	1------ 2------3------4------5
Preparing consular invoice	1------ 2------3------4------5
Obtaining proof of delivery	1------ 2------3------4------5
Obtaining export licenses	1------ 2------3------4------5
Obtaining insurance policy	1------ 2------3------4------5

Please leave your comments and state any other functions which you think should be included.

Please feel free to contribute any other suggestions.

Thank you very much for your kind co-operation

APPENDIX D

The Letter for Inviting A Panel of Experts

Ki Soon Hwang
Institute of Marine Studies
University of Plymouth
Drake Circus, Plymouth
PL4 8AA, U.K.

Dear Sir or Madam:

My name is Ki Soon Hwang. I am a researcher in Institute of Marine Studies at University of Plymouth. I am currently researching the following topic with Dr. Richard Gray (rgray@plymouth.ac.uk) : 'A comparative study of logistics service in liner shipping in the U.K. and South Korea'.

In order to come to a conclusion, Delphi survey was adopted for data collection. Forgiving my intrusion, I would like to invite you to participate as a member of the expert panel to consider the various aspects of newly introduced 'logistics service' to the liner shipping market. Enclosed is a copy of first round questionnaire. After analysing responses from a panel, at least one more round will be conducted. I can promise that your individual contribution will be strictly confidential and anonymous. Furthermore, if you have any other enquiries regarding this questionnaire, please do not hesitate to contact me.

Thank you for your kind co-operation in advance.

Yours truly,

Ki Soon HWANG

Tel : ++ 44 (0)1752 232437
Fax : ++ 44 (0) 1752 232406
E-mail : khwang@plymouth.ac.uk

APPENDIX E

The Questionnaire of Delphi First Round

First Round Delphi Questionnaire

Background

To become more competitive, some liner shipping companies are not just providing the delivery of goods but also logistics services to their shippers. This development has implications not only for shippers and carriers, but also for other related parties such as freight forwarders in the liner shipping market.

This questionnaire has been designed to find out if there are any substantial differences between the features of a traditional shipping service and those of a complete logistics service, and confirm circumstantial factors affecting the provision of logistics service. Furthermore, the functions of logistics services extracted from previous studies are to be refined.

Instruction for Section I & II

Please state your opinion about the following statements in each section. Mark one of the choices of 'Agree', 'Disagree', or 'Unable to comment' for each statement with a √. If you agree or disagree, please justify your choice by including your comments and by circling your level of confidence.

Section I The difference between traditional shipping service and logistics service

1. Logistics services are characterised by a close relationship based on individual suppliers and customers, while the traditional shipping service can be characterised by a remote relationship between shipper and liner company based on just ship movement.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. While liner companies are prepared to accept lower profitability in a logistics service context, liner companies are seeking to maintain a high profitability in a traditional shipping service context.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3. While shippers are interested in the whole delivery process in a logistics service context, shippers are interested in simply getting their goods out of the despatch area in a traditional shipping service context.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. While logistics services are more concerned with a greater understanding of supplier potential and customer problems and opportunities, traditional shipping services are concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

Section II Circumstances stimulating the provision of logistics services

1. Ongoing expansion of the container shipping business measured in TEUs.will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. Mergers and acquisitions between major liner companies will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3. Strategic alliances between major liner companies will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. The development of information technology will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

5. More liberalisation trends in international trade will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

6. More competition between suppliers of liner shipping services will lead to the provision of logistics services by liner companies to shippers.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

6-1. Liner companies offer ever lower freight rates. This will lead to greater provision of logistics services by them to increase profits.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

6-2. Competition between liner companies to secure more container cargo will lead to the provision of logistics services by liner companies.

Please tick one box
Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

7. Increasing demand by shippers for handling, processing, storage, and movement of goods to and from all parts of the world will provoke liner companies to provide logistics services to shippers.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

8. The negative impact on customer service of increases in late deliveries, lost or damaged goods, or misrouted international shipments will lead to the provision of logistics services by liner companies.

Please tick one box

Agree ☐ Disagree ☐ Unable to comment ☐

Please comment

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

SECTION III Logistics Service Functions

Background and Instruction

The following service functions are extracted from the logistics and liner shipping literature. They are classified into 6 groups. These functions will be used to ask international shippers to evaluate the operation of a logistics service. International shippers will be asked to which type of company is most suited to undertake each function. Each group of service function has its own attributes. With respect to these attributes, please mark your opinion about whether these attributes are appropriately selected or not.

Ship operation related service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Ship operation	1------ 2------3------4------5
Reserving cargo at port	1------ 2------3------4------5
Container handling at port	1------ 2------3------4------5
Booking vessel space	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Intermodal transport service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Inter-modal co-ordination	1------ 2------3------4------5
Consolidating shipments	1------ 2------3------4------5
Local collection and delivery	1------ 2------3------4------5
FTL or FCL transport operation	1------ 2------3------4------5
LTL or LCL transport operation	1------ 2------3------4------5
Route planning	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Logistics centre service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Warehousing	1------ 2------3------4------5
Inland container depot management	1------ 2------3------4------5
Export packaging	1------ 2------3------4------5
Consolidation	1------ 2------3------4------5
Special treatment for fragile cargo	1------ 2------3------4------5
Labelling for each cargo	1------ 2------3------4------5
Sorting and filtering shipment data	1------ 2------3------4------5
Scanning the product at the warehouse for container shipments.	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Information service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Tracking/tracing	1------ 2------3------4------5
Quoting rates	1------ 2------3------4------5
Scheduling information	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Documentation and invoicing service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Printing document	1------ 2------3------4------5
Issuing Bill of Lading	1------ 2------3------4------5
Preparing certificates of origin	1------ 2------3------4------5
Preparing commercial invoice	1------ 2------3------4------5
Preparing consular invoice	1------ 2------3------4------5
Obtaining proof of delivery	1------ 2------3------4------5
Obtaining export licenses	1------ 2------3------4------5
Obtaining insurance policy	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Customer marketing service functions

Attributes	Degree of Appropriateness 1------ 2------3------4------5 not appropriate very appropriate
Logistics consulting service	1------ 2------3------4------5
Monitoring shippers' inventory level	1------ 2------3------4------5
Customs clearance	1------ 2------3------4------5
Paying freight charges	1------ 2------3------4------5
Paying port charges	1------ 2------3------4------5
Paying insurance premiums	1------ 2------3------4------5
Paying customs duties	1------ 2------3------4------5
Paying taxes	1------ 2------3------4------5

Please add your comments if any and state any other attributes which you think should be included

Thank you very much for your kind co-operation

APPENDIX F

The Analysis of Delphi First Round

Table F.1 Analysis of the replies, First round

NO	STATEMENTS	A	D	U
I-1	Logistics services are characterised by a close relationship based on individual suppliers and customers, while the traditional shipping service can be characterised by a remote relationship between shipper and liner company based on just ship movement.	6	7	1
I-2	While liner companies are prepared to accept lower profitability in a logistics service context, liner companies are seeking to maintain a high profitability in a traditional shipping service context.	3	6	5
I-3	While shippers are interested in the whole delivery process in a logistics service context, shippers are interested in simply getting their goods out of the despatch area in a traditional shipping service context.	6	7	1
I-4	While logistics services are more concerned with a greater understanding of supplier potential and customer problems and opportunities, traditional shipping services are concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time.	9	4	1
II-1	Ongoing expansion of the container shipping business measured in TEUs will lead to the provision of logistics services by liner companies.	8	4	2
II-2	Mergers and acquisitions between major liner companies will lead to the provision of logistics services by liner companies.	8	4	2
II-3	Strategic alliances between major liner companies will lead to the provision of logistics services by liner companies.	5	7	2
II-4	The development of information technology will lead to the provision of logistics services by liner companies.	12	2	2
II-5	More liberalisation trends in international trade will lead to the provision of logistics services by liner companies.	8	4	2
II-6	More competition between suppliers of liner shipping services will lead to the provision of logistics services by liner companies to shippers.	11	1	2
II-6-1	Liner companies offer ever lower freight rates. This will lead to greater provision of logistics services by them to increase profits.	5	7	2
II-6-2	Competition between liner companies to secure more container cargo will lead to the provision of logistics services by liner companies.	11	1	2
II-7	Increasing demand by shippers for handling, processing, storage, and movement of goods to and from all parts of the world will provoke liner companies to provide logistics services to shippers.	13	1	0
II-8	The negative impact on customer service of increases in late deliveries, lost or damaged goods, or misrouted international shipments will lead to the provision of logistics services by liner companies.	8	5	1

A: Agree, D: Disagree, U: Unable to comment

Table F.2 Analysis of opinions expressed, First round

STATEMENT NO	A	D	O	CONFIDENCE LEVEL
I-1	6	7*	13	4.62
I-2	3	6*	9	4.67
I-3	6	7*	13	4.54
I-4	9*	4	13	4.69
II-1	8*	4	12	4.75
II-2	8*	4	12	4.83
II-3	5	7*	12	4.67
II-4	12*	2	14	4.64
II-5	8*	4	12	4.33
II-6	11*	1	12	4.17
II-6-1	5	7*	12	4.25
II-6-2	11*	1	12	4.25
II-7	13*	1	14	4.43
II-8	8*	5	13	4.69

A: Number agreed D: Number disagreed O: Total number of expressing opinions
(*): Majority opinions

APPENDIX G

The Analysis of Selecting Service Functions

Table G.1 Selection process of logistics service functions

Logistics service functions	AVERAGE SCORE
Ship operation	4.43
Reserving cargo at port	3.93
Container handling at port	4.00
Booking vessel space	3.86
Intermodal co-ordination	4.07
Consolidating shipments	3.93
Local collection and delivery	3.07*
FCL transport operation	4.07
LCL transport operation	3.86
Route planning	3.93
Warehousing	4.07
Inland container depot management	4.00
Export packaging	4.14
Consolidation	3.93***
Special treatment for fragile cargo	3.93
Labelling for each cargo	3.86
Sorting and filtering cargo	4.07**
Scanning the product at the warehouse for container shipments	3.07*
Tracking/tracing	4.29
Quoting rates	3.07*
Scheduling information	3.93
Printing document	3.93
Issuing Bill of Lading	4.14
Preparing certificates of origin	3.93
Preparing commercial invoice	3.86****
Preparing consular invoice	2.86****
Obtaining proof of delivery	3.93
Obtaining export licenses	4.00
Obtaining insurance policy	4.21
Logistics consulting service	3.00*
Monitoring shippers' inventory level	4.07
Customs clearance	4.21
Paying freight rates	4.29
Paying port charges	4.14
Paying insurance premiums	3.93
Paying customs duties	3.86
Paying taxes	2.36*
Mean of average scores	**3.84**

Note) *: functions discarded due to lower than mean (3.84)
**: a function divided into two functions
***: a function discarded because of duplication with another function
****: functions merged into a new function

APPENDIX H

The Questionnaire of Delphi Second Round

Second Round Delphi Questionnaire

Due to the confusion of terminology used in the previous round, the second round now provides the exact definition of logistics service adopted for this study. Some of the respondents tended to regard 'logistics service' as the service activities excluding ocean transport. However, 'logistics service' in this study means 'a total service process including land transport, cargo handling at port, ship movement, information, documentation/invoicing, and customer marketing service'. In section B, 'liner shipping service providers' do not necessarily mean 'liner shipping companies' but they are also meant to be freight forwarders, NVOCCs, and other companies which get involved with liner shipping business. In addition, it was pointed out that some statements are not clearly worded. Therefore, those statements are re-phrased to provide a clearer understanding.

Section I The difference between traditional shipping service and logistics service

Please consider each of the following statements and tick the appropriate box. If you agree with the statement or are unable to comment, you do not have to make comments. However, if you disagree, please make any alternations to the statements or add comments.

1. Traditional shipping service is based on a remote relationship between service providers and service consumers, while logistics service is based on a close relationship between service providers and service consumers.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. Traditional shipping service providers were seeking to maintain a high profitability within the conference system, while logistics service providers are prepared to accept lower profitability with new types of co-operation such as strategic alliances.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3. Shippers are interested in just ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. Traditional shipping service providers are mainly concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time, while logistics service providers are concerned with customers' problems and opportunities generated in the whole delivery process.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

Section II Contributing factors which have stimulated liner shipping service providers to operate 'logistics service' rather than traditional shipping service

Please consider each of the following statements and tick the appropriate box. If you agree with the statement or are unable to comment, you do not have to make comments. However, if you disagree, please make any alternations to the statements or add comments.

1. Mergers/acquisitions and strategic alliances between major liners are still very prominent in the liner shipping market. As a result, the emergence of the mega container operator which can exploit the economies of scale and utilise the 'in-house' global logistics resources enable them to operate logistics service.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

2. The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3-1. Intense competition between liner shipping companies arising in the liner shipping market has led to liner shipping service providers to operate logistics services.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

3-2. Competition between liner shipping companies and ocean transport intermediaries (freight forwarders, non-vessel-operating-common-carriers) to secure more container cargoes is leading to the provision of logistics services.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

4. The constant decline of freight rates in liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

5. In these days, shippers' demands are very diverse and sophisticated in terms of cargo handling, processing, storage, movement, and actually everything related to cargoes. This fact is leading to the provision of logistics services.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

6. Decline of the end-to-end/port-to-port liner conference system and the development of the hub and spoke global container network will enable liner shipping service providers to provide logistics service.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

7. Continuing improvements in the global infrastructure, e.g. port modernisation, the provision of new and enlarged ports, the development of road and rail networks serving the ports, are allowing liner shipping service providers to operate logistics service.

Please tick
Agree ( ) Disagree ( ) Unable to comment ( )

Comments (if you disagree)

Please circle one number
Your confidence in answering this question
(1 = least confident, 5 = most confident,)

1	2	3	4	5

Thank you very much for your kind help

APPENDIX I

The Analysis of Delphi Second Round

Table I.1 Analysis of the replies, Second round

NO	STATEMENTS	A	D	U
I-1	1. Traditional shipping service is based on a remote relationship between service providers and service consumers, while logistics service is based on a close relationship between service providers and service consumers.	13	1	0
I-2	2. Traditional shipping service providers were seeking to maintain a high profitability within the conference system, while logistics service providers are prepared to accept lower profitability with new types of co-operation such as strategic alliances.	5	8	1
I-3	3. Shippers are interested in just ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.	6	7	1
I-4	4. Traditional shipping service providers are mainly concerned with an efficient operation of ships, a higher frequency of sailings and shorter transit time, while logistics service providers are concerned with customers' problems and opportunities generated in the whole delivery process.	13	1	0
II-1	Mergers/acquisitions and strategic alliances between major liners are still very prominent in the liner shipping market. As a result, the emergence of the mega container operator which can exploit the economies of scale and utilise the 'in-house' global logistics resources enable them to operate logistics service.	12	1	1
II-2	The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.	5	7	2
II-3-1	Intense competition between liner shipping companies arising in the liner shipping market has led to liner shipping service providers to operate logistics services.	14	0	0
II-3-2	Competition between liner shipping companies and ocean transport intermediaries (freight forwarders, non-vessel-operating-common-carriers) to secure more container cargoes is leading to the provision of logistics services.	13	1	0
II-4	The constant decline of freight rates in liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.	4	9	1
II-5	In these days, shippers' demands are very diverse and sophisticated in terms of cargo handling, processing, storage, movement, and actually everything related to cargoes. This fact is leading to the provision of logistics services.	10	1	3
II-6	Decline of the end-to-end/port-to-port liner conference system and the development of the hub and spoke global container network will enable liner shipping service providers to provide logistics service.	12	2	0
II-7	Continuing improvements in the global infrastructure, e.g. port modernisation, the provision of new and enlarged ports, the development of road and rail networks serving the ports, are allowing liner shipping service providers to operate logistics service.	13	1	0

A: Agree, D: Disagree, U: Unable to comment

Table I.2 Analysis of opinions expressed, Second round

STATEMENT NO	A	D	O	CONFIDENCE LEVEL
I-1	13*	1	14	4.43
I-2	5	8*	13	4.46
I-3	6	7*	13	4.54
I-4	13*	1	14	4.38
II-1	12*	1	13	4.08
II-2	5	7*	12	4.33
II-3-1	14*	0	14	4.07
II-3-2	13*	1	14	4.00
II-4	4	9*	13	4.38
II-5	10*	1	11	4.36
II-6	12*	2	14	4.21
II-7	13*	1	14	4.50

A: Number agreed D: Number disagreed O: Total number of expressing opinions
(*): Majority opinions

APPENDIX J

The Questionnaire of Delphi Third Round

Third Round Delphi Questionnaire

Cover Letter

Dear Sir or Madam:

Thank you for your response to the first and second questionnaires. I am very grateful to you for finding time, in your busy schedule, to reply.

The responses to the previous questionnaires were analysed to determine areas of agreement and disagreement between the experts. Designing the third round was based on the views expressed by the experts who disagreed with the original statements. This seeks to clarify the disagreements between the respondents to statements on the previous rounds.

It is stressed again that your responses will remain strictly confidential.

The third questionnaire is enclosed with this letter. It will be very much helpful if you can return it to me as soon as possible by an e-mail, fax, or post, whichever you prefer.

May I also take this opportunity to wish you all the very best for this year.

Thank you for your help.

Yours sincerely

Ki Soon Hwang

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Instruction to the panel

Please review the comments received from the panel where the experts disagreed with the statements in the previous round. The number of statements to be considered on this round have been considerably reduced, from 12 to 4, on the basis of the panel's responses in the previous round. Only those statements are being considered where consensus among the experts was less than 80 %.

Reviewing the responses from other experts may cause you to change your previously stated opinion. This does not matter, please state your views as they stand at the moment. As previously stated anonymity will not be breached in any case.

After you have reviewed the comments please indicate slash (/) whether you Agree, Disagree or are Unable to comment. If you agree with any comments please indicate how important it is to the original statement. This can be indicated by marking the slash (/) in the third column. The scale is as follows :

Not Important (N.IMP)
Important (IMP)
Very Important (V.IMP)

Example

Statement	Agree	If you agree, please mark degree of importance			Disagree	Unable to comment
		N.IMP	IMP	V.IMP		
1	/	/				
2					/	
3	/			/		
4						/

Comments (if any)

Original statement

Traditional shipping service providers were trying to maintain a high profitability within the conference system, while logistics service providers are prepared to accept relatively lower profitability with new types of co-operation such as strategic alliances.

Disagreed opinions

1. Logistics service providers may accept lower profitability in some areas but have to make up for it in others or they would not survive.

2. Since liner shipping industry is characterised as a fixed freight rate system, there is no way of telling whether this industry is seeking to high profitability or low profitability.

3. It is true within short-term. As far as the long term objectives of such companies are concerned, they are planning to maintain high profitability.

4. Logistics service providers also want high profitability but are willing to accept less in order to establish permanent relationship for future business.

Statement	Agree	If you agree, please mark degree of importance			Disagree	Unable to comment
		N.IMP	IMP	V.IMP		
1						
2						
3						
4						

Comments (if any)

Original statement

Shippers are interested in just ship's operations in a traditional shipping service context, while shippers are interested in the whole delivery process in a logistics service context.

Disagreed opinions

1. Most traditional shipping services also offer inland haulage and shippers expect it.

2. The shippers in a traditional shipping service context are also interested in whole delivery process.

3. Shipping service providers in both contexts must be concerned with the total movement in order to be competitive in today's market place.

Statement	Agree	If you agree, please mark degree of importance			Disagree	Unable to comment
		N.IMP	IMP	V.IMP		
1						
2						
3						

Comments (if any)

Original statement

The rapid development of information technology such as EDI and computerised vessel operations is stimulating liner shipping service providers to provide logistics services.

Disagreed opinions

1. Logistics services were being provided manually – EDI and computers have made it easier and cheaper.

2. New technologies assist shipping companies to be able to meet customer expectation, but are not the main cause to provide logistics service.

Statement	Agree	If you agree, please mark degree of importance			Disagree	Unable to comment
		N.IMP	IMP	V.IMP		
1						
2						

Comments (if any)

Original statement

The constant decline of freight rates in liner shipping market is still a big problem. In order to get over this problem, many of liner shipping service providers are trying to operate logistics services.

Disagreed opinions

1. The motive of operating logistics service is to attract customers rather than halt decline of rates.

2. In order to stay competitive, shipping lines must operate logistic service, but the expectation is to increase profitability.

Statement	Agree	If you agree, please mark degree of importance			Disagree	Unable to comment
		N.IMP	IMP	V.IMP		
1						
2						

Comments (if any)

APPENDIX K

The Entire List of Accepted and Eliminated Service Functions

Functions originally presented to the Panel

1. Ship operation
2. Reserving cargo at port
3. Container handling at port
4. Booking vessel space
5. Intermodal co-ordination
6. Consolidating shipments
7. Local collection and delivery
8. FTL or FCL transport operation
9. LTL or LCL transport operation
10. Route planning
11. Warehousing
12. Inland container depot management
13. Export packaging
14. Consolidation
15. Special treatment for fragile cargo
16. Labelling for each cargo
17. Sorting and filtering shipment data
18. Scanning the product at the warehouse for container shipments
19. Tracking/tracing
20. Quoting rates
21. Scheduling information
22. Printing document
23. Issuing Bill of Lading
24. Preparing certificates of origin
25. Preparing commercial invoice
26. Preparing consular invoice
27. Obtaining proof of delivery
28. Obtaining export licenses
29. Obtaining insurance policy
30. Logistics consulting service
31. Monitoring shippers' inventory level
32. Customs clearance
33. Paying freight charges
34. Paying port charges
35. Paying insurance premiums
36. Paying customs duties
37. Paying taxes

Functions eliminated

Local collection and delivery
Consolidation
Scanning the product at the warehouse for container shipments
Quoting rates
Logistics consulting service
Paying taxes

Function divided into two functions

Sorting and filtering shipment data
→ Export sorting and filtering shipment data
→ Import sorting and filtering shipment data

Functions merged into one function

Preparing commercial invoice
Preparing consular invoice
→ Preparing invoice

Functions selected

1. Ship operation
2. Reserving cargo at port
3. Container handling at port
4. Booking vessel space
5. Inter-modal co-ordination
6. Consolidating shipments
7. FCL transport
8. LCL transport
9. Route planning
10. Warehousing
11. Inland container depot management
12. Export packaging
13. Export cargo sorting and filtering
14. Import cargo sorting and filtering
15. Special treatment for fragile cargo
16. Labelling
17. Tracking/tracing
18. Scheduling information
19. Printing document
20. Issuing Bill of Lading
21. Preparing Certificates of Origin
22. Preparing invoice
23. Obtaining proof of delivery
24. Obtaining export license
25. Obtaining insurance policy
26. Paying freight
27. Paying port charges
28. Paying insurance premiums
29. Paying customs duties
30. Customs clearance
31. Monitoring inventory level

APPENDIX L

U.K. Shipper Survey

Invitation Letter

Dear Sir/Madam

I am writing this letter to request you to fill in the enclosed questionnaire. The research project I am working on with my supervisor (Dr Richard Gray) is 'A Comparative Study of Logistics Service in the Liner Shipping Market in the U.K. and South Korea. Nowadays, some shipping companies are claiming that 'we are not just shipping lines but we are total logistics service providers'. Therefore, this questionnaire has been designed in order to investigate the international shippers' perception about the performance of logistics service providers and find out the most preferred type of logistics service providers for international shippers.

I promise that your answers will be used only for the research. All responses to the questionnaire will be held in the strictest confidence. After you fill in the questionnaire, please send it back to me by fax or enclosed freepost envelope, whichever method you prefer.

If you have any concerns or inquiries about this questionnaire, please do not hesitate to contact either me or my supervisor. Again I would like to thank you for your kind co-operation in advance.

Yours truly,

Ki Soon Hwang

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Section I Details of Shippers and Cargoes

This section aims to obtain the basic information about your company and products transported internationally.

1. Is your company doing export or import business or both?
Export only ☐ Import only ☐ Both ☐

2. How many years has your company been in business?
more than 50 years ☐
between 30 and 49 years ☐
between 10 and 29 years ☐
between 5 and 9 years ☐
less than 5 years ☐

3. Please describe in general terms which types of product your company is exporting or importing.
Export product .....
Import product .....

4. Please describe the approximate value of the product per tonne and/or per TEU.
Export product: per tonne .....
per TEU.....

Import product: per tonne .....
per TEU.....

5. Please describe the approximate volume of the product per tonne and/or per TEU.
Export product: per tonne .....
per TEU.....

Import product: per tonne .....
per TEU.....

6. Please give the total volume of traffic used by your company annually in either as cubic metres or TEU terms. Please describe at least one.
Export product : (.....TEU) or (.....cubic metres)
Import product : (.....TEU) or (.....cubic metres)

7. How would you classify the following routes as far as your cargoes are concerned?

	Major	Minor	Not at all
Trans-Atlantic	☐	☐	☐
Western Europe - Far East	☐	☐	☐
Western Europe - The rest of Asia	☐	☐	☐
Western Europe - South America	☐	☐	☐
Within Europe	☐	☐	☐
Other (please state .....)	☐	☐	☐

Section II Perception about Logistics Service

Please read the statement below and provide your opinion.

Today's liner shipping companies are providing not just a basic shipping service (traditional ship movement) but total logistics services (e.g. ship operation, inland transport, documentation, information service, customer marketing service, and possibly some more).

1. Do you agree with this statement?

Yes ☐ please answer Question 2 and go to Section III
No ☐ please answer Question 2 and go to Section III
Unable to comment ☐ please go to Section III directly

2. If you agree or disagree, how would you describe the type of service you receive from liner shipping companies now?

Logistics service ☐
Shipping service ☐
Other ☐

If 'other' please describe briefly
.....

Section III Logistics Service Providers

The following are a range of logistics service functions. This section aims to find out your current service provider and your preferred service provider. (Please tick boxes where appropriate)

Logistics Service Functions	Type of current service providers (tick more than one box if required)						Preferred types of service providers (instead of current types) if any					
	Shipping line	Freight forwarder	NVOCC	Agency	Your own company	N/A	Shipping line	Freight forwarder	NVOCC	Agency	Your own company	N/A
Ship operation												
Inter-modal co-ordination												
Reserving cargo at port												
Container handling at port												
Booking vessel space												
Consolidating shipments												
FCL transport operation												
LCL transport operation												
Route planning												
Warehousing												
Inland container depot management												
Export packaging												
Import cargo sorting and filtering												
Special treatment for fragile cargo												
Labelling												
Tracking/Tracing												
Printing document												
Scheduling information												
Export cargo sorting and filtering												
Paying freight												
Paying port charges												
Paying insurance premiums												
Paying customs duties												
Issuing of Bill of Lading												
Preparing Certificate of Origin												
Preparing invoice												
Obtaining proof of delivery												
Obtaining export licence												
Obtaining insurance policy												
Customs clearance												
Monitoring inventory level												

Section IV Degree of Satisfaction about Logistics Service

This section aims to find out your degree of satisfaction about each function of logistics service with current service providers. (Please tick boxes where appropriate)

Logistics Service Functions	Overall degree of satisfaction with current service providers (tick one box on each row)					
	1 very low	2	3	4	5 very high	N/A
Ship operation						
Inter-modal co-ordination						
Reserving cargo at port						
Container handling at port						
Booking vessel space						
Consolidating shipments						
FCL transport operation						
LCL transport operation						
Route planning						
Warehousing						
Inland container depot management						
Export packaging						
Import cargo sorting and filtering						
Special treatment for fragile cargo						
Labelling						
Tracking/Tracing						
Printing document						
Scheduling information						
Export cargo sorting and filtering						
Paying freight						
Paying port charges						
Paying insurance premiums						
Paying customs duties						
Issuing of Bill of Lading						
Preparing Certificate of Origin						
Preparing invoice						
Obtaining proof of delivery						
Obtaining export licence						
Obtaining insurance policy						
Customs clearance						
Monitoring inventory level						

Thank you for your kind contribution, if you have any other comments on this questionnaire please write it in the box below.

If you would like to receive an outline report of the results of this survey (all company names will remain confidential), please complete the details below.

Name .....
Position in company .....
E-mail .....
Address .....
.....
.....
.....

Thank you very much again for your kind co-operation.

APPENDIX M

South Korean Shipper Survey

부탁말씀

안녕하십니까?
저는 영국 플리머스대학교 해운경영학부 박사과정에 있는 황 기순입니다. 제 지도교수인 Dr. Richard Gray와 연구하고 있는 논문은 '정기선시장에서의 물류서비스 - 한국과 영국의 하주들을 대상으로 하는 비교연구' 입니다.

현재 정기선시장에서 서비스제공자들(정기선사 및 운송주선인 등)은 기존의 단순한 해운서비스가 아닌 종합적인 물류서비스를 제공하고 있다고 주장하고 있습니다. 이들이 주장하고 있는 바는 아직까지 실제 서비스 소비자인 하주들을 대상으로 실증적인 분석이 이루어지지 않고 있는 실정입니다. 첨부한 설문지는 과연 그들이 주장하는 것처럼 '기존의 해운서비스'가 아닌 '물류서비스'를 제공하고 있는지, 제공받는 서비스에 대해서 하주들이 얼마나 만족하고 있는지, 마지막으로 현재의 서비스제공자와 미래에 선호되어지는 서비스제공자가 차이가 있는지에 대해서 선생님의 고견을 얻고자 작성되어졌습니다.

선생님께서 답변하시는 내용은 연구이외의 목적에는 사용되어지지 않을 것이며, 통계법 8조에 의해서 철저한 비밀보장을 받게 될 것입니다. 작성하신 후, 제 주소(한국)가 적혀진 동봉된 봉투(수신자요금후납) 혹은 팩스 중 편하신 방법으로 답장해주시면 대단히 감사하겠습니다.

선생님의 고견이 정기선운송서비스의 품질개선 및 나아가서 해운산업의 국가경쟁력제고에도 도움이 될 것으로 굳게 믿사오니, 바쁘시더라도 본 연구에 협조해 주시면 대단히 감사하겠습니다.

만약 설문사항에 대해서 의문사항이 계시면 아래의 주소로 연락주시기 바랍니다.

황 기 순 배상

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1부 이 부분은 선생님의 회사 및 운송되어지는 화물에 대한 정보를 위한 난입니다.

1. 지금 현재 귀사에서 취급하는 화물은 수출용, 수입용 중 어느 것입니까?

수출용 ☐
수입용 ☐
수출용 수입용 모두 취급 ☐

2. 귀사는 현재까지 몇 년간 이 업종에서 영업을 하시고 있습니까?

(1) 50년 이상 ☐
(2) 30년 - 49년 ☐
(3) 10년 - 29년 ☐
(4) 5년 - 9년 ☐
(5) 5년 이하 ☐

3. 현재 귀사에서 수출하거나 수입하는 화물은 무엇입니까?

수출용 화물.....
수입용 화물.....

4. 위 화물의 톤(tonne)당 혹은 TEU당 가치를 적어주십시오.

수출용 화물 : 톤당 (원) 혹은 TEU당 (원)
수입용 화물 : 톤당 (원) 혹은 TEU당 (원)

5. 위 화물의 톤(tonne)당 혹은 TEU당 부피를 적어주십시오.

수출용 화물 : 톤당 (박스) 혹은 TEU당 (박스)
수입용 화물 : 톤당 (박스) 혹은 TEU당 (박스)

6. 귀사에서 연간 수출 혹은 수입하는 화물의 양을 TEU 혹은 큐빅미터로 환산하면 얼마입니까?

수출용 화물 ( ) TEU 혹은 ( ) 큐빅미터
수입용 화물 ( ) TEU 혹은 ( ) 큐빅미터

7. 귀사에서 수출하거나 수입되는 화물은 어느 항로를 가장 빈번히 사용하시고 있습니까?

	다수	소수	전혀이용안함
(1) 태평양횡단항로	☐	☐	☐
(2) 극동-유럽항로	☐	☐	☐
(3) 아시아내 항로	☐	☐	☐
(4) 아시아-오세아니아 항로	☐	☐	☐
(5) 극동-중동항로	☐	☐	☐

(6) 기타 (구체적으로 명시,.....)

2부 물류서비스에 대한 귀하의 인식

아래의 문장을 읽어보시고 귀하의 의견을 제시하여 주십시오.

"오늘날의 정기선운송서비스 제공자들은 기본적인 해운서비스(즉, 항구에서 항구운송)을 탈피한 종합 물류서비스(즉, 항구에서 항구운송 뿐만 아니라 내륙도로운송, 운송서류서비스, 정보서비스, 소비자마케팅서비스, 등등)을 하주에게 제공하고 있다"

1. 위 사실에 대한 귀하의 생각은?

(1) 동의한다 ☐ 2번 문항으로 가십시오
(2) 동의하지 않는다 ☐ 2번 문항으로 가십시오
(3) 모르겠다 ☐ 3부로 직접 가십시오

2. 만약 위 사실에 대해서 동의하거나 혹은 동의하지 않으시면, 귀사가 현재 제공받는 정기선운송서비스는 다음 중 어느 항목에 속한다고 생각하십니까?

(1) 종합 물류서비스 ☐
(2) 보통정기선운송서비스 ☐
(3) 기타 ☐

만약 기타라면 구체적으로 무엇이라고 생각하십니까?

.....

3부 물류서비스 기능 및 서비스제공자

아래의 기능들은 정기선시장에서의 물류서비스 기능들입니다. 각각의 기능들에 대하여 현재 귀사에서 이용하고 있는 서비스제공자와 미래에 선호되어지는 서비스 제공자를 파악하기 위한 난입니다. (적합한 난에 표시하여 주시면 감사하겠습니다)

물류서비스기능	현재서비스제공자 (기능별로 2개 이상의 서비스제공자가 있으면, 각각의 난에 표시하여 주십시오)						선호되어지는 물류서비스제공자 (만약 장래에 새로운 형태의 서비스제공자를 원하신다면)					
	정기선사	운송주선인	비선박소유운송인	대리인	자체수단	해당사항없음	정기선사	운송주선인	비선박소유운송인	대리인	자체수단	해당사항없음
선박운송												
내륙연계운송												
항구내보관												
항구내콘테이너선적												
선복수배												
집화												
FCL 화물선적												
LCL 화물선적												
운송경로계획												
내륙보관창고												
내륙콘테이너데포												
수출포장												
수입화물분류												
위험화물특별관리												
상표부착												
화물추적												
운송서류인쇄												
운항계획통보												
수출화물분류												
운송료지급												
항구세지급												
보험료지불												
관세지급												
선하증권발행												
원산지증명서발행												
송장발행												
배달증명확보												
수출면장취득												
보험증권획득												
통관												
수출입화물재고관리												

다음은 귀사에서 제공받고 있는 물류서비스에 대한 귀하의 만족도를 표시하는 난입니다. 해당난에 표시하여 주십시오.

물류서비스기능	만족도					
	매우 불만족 1	불만족 2	보통 3	만족 4	매우 만족 5	해당사항 없음
선박운송						
내륙연계운송						
항구내보관						
항구내콘테이너선적						
선복수배						
집화						
FCL 화물선적						
LCL 화물선적						
운송경로계획						
내륙보관창고						
내륙콘테이너데포						
수출포장						
수입화물분류						
위험화물특별관리						
상표부착						
화물추적						
운송서류인쇄						
운항계획통보						
수출화물분류						
운송료지급						
항구세지급						
보험료지불						
관세지급						
선하증권발행						
원산지증명서발행						
송장발행						
배달증명확보						
수출면장취득						
보험증권획득						
통관						
수출입화물재고관리						

대단히 수고하셨습니다. 설문지에 대하여 다른 의견이 있으시면 아래의 준비된 난에 남겨주시면 감사하겠습니다.

마지막으로, 통계처리에 필요한 사항이오니 선생님의 인적사항을 남겨주시면 감사하겠습니다.

성명 :

직책 :

선생님의 귀중한 시간을 할애해주셔서 대단히 감사합니다.

APPENDIX N

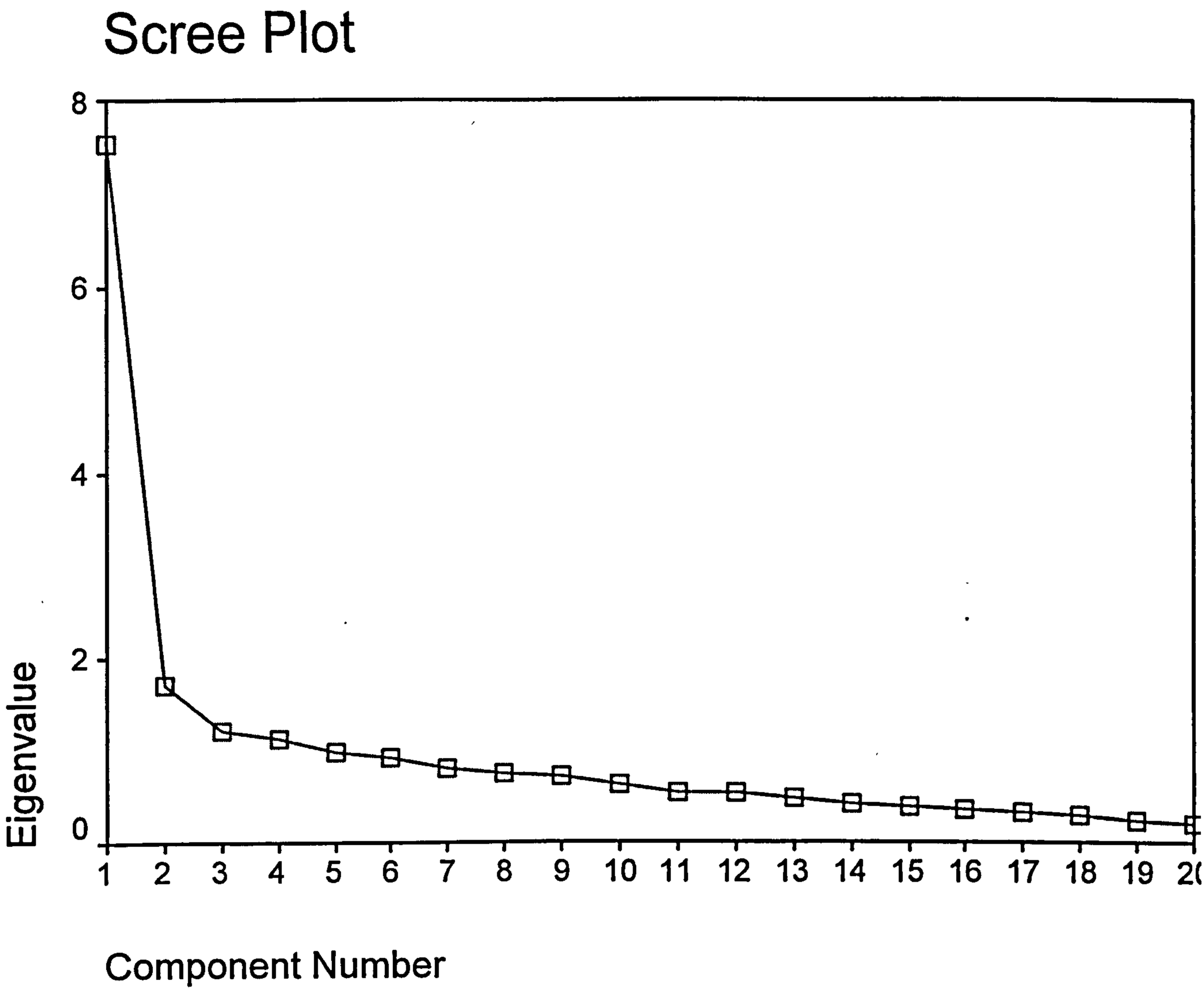
The Correlation Matrix of Factor Analysis

Table N.1 Correlation matrix

	SHIP OP	INTER MO	RESE CAR	CONT HAN	VSL SPAC	CONS OLI	FCL	LCL	ROUT PLN	TRAC ING	PRN DOCU	SCHE DUL	FREIG HT	PORT FEE	INSUR AN	CUST DUT	ISSU BL	INVO ICE	INSU POL	CUST CLR
SHIPOP	1.000	.559	.472	.444	.606	.399	.427	.416	.270	.280	.280	.269	.536	.495	.398	.385	.342	.211	.405	.369
INTERMO	.559	1.000	.562	.451	.605	.405	.510	.506	.221	.337	.374	.254	.424	.413	.352	.376	.309	.296	.362	.359
RESECAR	.472	.562	1.000	.500	.451	.413	.325	.367	.217	.287	.253	.080	.381	.338	.218	.248	.213	.318	.170	.198
CONTHAN	.444	.451	.500	1.000	.509	.367	.321	.318	.222	.364	.254	.162	.385	.312	.222	.285	.258	.239	.205	.223
VSLSPAC	.606	.605	.451	.509	1.000	.434	.417	.361	.245	.341	.349	.244	.363	.388	.258	.293	.380	.217	.333	.385
CONSOLI	.399	.405	.413	.367	.434	1.000	.352	.347	.258	.223	.245	.150	.325	.224	.186	.234	.237	.278	.150	.155
FCL	.427	.510	.325	.321	.417	.352	1.000	.545	.118	.124	.246	.192	.420	.459	.388	.398	.435	.238	.372	.275
LCL	.416	.506	.367	.318	.361	.347	.545	1.000	.272	.250	.317	.294	.418	.454	.388	.412	.306	.212	.307	.311
ROUTPLN	.270	.221	.217	.222	.245	.258	.118	.272	1.000	.333	.287	.123	.269	.266	.159	.328	.041	.075	.126	.214
TRACING	.280	.337	.287	.364	.341	.223	.124	.250	.333	1.000	.377	.210	.293	.303	.243	.365	.175	.136	.265	.355
PRNDOCU	.280	.374	.253	.254	.349	.245	.246	.317	.287	.377	1.000	.364	.348	.292	.226	.307	.171	.310	.292	.286
SCHEDUL	.269	.254	.080	.162	.244	.150	.192	.294	.123	.210	.364	1.000	.328	.288	.190	.243	.291	.310	.325	.158
FREIGHT	.536	.424	.381	.385	.363	.325	.420	.418	.269	.293	.348	.328	1.000	.711	.568	.619	.408	.248	.428	.343
PORTFEE	.495	.413	.338	.312	.388	.224	.459	.454	.266	.303	.292	.288	.711	1.000	.644	.733	.416	.290	.503	.352
INSURAN	.398	.352	.218	.222	.258	.186	.388	.388	.159	.243	.226	.190	.568	.644	1.000	.630	.383	.299	.512	.312
CUSTDUT	.385	.376	.248	.285	.293	.234	.398	.412	.328	.365	.307	.243	.619	.733	.630	1.000	.366	.307	.418	.389
ISSUBL	.342	.309	.213	.258	.380	.237	.435	.306	.041	.175	.171	.291	.408	.416	.383	.366	1.000	.386	.333	.345
INVOICE	.211	.296	.318	.239	.217	.278	.238	.212	.075	.136	.310	.310	.248	.290	.299	.307	.386	1.000	.360	.168
INSUPOL	.405	.362	.170	.205	.333	.150	.372	.307	.126	.265	.292	.325	.428	.503	.512	.418	.333	.360	1.000	.507
CUSTCLR	.369	.359	.198	.223	.385	.155	.275	.311	.214	.355	.286	.158	.343	.352	.312	.389	.345	.168	.507	1.000

APPENDIX O

The Scree Test of Factor Analysis


Scree Plot
8
6
4
2
0
Eigenvalue
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 2(
Component Number

References

Aaker, D. A. and Weinberg, C. B. (1975) Interactive Marketing Models, *Journal of Marketing*, Volume 39, October, pp.16-23.

Aaker, D. A., Kumar, V., and Day, G. S. (1995) *Marketing Research*, (5th Ed), Wiley, New York.

Abbel-Fattah, N. M. (1997) *Road Freight Privatisation in Egypt: A comparative analysis with Great Britain and Hungary*, Ph.D. Dissertation, Institute of Marine Studies, University of Plymouth.

Amand, D. (1999) Finding a cure, *Containerisation International*, September, pp.57-59.

Andel, T. (1998) Efficient Transportation Starts in the Warehouse, *Transportation and Distribution*, June, Volume 39 Number 6, pp.84-87.

Anderson, J. and Schroeder, R. (1994) A Theory of Quality Management Underlying the Deming Management Method, *Academy of Management Review*, Volume 19 Number 3, pp.472-509.

Anscombe, J. (1994) The Fourth Wave of Logistics Improvement: Maximising Value in the Supply Chain, *Logistics Focus*, Yearbook Supplement, pp.36-40.

Ariel, A. (1989) Delphi Forecast of the Dry Bulk Shipping Industry in the Year 2000, *Maritime Policy and Management*, Volume 16 Number 4, pp.305-336.

Armstrong, J. S. and Yokum, J. T. (1994) Effectiveness of Monetary Incentives – Mail Surveys to Members of Multinational Professional Groups, *Industrial Marketing Management*, Volume 23, pp.133-136.

Babbie, E. (1998) *The Practice of Social Research*, (8th Ed), Wadsworth Publishing Company.

Bagchi, P. K. (1992) International Logistics Information Systems, *International Journal of Physical Distribution and Logistics Management*, Volume 22 Number 9, pp.11-19.

Bailey, K. (1994) *Methods of Social Research*, (4th Ed), The Free Press.

Ballou, R.H. (1992) *Business Logistics Management*, (3rd Ed), Prentice-Hall International, Inc.

Bardecki, M. (1984) Participants' Response to the Delphi Method: An Attitudinal Perspective, *Technological Forecasting and Social Change*, Volume 25, pp.281-292.

Benson, D. and Whitehead, G. (1985) *Transport and Distribution*, Longman Group Limited.

Bergin, S. (1997) How ocean carriers are staying afloat, *Transportation and Distribution*, Volume 38 Number 2, pp.45-47.

Best, R. J. (1974) An Experiment in Delphi Estimation in Marketing Decision Marketing, *Journal of Marketing Research*, Volume 11, pp.447-452.

BMDP Statistical Software, Inc. (1992) *BMDP Statistical Software Manual, Release 7*, Volums 1 and 2, Los Angeles.

Boje, D. and Murnighan, J. (1982) Group Confidence Pressures in Iterative Decisions, *Management Science*, Volume 28 Number 10, October, pp.1187-1196.

Bolton, N. and Drew, H. (1991) A Multistage model of Customers' Assessments of Service Quality, *Journal of Consumer Research*, Volume 17, March, pp.375-384.

Bonney, J. (1998) "Shipping Reform: Ready, Set...", *American Shipper*. September, pp.8-12.

Bowersox, D. J. (1983) Emerging from the Recession: The Role of Logistical Management, *Journal of Business Logistics*, Volume 4 Number 1, pp.21-33.

Bowersox, D. J. (1990) The Strategic Benefits of Logistics Alliances, *Harvard Business Review*, July/August, pp.34-45.

Boyes, J. (1997) Customer Focus, *Containerisation International*, May, p.62.

Boyes, J. (1999) An age of giants, *Containerisation International*, September, pp.37-41.

Braam, T. (2000) *Liner Operators 2000: An Analysis of Major Liner Trade Companies*, Dynamar Consultancy BV & Fairplay Publications Ltd.

Branch, A. (1996) *Elements of Shipping*, (7th Ed), Chapman & Hall.

Brideweser, D. and Paton, C. (1981) Service versus Cost: The Shipper's Dilemma, *Lloyd's World of Shipping Conference: Liner Shipping... Survival of the Fittest*, Lloyd's of London Press Ltd.

British International Freight Association, (1997) *The International Freight Guide: The Handbook for Exporters, Importers and Forwarders*, LLP Limited.

Brockhoff, K. (1975) The Performance of Forecasting Groups in Computer Dialogue and Face-to-Face Discussion, In: Linstone, H. and Turoff, M. eds. *The Delphi Method: Techniques and Applications*, Addison-Wesley, Reading, MA.

Brooks, M. (1984) An Alternative Theoretical Approach to the Evaluation of Liner Shipping Part I. Situational Factors, *Maritime Policy and Management*, Volume 11 Number 1, pp.35-43.

Brooks, M. (1985) An Alternative Theoretical Approach to the Evaluation of Liner Shipping Part II. Choice Criteria, *Maritime Policy and Management*, Volume 12 Number 2, pp.145-155.

Brooks, M. (1990) Ocean Carrier Selection Criteria in a New Environment, *The Logistics and Transportation Review*, Volume 26 Number 4, pp.339-355.

Brooks, M. (1995) Understanding the Ocean Container Market - a seven country study, *Maritime Policy and Management*, Volume 22 Number 1, pp.39-49.

Brooks, M. (2000a) *Sea Change in Liner Shipping: Regulation and Managerial Decision-Making in a Global Industry*, Pergamon.

Brooks, M. (2000b) Performance Evaluation of Carriers by North American Companies, *Transport Reviews*, Volume 20 Number 2, pp.205-218.

Bryman, A. and Cramer, D. (1997) *Quantitative Data Analysis with SPSS for Windows*, Routledge.

Burnett, J. J. and Chonko, L. B. (1980) The role of causality in marketing: a cautionary note. In: Namb, C. W. and Dunne, P. M. eds. *Theoretical Developments in Marketing*. Chicago: American Marketing Association, pp. 51-55.

Butz, D. A. (1998) Seize the Day!, *American Shipper*, October, pp.8-14.

Buzzell, R. D. (1964) *Mathematical Models and Marketing Management*, Boston, Harvard University.

Calderwood, J. A. (1999) Shipping Reform: The Prospects, *Transportation and Distribution*, Volume 40 Issues 8, p.112.

Cambridge Advanced Learner's Dictionary (2003) Cambridge University Press.

Campbell, D. T. (1976) Psychometric theory, In: Dunnette, M. D. ed. *Handbook of industrial and organizational psychology*, Chicago: Rand-McNally.

Cargonews Asia (1998a) December.

Cargonews Asia (1998b) September.

Carmines, E. and Zeller, R. (1979) *Reliability and Validity Assessment*, Newbury Park, US:Sage Publications.

Cattel, R. B. (1966) The Scree Test for the Number of Factors, *Multivariate Behavioral Research 1*, pp.245-276.

Chadwick, B., Bahr, H., and Albrecht, S. (1984) *Social Science Research Methods*, Englwood Cliffs, NJ.:Prentice-Hall.

Checkland, P. (1981) *Systems Thinking, Systems Practice*, J Wiley.

Christopher, M. (1990) Why it Pays to Think 'Logistics', In: Cooper, J. ed. *Logistics and Distribution Planning*; Revised edition, Kogan Page Ltd.

Christopher, M. (1992) *Logistics and Supply Chain Management*, Pitman.

Churchill, G. A. (1991) *Marketing Research: Methodological Foundations*, (5th Ed), Dryden Press.

Cipolla, C. (1970) *The Economic History of World Population*, (5th Ed), London: Croom Helm.

Clark, A. and Friedman, M. (1982) The Relative Importance of Treatment Outcomes, *Evaluation Review*, Volume 6 Number 1, February, pp.79-93.

Clegg, P. (1998) Special Report: World Container Ports: Competition becoming more fierce, *Lloyd's List*, 30 January 1998.

Cliff, N. and Hamburger, C. (1967) The Study of Sampling Errors in Factor Analysis by means of Artificial Experiments, *Psychological Bulletin*, Volume 68, pp.430-445.

Collison, F. (1984) Market Segments for Marine Liner Service, *Transportation Journal*, Volume 24 Number 2, pp.40-54.

Containerisation International (1999a) Heaven or hell?, *Containerisation International*, October, p.50.

Containerisation International (1999b) An age of giants, *Containerisation International*, September, pp.37-41.

Containerisation International (2001) Who's fooling whom?, *Containerisation –n-------ternational*, October p.97.

Containerisation International (2003a) East-West Trade Cargo Analysis, *Containerisation International*, July, pp.5-7.

Containerisation International (2003b) North-South Trade Cargo Analysis, *Containerisation International*, August, pp.5-7.

Containerisation International Database (2003a), *Fleet Statistics*, [Online] 01 August 2003. <http://www.ci-online.co.uk/fleetstatistics>.

Containerisation International Database (2003b), *Alliances*, [Online] 01 August 2003. <http://www.ci-online.co.uk/alliances>.

Containerisation International Database (2003c), *Liner Profile: P&O Nedlloyd*, [Online] 18 August 2003. <http://www.ci-online.co.uk/shippinglines/comprofile.asp>

Containerisation International Database (2003d), *Liner Profile: Hanjin Shipping*, [Online] 18 August 2003. <http://www.ci-online.co.uk/shippinglines/comprofile.asp >

Containerisation International Database (2003e), *Liner Profile: Hyndai Merchant Marine*, [Online] 18 August 2003. <http://www.ci-online.co.uk/shippinglines/comprofile.asp >

Containerisation International Yearbook (2003).

Cooper, D. and Emory, C. (1995) *Business Research Methods*, (5th Ed), Richard D. Irwin, Inc.

Cooper, P., Diamond, I. and High, S. (1993) Choosing and using contraceptive: integrating qualitative and quantitative methods in family planning, *Journal of the Market Research Society*, October, Volume 35 Number 4, pp.325-339.

Council of Logistics Management (2003) *The definition of logistics*, [Online] 4 August 2003. <http://www.clm1.org>.

Cowell, D. (1984) *The Marketing of Services*, Heinemann, London.

Coyle, J. J., Bardi, E. J., and Langley, C. J. (1992) *The Management of Business Logistics*, (5th Ed), West Publishing Company.

Coyle, J. J., Bardi, E. J., and Langley, C. J. (1996) *The Management of Business Logistics*, (6th Ed), West Publishing Company.

Coyle, J. J., Bardi, E. J., and Novack, R. (1994) *Transportation*, (4th Ed), West Publishing Company.

Craig, R. T. (1981) Generalisation of Scott's index of intercoder agreement, *Public Opinion Quarterly*, Volume 45, Iss.2, pp.260-264.

Craig, T. (1996) Logistics Cycle Time, *World Wide Shipping*, June, pp.24-26.

Cronin, J. and Taylor, S. (1992) Measuring Service Quality: Re-examination and Extenuation, *Journal of Marketing*, Volume 56 Number 3, pp.55-68.

Czaja, R. and Blair, J. (1996) *Designing Surveys: A guide to decisions and procedures*, Pine Forge Press.

Czinkota, M. and Ronkainen, I. (1997) International Business and Trade in the next decade: report from a Delphi study, *Journal of International Business Studies*, Winter, Volume 28 Number 4, pp.827-844.

Dalkey, N. C. (1969) *Delphi Method: An Experimental Study of Group Opinion*, The Rand Corporation, USA.

Dalkey, N. and Helmer, O. (1963) An Experimental Application of the Delphi Method to the Use of Experts, *Management Science*, Volume 9 Number 3, April, pp.458-467.

Damas, P. (1998) FMC and EC move closer, *American Shipper*, May, pp.8-12.

Daugherty, P. and Droge, C. (1997) Organisational Structure in Divisionalised Manufacturers: The Potential for Outsourcing Logistical Services, *International Journal of Physical Distribution and Logistics Management*, Volume 27 Number 5-6, pp.337-349.

Deakin, B. and Seward, T. (1973) *Shipping Conference: A Study of their Development and Economic Practice*, Cambridge University Press.

Dekker, N. (2003a) A Poor Industry, *Containerisation International*, May, pp.48-49.

Dekker, N. (2003b) Safety in Numbers, *Containerisation International*, August, p.59.

Dekker, N. (2003c) Seoul Security, *Containerisation International*, August, pp.56-57.

Dekker, N. (2004) Seeing change, *Containerisation International*, April, pp.43-45.

Delbecq, L., Van de Ven, A. and Gustafson, D. (1975) *Group Techniques for Program Planning: A guide to Nominal Group and Delphi Processes*, London, Routledge.

Denzin, N. and Lincoln, Y. (1994) Ed, *Handbook of Qualitative Research*, Thousand Oaks, CA: Sage Publications.

Department of Transport (2000) *Transport Statistics Great Britain.*

Department of Transport (2002) *Transport Statistics Great Britain.*

Desmet, S., Looy, B., and Dierdonck, R. (1998) The Nature of Services, In: Looy, B., Dierdonck, R., and Gemmel, P. eds. *Services Management: An Integrated Approach*, Pitman Publishing, pp.3-23.

Dictionary of Contemporary English (1978), Longman.

D'Onofrio, M. (1999) Debate continues over methods, *Advertising Age's Business Marketing*, January, Volume 84 Issue 1, p.28.

Drewry (1996) *Global Container Markets*, Drewry Shipping Consultants.

Eller, D. (1994) Quality Counts, *Containerisation International*, June, p.59.

Ellinger, A. E., Daugherty, P. J., and Gustin, C. M. (1997) The Relationship between Integrated Logistics and Customer Service, *Transport Research: Part E (Logistics and Transportation Review)* Volume 33 Number 2, pp.129-138.

Elliott, J. (1981) *Action Research: A Framework for Self Evaluation in Schools*, Cambridge, CUP. (1993) *Reconstructing Teacher Education* London, Falmer Press.

Ellram, L. and Cooper, M. (1993) Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy, *International Journal of Logistics Management*, Volume 4 Number 2, pp.1-10.

Erffmeyer, R., Erffmeyer, E., and Lane, I. (1986) The Delphi Technique: An Empirical Evaluation of the Optimal Number of Rounds, *Group and Organisation Management*, Volume 11 Number 1-2, March-June, pp.120-129.

Fadda, E. (1997) *Brazilian Coastal Shipping in 2010: Qualitative Scenarios Through The Application of Delphi and Scenario Writing Methods*, Ph.D. Dissertation, Department of Maritime Studies and International Transport, University of Wales College of Cardiff.

Farmer, R. and Richman, B. (1970) *Comparative Management and Economic Progress*, Cedarwood Publishing Co., Bloomington, Indiana.

Fawcett, P., McLeish, R. E., and Ogden, I. D. (1992) *Logistics Management*, London, Pitman.

Fawcett, S. E. and Fawcett, S. A. (1995) The Firm as a Value-added System, *International Journal of Physical Distribution and Logistics Management*, Volume 25 Number 5, pp.24-42.

Finer, C. J. and Hundt, G. L. (2001) *The Business of Research: Issues of Policy and Practices*, Oxford, Blackwell.

Flynn, M. (1998a) Empty boxships threat to small bulker sector: Top broker warns of crisis due to complacency, *Lloyd's List*, 10 November 1998.

Flynn, M. (1998b) Special report on Korean maritime investment: Deregulation policy is gathering pace, *Lloyd's List*, 31 December 1998.

Fojt, M. (1995) Strategic Logistics Management, *International Journal of Physical Distribution and Logistics Management*, Volume 25 Number 7, pp.3-22.

Fossey, J. (1994) Post-Panamax Breakthrough, *Containerisation International*, September, pp.47-51.

Fossey, J. (1995) KMPA's liberalisation license, *Containerisation International*, January, pp.50-51.

Fossey, J. (1997) Post-Panamax Passion, *Containerisation International*, February, pp.44-46.

Fossey, J (1999) Heaven or hell?, *Containerisation International*, October, p.37-40.

Frankel, E. (1987) *The World Shipping Industry*, London: Croom Helm.

Fromme, H. (1996) Special Report on World Container Ports: Box trade volume to outstrip global economy, *Lloyd's List*, 27 February 1996.

Fung, P. and Wong, A. (1998) Case Study: Managing for Total Quality of Logistics Services in the Supply Chain, *Logistics Information Management*, Volume 11 Number 5, pp.324-329.

Garde, V. D. and Patel, R. R. (1985) Technological Forecasting for Power Generation - A Study Using the Delphi Technique, *Long Range Planning*, Volume 18 Number 4, pp.73-79.

Gardiner, P. (1997) *The Liner Market 1997/98*, Lloyd's Shipping Economist Management Reports: LLP Limited.

Gay, L. (1987) *Educational Research Competencies for Analysis and Application*, Merrill Publishing Co., Ohio.

George, D. and Mallery, P. (2001) *SPSS for Windows – A Simple Guide and Reference*, A Pearson Education Company, MA, USA.

Gibson, B.J., Rutner, S.M., and Keller, S.B. (2002) Shipper-carrier partnership issues, rankings and satisfaction, *International Journal of Physical Distribution and Logistics Management*, Volume 32, Number 8, pp.669-681.

Gilman, S. (1983) *The Competitive Dynamics of Container Shipping*, Alder Sho:Gower.

Goldsborough, W. and Anderson, D. (1994) Import/Export Management, In: Robeson, J. and Copacino, W. eds. *The Logistics Handbook*, New York, Free Press, pp.674-696.

Goldschmidt, P. (1975) Scientific inquiry or political critique? Remarks on Delphi Assessment, Expert opinion, Forecasting, and Group process by H. Sackman, *Technological Forecasting and Social Change*, Volume 7 Number 2, pp. 195-213.

Goodman, C. (1987) The Delphi Technique: A Critique, *Journal of Advanced Nursing*, Volume 12, pp.729-734.

Gordon, W. and Langmaid, R. (1988) *Qualitative Market Research: A Practitioner's and Buyer's Guide*, Aldershot:Gower.

Gourdin, K. N. and Clarke, R. L. (1990) Can US Transportation Industries Meet the Global Challenge?, *International Journal of Physical Distribution and Logistics Management*, Volume 20 Number 4, pp.31-36.

Graham, M. and Hughes, D. (1985) *Containerisation in the Eighties*, Lloyd's of London Press Ltd., London.

Graham, M. (1998) Stability and Competition in Intermodal Container Shipping: Finding a Balance, *Maritime Policy and Management*, Volume 25 Number 2, pp.129-147.

Granzin, K. L. and Bahn, K. D. (1989) Consumer Logistics: conceptualisation, pertinent issues and a proposed program for research, *Journal of the Academy of Marketing Science*, Volume 17 Number 1, pp.91-102.

Gray, R. and Kim, K. S. (2001) *Logistics and International Shipping*, Institute of International Maritime Affairs in Korea Maritime University.

Green, H., Hunter, C. and Moore, B. (1990) Assessing the environmental Impact of Tourism Development - Use of the Delphi Technique, *Tourism Management*, Volume 11 Number 2, June, pp.111-120.

Gronroos, C. (1980) *An Applied Service Marketing Theory*, Working Paper Number 57, Swedish School of Economics and Business Administration, Helsinki.

Grummitt, J. (1980) *Interviewing Skills*, London, The Industrial Society.

Guenther, W. C. (1964) *Analysis of Variance*, Englewood Cliffs, N. J., Prentice-Hall.

Gustafson, D., Shukla, R., Delbecq, A., and Walster, G. (1973) A Comparative Study of Differences in Subjective Likelihood Estimates Made by Individuals, Interacting Groups, Delphi Groups, and Nominal Groups, *Organisational Behaviour and Human Performance*, Volume 9, pp.280-291.

Hair, J. F. Jr., Anderson, R. E., Tatham, R. L. and Black, W. C. (1995) *Multivariate Data Analysis with Readings*, (4th Ed), (NJ, USA: Prentice-Hall International).

Hanjin Shipping (2003) *Company Profile*, [Online] 01 September 2003. <http://www.hanjin.com>.

Hakim, S. and Weinblatt, J. (1993) The Delphi Process as a Tool for Decision Making, *Evaluation and Programme Planning*, Volume 16 Number 1, pp.25-38.

Hawkins, J. (1997) *A Strategic Choice Model for Asia-Pacific Shipping*, PhD Thesis, Institute of Marine Studies in University of Plymouth.

Harrington, L. (1995) Logistics Unlocks Customer Satisfaction, *Transportation and Distribution*, May, Volume 36 Number 5, pp.41-43.

Harrington, L. (1998) The New Warehousing, *Industry Week*, 20th July, Volume 247 Number 14, p.52.

Harrington, L. (1999) A new era dawns, *Industry Week*, 4th January, Volume 248 Issue 1.

Hayuth, Y. (1985) Freight Modal-Split Analysis of Air and Sea Transportation, *Logistics and Transportation Review*, Volume 21, pp.389-402.

Hayuth, Y. (1987) *Intermodality: Concept and Practice*, Lloyd's of London Press Ltd.

Helmer, O. (1966) *Social Technology*, Basic Books, New York.

Helmer, O. (1968) The Delphi Method - An Illustration, In: Bright, J. R. ed. *Technological Forecasting for Industry and Government: Methods and Applications*, Prentice-Hall, Englewood Cliffs, NJ.

Hentschel, J. (1999) Contextuality and Data Collection Methods: A Framework and Application to Health Service Utilisation, *Journal of Development Studies*, April, Volume 35 Issue.4, pp.64-93.

Heskett, J. L. (1983) Challenges and Opportunities for Logistics Executives in the 1980's, *Journal of Business Logistics*, Volume 4 Number 1, pp.13-19.

Heskett, J. L. (1986) *Managing in the Service Economy*, Boston, Harvard Business School Press.

Heskett, J. L. (1987) Lessons in the Service Sector, *Harvard Business Review*, Volume 65 Number 2, Mar/Apr, pp.118-126.

Hill, D. J. (1986) Satisfaction and Consumer Services, *Advances in Consumer Research*, Volume 13, pp.311-315.

Hofstede, G., Neuijen, B., Ohayv, D., and Sanders, G. (1990) Measuring organisational cultures: a qualitative and quantitative study across twenty cases, *Administrative Science Quarterly*, June, Volume 35 Number 2, pp.286-316.

Hong, S. Y. (1995) Marine Policy in the Republic of Korea, *Marine Policy*, Volume 19, Number 2, pp.97-113.

Hope, R. (1990) *A New History of British Shipping*, London, John Murray Ltd.

Howe, K. and Eisenhart, M. (1990) Standards for qualitative and quantitative research: a prolegomenon. *Educational Researcher*, Volume 19 Number 4, pp.2-9.

Hyundai Merchant Marine (2003) *Company Profile*, [Online] 01 September 2003. <http://www.hmm21.com>

IATA (2001) *World Air Transport Statistics*, Number 45, Geneva.

International Monetary Fund (2002) *Direction of Trade Statistics*, pp.264-265.

Institute of Shipping Economics and Logistics (2002) *Shipping Statistics Yearbook*, Bremen.

Jamaluddin, T. (1995) *Marketing of freight liner shipping services with reference to the Far East-Europe trade: a Malaysian perspective*, Ph.D. Dissertation. Department of Maritime Studies and International Transport. University of Wales College of Cardiff: U.K.

Jansson, J. and Shneerson, D. (1987) *Liner Shipping Economics*, Chapman and Hall Ltd.

Johnson, J. and Wood, D. (1996) *Contemporary Logistics*, (6th Ed), Prentice Hall.

Jolson, M. and Rossow, G. (1971) The Delphi Process in Marketing Decision Making, *Journal of Marketing Research*, Volume 8, pp.443-448.

Kadar, M. H. (1996) The Future of Global Strategic Alliances, *Containerisation International*, April, p.81.

Kadar, M. and Proost, D. (1997) Supply and Demand in Liner Shipping, *Containerisation International*, June, pp.61-65.

Kaiser, H. F. (1970) A Second-Generation Little Jiffy, *Psychometrika*, Volume 35, pp.401-415.

Kaiser, H. F. (1974) Little Jiffy, Mark IV, *Educational and Psychology Measurement*, Volume 34, pp.111-117.

Kaplan, A., Skogstad, A., and Girshick, M. (1950) The Prediction of Social and Technological Events, *Public Opinion Quarterly*, Volume 14 Number 1, Spring, pp.93-110.

Kaplan, R. and Saccuzzo, D. (1989) *Psychological Testing: Principles, Applications, and Issues*, (2nd Ed), Brooks/Cole Publishing Co., California.

Kapoor, P. (1987) *A System Approach to Documentary Maritime Fraud*, Ph.D. Dissertation, Plymouth Polytechnic.

KCTA (2003) *Port Traffic Statistics*, Korea Container Terminal Authority.

Kent, R. (1993) *Marketing Research in Action*, London, Routledge.

Kent, J. L. and Parker, S. R. (1999) International Containership carrier selection criteria – Shippers/carriers differences, *International Journal of Physical Distribution and Logistics Management*, Volume 29 Number 6, pp.398-408.

Kidder, L., and Judd, C. H. (1986) *Research Methods in Social Relations*, New York: Holt, Rinechart and Winston.

Kim, Y. M. (1995) *A Study on the Perception of the Service Quality in Shipping Marketing*, PhD Dissertation, Korea Maritime University, Busan, Korea.

King, G., Keohane, R., and Verba, S. (1994) *Designing Social Inquiry: scientific inference in qualitative research*, Princeton University Press, U.K.

King, J. (1997) Globalisation of Logistics Management: present status and prospects, *Maritime Policy and Management*, Volume 24, Number 4, pp.381-387.

Korean Ministry of Maritime Affairs and Fisheries (2002) *The Handbook of Shipping Statistics*, Seoul, Korea.

Korean Statistics Office (2002) *National Statistics Handbook*, Korean Statistics Office.

Kotler, P. and Armstrong, G. (1991) *Principles of Marketing*, (5th Ed), Prentice-Hall, Englewood Cliffs, NJ.

La Londe, B. J. (1983) A Reconfiguration of Logistics Systems in the 80's: Strategies and Challenges, *Journal of Business Logistics*, Volume 4 Number 1, pp.1-11.

La Londe, B. J., Cooper, M. C., and Noordewier, T. G. (1988) *Customer Service: A Management Perspective*, Oak Brook, Ill.: Council of Logistics Management.

La Londe, B. J. and Mason, R. E. (1993) Some Thoughts on Logistics Policy and Strategies, *International Journal of Physical Distribution and Logistics Management*, Volume 23 Number 5, pp.39-45.

Langley, C. J. (1986) The Evolution of Logistics Concept, *Journal of Business Logistics*, Volume 7 Number 2, pp.1-13.

Lascelles, D. M. and Dale, B. G. (1989) The buyer-supplier relationship in total quality management, *Journal of Purchasing and Materials Management*, Volume 25, Summer, pp.10-19.

Levitt, T. (1983a) The Globalisation of Markets, *Harvard Business Review*, May-June, pp.92-102.

Levitt, T. (1983b) *The Marketing Imagination*, New York, The Free Press.

Levy, D. L. (1995) International Sourcing and Supply Chain Stability, *Journal of International Business Studies*, Volume 26 Number 2, pp.343-360.

Lewis, D. (1994) Freight Mode Choice: Air Transport versus Ocean Transport in the 1990's, *Flight Transportation Laboratory Report*, MIT, USA.

Lindman, H. R. (1974) *Analysis of Variance in complex experimental designs*, San Francisco: W. H. Freeman.

Linstone, H. and Turoff, M. (1975) *The Delphi Method: Techniques and Applications*, Addison-Wesley Publishing Co., Reading, MA.

Livingstone, G. (1992) Measuring Customer Service in Distribution, *International Journal of Physical Distribution and Logistics Management*, Volume 22 Number 6, pp.4-6.

Lloyd's List (1997) Quarterpoints: Are boxships heading for a crash in 1997?, 10 February 1997.

Lloyd's List (2001a) Foreign Exchange Rates Section, 01/05/01.

Lloyd's List (2001b) Foreign Exchange Rates Section, 01/06/01.

Lloyd's List (2001c) Foreign Exchange Rates Section, 01/07/01.

Lloyd's List (2002) Pair of hub ports is official aim, 21 August 2002.

Lovelock, C. H. (1983) Classifying Services to Gain Strategic Marketing Insights, *Journal of Marketing*, Volume 47, Summer, pp.9-20.

Lovelock, C. H. (1984) *Services Marketing*, Prentice-Hall, Englewood Cliffs, NJ.

Lovelock, C. H. (1991) *Services Marketing*, (2nd Ed), Prentice-Hall, Englewood Cliffs, NJ.

Lovelock, C. H. (1996) *Services Marketing*, (3rd Ed), Prentice-Hall, Englewood Cliffs, NJ.

Lu, C. and Marlow, P. (1999) Strategic groups in Taiwanese liner shipping, *Maritime Policy and Management*, Volume 26 Number 1, pp.1-26.

Ludlow, J. (1971) *The Delphi Method: A Systems Approach to the Utilisation of Experts in Technological and Environmental Forecasting*, Ph.D Dissertation, University of Michigan, USA.

Mahoney, J. H. (1985) *Intermodal Freight Transportation*, Westport: ENO Foundation for Transportation.

Marr, N. E. (1994) Do Managers Really Know What Service Their Customers Require?, *International Journal of Physical Distribution and Logistics Management*, Volume 24 Number 4, pp.24-31.

Martino, J. P. (1983) *Technological Forecasting for Decision Making*, American Elsevier, New York.

Matthews, S. (2003) Tale of the unexpected, *Lloyd's Shipping Economist*, July 2003, pp.7-10.

McConville, J. (1977) *The Shipping Industry in the U.K.*, Geneva: International Institute for Labour Studies.

McDougall, G. H. and Snetsinger, D. W. (1990) The Intangibility of Services: Measurement and Competitive Perspectives, *Journal of Service Marketing*, Volume 4 Number 4, pp.27-40.

McKnight, B., Meynial, P. and Snow, W. (1997) Shippers can capitalise on freight forwarder consolidation, *Transportation and Distribution*, February, pp.61-62.

McKnight, B., Reeve, J. and Lee, Y. (1997) Can Container Lines Make It As Global Logistics Service Providers?, *Transportation and Distribution*, Volume 34 Number 4, pp.34-40.

McKinnon, A., Button, K. and Nijkamp, P. (2002) *Transport Logistics*, Edward Elgar.

McLellan, R. (1997) Bigger vessels, *Maritime Policy and Management*, Volume 24 No 2, pp.193-211.

Mechance, D. (1989) Medical Sociology: Some Tensions about Theory, Method and Substance, *Journal of Health and Social Behaviour*, Volume 30 Number 2, pp.147-160.

Meier, R., Humphreys, M. and Williams, M. (1998) The Role of Purchasing in the Agile Enterprise, *International Journal of Purchasing and Materials Management*, Volume 34 Issue.4, pp.39-45.

Min, H. and Eom, S. B. (1994) An Integrated Decision Support System for Global Logistics, *International Journal of Physical Distribution and Logistics Management*, Volume 24 Number 1, pp.29-39.

Miner Jr, F. (1979) A Comparative Analysis of Three Diverse Group Decision Making Approaches, *Academy of Management Journal*, Volume 22 Number 1, pp.81-93.

Mintzberg, H. (1979) An Emerging Strategy of 'Direct' Research, *Administrative Science Quarterly*, Volume 24 (December), pp.582-589.

Mudie, P. and Cottam, A. (1993) *The Management and Marketing of Services*, Butterworth-Heinemann.

Muranaka, K. (1988) *Future Development in Container Liner Shipping*, Conference Report: International Symposium on Liner Shipping IV Bremen 1988, Institute of Shipping Economics and Logistics.

Murphy, P., Daley, J. and Hall, P. (1997) Carrier Selection: Do Shippers and Carriers Agree or Not?, *Transportation Research-E (Logistics and Transportation Review)* Volume 33 Number 1, pp.67-72.

Murphy, P. R. and Poist, R. F. (1996) Comparative Views of Logistics and Marketing Practitioners regarding Interfunctional Co-ordination, *International Journal of Physical Distribution and Logistics Management*, Volume 26 Number 8, pp.15-28.

Naert, P. A. and Leeflang, P. S. H. (1978) *Building Implementable Marketing Models*, Leiden/Boston: Martinus Nijhoff Social Sciences Division.

Nanus, B., Wooten, L. and Borko, H. (1973) *The Social Implications of the Use of Computers across National Boundaries*, AFIPS Press, New Jersey.

Nebenzahl, I. D. and Jaffe, E. D. (1995) Facsimile Transmission versus Mail Delivery of Self-Administered Questionnaires in Industrial Surveys, *Industrial Marketing Management*, Volume 24 Number 3, pp.167-175.

Nelms, K. and Porter, A. (1985) EFTE: An Interactive Delphi Method, *Technological Forecasting and Social Change*, Volume 28, pp.43-61.

Neuman, W. (1994) *Social Research Methods: Qualitative and Quantitative Approaches*, Boston:Allyn and Bacon.

Novack, R., Langley, C., and Rhinehart, L. (1995) *Creating Logistics Value Themes for the Future*, Council of Logistics Management, Oak Book.

Nunnally, J. C. (1978) *Psychometric Theory*, (2nd Ed), New York: McGraw-Hill Book Company.

OECD (1998) *Maritime Transport 1994-1996.*

Oliver, L. (1980) A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions, *Journal of Marketing Research*, Volume 42 Number 4, pp.460-469.

Oxford Advanced Learner's Dictionary of Current English (2000), edited by Wehmeier, S., (6th Ed), Oxford University Press.

Palmer, A. (1994) *Principles of Services Marketing*, London: McGraw-Hill.

Parasuraman, A. (1991) *Marketing Research*, (2nd Ed), Addison Wesley.

Parasuraman, A., Zeithaml, V. and Berry, L (1988) SERVQUAL: A Multiple-Item Scale for Measuring Customer Perceptions of Service Quality, *Journal of Retailing*, Volume 64 Number 1. pp.12-37.

Patton, M. (1990) *Qualitative Evaluation and Research Methods*, Newbury Park, CA: Sage Publications.

P&O Nedlloyd (2003) *Company Profile*, [Online] 01 September 2003. <http://www.ponl.com>.

Pearson, R. (1988) *Container Ships and Shipping*, Fairplay Publications Ltd.

Pedersen, D. (1992) *Qualitative and quantitative: Two Styles of Viewing the World or Two Categories of Reality?*, in Scrimshaw and Gleason, pp.39-49.

Perry, C. (1995) *How to Get a PhD*, [Online] 23 September 1997. <http://www.mcb.co.uk/imc/news/occpaper/cpindex.html>.

Peshkin, A. (1993) The goodness of qualitative research. *Educational Researcher*, Volume 22 Number 2, pp.24-30.

Peters, H. J. (2001) Developments in Global Seatrade and Container Shipping Markets: Their Effects on the Port Industry and Private Sector Involvement, *International Journal of Maritime Economics*, Volume 3, pp.3-26.

Phillips, D. (1971) Knowledge from What?, *Theories and Methods in Social Research*, Chicago: Rand McNally.

Port of Busan (2004) Internet Homepage, *www.portbusan.or.kr*

Port of Felixstowe (2004) Internet Homepage, *www.portoffelixstowe.co.uk*

Porter, J. (1998a) DSR-Senator starting critical recovery phase: New service schedules to improve port coverage and transit times, *Lloyd's List*, 21 January 1998.

Porter, J. (1998b) Global Lines in New Alliance: HMM, APL and Mitsui OSK set January 30 target, *Lloyd's List*, 23 January 1998.

Power, T. (2003) Lines' logistics ventures, *Lloyd's Shipping Economist*, July, pp.25-27.

Power, T. (2004) Two-way, *Containerisation International*, April, pp.51-53.

Raguraman, K. and Chan, C. (1994) The Development of Sea-Air Intermodal Transportation: AN assessment of Global Trends, *Logistics and Transportation Review*, Volume 30 Number 4, pp.379-396.

Redding, E. (1997) Hanjin leads the Korean challenge: Hanjin and South Korea enjoy heavyweight status in container shipping, *Lloyd's List*, 10 October 1997.

Reichardt, C. and Cook, T. (1979) Beyond qualitative versus quantitative methods, In: Cook, T. D. and Reichardt, C. S. eds. *Qualitative and Quantitative Methods in Evaluation Research*, Beverly Hills: Sage Publications, pp.7-32

Rich, N. and Hines, P. (1997) Supply Chain Management and Time-based Competition: The Role of The Supplier Association, *International Journal of Physical Distribution and Logistics Management*, Volume 27 Number 3/4, pp.210-225.

Richardson, H. L. (1999) OSRA makes waves, *Transportation and Distribution*, Volume 40, Issue 10, pp.27-30.

Robinson, P. J., Faris, C. W. and Wind, Y. (1967) *Industrial Buying and Creative Marketing*, Allyn Bacon Inc., Boston, MA.

Rochdale Report (1970) *Committee of Enquiry into Shipping*, Cmnd 4337, London HMSO.

Roscoe, J. T. (1975) *Fundamental research statistics for the behavioral sciences*, (2nd Ed), New York: Holt, Rinehart and Winston.

Rust, R., Zahorik, A. and Keiningham, T. (1996) *Service Marketing*, Harper Collins College Publishers, New York.

Ryoo, D. (1997) Korean Liner Shipping in the Era of Global Alliances, *International Association of Maritime Economists 1997 International Conference*, London.

Ryoo, D. and Thanopoulou, H. (1999) Liner Alliances in the Globalisation Era: A strategic tool for Asian container carriers, *Maritime Policy and Management*, Volume 26 Number 4, pp.349-367.

Sackman, H. (1975) *Delphi Critique: Expert Opinion, Forecasting, and Group Process*, D.C. Heath, Lexeington.

Sackman, H. (1976) A Sceptic at the Oracle, *Futures*, October, Volume 8 Number 5, pp.444-446.

Sarantakos, S. (1993) *Social Research*, Macmillan Education Australia Pty Ltd, Australia.

Saunders, M., Lewis, P. and Thornhill, A. (1997) *Research Methods for Business Students*, Financial Times Management.

Schary, P.B. and Skjott-Larsen, T. (2001) *Managing the Global Supply Chain*, (2nd Ed) Copenhagen Business School Press, Denmark.

Scheibe, M., Skutsch, M. and Schofer, J. (1975) Experiments in Delphi Methodology, In: Linstone, H. and Turoff, M. eds. *The Delphi Method: Techniques and Applications*, Addison-Wesley, Reading, MA.

Schirach-Szmigiel, C. (1979) *Liner Shipping and General Cargo Transport*, The Economic Research Institute Stockholm School of Economics.

Schneider, K. C. and Johnson, J. C. (1995) Stimulating Response to Market Surveys of Business Professionals, *Industrial Marketing Management*, Volume 24, pp.265-276.

Semeijn, J. and Vellenga, D.B. (1995) International Logistics and One-stop Shopping, *International Journal of Physical Distribution and Logistics Management*, Volume 25 Number 10, pp.26-44.

Sekaran, U. (1992) *Research Methods for Business: a skill-building approach*, (2nd Ed), John Wiley, New York.

Sekaran, U. (2000) *Research Methods for Business: a skill-building approach*, (3rd Ed), Wiley.

Sekaran, U. (2003) *Research Methods for Business: a skill-building approach*, (4th Ed), John Wiley and Sons, Inc.

Sharma, A., Grewal, D. and Levy, M. (1995) The Customer Satisfaction/Logistics Interface, *Journal of Business Logistics*, Volume 16 Number 2, pp.1-21.

Shneiderman, M. V. (1988) Empirical Studies of Procedures for Forming Group Expert Judgements, *Automation Remote Control*, Volume 49, pp.547-557.

Shostack, G. (1977) Breaking Free from Product Marketing, *Journal of Marketing*, Volume 41 Number 2, pp.73-80.

Smith, A. [1776] (1983) *The Wealth of Nations*, London : Penuin English Library.

Stake, R. (1995) *The art of case research*, Thousand Oaks, CA: Sage Publications.

Stanton, W. J. (1981) *Fundamentals of Marketing*, McGraw-Hill, New York.

Stationery Office (2001) *National Statistics U.K. Balance of Payments*, The Pink book 2001, London, The Stationery Office.

Stell, R. and Donoho, C. L. (1996) Classifying services from a Consumer Perspective, *The Journal of Services Marketing*, Volume 10 Number 6, pp.33-44.

Stern, L. W., Sturdivant, F. and Getz, G. (1993) Accomplishing Marketing Channel Change: Paths and Pitfalls, *European Management Journal*, Volume 11 Number 1, pp.1-8.

Stopford, M. (1988) *Maritime Economics*, Unwin Hyman Ltd.

Stopford, M. (1997) *Maritime Economics*, (2nd Ed), Routledge.

Sullivan, W. and Claycombe, W. (1977) *Fundamentals of Forecasting*, Reston Publishing Co., Reston, Virginia.

Tersine, R.J. and Riggs, W.E. (1976) The Delphi Technique: A Long-Range Planning Tools, *Business Horizons*, Volume 19 Number 2, April, pp.51-56.

Thorby, C. (2001) Value-added carriers, *Containerisation International*, April, pp.52-57.

Tiwari, P., Itoh, H. and Doi, M. (2003) Shippers' Port and Carrier Selection Behaviour in China: A Discrete Choice Analysis, *Maritime Economics and Logistics*, Volume 5, pp.23-39.

Tomlinson, D. S. (1996) New Directions in Shipping Policies of the EU and US, In: Korea Maritime Institute ed. *The Globalisation of Logistics Management and the Restructuring of Shipping and Port Industries*. 7th KMI International Seminar, Seoul.

Trace, K. (1997) Globalisation of Liner Shipping: Implication for Australia, *International Association of Maritime Economists 1997 International Conference*, London.

Tull, D. S. and Hawkins, D. I. (1993) *Marketing Research: Measurement and Method*, (6th Ed), Prentice-Hall.

Twede, D. (1994) Packaging, in *The Logistics Handbook* edited by Robeson, J. and Copacino, W., New York, Free Press, pp.443-462.

UNCTAD (1974) *Code of Conduct for Liner Conferences*, Chapter 1, United Nations.

UNCTAD (1997) *Review of Maritime Transport 1997*, United Nations.

UNCTAD (2000) *Review of Maritime Transport 2000*, United Nations.

UNCTAD (2001) *Review of Maritime Transport 2001*, United Nations.

University of Manchester (1994) *A Delphi Survey of Optimum Practice in Nursing, Midwifery and Health Visiting*, University of Manchester.

Van Maanen, J. (1979) Reclaiming Qualitative Methods for Organisational Research: A Preface. *Administrative Science Quarterly*, Volume 24 (December) pp.520-526.

Vellenga, D. B., Semeijn, J. and Vellenga, D. R. (1999) One-stop shopping for logistics services: a review of the evidence and implications for multi-modal companies, *Journal of Transport Management*, Volume 3, pp.31-58.

Walker, J. L. (1995) Service Encounter Satisfaction: Conceptualised, *The Journal of Services Marketing*, Volume 9 Number 1, pp.5-14.

Welty, G. (1974) Problems of Selecting Experts for Delphi Exercises, *Academy of Management Journal*, Volume 15, pp.121-124.

Webster's Dictionary (2002) Merriam-Webster Dictionary, [Online] 21 September 2003. <http://www.m-w.com/cgi-bin/dictionary>.

Wilder, C. (1996) IT plays key role behind the scene, *Information Week*, Issue 596, pp.168-170.

Williams, P. and Webb, C. (1994) The Delphi Technique:. A Methodological Discussion, *Journal of Advanced Nursing*, Volume 19 Number 1, January, pp.180-186.

Willmington, R. (2003) World fleet changes in December 2002, *Containerisation International*, February, pp.14-15.

Wiseman, F. and Billington, M. (1984) Comment on a Standard definition of Response Rates, *Journal of Marketing Research*, Volume 21, pp.336-338.

Witt, S. and Moutinho, L. (1989) Delphi Method Applied to Tourism, In: Witt, S. and Moutinho, L. ed. *Tourism Marketing and Management Handbook.*

Wood, D., Barone, A., Murphy, P., and Wardlow, D. (1995) *International Logistics*, Chapman & Hall.

Woudenberg, F. (1991) An Evaluation of Delphi, *Technological Forecasting and Social Change*, Volume 40 Number 2, pp.131-150.

Yamada, H. (1995) *Mechanism of the equilibrium of supply and demand in the shipping market. Part 2. Dynamic state of tonnage operating rate of shipping tonnage and basic unit of revenue/transport*, Japan Maritime Research Institute, Tokyo.

Yeong, Y., Kau, K. and Tan, L. (1989) A Delphi Forecast for the Singapore Tourism Industry: Future Scenario and Marketing Implications, *European Journal of Marketing*, Volume 23 Number 11, pp.15-26.

Yin, R. (1993) *Applications of case study research,* Beverly Hills, CA: Sage Publishing.

Yin, R. (1994) *Case study research: Design and methods* (2nd Ed), Beverly Hills, CA: Sage Publishing.

Yoshino, M. Y. and Rangan, U. S. (1995) *Strategic Alliances: An Entrepreneurial Approach to Globalisation*, Boston: Harvard Business School Press.

Zeithaml, V., Parasuraman, A. and Berry, L. (1985) Problems and Strategies in Services Marketing, *Journal of Marketing*, Volume 49, Spring, pp.33-46.