

**INTERNATIONAL FREIGHT TRANSPORT MULTIMODAL DEVELOPMENT
IN DEVELOPING COUNTRIES: THE CASE OF BANGLADESH**

by

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ABSTRACT

INTERNATIONAL FREIGHT TRANSPORT MULTIMODAL DEVELOPMENT IN DEVELOPING COUNTRIES: THE CASE OF BANGLADESH

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An efficient transport system is essential for an efficient supply chain to facilitate international trade. To utilise all cheaper resources, such as labour in Bangladesh, companies receive supplies from one country (e.g. in Hong Kong), produce the products in another country, and sell them in other countries (e.g. European countries). Thus the production and consumption has turned into a global activity with transport filling the gaps among them. To perform the transport function a carrier may require the use of more than one mode, the so-called multimodal transport. Multimodal transport, an integrated systems approach, can be defined as the most cost- and time-effective way of moving goods from shipper to consignee by at least two different modes of transport under a single contract. The system has been operating for more than three decades in developed countries, but in developing countries the transport system is still operating in a conventional fragmented way where modal integration has not been achieved. In particular the inland part of the international transport haul has appeared as a barrier to establishing an integrated multimodal transport system. In general, the transport systems in developing countries have failed to contribute to effective international supply chain.

Little research has been conducted in this field in developing countries, including Bangladesh. The present research attempts to fill this gap through a triangulation technique; an in-depth literature review of international freight transport of developing countries particularly Bangladesh and developed countries; two rounds of Delphi study among a Bangladeshi panel; and a quantitative study based on a survey. The research hypothesises that *'the extent to which a fragmented freight transport system can be transformed into an integrated multimodal transport system depends on the present state of the country'*. The validity of the hypothesis was established through triangulation. The research also found that there has been a significant freight transport multimodal development in Bangladesh but it has not been perceived by the stakeholders.

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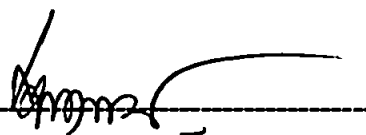
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List of Abbreviations

ADB	Asian Development Bank
AH	Asian Highway
ASEAN	Association of Southeast Asian Nations
ASYCUDA	Automated SYstem for CUstoms DAta
BBS	Bangladesh Bureau of Statistics
BIWTA	Bangladesh Inland Water Transport Authority
BIWTC	Bangladesh Inland Water Transport Corporation
CFS	Container Freight Stations
CIF	Cost, Insurance and Freight
CIWTC	Central Indian Water Transportation Corporation
CPA	Chittagong Port Authority
CPD	Centre for Policy Dialogue
ECMT	European Conference of Transport Ministers
EDI	Electronic Data Interchange
EOQ	Economic Order Quantity
EPZ	Export Processing Zone
ESCAP	(United Nations) Economic and Social Commission for Asia and the Pacific
EU	European Union
FCL	Full Container Load
FDI	Foreign Direct Investment
FMC	Federal Maritime Commission
FOB	Free on Board
GDP	Gross Domestic Product
GNP	Gross National Product
GSP	Generalised System of Preferences
GVW	Gross Vehicle Weight
HGV	Heavy Goods Vehicle
HS	Hub and Spoke
ICC	Interstate Commerce Commission (in the U.S.)
ICD	Inland Clearance Depot
IFFAB	International Freight Forwarder Association of Bangladesh
ILU	Intermodal Loading Unit
IMC	Intermodal Marketing Company
IMF	International Monetary Fund
INCOTERMS	International Commercial Terms
ITC	International Trade Centre
IWT	Inland Waterway Transport
JIT	Just-In-Time
LDC	Least Developed Country
L/C	Letters of Credit
LTL	Less than Truck-Load
MCA	Motor Carrier Act (in the U. S.)
MNCs	Multinational Companies/ Corporations
MOF	Ministry of Finance (Bangladesh)
MOS	Ministry of Shipping (Bangladesh)
MPA	Mongla Port Authority
MTO	Multimodal Transport Operators
NAFTA	North American Free Trade Area
NOC	No Objection Certificate
NVOCC	non-vessel owing common carriers
OECD	Organisation for Economic Co-operation and Development

PDC	Primary Data Collection
QR	Quick Response
RMG	Ready-Made Garments
SAARC	South Asian Association for Regional Co-operation
SAGQ	South Asian Growth Quadrangle
SCCI	SAARC Chamber of Commerce and Industries
SDC	Secondary Data Collection
SEM	Single European Market
SMEs	Small and Medium Enterprises
SOEs	State Owned Enterprises
SSP	Strategic Supplier Partnering
3PL	Third Party Logistics
TEUs	Twenty Feet Equivalent Units
UIRR	International Union of Combined Road-Rail Transport Companies
UNCTAD	United Nations Conference on Trade and Development
VAT	Value Added Tax
WMU	World Maritime University
WTO	World Trade Organisation

CHAPTER 1

INTRODUCTION TO THE RESEARCH

1.1 RESEARCH BACKGROUND

Today companies, including suppliers, manufacturers, intermediaries and customers, are following global production and consumption policies (Coyle et al., 2003). Another important feature, closely related to this policy, is the shift of traditional competition of 'company versus company' to a 'supply chain versus supply chain'. The companies in the supply chain are looking for 'competitive edge' to be reliable, cost and time effective in the increasingly competitive market place. Many companies are achieving a competitive edge by engaging an efficient transport and logistics services (Martin, 1998). On the other side of the coin, the advancement in transport, logistics and communication technologies has revolutionised total manufacturing, value adding and distribution, as well as the consumption process and the world has become 'virtually a global village' (Mooy, 1999). In this 'village' the producers, intermediaries, shippers and consignees, located often thousands of miles distant from each other, require efficient transport and logistics services to get the right product with the right quality and quantity to a right place within the right time and above all at a right price (Martin, 1998; Coyle et al., 2003). Thus the first and most important task for a transport carrier or a logistics service provider is to provide the best possible customer-oriented service for a well-balanced price and quality ratio (Wiegmans et al., 2001). As a result, the globalisation of trade is dependent on the transport system with factors such as quality, cost and time (Banomyong and Beresford, 2001).

Distance, among other factors, separates markets, manufacturers and suppliers in the supply chain (Zeng and Rossetti, 2003). Transport services bridge the spatial gap between various points. From an economic point of view, transport *'adds value to a company by creating time and place utility; the added value is the physical movement of goods to the place desired and at the time desired'* (Coyle et al., 1996 p.318). Apart from bridging the particular gap, it is also associated with the flow of information and cash transactions. In fact, transport and logistics excellence has become a prerequisite to achieving a world-class supply chain (Zeng and Rossetti, 2003). Transport is also viewed as a technological and organisational system with the aims of transferring goods and passengers from one place to another to balance the spatial and economic gap between demand and supply centres (Hayuth, 1987).

The international trade of not only Bangladesh but also of all countries, is playing an increasingly important role in the national economy. North America and Europe are the main export destinations of many developing countries including Bangladesh. The importers of these developed countries or regions follow modern logistics practices such as a just in time (JIT) inventory approach. Also the transport operators and logistics service providers offer efficient, integrated, reliable and door-to-door cost effective services. Generally transport is not a barrier to trade in these countries in contrast to the poor transport systems often found in developing countries (UNCTAD, 1994a). The situation, in particular in Bangladesh, is such that the transport and logistics services have appeared as a barrier, instead of being a facilitator, to national and international trade (The Daily Jugantor, 2004a; CPA, 1998; ADB, 2005). The manufacturers and traders of Bangladesh face transport and logistics related constraints and find it hard to maintain export schedules, profit margins and ultimately export markets (The Daily Jugantor, 2004b).

The uncertainty, unreliability and inefficiency of transport services in Bangladesh are derived from a range of sources. This includes weak infrastructure, lack of inland terminals or inland clearance (or container) depots (ICDs), ineffective government involvement in providing services (such as rail or port services), low investment in transport services by private parties, the cumbersome requirement of multiple documents (such as for customs and port clearance), inefficient customs procedures, rampant corruption, natural calamities and political infighting (Babul, 2000; Subramanian and Arnold, 2001; The Daily Star, 2004a; ADB, 2003). As in many other developing countries, Bangladeshi industrial, commercial and service sectors are characterised by small and medium sized enterprises (SMEs) (Dadzie, 1990). International trade for these SMEs could be easier and simpler through such services as consolidation in ICDs or logistics centres, pick-up or delivery services and through reduction and harmonisation of cumbersome and time-consuming paperwork. But the absence of ICDs not only restricts the use of door-to-door flexible and reliable services but also prevents transport operators from reducing empty hauls.

The freight forwarders or transport operators are restricted from offering time- and cost-effective and flexible freight rates for small shippers and also reduced packaging cost. UNCTAD (1994a) identified the following key areas for achieving trade efficiency: transport, customs, business information, business practices, telecommunication and information technology, banking and insurance. Trade barriers can be removed or at least reduced through a concerted effort on three fronts: a) action by the individual transport and logistics service providers and users (primarily private parties), b) action at the national level (by government and representative bodies), and c) action at the regional and international level (by international organisations such as the World Bank, UNCTAD (UNCTAD, 1994a). Improvement of these elements (shown in figure 1.1) would make an effective and efficient environment for trade and investment.

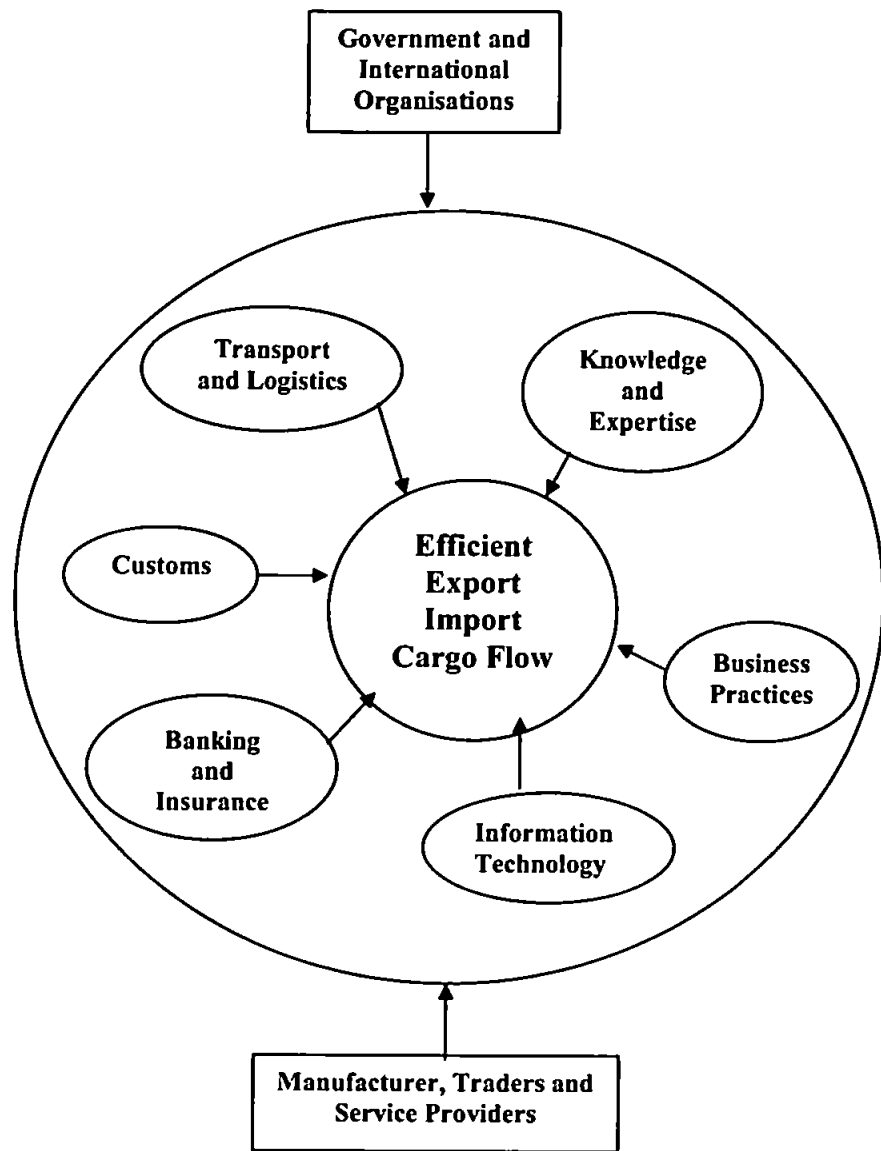


Figure 1.1 The elements of trade efficiency

Source: The Author

Any improvement in the transport system will have a significant impact on the economies of developing countries and the prosperity of their trade (UNCTAD, 1994a). Keeping this point in consideration, the present research focuses on freight transport multimodal development for international trade in developing countries, in particular Bangladesh. Multimodal transport can be defined as the most cost- and time-effective way of moving goods from shipper to consignee by at least two different modes of transport by a single operator under a single contract. Multimodal transport is sometimes termed as ‘intermodal transport’ in the U. S. and ‘combined transport’ in Europe. Some consider multimodal

transport as a 'technology' (Chowdhury, 1995; Fowkes et al., 1991), others as a 'service' rather than 'technology' (D'Este, 1996) while others consider it as a 'systems approach' to transport services (Hayuth, 1987). The present research prefers to adopt the last approach (systems approach). In principle a systems approach focuses on the overall interaction and achievement rather than on individual elements of a transport haul. Thus the aim is to operate the whole system effectively and efficiently, not just an individual element (Coyle et al., 1996).

1.2 MULTIMODAL TRANSPORT RESEARCH

Hayuth (1987) discussed the concept and practices of the multimodal transport system in general, whereas Fowkes et al., (1991) explored the intermodal freight market for road-rail services in Great Britain. Martin (1996) explored the growth of multimodal transport services in the context of developed countries such as the U. S. Konings (1996) investigated the developmental aspects of the 'integrated centres' to make the multimodal transport system time-, cost- and quality- effective with a particular emphasis on Rotterdam, The Netherlands. Nozik and Morlok (1997) also undertook a study to describe a model for medium term operations planning in an intermodal rail-road service.

ECMT (1998) assessed the state of multimodal transport in Europe. Stank and Roath (1998) performed a study on the North American shippers' desire for development of multimodal transport and logistics and their anticipated use of the system. There is an E.U.-U. S. forum represented by senior freight industry executives and government officials to review the development and necessity of intermodal transport system from the trans-Atlantic perspective (Eno Transportation Foundation, Inc, 1998; Eno Transportation Foundation, Inc, 1999). Muller, (1999) discusses the multimodal transport system in a

detailed textbook. Faber et al., (1997) worked on the legal context of multimodal transport. Ashar (1999) discusses briefly the revolutionary aspects of multimodal transport systems.

Buethel et al., (2001) examined the direct and cross-elasticity estimates of the demands of road, rail and waterways in a multimodal network model in the context of Belgium. Van Schijndel and Dinwoodie (2000) explored the potential of switching traffic from road to multimodal transport in the context of congestion-induced delays in the Netherlands. Banomyong, (2000) studied multimodal transport corridors in South East Asia with particular focus on the needs and issues of a land-locked country (Lao PDR). Subramanian and Arnold (2001) studied the sub-regional links in transport and logistics in South Asia consisting of Bangladesh, Bhutan India and Nepal and identified some critical impediments for alternative supply chain corridors. This study, as in Bangomyong, (2000) also focused on the issues and perspectives of land-locked countries or regions. Ockwell (2001) performed a study to develop a benchmarking methodology capable of examining the relationship between the efficiency of the ports and terminals and the efficiency of its intermodal linkages of road, rail and sea.

An OECD (2001) project explored the institutional aspects with the aim of comparing and assessing the impact of different organisational structures on transport planning and multimodal policy development. The focus of the study was the (European) governments rather than private parties. ESCAP (2001) reviewed the developments in transport and communications in general in the ESCAP region, which ranges from developed countries such as Australia to least developed countries such as Bangladesh, over the period of 1996-2001. The study included the multimodal transport system along with other elements. Saldanha and Gray (2002) studied the potential of British coastal shipping to be integrated in a multimodal door-to-door supply chain.

Relevant equivalent research specific to Bangladesh is practically non-existent. Chowdhury (1995) explored the potential of multimodal freight transport in Bangladesh and found that shippers are eager to adopt this system although the system has not been developed. However, the study could not identify the issues and dimensions of the system due to, probably, its limited scope as a Masters dissertation.

Thus, a review of available resources suggests that little research has been conducted on the multimodal transport system in the context of developing countries. In particular none of the above research works focused on identifying the issues and dimensions of freight transport multimodal development for overseas international trade of developing countries. So, the present study attempts to contribute to this under researched area.

1.3 AIM OF THE RESEARCH

Although the revolution of containerisation took place four decades ago and multimodalism has been developing for the past three decades, the transport system in developing countries is largely featured by conventional fragmented services (UNCTAD, 1994a). The development of transport systems in these countries has been occurring on a piecemeal basis in contrast to the requirements of multimodal transport, which is a systems concept. There is hardly any integrated system of transport or logistics for example in the South Asia or South East Asia region (Banomyong and Beresford, 2001). Limited research has been done, as discussed in the previous section, to identify the issues and dimensions of freight transport multimodal development in the developing countries. Thus the present study aims to aid government policy makers, academics, transport and logistics service providers and users to develop and adopt such a systems approach by achieving the following objectives:

- An appraisal and understanding of the issues, concepts, categories and dimensions of freight transport multimodal development in developed and developing countries, in particular Bangladesh, through an in-depth literature review.
- The identification of issues and dimensions of freight transport multimodal development by an exploratory Delphi study in Bangladesh.
- The identification of factors of freight transport multimodal development in developing countries.
- The creation of a multimodal ranking index and
- Recommendation of some priority actions for freight transport multimodal development in Bangladesh.

1.4 PROBLEMS OF DATA COLLECTION

Data collection in any field of research in developing countries is a troublesome and difficult task. The reliability, accessibility and availability of the data are always subject to questions and barriers. Moreover the present field of research (supply chain, logistics and transport) is almost unexplored in Bangladesh and even in some so called newly industrialised countries (Razzaque and Sirat, 2001; Banomyong, 2000; Razzaque, 1997; Chowdhury, 1995). The recent development of online publications of daily newspapers from Bangladesh has provided new sources of information, although this data must be used carefully in case of bias, particularly due to political affiliations. Also, some seminar papers were collected through friends or colleagues. Some people were reluctant to help in collecting data anticipating political or data protection constraints. Some materials are published by the Bangladesh government or related agencies. Information on other countries is collected primarily from published academic journal or books. An email

survey, supported by telephone, was adopted for primary data collection from Bangladesh and other developing countries, mainly for greater speed, lesser cost and higher reliability.

1.5 RESEARCH METHODOLOGY

The research is performed broadly in three stages applying so-called triangulation: an in-depth literature review, Delphi study and quantitative study. First, an in-depth literature review was conducted to understand the issues and concepts of freight transport multimodal development in the developed, developing countries and Bangladesh. As the topic is virtually unexplored with little research in Bangladesh, an exploratory study with two rounds of Delphi was performed with a Bangladeshi panel. This was followed by a quantitative study among experts and stakeholders from developing countries. Several data analysis techniques, including factor analysis and ranking techniques, were applied to the result of this study. The triangulation technique helped the research, first, to develop an in-depth understanding of the issues, second to identify the issues and dimensions of freight transport multimodal development in Bangladesh and third, to validate the issues, assumptions and hypotheses, as well as to find out the factors of freight transport multimodal development in developing countries. Finally, a multimodal ranking index was developed, within which Bangladesh could be placed.

1.6 STRUCTURE OF THE THESIS

The organisation of the thesis can be seen in figure 1.2. The first part of the thesis performs the literature review in chapters 2 to 5. Then the second part in chapters 6 to 8 performs the conceptual framework, research methodology and exploratory Delphi study to finalise the

issues or concepts of freight transport multimodal development. And then the third (final) part in chapters 9 and 10 performs the quantitative analysis, conclusions and recommendations.

Chapter 2 discusses containerisation and multimodalism, and definitions of multimodalism, intermodalism and combined transport. It then discusses limitations of multimodalism and issues relating to cargo handling, which may hamper the achievement of an integrated multimodal freight transport system

Chapter 3 reviews the literature on freight transport systems for international trade in developing countries including globalisation and competition; the role of government; changes in technology and methodology; standardisation; logistics concepts and practice and inland freight transport systems.

Chapter 4 reviews the literature on freight transport systems in Bangladesh for overseas trade including the economy and trade of Bangladesh, and the consequent demand for overseas freight transport. Then it looks at the inland transport system, seaports and inland terminals. It also discusses logistics practices and assesses public and private partnerships.

Chapter 5 reviews the literature on freight transport systems in Bangladesh for cross border trade. It examines bilateral and regional trade, the change in demand for regional freight transport, transport options, transport and logistics related constraints and facilities at border crossings.

Chapter 6 examines the concepts and best practices of international multimodal freight transport in the context of modern logistics management and the role of users and government.

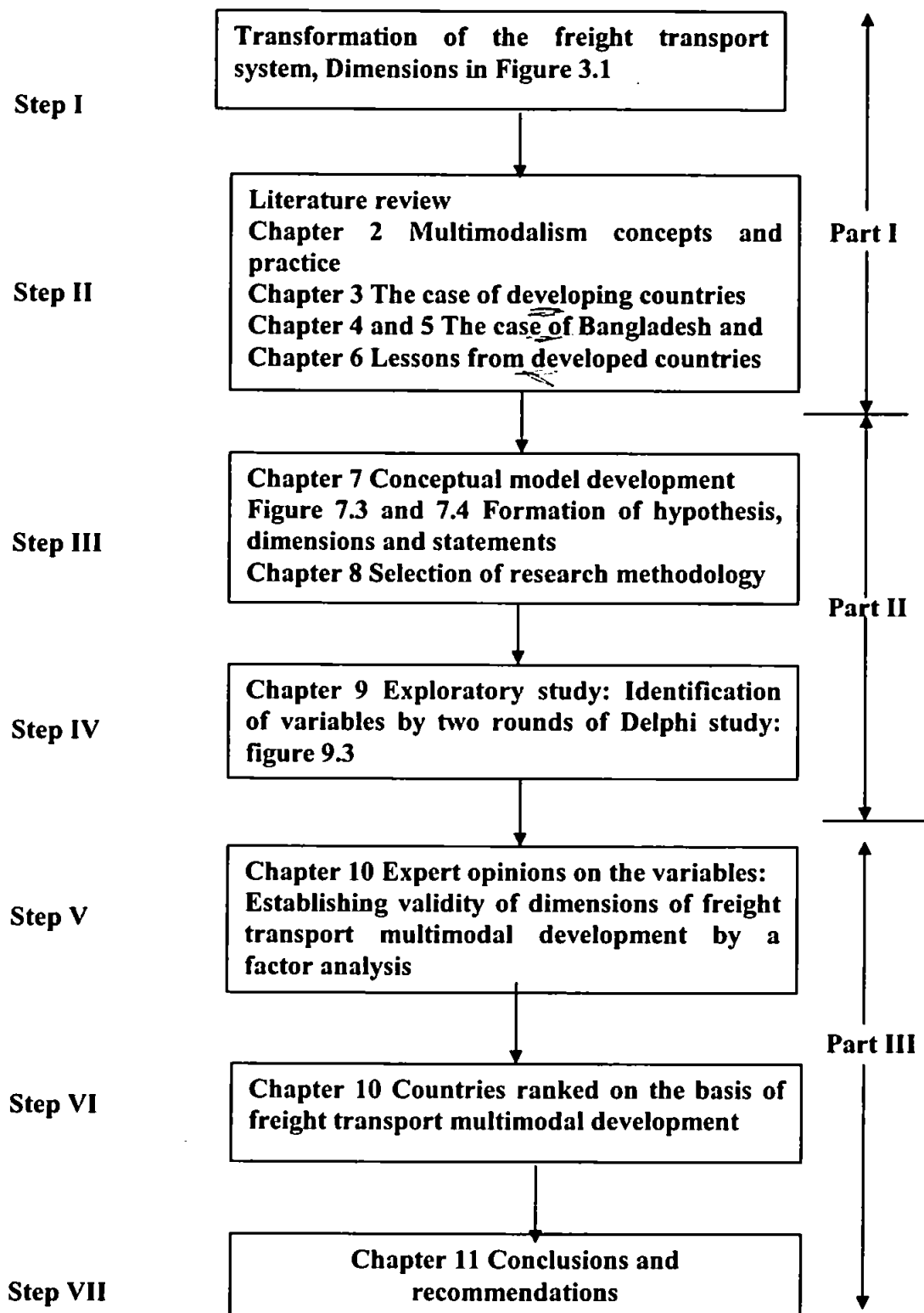


Figure 1.2 Organisation of the research process

Source: The Author

Chapter 7 summarised the findings of the literature review and then proposes a framework for the research for international freight transport multimodal development in Bangladesh.

Chapter 8 discusses first, the research methodology. Second, it discusses alternative methodologies for social research with a particular focus on the Delphi technique as the technique chosen for the exploratory part of the research. Then it discusses the data collection methodology including the reasons for using Email surveys.

Chapter 9 presents the findings of the Delphi study consisting of the Bangladeshi panel. It discusses first, the formulation of the questionnaire for the first round; second, the panel and process of the Delphi study; third, a comparison of the two-round of Delphi studies; fourth, the results of the first round; fifth, the results of the second round; sixth, the results of the Delphi study.

Chapter 10 presents the findings of the quantitative analysis. First, it briefly discusses the survey, second, respondents' profile, third, data manipulation and fourth, a reliability test to test the internal consistency of the issues. Then, fifth, a factor analysis is performed to find out the dimensions of freight transport multimodal development in developing countries. Finally, a ranking of freight transport multimodal development was produced using a number of techniques including ranking of survey scores, relative weights method, ratio method and a composite method. Thus the major constraints of freight transport multimodal development in Bangladesh are identified and priority actions to be taken are recommended.

Chapter 11 summarises the research findings and then portrays applicability of the research findings and finally, discusses the limitations and finally suggests future research areas.

1.7 OUTCOME OF RESEARCH

The research aims to build an in-depth understanding of the issues, concepts, categories and dimensions of freight transport multimodal development in developing countries in particular in Bangladesh. The research findings are intended to assist with the development of a 'systems approach' to multimodal freight transport in developing countries in general and specifically in Bangladesh. Thus, the government policy makers, academics, transport and logistics service providers are expected to benefit from the research.

CHAPTER 2

MULTIMODALISM: CONCEPTS AND PRACTICE

2.1 INTRODUCTION:

The availability of an efficient transport system in a country or region is a catalyst for its economic growth (Hayuth, 1987). The service quality of transport means affects transport and logistics related costs and also influences the demand for products (Coyle et al., 1996). The demand for increased productivity and efficiency of the transport industry has been heightened as the manufacturing and service sectors adopt such logistics concepts as “just-in-time” delivery and supply chain integration, and by the shift towards a global economy, competition between supply chain versus supply chain (instead of company versus company), e-business and e-commerce. In such a situation mode-specific segmental approaches are no longer able to meet effectively the needs of shippers and manufacturers (OECD 2001). Containerisation involves improving the quality of handling and transfer of general cargo in transit moving by road, rail or ship, but multimodalism integrates the modal transport function under one operator from factory door to factory door. This chapter considers containerisation and multimodalism, and definitions of multimodalism, intermodalism and combined transport. It then discusses limitations of multimodalism and issues relating to cargo handling, which may hamper the achievement of an integrated multimodal freight transport system.

2.2 CONTAINERISATION AND MULTIMODALISM

Containerisation is defined as a method of distributing or transporting merchandise in a standard unit, thereby supporting an inter-modal transport system involving combinations of road, rail and maritime modes (Branch, 1994). The most important recent technical developments in transport, especially ports and shipping, were containerisation and unitisation in the 1960s. This revolution replaced the centuries old traditional break-bulk line shipping or port with traditional jetty and labour intensive handling of cargo, by unitised or palletised transport and transfer of cargo. General cargo is transferred onto a standard unit such as a pallet and placed in a standard container. Palletisation involves loading small packages onto a plate-like pallet for easy and safe stacking and handling (Stopford, 1997). It reduces packing, facilitates stowage, mechanises the cargo handling technique using the pallet truck and forklift truck or even hand forklift (Branch, 1994).

Containerisation has greatly improved the performance of modal transfer of general cargo, but in terms of the origin-to-destination transport haul containerisation is not enough to meet today's business need, and containerisation and intermodalism are not synonymous terms (Muller, 1999), although intermodalism can be seen as a natural continuation of containerisation (Hayuth, 1987). When container movement becomes a dominant technique in the general cargo trade and transport, the intermodal transport network becomes effective and expands (ECMT 2001). In other words containerisation or unitisation is a first step to achieving a multimodal transport system (see figure 2.1), because the degree of achievement of multimodalism is proportionate to the door-to-door movement of the cargo unit without or with minimum intermediate transfer of cargo. Table 2.1 shows the basic ten elements of containerisation and intermodality to distinguish them from each other. Most of the elements of containerisation emphasise technical requirements whereas the elements of intermodality put focus on an integrated system

approach. By adopting these elements an interoperable system can be achieved. For international freight transport involving maritime transport we need to understand three basic concepts: port-to-port, port-to-point and point-to-point (Coyle et al., 1996). Port-to-port refers to the transport of goods between two ports; port-to-point refers to the transport of goods between a port and final inland destination; and point-to-point implies transport from shipper's door to customer's door. Point-to-point transport of goods is the characteristic of intermodalism (Coyle et al., 1996).

Containerisation	Intermodalism
1. Unitization	1. System concept
2. Standardisation	2. Management and co-ordination
3. Cellular ships	3. Control over cargo
4. Roll-on/ roll-off vessels	4. Mergers
5. Gantry cranes	5. Multi-modal companies
6. Straddle carriers	6. Modal integration
7. Specialised terminals	7. Through rates and billings
8. Ship-to-shore productivity	8. Information system
9. Terminal back-up land	9. Physical distribution
10. Multi-rate structure	10. Deregulation

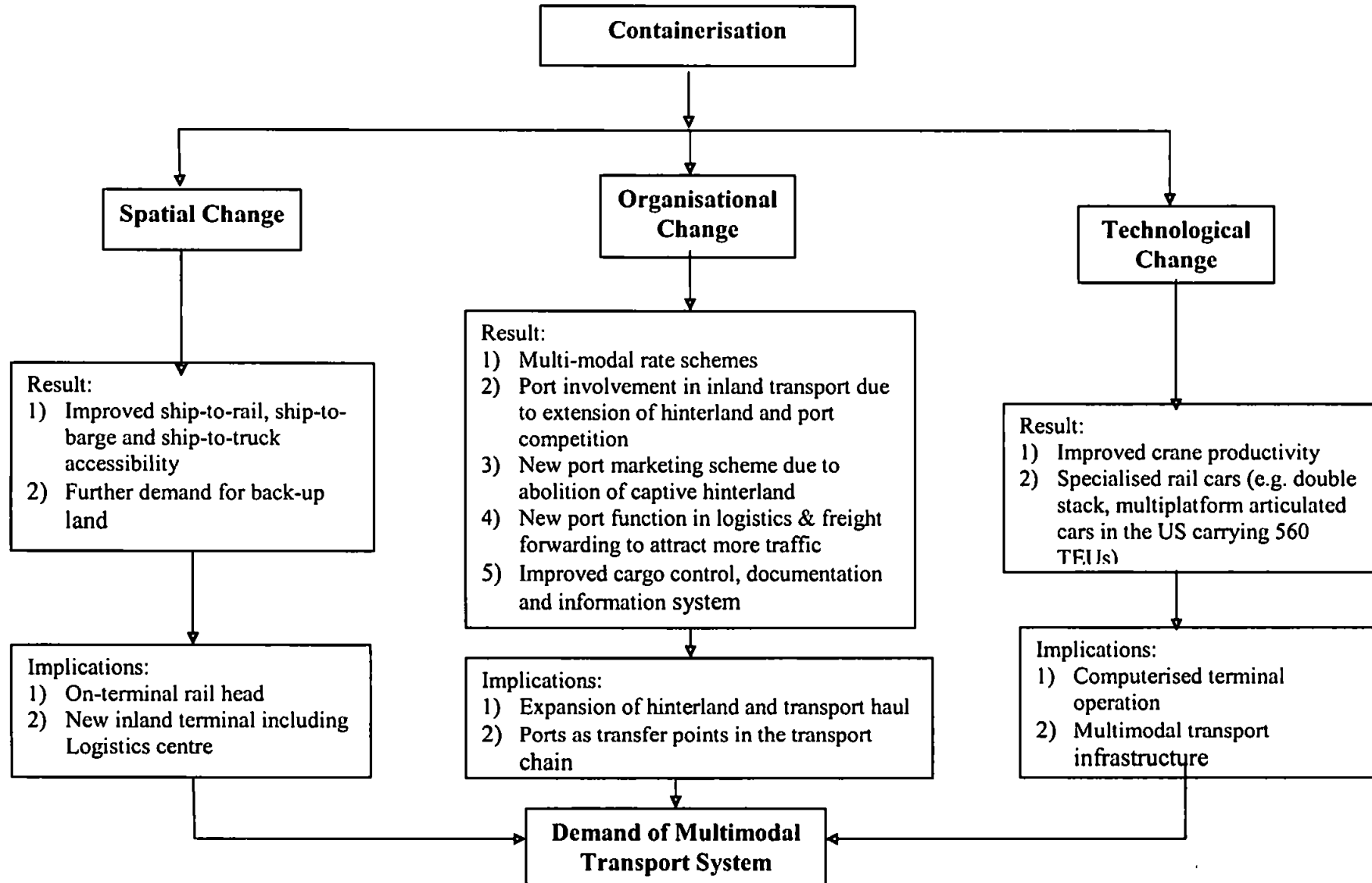
Table 2.1 Elements of containerisation and intermodalism

Source: Hayuth, (1987 p.14)

2.3 MULTIMODALISM, INTERMODALISM AND COMBINED TRANSPORT

Multimodal transport is defined as the carriage of goods by at least two different modes of transport (Intersecretariat Working Group on Transport Statistics, 1997). UNCTAD (1995), states that the concept of international multimodal transport covers the door-to-door movement of goods under the responsibility of a single contract. Muller (1999 p. 3) uses the term 'intermodal freight transportation' and defines it as 'co-ordinated, seamless,

Figure 2.1 The impact of containerisation on the freight transport system (adapted from Hayuth, 1987 p. 67)



flexible, and continuous from door-to-door on two or more transportation modes'. Defining multimodal transport may not be so difficult but the problem starts when we try to distinguish from other types of carriage. Multimodal transport is the opposite of unimodal transport, which is the transport of goods by one mode of carriage by one or more carriers, for example, carriage by truck (Wit, 1995). 'Definitions of intermodalism usually concentrate on operational aspects and transport infrastructure. However, successful intermodal transport also requires a conducive administrative and legal environment, and efficient interchange of information' (D'Este, 1996 p 4). UNCTAD (1990 p6) defines a multimodal transport operator (MTO) as 'a carrier who offers a package including not only transport, handling, and storage of goods, but also full responsibility from the origin to destination on the basis of a single MT (Multimodal Transport) contract'. Ockwell (2002 p 3) defined an intermodal system 'as those activities that occur between the point at which cargoes are consolidated (into container) and the point at which they are deconsolidated'.

The terms multimodal, intermodal, and combined transport are often used synonymously to mean the transport of cargo by two or more modes. Although these terms are used in an interchangeable fashion, it might not be correct in many cases (Institute of Logistics, 1994). The term 'intermodal' is more used in the U.S., with a higher degree of the achievement of the integrated system compared to that in Europe and other parts of the world, and also more and more is being used in Europe and Australia and in various academic journals, books, research publications of organisation such as OECD and ECMT, whereas the term 'multimodal' is more used by UNCTAD and in the developing countries and in Europe as well. For transport policy purposes the ECMT restricts the term combined transport to cover: 'Intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final leg carried out by road are as short as possible' (Intersecretariat Working Group on Transport Statistics, 1997 p. 2). Thus

we can probably assume that multimodalism is an intermediate stage on the way to achieving full intermodalism. However, from now on we will use the word 'multimodal' rather than intermodal or combined transport.

Multimodalism, as a tool, offers shippers a greater choice of cost control, flexibility, competition, reliability and, above all, a one-stop service. It has, on the one hand, lowered costs by enabling shippers to select combinations of modes that offer the most efficient, and perhaps less expensive service. On the other hand, it has forced carriers to lower costs through rates and improved service (Muller, 1999). A high level of managerial control and rigid structuring of the cargo flow are needed to achieve greater efficiency and reduce transport and logistics costs (Hayuth, 1987). Thus multimodal transport is at the heart of trade and provides the arteries through which freight moves efficiently and cost-effectively across oceans, along coastal and inland waterways, through ports and terminals, on rail and by highways, and economic growth could not be sustained without such a transport method (OECD, 2001). For long distance shipments to meet shippers' demand for low cost and faster service markets the motor carriers and railroads have formed partnerships in the U.S. By doing so, railroad¹ multimodal traffic is growing. A new type of transport company called a multimodal (intermodal) marketing company (IMC) is working on behalf of rail, by soliciting multimodal traffic from shippers for rail (Coyle et al., 1996).

Although over the years rail traffic in Europe has been declining, rail multimodal transport has shown constant growth rates (Burkhardt, 1999). Over the past ten years, the volume of multimodal transport via rail in Europe has risen at an annual rate of around 10% (Akyuz, 1998). An important objective of adopting multimodal transport in the European context is shifting traffic from highly congested road to rail or in some cases to water. The creation of

¹ The term 'railroad' refers to railway in the U.S. and also sometimes in Europe

the single European market (SEM) and the more recent single European currency has increased trade opportunities and thereby more movement of cargo. Congestion on main trunk roads in Europe is common and the number of accidents is rising, despite efforts to educate drivers (Simon, 1996). Adding more freight to the roads would create further difficulties, particularly with respect to environmental deterioration and providing enough new road capacity to meet demand, not to mention worsening standards of performance in freight services (delivery delays for example) (Cooper et al, 1994).

2.4 LIMITATIONS OF MULTIMODALISM

As with other systems international multimodal transport systems are limited in their application. For example, all goods are not technically and economically transferable from road to this system (Burkhardt, 1998). A study performed by A. T. Kearney of Brussels found that long-distance routes with high traffic volumes have the biggest potential for multimodal transport (ECMT, 1998). Moreover it requires transfer of goods from one mode to another in seaports and multimodal terminals. Containerised ports and special terminals with back-up facilities and skilled manpower are essential to perform such transfers. So, multimodal freight transportation is capital intensive and less skilled labour intensive than traditional freight handling methods (Muller, 1999). Rail transport is only cost-effective for longer transport hauls whereas in Europe more than 80 percent of the transport volume is moved on distances shorter than 150 km (details discussed in chapter 6). Thus for short distances rail (unimodal) transport or rail multimodal transport is not a cost-effective alternative (Seeck and Vanroye, 1999). The prospect of multimodal transport in Europe is further hindered by the use of different non-ISO containers or cargo units such as swap body (there are different sizes as well). Another important limitation of multimodal transport is the lack of willingness to co-operate and co-ordinate among the

carriers of different modes. Success is highly dependent on, among others, the higher degree of co-operation and co-ordination among parties concern. But in the competitive market the reality is such that 'when one carrier can transport the commodity the entire distance over its own lines, the carrier is hesitant to co-ordinate with other carrier' (Coyle et al., 1996 p. 339).

2.5 CARGO HANDLING AND TRANSFER

Until containerisation was achieved, cargo handling, whether in factory, warehouse or in transit, was labour intensive, costly, time consuming and above all prone to damage, delay or loss, including pilferage. One of the important objectives of containerisation was to protect cargo from loss, damage and delay. For the first time the transport of raw materials, intermediate or finished products was viewed as part of an integrated material handling operation and the industry think-tank understood the potential for improving productivity by investment in technology (Stopford, 1997). So, American and later European ports, terminals, transport modes and means, experienced massive investment in the 1960s and 1970s. The manufacturing industries interfacing with such cargo handling technology and methodologies also faced changes. Table 2.2 shows some twenty principles of efficient material handling.

Return on capital is always a crucial issue for any investment decision. This is even more important in investment in ports and terminals where it is termed a 'sunk investment'. Containerisation has opened the door to port and route choice. So, strong competition amongst ports and terminals has resulted in the concept of the hub and spoke port systems, and ports are under tremendous pressure to upgrade and expand facilities with such items as modern gantry cranes and require extensive back-up land (Eno Transportation Foundation, Inc., 1999).

Principles	Material handling
Planning	Plan all material handling and storage activities to obtain maximum overall operating efficiency
System approach	Integrate as many material handling activities as is practical into a coordinated operations system covering vendor, storage, receiving, production inspection, packaging, warehousing, shipping, transportation and customer.
Material flow*	Provide an operation sequence and equipment layout that optimises material flow
Simplification*	Simplify handling by reducing, eliminating or combining unnecessary movements and or equipment.
Gravity utilisation*	Utilise gravity to move material wherever practical
Space utilisation*	Make optimum use of the building cube
Unit size	Increase the quantity, size or weight of unit loads or their flow rates
Mechanisation	Mechanise handling operations
Automation	Provide automation that includes production, handling and storage function
Equipment selection*	In selecting handling equipment, consider all aspects of the material handled- the movement and the method to be used.
Standardisation*	Standardise handling methods, as well as types and sizes of handling equipment
Adaptability*	Use methods and equipment that adapt to the widest variety of tasks and applications, except where special purpose equipment is justified
Deadweight	Reduce the ratio of mobile handling equipment deadweight to load carried.
Utilisation	Plan for optimum utilisation of handling equipment and labour
Maintenance	Plan for preventative maintenance and scheduled repairs of all handling equipment
Obsolescence	Replacing obsolete handling methods and equipment with more efficient methods or equipment will improve operations
Control	Use material handling activities to improve control of production, inventory and order handling
Capacity	Use handling equipment to improve production capacity
Performance	Determine handling performance effectiveness in terms of expense per unit handled
Safety	Provide suitable methods and equipment for safe handling
N.B. Principles marked (*) deserve special emphasis	

Table 2.2 Principles of efficient materials handling.

Source: Coyle, et al., (2003) p. 313

A case study of the largest ports in the U.S. revealed deteriorating economic performance, mainly because of apparent diminishing returns on investment. Experts identified two causes: lack of growth in productivity in the use of a terminal's revenue-earning facilities (lift per acre), and the lack of the growth in facility pricing commensurate with investment

costs (Ricklefs et al, 1999). Under such a situation a study conducted by the U.S. Department of Transportation's Maritime Administration covering the period 1985-94 recommended 'the future growth of most ports will have to be funded through taxes and sources other than port revenues' (Ricklefs et al, 1999), justifying the funding for infrastructure development by government.

Thus another important issue is the source of funding for the huge investment in ports, terminals and inland transport networks such as road or rail to make them suitable for container movement and transfer. Although this may not be a problem for developed countries like the U. S., most developing countries rely on external funding from sources such as the World Bank or Asian Bank. Another important issue is investment in technology change: whether to adopt 'intermediate' or 'high' technology. Whereas the investment in 'high tech' gantry cranes for Singapore port may be justifiable to sustain its competitive position as a global 'hub port' such technology might not be justifiable in a developing country's port such as Chittagong port due to, amongst other factors, skilled manpower shortages and employment opportunities.

2.6 CHANGING INTO A MULTIMODAL TRANSPORT SYSTEMS

These changes have affected all three components of the international freight transport system including inland transport involving pick-up and delivery at both ends of the journey, ports and terminals, and maritime or air transport. A conventional modal transport system can be transformed into a multimodal transport through the three types of change summarised in Table 2.3.

Type of change	Seaport/ Terminal	Inland Transport	Maritime Transport
Spatial	Extension of hinterland, new terminal with back-up land, ship-to-shore-to-inland transport accessibility, ICDs	Operation beyond seaports, change of traditional trade centres, door-to-door service	Operation beyond seaports, variety of routes and port of call
Technological	Gantry crane, straddle carrier, computerised terminal operation, EDI facility, reduced labour & new skill.	Specialised, large, high speed carriers, & new skill	Specialised, large, & high speed vessel/ carrier, skilled and reduced manning
Organisational	CFS service, through rate scheme, logistics concepts, involved in inland transport, port marketing.	Innovative logistics management, CFS service, through-rates.	Innovative logistics management, land side transport management, through-rates.

Table 2.3 The transformation of freight transport systems

Source: Adapted from Hayuth, (1987) pp 64-67

2.6.1 Spatial Change

The spatial change in a seaport includes bigger berthing facilities and terminals, back-up land, and improved access to inland transport modes with extended hinterlands. Spatial change in an inland transport system results in a change of production or trade centre from traditional riverbank to an inland industrial and commercial area. To serve these commercial enterprises inland clearance depots (ICDs) are established at a suitable point connected with transport and other networks including the Internet. The ICDs are served with Customs facilities, sheds and accommodation for stuffing and unstuffing for less than container load (LCL). Thus the ICDs have taken over the traditional role of seaports. The transport service providers operate services beyond the port terminal and from door-to-door. The spatial change in maritime transport has resulted in a change of routes and ports of call and operation beyond port-to-port limits. The change cannot be effective without transport infrastructure such as improved road, rail, waterways, and communication networks as well as inland ports or terminals or depots.

2.6.2 Technological Change

Technological change has changed the cargo handling methodology in ports, terminals, warehouses and factories world wide and made operations capital intensive. It was discussed earlier that investment in technology is costly. The problem becomes more acute due to lack of funds needed for developing terminals with container handling equipment such as gantry cranes, straddle carriers, computerised terminal operations, EDI facilitation and skilled manpower. Technological change has affected inland transport systems and includes specialised, large high-speed carriers such as block-train, container barge or high-cube truck. The main challenge for the transport or logistics service providers lies in the necessity of skilled and knowledgeable manpower and the vision to look at how other parts of the multimodal transport system (e.g. maritime transport) are responding to the change. The technological change in maritime transport has resulted in the operation of specialised (such as cellular container vessel), large (such as ships of 7500 TEUs capacity), and high-speed ships (such as 28 knot roll -on-roll off ships), with skilled and reduced manning.

2.6.3 Organisational Change

Organisational change includes co-operation among operators including those of inland terminals, ports, transport service providers, freight forwarders to introduce through-rate schemes, stuffing and un-stuffing services, and port marketing to ensure passage of cargo through a port. Good port facilities are not enough today to attract cargo unless one can move goods into or out of the port smoothly without any delay (Speece, 1995). The organisational change also includes partnership with other operators and updated logistics concepts and knowledge of more than one mode of transport. An increasing the number of endpoints served in a hub and spoke (HS) network can be a profit-enhancing strategy and

larger HS networks provide cost benefits that translate into higher traffic and lower fares throughout the network. Larger HS networks bring demand benefits, which in turn might translate into more decisive competitive advantage and potential greater market power (Nero, 1990). Freight consolidation, along with many other value adding activities in ICDs or logistics centres, reduces the costs by transporting several small shipments to a common destination as a single load, rather than separately. These cost savings result from the spreading out of fixed costs over larger load sizes or from obtaining freight rate discounts for tendering a large shipment (Higginson, 1995).

2.7 SUMMARY

Unitisation including containerisation and palletisation aims to reduce time, and cost for handling or transfer of cargo, as it reduces the intermediate loading or unloading of cargo. This is a first step towards achieving a cost and time effective transfer or movement of cargo. However, this is not good enough to meet today's business challenge, as it is a segmental approach in the context of using more than one mode of transport. A modern supply chain needs an efficient transport system, which is capable of integrating all parties along the supply chain from shipper's premises to consignee's premises under a single operator's responsibility or contract. To achieve such a system three types of changes are essential in the three components of international multimodal transport involving maritime transport. As the multimodal transport system involves modal transfer, the handling or transfer of cargo from one mode to another, remains a crucial issue in providing a low cost, speedy and reliable service.

CHAPTER 3

INTERNATIONAL FREIGHT TRANSPORT SYSTEMS IN DEVELOPING COUNTRIES

3.1 INTRODUCTION

The economic growth of a country is dependent on external exchange with other countries (Sharif, 1986), requiring an integrated, co-ordinated, seamless, flexible, reliable and door-to-door transport and logistics service (Muller, 1999). Such an ideal service rarely exists. Development in this field takes years. For example, the multimodal transport system has developed in the U.S. over the last four decades through changes in many areas or dimensions and the transport system of a developing country also needs to progress through these changes. Containerisation has existed for four decades and multimodalism for three decades, but in many countries a very restricted form of fragmented transport still exists. As a result transport and logistics costs form up to 30 per cent of the delivery cost of a product of many developing countries whereas this cost is as low as 9.5 per cent in developed economies (Roberts, 2004). In this chapter we will discuss the transport and logistics system in developing countries examining their freight transport system, globalisation and competition, government role, changes in technology and methodology, standardisation, logistics concepts and practice, and inland transport system.

3.2 FREIGHT TRANSPORT SYSTEMS IN DEVELOPING COUNTRIES

3.2.1 Present Freight Transport System

Traditionally analysis and research in the field of freight transport look at the different freight elements of a supply chain on an individual modal basis, with only a few focusing on the intermodal supply chain (Ockwell, 2001). Moreover, according to Hilling, 1996 (p.1) *'large parts of the Third World are characterised by lack of year-round mechanised transport and movement is by unreliable, high cost, labour-intensive methods'*. Carriers are mostly single-mode and performing the transport function in a conventional method. Very little co-operation and co-ordination exists among the carriers of *'road, rail and inland waterways transport services and of services crossing the boundaries of neighbouring countries'* (UNCTAD, 1994a p.19). From an organisational point of view this may be termed as a *'fragmented freight transport'* system. Transport infrastructure is weak, capacity constrained and also inadequate and poorly maintained. Moreover there is lack of transport management skills and resources to upgrade the transport and logistics system (Hilling, 1996; Simon, 1996).

The poor inland transport system compels the international shipping lines to transport only from *'port to port'* or *'port-to-point'* instead of *'door-to-door'* as in developed countries. Ports and terminals are built with conventional jetty/piers and handling equipment and as a result, the ships calling at such ports need to be equipped with gear. A number of services including warehousing, stuffing and unstuffing are mainly performed within the port area. The loading/ unloading process is mainly dependent on the output of unskilled people. Transport service providers concentrate on only one mode and do not have, in most cases, knowledge of other modes of transport. They are unaware of the latest logistics concepts and the ever-changing requirements for international and national trade and investment.

They are not trained to handle unitised or more specifically containerised cargo. Moreover government regulations and controls restrict the inland movement of containers (UNCTAD, 1994a). Sufficient information about multimodal freight rates or transit time is not available to shippers or consignees. Transport providers are unable to offer tracking and tracing services and in most cases have limited access to information technology such as electronic data interchange (EDI) or email. These factors are more crucial to small and medium size traders because the managers do not have the necessary knowledge and skill and they do not produce enough cargo to have leverage on transport decisions. On the other hand the large traders or industries often have their own transport and logistics department with necessary skills and are able to produce truck load cargo (UNCTAD, 1994b).

3.2.2 Freight Transport Multimodal Development

During the last half century the maritime transport system has experienced rapid changes (Hayuth, 1987), which can be classified into two broad categories: evolution in the growth of ship and port size, and revolution in the system of linkages. The first revolution was in the ship-to-shore transfer i.e. containerisation; the second was in the ship-to-rail transfer i.e. intermodal (or multimodal) revolution (Ashar, 1999). The practice of using more than one mode of transport in a co-ordinated and seamless way can be termed as multimodal transport (D'Este, 1996). The concepts and practice of multimodalism are discussed in more detailed in chapter 5.

Freight transport multimodal development requires, apart from operational and infrastructural features, a conducive administration and legal environment, and efficient interchange of information (D'Este, 1996). Developing such an integrated transport system

is challenging in particular in developing countries. The challenges can be categorised and discussed in six major areas: globalisation of trade and investment, the role of government, new technology and methodology, standardisation, changes in logistics concepts and changes in the inland transport system (Islam and Gray, 2003).

3.3 GLOBALISATION AND COMPETITION

Globalisation, among other factors, has forced as well as enabled companies to be competitive, extend markets and get supplies from worldwide sources (Zeng and Rossetti, 2003). Globalisation focuses on achieving 'one village' i.e. a border-less world in terms of trade and investment (Zinn, 1999) and has extended its arena by including the flow of information as well. Today successful multinational companies (MNCs) develop their products in the U.S. and Europe and manufacture them in developing countries and then sell them worldwide (Zeng and Rossetti, 2003). Thus, globalisation has had a great impact on freight transport systems, because international trade, financial flows, foreign direct investment (FDI) and other forms of transborder linkages among private firms have become the main features of globalisation (UNCTAD, 2000a).

The argument for free trade was based on the considerations of specialisation and international division of labour (Foster, 2003). In contrast, geographical and institutional divisions affect the construction of infrastructure, availability of transport networks and options, the operation of the transport service and thereby its quality (Reynaud, 1998). These features can measure the level or degree of attachment of any country to the global village. Because of a dependence on global production and consumption as well as global competitiveness, trading companies are constrained in terms of transport by factors such as transit time, transport cost and costs from loss, damage and delay. The cost of transport is

generally relatively higher in developing countries (UNCTAD, 1994b; Roberts, 2004). Industries in developing countries have to operate with highly inefficient transport systems and thereby lowering the competitiveness of their products in the global market (Gulyani, 2001; ADB, 2003). Nevertheless, globalisation has increased prosperity and the potential for developing countries. At the same time it has raised the risk of marginalization. For example, the income gap within and among the countries has widened, and the number of people living in poverty has increased. Asymmetries and imbalances in the international economy have been intensified (UNCTAD, 2000b). The challenge associated with globalisation for developing countries is discussed under the following headings: globalisation versus regionalisation; challenges in transformation of economy; local entrepreneurial skill; political influence on trade and investment; and trade barriers.

3.3.1 Globalisation versus Regionalisation

Although multilateralism is probably the most efficient, fairest and effective way for global growth, many countries have grouped themselves into regional trading blocs e.g. the European Union (EU) and the North American Free Trade Area (NAFTA). Such associations are based on geographical proximity, although not exclusively, and often may be perceived as an extended 'home' or 'domestic' market. The regional groupings are creating special links between states and greater openness (Reynaud, 1998). The object of creating trading blocs is to form larger markets but also to increase competition for business among firms (Zinn, 1999). Most industrial and developed countries in the world are members of a regional integration agreement, and some even belong to more than one (The World Bank, 2000). The formation of blocs helps to promote and maintain economic as well as political stability (Subrmanian, 1999), and there are now more than 23 trading blocs representing about half of the world's population and four-fifth of its trade (Muller,

1999). There is a growing world-wide consensus on the economic and political advantages of trading blocs (Zinn, 1999), although not all regional blocs are doing well. For example, the South Asian Association for Regional Co-operation (SAARC) offers little in trade or investment access beyond what they offer to all other countries (Page, 2000). *'Any analysis for expanding trade and economic progress in South Asia must begin with the recognition and concern that the share of SAARC countries in total world trade today is still less than 1%, and that intra- SAARC trade, despite all efforts on SAFTA tariff concessions, remains a meagre 3% of their total world trade. This compares poorly with 63.4% for intra-European trade (EU), 37.2% for North America (NAFTA), 38.4% for East Asian (ASEAN)'* (SAARC Chamber of Commerce and Industry, 2001a p.4).

3.3.2 Local Entrepreneurial Skill

According to Schumpeter *'the function of entrepreneurs is to reform or revolutionise the pattern of production by exploiting an invention or - more generally – an untried technological possibility for producing a new commodity or producing an old one in a new way, by reorganising an industry and so on'* (Wiegman et al., 2001 p.400). Globalisation has positive and negative effects on developing countries. Unlike the industries of developed countries, such countries are characterised by small-scale enterprises (Dadzie, 1990; Jiang and Prater, 2002). But globalisation has also helped improving some economies, with big companies moving from high to low cost countries (Harding, 2003). For example, the Chinese and Indian economies are growing fast and many multinational companies are moving from developed country to developing country e.g. from Great Britain to India (e.g. call centres). Thus the companies in developing countries are compelled to be innovative and competitive. However, failure to see the benefits of modern management restricts the entrepreneurial skill of companies in developing

countries, and puts them at risk of losing markets. Ready-made garment (RMG), the only successful manufacturing sector of Bangladesh, consists of entirely private sector entrepreneurs. Even the entrepreneurs themselves did not understand the intricacies and nuances of this complicated tightly scheduled export business (Quddus, 1993). In general it is reported that none of the Bangladeshi local partners of joint ventures with foreign investors are successful and all of them have been involved in some kind of dispute (The Daily Star, 1997b). The poor operating performance of local companies, as in Bangladesh, discourages foreign direct investment. Only an improvement in the entrepreneurial skill of local companies would probably attract more foreign investment than tax concessions or other incentives (The Daily Star, 2001a). The transport sector is organised along traditional modal lines, which results in an absence of entrepreneurial spirit at the interfaces of different transport modes (Wiegmans et al., 2001). The innovativeness of the transport industry compared to other industries is below the national level as a whole (Bilderbeck, et al., 2003).

3.3.3 Political Influence

The volatility and unpredictability of the political climate increases firms' investment risks. Political decisions, events or activities in a country may affect the trade and investment environment so that investors feel that there is risk of losing money or not making a profit (Hong et al., 1999). This is true in many developing countries including Bangladesh. Although her economy has been opened for international finance capital since the mid 1980s, little success in terms of trade and investment has been achieved. Investors are deterred, among other reasons, by infighting among the political parties (World Socialist Web Site, 1999a). There were only 13 foreign companies in the national economy of Bangladesh whereas in Vietnam 1544 foreign companies were working in year 2002

(UNCTAD, 2003a), although Vietnam has accepted globalisation more recently than Bangladesh. Strong political influence also becomes a barrier to normal commercial system development. For example a seminar disclosed the fact that among 150 loan cases, 80% were approved through political influence (The Daily Star, 2000a).

As the labour unions are aligned according to the national political parties, in many cases the working environment is hampered. For example, 30,000 people hold labour identity cards from different labour unions in Chittagong port. These union cards are freely tradable and command a price of up to US \$7,000, the equivalent of three years or more in wages from port employers. The number is so many that if the port is full of ships and working maximum gangs, there are so many labourers that each could only work one shift in eight days (The Shipping Times, 1998). Moreover, the port has been turned into a 'hot-bed' of trade union activities, with frequent incidents of labour unrest (The Daily Star, 1997c). The situation is so bad that the speakers at a conference stressed the need for freeing Chittagong Port from political programmes to ensure normal activity (The Daily Star, 2000b). Such political unrest and instability create barriers to trade and investment in developing countries (World Socialist Web Site, 999b). This is, probably, one of the main reasons why ten countries (China, Mexico, Singapore, Malaysia, Brazil, Indonesia, Argentina, Poland, Bermuda, Hungary) achieved 82% of the total FDI inflows to developing countries between 1991 and 1996 (Radosevic, 1999).

3.3.4 Trade Barriers

Apart from the above problems, tariff and non-tariff barriers work against the smooth flow of international trade and investment. For example, authorities may use non-tariff barriers such as the requirement of sanitary and Phytosanitary measures, certification about seafood safety and quality (Ruckes, 1998). The Government's main responsibility should be to

ensure that standards and technical regulations do not create unjustifiable trade barriers (Foreign Trade Information System, 1997). The elimination of non-tariff trade barriers during the transport of goods across international borders is crucial to transport cost and time reduction, and thus has become an important issue in trade agreements; bilateral, multilateral or regional. For example, the North American Free Trade Agreement (NAFTA) has explicit language to eliminate entry barriers for foreign trucks entering the United States and it was intended that most of the entry barriers were to be eliminated within ten years of the signing of NAFTA (Jones, 1999). The *WTO Trade Facilitation Symposium*, held in 1998, identified a number of areas where traders face obstacles when moving goods across borders which are mentioned below:

- Excessive documentation requirements;
- Lack of automation and insignificant use of information technology;
- Lack of transparency; unclear and unspecified import & export requirements;
- Inadequate procedures, especially a lack of audit based controls and risk assessment techniques;
- Lack of modernisation of, and co-operation among customs and other government agencies, which thwarts efforts to deal efficiently with increased trade flows (World Trade Organisation, 2000a).

3.4 THE ROLE OF GOVERNMENT

We have already discussed trade barriers in the previous section, which can be removed or eliminated gradually by government in steps. For example in the case of bilateral trade both governments (through their Customs authorities) may agree to allow movement of goods across a border with or without certain documents or may share information on imports or exports. Such an agreement and arrangement will reduce the presence of

barriers. Thus the transport system would become more time and cost effective. In this section we will restrict the discussion to the deregulatory role of government. Other roles of government will be discussed in chapter 5.

3.4.1 Deregulation and Privatisation

It is claimed that state ownership and operation are inefficient, bureaucratic and prone to corruption and that private firms do a better job than state ones (Simon, 1996). Transformation from controlled-market to market-economy involves eliminating non-economic activities and restructuring the economy (Chikan, 1996). Privatisation, transfer of ownership of commercial and economic enterprises from public to private, is dependent on suitable regulation and the government takes responsibility for creating such regulation within an institutional framework (Paliwala, 2001). A suitable regulatory and institutional framework can encourage first local and then foreign investors. But deregulation may become ineffective due to, among other reasons, the slow pace of privatisation such as in Bangladesh (WTO, 2000b). Although consecutive governments in Bangladesh have followed an open market economy, there were 40 state owned enterprises (SOEs) in 2001 (Ministry of Finance 2001). Under the category of SOE, public bodies and corporations incurred a cumulative net loss of TK. 67234.6 million over the period 1992/2000. This does not include the losses incurred by government organisations such as railways, telephone and telegraph, postal department and state owned financial institutions (The Daily Star, 2001b).

Many transport services were offered by government agencies, including developed countries, some years ago. It is widely accepted that the private sector is best at offering services with commercial value. So, privatisation and deregulation have been adopted as

the process of economic reform in developed countries (e.g. British Airways in the 1980s and British Rail in the 1990s) as well as in developing countries (e.g. Mexico) or countries in transition (e.g. Poland, Hungary). Deregulation or liberalisation refers to the relaxation and /or removal of regulations and restrictions on economic activity imposed by government (Simon, 1996). It removes barriers such as regulations designed to protect the public sector to create a more competitive market. In a deregulated market companies are able to compete with each other in a free and fair environment (Bamford, 1995) and the production capability and operational efficiency of enterprises are improved through competition.

Liberalisation has also laid the foundation of a restructuring of previously domestic-market-oriented FDI to the direction of regionally-oriented corporate networks (Radosevic, 1999). Privatisation has become a vital instrument for increased foreign trade, and higher levels of inward investment from large multinational companies (MNCs) in many developing countries e.g. Brazil and Argentina (Ward, 1999). The global investors invest where a liberal regime exists. Thus privatisation has become an essential element of globalisation (Paliwala, 2001). The privatisation of public corporations enabled FDI inflow into Latin America to grow 22.7% to US\$ 90.48 billion, exceeding investment in East Asia (US\$ 63.59 billion) in 1999 (Japan External Trade Organisation, 2001). FDI increases financial resources for investment, enhances technological capabilities, boosts export-import competitiveness, and generates and upgrades employment (UNCTAD, 1999). In many developing countries FDI has strengthened economic growth and stability and thus they have evolved towards a developed economy and have generated interest in investment decisions of multinational corporations (MNC) (Hong et al., 1999). It is very important that the host country's government creates an appropriate environment for FDI. For example, measures taken by the Malaysian government created an environment for international trade and investment (Fossey, 1998).

Although the average annual inflows to developing countries rose globally by 3.5 times (compared to inflows to developed countries of only 1.3 times) in the period 1985-96 the investment was concentrated in only a few countries or regions. FDI operates unevenly, produces simultaneous regional, country and sector-specific integration as well as marginalization (Radosevic, 1999). None of the South Asian countries, including Bangladesh, fall in this category. Countries with open financial sectors have typically grown faster than with closed regimes, except in the case of China, which is now becoming more liberal.

3.4.2 Deregulation in the Transport Sector

Some argue that government should play a central role in the development of an efficient transport system (Hooper, 1997). Others argue that government's function is to govern and that traders should do business and provide services. The national transport policy has to cover regulatory as well as deregulatory aspects to facilitate trade, investment and transport. Regulation in the transport sector may take the following forms (Hindley and Smith, 1986):

- Control of the rates charged by utilities;
- Control of entry into and of rates charged in various modes of transport;
- Control by licensing and / or numerical restriction of entry into many professional and other services;
- Government ownership and control of communications and media;
- Detailed supervision of the structure and practice of firms in the financial sector.

3.4.3 Policy Formation

Formation of a comprehensive deregulatory policy to facilitate investment and trade, and thereby transport, is a great challenge for the government of developing countries. It has been already mentioned that the transport infrastructures in developing countries are weak, inadequate and insufficient and thus services are very poor. So, any transport sector policy is likely to have a major objective to develop transport networks, increase capacity (e.g. road width and load bearing capacity) so that services may get extended, expanded and have improved quality (Oster and Strong, 2000). Privatisation in the transport sector is often part of national policy. The process of restructuring, privatisation and deregulation encounters many problems and barriers and formulating a long-term policy is just one of them. Some argue that the Ministry of Transport (or equivalent name) has the duty of creating a long-term policy covering ports, water, rail, road, air and urban transport. In many countries (e.g. Bangladesh) transport ministries or departments are mode-specific (e.g. Ministry of Shipping). Thus how can a policy for multimodal transport be adopted and implemented? Optimists argue that the interested private parties (e.g. the shippers' council or association for freight forwarders) should take the initiative and encourage governments to adopt an appropriate policy. In such cases there is a strong need for an environment of public-private partnership. This means that private bodies will complement, not compete with the government's efforts and show initiative. Some also argue that although the ministry ought not to engage in operational activities such as offering the services of a market economy, the ministry must be ready to interfere wherever and whenever needed (Rydzkowski and Spraggins, 1994).

Service operation by government bodies often lacks commitment and a commercial attitude, which is a great barrier to achieving an efficient, reliable and door-to-door transport service. To continue such status some argue that to encourage multimodal

transport development it is not necessary to run such services profitably. From a global perspective the transport services must be ready to compete not only in the national market but also in the international market. Some experts believe that ownership and operation of transport infrastructure as well as services in some cases (e.g. rail and ports) tend to be a natural monopoly and destructive and wasteful competition must be avoided through outright privatisation. Transport service and infrastructure is being deregulated following the successful examples in developed countries. However, it must be noted that the deregulation policy of the U.S. or Europe may not be appropriate for a developing country like Bangladesh. For understanding the situation of a particular country some examples of country specific deregulation are discussed in chapter 5.

3.5 CHANGES IN TECHNOLOGY AND METHODOLOGY

The methodology and technology for transport and handling of cargo has been changing through such methods as containerisation and multimodal transport since the 1960s (Yetgin, 1998). Ever changing technology has become an unavoidable fact for developing countries and the freight transport sector has required new equipment such as gantry cranes instead of conventional ship to shore cranes. Technology change has revolutionised the transport system (also discussed in section 3.8). Ships are getting bigger and more specialised with technology-based operations. The traditional port with a jetty is being replaced by a containerised port. Even inland transport modes and terminals are not spared from such revolution. For example the traditional river ports and rail terminals based on labour intensive cargo handling are being replaced by crane-based operations. Even cargo centres are being moved from the centuries-old tradition of river-bank to remote inland destinations connected by good road infrastructure. Costly but technology-based tractor-trailers are replacing conventional trucks.

3.5.1 Inland Terminals and Clearance Depots

There are three types of network in a transport chain: a collection network, a transport network and a distribution network (ECMT, 2001). An efficient inland terminal or ICD or logistics centre is not only a prerequisite for the integration of a container port and hinterland network but also for the development of multimodal door-to-door transport and logistics services. In a conventional transport system a seaport occupies a central role whereas in an origin-to-destination transport system a multimodal freight terminal takes over the central position (Wiegmans et al., 2001). Another important aspect of this change of method is that a large share of cargo represents either small or less than truckload (LTL) shipments. Many shippers in developing countries produce small consignments and thus the need for such logistics centres, in the form of a hub, with such value adding activity as consolidation, packing, transshipment according to market needs etc. in developing countries, is even stronger than in developed countries (Coyle, 2003; Simon, 1996). The lack of ICD restricts door-to-door services for these shippers (Babul, 2000). In contrast the concentration of high-volume trunk lines between ICD and major market centres allows deeper penetration of containers and introduces direct competition between not only transport operators but also between ICDs.

3.5.2 Technology Transfer

Technology change can be demand driven (e.g. containerisation in the U.S.) or by pressure from outside (e.g. containerisation in developing countries to sustain a place in international trade and investment). The new technology is generally imported from developed countries to developing countries, as in the case of containerisation. The

suitability and transferability of new technology is one important element for importing new technology transfer policy for developing countries. Implementing new technology is time consuming, costly and risky because of the tightening of intellectual property rights and control over technology, which have greatly reduced the possibilities for easy transfer and use of technology in developing countries (Radosevic, 1999). Another challenge for developing countries is the constraints on funding in a context of fast changes in technology. In developing countries it takes two or three years or even more to arrange funds for a development project. On the other hand within three or four years a newly produced computer becomes technologically old. New technology comes into the market long before the expiration of the economic life of existing technology. Thus, although technological change decisions should be purely on the basis of economic and performance advantage, the choice, timing, scale of introduction, and utilisation of old as well as new technology is becoming more difficult and challenging for developing countries (Frankel, 1991).

Finally, the acquisition or set-up costs of new technology are very high and capital intensive for a freight transport system. To cope with containerisation for international trade, developing countries need to equip their ports with appropriate terminals and equipment. Meanwhile the industrialised nations and big shipping lines are pushing towards the introduction of larger non-ISO containers, which will require new equipment and also the expansion of locks and bridges.

3.5.3 Information Technology

Information flow, discussed in detail in section 3.6.2, is one of the three types of flow for international trade. The flow of information has become as important as the flow of cargo

itself. In the age of agile manufacturing, a quick flow of information is a precondition for success. Many companies today are facing competition in terms of value (of products or services) and speed. Both sensitivity of market and quick response ability are important conditions that help companies to succeed (Li and Wu, 2003). Businesses need information on the day-to-day price of products or raw materials, but also on tracking and tracing services while in transit, and news about the arrival of cargo at destination. Even before exporting or importing a consignment the related parties exchange information many times. For example, the buyer wants a quotation of the price. The seller wants to know the opinion or decision of the buyer. They may engage in bargaining and fixing other terms such as international commercial terms (INCOTERMS). It may be convenient to publish information online to reach to every customer anywhere in the world. Information technology has accelerated the flow of documents and information for the international freight transport industry in the recent decades. For example, fax, electronic data interchange (EDI), e-mail, the Internet, satellite tracking and electronic commerce are increasing the movement of information even faster than the movement of cargo. For example, EDI improves trade efficiency by reducing delays, eliminating sources of error and increasing the possibilities for processing at all points in the information circuits being established (UNCTAD, 1994a).

The need for EDI or email is even more necessary in developing countries where the postal service is unreliable such as Bangladesh. The integration of the supplier, customer and service provider's computer systems also strengthens the operational bond between them and thus increases the client's confidence. In the absence of an information gap it becomes difficult for either party to break off the relationship suddenly (McKinnon, 1999). Computing skill in the context of small firms, a common feature in developing countries, is a special necessity of using information technology (Ndubisi and Jantan, 2003). Intermodal transfer points such as ports and terminals are important points of information flow and

their success largely depends on the information system they have. But many developing countries have failed to connect their ports and customs and other related organisations with EDI (ADB, 2003)

Recently published statistics show per head or per square km telephone density (landline) is very low in most developing countries (UNCTAD, 2003b). Producers or traders and consumers have limited access to such online services and are therefore restricted from the benefits of the Internet and other information technology, and have to rely on the physical mail service (mostly provided by a public organisation), which is unreliable and uncertain. The manufacturing cycle, procurement, distribution, and cost of inventory (investment and maintenance) at different stages can be shortened or reduced if the companies along the supply chain could implement a quick response system with effective information (Li and Wu, 2003). Another problem is that the management of SMEs in developing countries have little knowledge of the benefits of using modern information systems.

3.6 STANDARDISATION

In the context of multimodal freight transport systems we will restrict discussion to two types of standardisation: 1) standardisation of cargo units and 2) standardisation of flows of information or documents.

3.6.1 Cargo Unitisation

‘Modularity, interchangeability, and interoperability were the characteristics desired in setting the standards. 10-, 20-, 30-, and 40-foot lengths and an 8-foot width were the basis

for the organisational ISO standards. Today, 20-, 30- and 40-foot lengths have become the norms. To height, 8 feet and 8.5 feet, have become standard, and a new height of 9.5 feet is increasingly seen' (Eno Transportation Foundation, 1999 p.10). Standards can help businesses achieving economies of scale. Transport companies can reduce the transfer cost by using standard units (Eno Transportation Foundation, 1998). The facility providers (e.g. terminal operators) also can acquire and operate facilities with comparatively less cost. However, the stakeholders must achieve consensus on the use of standard dimensions to achieve the benefits of cargo unitisation.

The main objective of containerisation, faster transfer of cargo units without intermediate handling (stuffing or unstuffing) of cargo, cannot be achieved unless there is a standard unit. The equipment of terminals has to be capable of handling the unit quickly and the carrier has to utilise its space to lower the cost of transport. But standardisation associated with container movement has presented a big challenge. Because firstly, although containerisation has been imported into developing countries by the economic interests of foreign trade partners, it has failed to penetrate to inland destinations (De Castro, 1999). Secondly, although international container movement is subject to the standard container dimensions mentioned before, there are non- ISO-containers with different dimensions operating within regions. In North America high cubes (45ft, 48 ft, 53 ft long containers) are quite normal whereas in Europe there are swap-bodies, similar to containers but differing in dimensions (13.6 m and 7.82 m long) and operations (can be loaded or unloaded from either side) (Brodie, 1996; Commission of the European Communities, 2003). Some shipping lines have introduced non-ISO-size containers. Truckers have also shown interest in increasing the length and height of containers to improve truck utilisation (Hayuth, 1987). The main argument for introducing a higher intermodal loading unit (ILU) is to utilise the inner space of the container by placing three pallets of 1.2 m x 0.8 m size or two pallets of 1.2 m x 1.2 m size (Commission of the European Communities, 2003). The

introduction of over-size containers necessitates huge investment in infrastructure, container terminals, depots, roads, bridges, container trailers, wagons etc. The extension of ISO-container types puts developing countries at a disadvantage, because in most developing countries ISO series 1 containers have been the basis for large-scale investment in infrastructure, rolling stock and handling equipment (Huigen, 1996), and they are not capable of investing in the ever-changing technology.

3.6.2 Flow of Information

Multimodalism is not only the movement of cargo over more than one transport mode, but also the interchange of information necessary to make these movements effective. In a multimodal transport system goods move so fast that they sometimes arrive before the arrival of the documents and therefore EDI has become an essential part of the system (Muller, 1999). Due to improvements in trade procedures it is now possible to “detach” the documents from the goods in question and to transfer them on the new electronic media developed over the past few decades (UNCTAD, 1994b). Due to the necessity of frequent and numerous flows of information or documents, international trade and transport are very paper intensive areas. However, in all types of trade the basic transaction is the same (Sauna-Aho, 1998 p. 3):

- The buyer requests a price quote for the goods (invitation tenders);
- The seller quotes the buyer a price;
- The buyer places an order on the basis of the quote;
- The seller or the buyer arranges the transport of the goods;
- The seller supplies the buyer with the goods;
- The buyer pays for the goods.

Continuous flow of information has become as important as the physical movement of cargo itself. The buyer, seller and carrier are considered the main parties in such a transaction. But, to complete the transaction a number of parties e.g. banks, insurance companies, freight forwarders, terminal operators, port authority, customs at both ends and customs agents, ships agent (when using international shipping lines) etc. appear on the scene. It is estimated that *'there are 20-27 parties per transaction' and 'a trade transaction involves 26-34 basic documents, with transport accounting for 12-14 of these or more than 40% on average'* (Sauna-Aho, 1998 p.2). The multiple entry of the same data and the transmission of a large number of documents results in not only higher cost and longer time, but also increases the risk of errors. The dream of non-paper trade documentation dates back long before the Internet appeared as a commercial entity in the 1990s (Lloyd's Shipping Economists, 2000).

'The legislation and rules governing trade allow a partner to demand certain documents. If the partners who are using EDI trust each other, however, they may agree that some documents will not be used. When this happens, the number of overlapping documents can be reduced' (Sauna-Aho, 1998 p.3). One country can reduce the requirement for documents by changing the rules and legislation for domestic trade. Import and export declarations account for a large number of basic documents. So, for international trade and transport, co-operation among parties is needed (Sauna-Aho, 1998).

To achieve a paperless transaction a common standard for recognising inter-flow of information is essential. As yet there is no standard format for EDI to be used world wide, and regionally developed formats have appeared e.g. in the U.K. Tradacoms, in the U.S. ASCX12, and in the mainland Europe Odette (Mulligan, 1998). International harmonisation of EDI messages is a problem and these important aspects of international trade are in transition. The first step is the regional development of EDI standards and then

the development and use of one global standard or UN/EDIFACT. This global standard is expected to accelerate the use of electronic communications within the various functions including transport, customs, finance, insurance (Mulligan, 1998). Developing countries are facing big challenges to use information technology including accessibility or availability, cost and developing a standard format.

There is an opinion that EDI is best suited to multinational companies. They can tie subsidiaries across international borders or to freight forwarders who have a large portion of their business with one customer located in a foreign country and where EDI and system integration are seen as major benefits (Mulligan, 1998). On the other hand the small or medium sized companies and freight forwarders of developing countries are restricted in their use of EDI. The main problem is that although electronic shipment information resembles the bill of lading issued by the ocean carrier, for legal reasons electronic communiques have not yet replaced the actual bill of lading (Muller, 1999), although in developed countries electronic commerce now carries the same weight in terms of legal status as documents (The Guardian, 2000). The legal aspect of EDI faces more questions in developing countries where the shippers or consignees, as well as transport service providers, are not fully aware of the latest contribution of technology and rely on hard documents.

3.7 LOGISTICS CONCEPTS AND PRACTICE

Logistics is a new concept in developing countries such as Bangladesh and the management of manufacturers, intermediaries and logistics service providers do not yet understand the necessity and application of modern logistics concepts (Chowdhury, 1995). Logistics is even an emerging discipline in many newly industrialised countries such as

Malaysia and Singapore (Razzaque, and Sirat, 2001). There is also a difference between the perception and actual development of transports and logistics systems (Brooks, 1998). With globalisation and advances in technology, among other advances, the focus of freight transport networks has shifted from the mode-specific to the organisation of distribution. The importance of individual modes has been diminished in favour of the management of the total supply chain, which in some circumstances has become more important than even producing a transport service (Thanopoulou, 2000). Today logistics consists of strategically managing the movement and storage of materials, semi-finished and finished product inventory along the supply chain from suppliers, between enterprise facilities and of customers (Gulyani, 2001). Enterprises adjust logistics systems to match factors such as freight cost, time, cost from damages and losses incurred in transit, total inventory cost including stock out cost, ordering or overhead costs and packaging cost. A poor transport system requires a company at origin, in transit, or at destination to increase the total inventory level of raw material, intermediate as well as finished product resulting in higher cost or 'stock out' cost, and the ordering and overhead cost associated with managing flow because of inadequate and inefficient transport service (Gulyani, 2001).

Unlike developed nations, the logistics system tends not to be smooth or efficient in developing countries. The logistics cost, one important item of the service sector, is very high (also mentioned in section 2.1) in developed countries (Roberts, 2004). However, in some countries, such as Malaysia, the service sector has emerged as the largest sector in the economy, contributing 52.4 percent to GDP (in contrast to manufacturing sector's 33.4 per cent) and 48.6 percent to total employment in 2000 (China-asean business net, 2004). The employment in the service sector, 70 per cent in 2001, in South Korea is even higher than in Malaysia. In contrast only 19.5 per cent was in the manufacturing sector. The service sector, which contributed 51 per cent to the GDP in 2003 of the Indian economy, is also propelling double-digit GDP growth (The Hindu Business Line, 2004). These data on

newly industrialised or emerging countries probably indicate that the focus of the economy has changed from the manufacturing to the service sector.

Generally the productivity of the developing countries' service industry is low and growth in productivity is slow. For example, productivity growth in the Korean service industry increased only two per cent per year between 1971 and 1988. This was relatively low compared with manufacturing, which gained three per cent per year in productivity during the same period (Noh, 1999). In fact a country needs to achieve higher growth in the service sector than manufacturing for economic take-off and then for sustainability (The Hindu Business Line, 2004). So these examples suggest that the developing economy needs to transform step by step from the low-value-adding agriculture and manufacturing areas to the high-value-adding service sector as the case of Taiwan, Malaysia, South Korea or recently India (Lau, 2002; The Hindu Business Line, 2004). The transformation of the logistics service industry in developing countries is constrained by a number of challenges:

- Logistics services less important in the national economy;
- So many contrasting logistics concepts;
- Challenge from foreign logistics service providers; and
- Lack of trust or commitment.

3.7.1 Importance of Logistics Services

Global manufacturing strategies provide the greatest competitive advantage when they are appropriately supported through key value-added logistics activities (Razzaque, 1997). The logistics activities include the flow of material, information and cash (Zeng and Rossetti, 2003). But in many developing countries the value-adding service is inefficient and insignificant. This is partly due to the fact that the management thinks that adopting

modern logistics concepts and practice has no practical value in such countries (Razzaque, 1997). Also many argue that supply chain management techniques derived in the West might not be compatible, such as in China (Luk, 1998). Other aspects of poor logistics services include weak transport and logistics-related infrastructure including transport networks, telecommunication systems, warehousing facilities and customs procedures (Goh and Ling, 2003); differentiated market access for local and foreign firms (Zeng and Rossetti, 2003); and above all the recognition of the importance of logistics in the economy (Sohail et al., 2004; Jiang and Prater, 2003; Gunasekaran and Ngai, 2003; Sahay and Mohan, 2003).

It is an undeniable fact that to remain in competition it is crucial for a producer that the input is delivered on the production line in time as well as that the product is delivered to the buyer in time. Cost-effective production of products and services alone is not enough (Kim, 1996; Sohail et al., 2004). Thus, the leading edge companies in the U.S. and Europe are developing and implementing total quality management, quick response systems, strategies for sharing information along the supply chain, efficient consumer response and, above all, supply chain management models. In contrast, the basic concepts have often not been yet recognised by the executives of developing countries as making a strategic difference in global competitiveness (Kim, 1996). However, following the success of logistics in developed countries as well as other factors such as to be integrated into a global supply chain, a prerequisite of FDI, it is becoming increasingly important in developing countries such as in Malaysia, China, and Latin America. In Mexico, the contribution of the service sector to the GNP in 1997 was 66 per cent while the employment level exceeded 50 per cent. Many other Latin American countries show similar trends (Reynoso, 1999). The service industry in Korea contributed 46 per cent to GDP in 1991, compared with 41 per cent in 1975. During the same period the service industry labour force increased from 34 per cent to 48 per cent of the total labour force.

Consumption of services has also increased from 29 per cent in 1975 to 35 per cent in 1985 (Noh, 1999). Until now this has not been the case in many least developed countries such as Bangladesh (UNCTAD, 2003a; UNCTAD, 2003b).

3.7.2 Contrasting Logistics Concepts

Selecting an appropriate logistics approach can help a company to be competitive in the market. So choosing and adopting an appropriate approach should be a focus of management. Each logistics concept such as just-in-time (JIT), global sourcing, economic order quantity (EOQ), quick response (QR), partnership and alliances and so on has its own specialities. An appropriate approach is particularly a problem in developing countries. Firstly, this is because the management lacks knowledge of modern concepts and associated skills. Secondly they are not ready to or capable of accepting innovative ideas (Razzaque, 1997; Kidd and Stumm, 2003). Prescription from outside or adopted in another context may not work well in that country's context. So, adopting an appropriate supply and distribution strategy is a great challenge to meet the particular business environment in a developing country.

JIT is a philosophy applied by the Japanese up to four decades ago, which encourages a firm to reduce or eliminate inventory and only to make products those as they are needed. Under this philosophy inventories of any kind (including raw material, work-in-process, and finished goods) are viewed as liabilities not assets (Mehra and Inaman, 1990). Although a JIT strategy has helped many firms to be more productive and competitive (Fazel, 1997), many question whether it is applicable in developing countries where port or terminal operations are uncertain, port delays are usual, transport infrastructure is weak and services including transport, banking and insurance are poor. It has been mentioned before

that enterprises in developing countries are characterised as SMEs. Although there is no proven relationship between JIT implementation and the size of company, it is understandable that the implementation of the JIT concept for these firms in developing countries is not always an easy solution. Moreover, in the supply chain a number of problems or barriers at different interfaces or boundaries arise and the success of a logistics operation largely depends on diminishing these problems (ECMT, 1997)

Some companies adopt a transitory JIT strategy as 'intermediate technology'. For example, Proton, an automobile manufacturing company in Malaysia adopted such a strategy, because full strategic JIT seemed to be beyond Proton's reach in the foreseeable future with so many constraints imposed by the social policies of ethnic quotas, including component suppliers, staff development etc. (Simpson and Abdullah, 1997). Thus there is a difference of understanding as well as level of actual development of transport and logistics systems among developing countries. So, the main challenge remains in finding a suitable logistics management strategy for developing countries.

3.7.3 Trust and Commitment

In a newly open economy the companies find difficulties: working with the right business partners, fostering trust between them and selecting a system of measuring performance (Sahay and Mohan, 2003). Companies become more and more dependent on the supply of accurately worked parts from suppliers located far away from the production. To fill the gaps between the firms along the supply chain, companies are increasingly using the services of third party logistics (3PLs), in particular in a JIT approach (Kidd and Stumm, 2003). To adopt a JIT approach a higher degree of trust and communication among trading partners is essential (Simpson and Abdullah, 1998). Commitment may not be met due to

many factors including traffic congestion, machine breakdowns at suppliers' enterprises and poor quality of parts. This is particularly acute in the case of dependence on imported parts and more of a problem in many developing countries. Trust is easier to maintain than to initiate but it is not hard to destroy (Kidd and Stumm, 2003). Trust and commitment are two important aspects of strategic supplier partnering (SSP) in a supply chain. The partners must be aware of the result of violations of trust and commitment. So, it is in the best commercial interest for all partners along the supply chain to have a strong and loyal relationship (Blancero and Ellram, 1997). Distrust along the supply chain increases the production cost as well as breakdown of alliance or partnership. An explicit contract stating rights and obligations helps to maintain trust. An explicit contract enhances a vendor's commitment, which leads to reduced uncertainty. However, some also believe that an explicit contract may create a negative effect as well (Salam and Banomyong, 2003). As companies progress towards the higher degree of integration in the supply chain the importance of a contract diminishes and instead partnership and co-operation between the companies takes place.

3.7.4 Impact of Foreign Service Providers

The management of many enterprises in developing countries does not realise that the function of logistics covers more than transport and warehousing. Logistics is not confined only to physical distribution but also includes physical supply and even some form of manufacturing (Kim, 1996). Liberalisation, technological advance and globalisation have resulted in accelerated penetration of the service markets by foreign firms (Zeng and Rossetti, 2003). They come with, among others, capital, improved information technology, skilled and knowledgeable management and improved service quality. In many cases the local service providers see this development as an invasion. So, virtual walls to foreign

companies: hiring local service provider's services, constraints on foreign equity, entry restrictions, and requirements, are developed to protect local firms (Jiang and Prater, 2003).

In a competitive market, local service providers are compelled to improve, on the one hand, their skill, knowledge and capacity and thus certainty and reliability, whereas on the other hand they have to decrease the time and cost of the service. They have to understand the meaning and benefits of modern logistics. For example, in the presence of foreign firms, the South Korean and Chinese local firms achieved competitive edge by investment in advanced information technology, improved customer service, reducing costs, and differentiating service offerings (Noh, 1999; Jiang and Prater, 2003). Local firms improve their skill and knowledge to be competitive from the example of foreign firms. But in many cases the progress of local firms is frustrating. For example 92% of international transport service comes from foreign firms in Bangladesh (UNCTAD, 2003b). Indian truckers enjoy economies of scale and scope (e.g. Indian trucks are newer and built in India). Thus, Bangladeshi truckers (with comparatively older trucks imported from India) fear to loss of their market if Indian trucks are permitted to enter into the Bangladeshi market. Before taking such an open approach many argue that there is a great need to educate executives and managers to be capable of facing the challenge offered by foreign firms. So it is essential for service business leaders to listen, to understand and to interpret the needs of an increasingly demanding and dynamic environment surrounding the service economy (Reynoso, 1999).

3.8 CHANGES IN INLAND TRANSPORT SYSTEMS

A reduction of specific transport costs allows a region to operate at a lower cost with greater efficiency and stimulates economic growth (Sharif, 1986). It has been discussed already that transit time and transport cost, and more recently reliability, flexibility, and door-to-door services are important decision making factors for trade and investment. The international freight transport system today can be broadly divided into three components: a) inland transport (i.e. pick-up and delivery) at both ends of the journey; b) ports and terminals; and c) maritime (or air) transport. In the case of trade with neighbouring countries surface transport and efficient border-crossing may be needed instead of maritime transport and modal transfer. Harmonised, efficient, modal integration and co-ordinated efforts are essential as well as through rates and billings, efficient information systems, logistics or distribution centres. It needs a shift of focus from a modal 'segmental approach' to a 'systems approach' for the origin-to-destination transport haul.

Ports and terminals must be equipped with modern facilities for faster transfer of containers. Containers and break bulk cargoes are operated within a multimodal transport system where the linkage to different modes of transport is more important than the geographical location of a port or terminal (Palmer, 1999). The preliminary objective of containerisation was to eliminate the multiple handling of cargo in transit thereby requiring less transit time and transport cost. Later on its ultimate objective shifted towards the achievement of an integrated transport system under through-responsibility. To achieve such an objective, container terminals are being built to allow faster transfer between modes. Thus the impact of containerisation on the conventional general cargo port was manifested in three types of change: a) the technological change, b) the spatial change, and c) the organisational change. Containerisation contributed to the further innovation of multimodal transport systems, integrating the origin and destination under a single

transport operator. The impact of multimodal transport systems has also caused changes to containerised ports (Hayuth, 1987). These changes have in fact affected all three components of the international freight transport system. Thus a conventional (modal) transport system can be transformed into a multimodal transport through the three types of changes: spatial, technical and organisational.

3.9 SUMMARY

The freight transport system in developing countries is conventional (i.e. segmental) and transport cost and transit time is relatively higher. On the other hand it is uncertain and unreliable, and appears as a constraint or barrier to trade and investment. To join and to remain competitive in the global market a company needs an efficient transport system to be integrated in the international supply chain. A conventional freight transport system can be transformed into an efficient multimodal system, which is summarised in Figure 3.1, by taking the following measures: 1) adopting a global trade and investment policy; 2) deregulation in the transport sector; 3) embracing new and emerging technology; 4) standardisation; 5) adopting modern logistics concepts and practice, and 6) change in the inland transport system.



Figure-3.1 Transformation of a freight transport system (Islam and Gray, 2003)

The measures are kept parallel due to the fact that the transformation in each dimension has to take place simultaneously. However, as some measures take less time than others (e.g. change in technology and methodology takes shorter time than that for the inland transport system) the transformation measures have to be adopted as and when needed, depending on the state of the country or region. For example, in some countries deregulation in the national economy may have taken place, but not in the transport sector (e.g. in Bangladesh). An integrated multimodal freight transport system will not be feasible until all measures are in place.

Globalisation of trade and investment offers opportunities to developing countries. To take such opportunities they face challenges including a threat from strong regional blocs (e.g. NAFTA, EU), lack of entrepreneurial skills, political instability, labour unrest, and trade barriers (e.g. unclear and unspecified import and export documents). So far FDI has grown in a few countries where suitable investment regimes exist. The governments of these countries have played an important role in creating trade and an investment friendly environment. Many transport and trade-related services such as rail transport, and port or terminal operation are offered by government organisations in developing countries. The transport market is regulated by a different mechanism. A deregulated freight-rate and service environment may exist for a particular mode of transport, but until a comprehensive freight-rate and service regime is formulated, an efficient, reliable, flexible, competitive freight system, capable of offering origin-to-destination service, cannot be established. Government ministries and departments are aligned along the modal split in developing countries. Thus, developing or formulating such a transport policy is a great challenge.

Technology changes very quickly and offers vast potential to those who can adopt it quickly, but it is a great constraint in developing countries. As the new technology comes

in from developed countries before the expiry of the existing technology, the task of decision makers in developing countries becomes challenging as to what technology should be adopted. Moreover, such factors have a high set up cost, and fund constraints, which has resulted in a lack of informatics in general and EDI, e-commerce and Internet facilities in particular, which in turn discourages the use of door-to-door multimodal freight transport. Also, the inland container terminals have insufficient facilities such as container handling equipment or use of computers.

Logistics is a new as well as an emerging discipline in developing countries. Its importance in the national economy has not yet been recognised very well and thus contributes insignificantly. Managers in developing countries face difficulty in adopting an appropriate logistics concept such as JIT, or global sourcing. Moreover, it is not normally the role of logistics managers to take such decisions. A very low level of trust among parties exists and there is a lack of commitment to offer quality service. Thus the logistics service providers in developing countries are characterised by higher transit times, costs and unreliability and they offer poor customer service. In terms of standardisation, developing countries face challenges such as ISO versus non-ISO cargo units requiring frequent procurement of equipment, ever-changing information technology and a lack of standard format. Poor infrastructure and communication-networks add further constraints to these problems. An efficient inland transport system requires three types of changes: spatial, technological and organisational.

transport operator. The impact of multimodal transport systems has also caused changes to containerised ports (Hayuth, 1987). These changes have in fact affected all three components of the international freight transport system. Thus a conventional (modal) transport system can be transformed into a multimodal transport through the three types of changes: spatial, technical and organisational.

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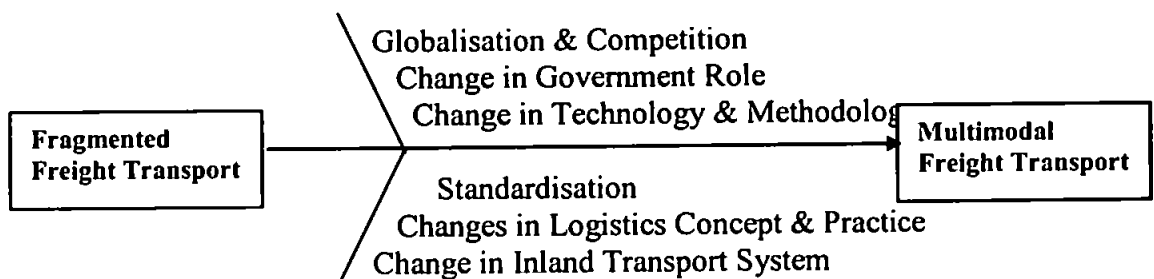


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CHAPTER 4

INLAND TRANSPORT SYSTEMS IN BANGLADESH FOR OVERSEAS TRADE

4.1 INTRODUCTION

In this chapter we will examine the suitability of the inland transport system in Bangladesh for overseas trade. The surface transport system with SAARC neighbouring countries in particular the East and North-eastern part of India, Nepal and Bhutan will be discussed in the next chapter. As in other countries containerisation and multimodalism have changed the transport system in Bangladesh. Considerable reductions in international maritime transport costs have occurred world-wide, but the inland leg of the international transport chain has been identified as one of the costliest components (ECMT, 2001). It has received little focus compared to the maritime leg, and in fact inland transport has been given importance in the light of domestic rather than international need. The discussion in this chapter argues that a new approach is essential for the inland transport system in the context of origin-to-destination international transport haul.

The U. S. and Europe are the main destination of Bangladeshi exports. From Bangladesh to US West Coast, a 20 ft container by air transport costs about US\$ 18,000 whereas the sea shipping cost is about \$3,100 i.e. air transport cost is about 6 times higher (Cookson and Ahmed, 2000). As a result the share of air transport for international trade is negligible. Dhaka and its surrounding areas constitute the biggest single area of production and consumption. About 80 per cent of the country's seaborne international trade moves through Chittagong Port (Babul, 2000; ADB, 2003) and the port is accessible by all three

surface transport modes (road, waterways and rail). This chapter discusses the economy and trade of Bangladesh, and the consequent demand for overseas freight transport. It looks at the inland transport system, seaports and logistics centres/ inland terminals. It also considers logistics practice and assesses the requirement of public and private ownership.

4.2 ECONOMY AND TRADE OF BANGLADESH

4.2.1 Economic Policy

During the pre-independence period (independence was in 1971) Bangladesh, a least developed country (LDC), was following an economy inclined to the open market, but inclined to socialism following independence. After 1975 the country gradually moved towards more a liberal mixed economy (Ali, 1994; Razzaque, 1997). Although the participation of the private sector in international trade and transport has been present since independence, it gained momentum since 1976. However, in a real sense the trade liberalisation process started in the mid-1980s and has continued. Bangladesh has undertaken a number of steps including liberalisation of the trade and investment regime, restructuring of the financial sectors, legislative and regulatory framework, closing down and privatising some loss-making state owned enterprises, adjusting or abolishing some administrative prices, broadening the base of VAT collection and taking steps to improve good governance. The economic strategy of Bangladesh focuses on export-led growth, supported by an 'open door' policy on foreign investment. Table 4.1 shows the trends in average and dispersion of tariffs over the period 1991 to 2000. To strengthen the liberal and innovative economic policy the Intellectual Property Rights Bill was introduced in Bangladesh in July 2000 (The Daily Star, 2000d) and pre-shipment inspection has been made mandatory for all imports in June 2000 to enable a faster cargo flow (The Daily Star,

2000e). The major political parties representing people in the parliament (for example, the Parliaments of 1991, 1996, and 2001) and the different governments have followed a market economic policy. So, it can be concluded that the people of Bangladesh generally have a consensus over the present market economic policy. Also the Bangladeshi currency, the 'Taka' (TK) has been floated to facilitate the export import rate in June 2003.

Although consecutive governments have been following an open market economy and according to this policy the government is not supposed to run commercial enterprises, there were 40 state owned enterprises (SOEs) in 2001 (Ministry of Finance, 2003). In principle the government is determined to privatise these enterprises, but in practice so far the progress is very unimpressive. It is widely believed that despite consensus among major political parties over economic policy there is a practical negative tendency to oppose privatisation while in opposition. Moreover, consecutive governments have also been hesitant to take bold steps. As a result, public bodies and corporations (SOEs) incurred a cumulative net loss of TK. 67234.6 million over the period 1992/93-1999/2000. This does not include the losses incurred by the government-owned and operated organisations such as railway, telephone and telegraph, postal department and state owned financial institutions (The Daily Star, 2001c).

Description	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of tariff rates	17	17	14	11	5	6	6	6	6	4
Infrastructure Development Surcharge	-	-	-	--	--	--	-	2.5	2.5	2.5
Average licence Fee	--	1.2	1.4	1.5	1.5	1.2	1.3	1.3	1.0	--
Top customs duty rate	350	350	300	300	60	50	45	42.5	40.5	37.5

Table 4.1 Trends in average and dispersion of tariffs over the period 1991 to 2000.
Source: WTO, 2000b

4.2.2 Benefits of Liberal Economic Policy

It is widely believed that the liberal economic policy has benefited the country in general and investment, trade and transport in particular. For example, per capita annual income had grown to 386 US\$ in 2000 (The Daily Star, 2000a), from US\$ 260 in 1996. Trade as a percentage of GDP had increased from 17 per cent in 1970 to 33 per cent in 1998 (The World Bank, 2000a). The average annual growth of GDP in Bangladesh from 1991 to 2000 was 4.8 per cent (US Department of State, 2000). The growth rate of GDP had increased from around 4 per cent in 1991/95 to 5.9 per cent in 1999/2000 (Ministry of Finance 1998; Ministry of Finance 2001). The Centre for Policy Dialogue (CPD) estimated in August 2001 that gross investment as a percentage of GDP demonstrated an impressive rise over the 1990s from 16.9 per cent in 1991 to 23 per cent in 2000. Investment and growth were more impressive in the second half of the 1990s than the first half (The Daily Star, 2001a).

According to a CPD estimate *'about half a billion dollars have been invested in the textile sector over the past five years. During the period textile-related imports on an average accounted for 10 to 12 per cent of the total imports'* (The Daily Star, 2001c.3). The international trade volume in terms of weight grew 3 per cent annually over the period 1987/88 to 1995/96 (Planning Commission, 1998a). On the other hand, the annual average growth rate, in terms of US\$, of exports and imports were 17.3 per cent and 15.1 per cent respectively over the period 1991/92 to 1996/97 (Chittagong Port Authority, 1998). Although the country benefited from a liberal policy, inward foreign direct investment is negligible. In 2002 there were only 13 foreign affiliated companies in her economy whereas in Vietnam, a newcomer to a liberal economy, there were as many as 1544 (UNCTAD, 2003a). The liberal economic policy failed to attract foreign direct investment to Bangladesh. Thus it is essential to identify other barriers to investment and trade. A frequently mentioned factor is the high cost of trade, manufacturing and investment.

Inadequate infrastructure such as port, road, rail, telecommunications and inefficient services such as rail freight transport and port/ terminal services and above all rampant corruption¹ upset the cheap labour and tax incentive regime.

4.2.3 Overview of International Trade

The size of the current Gross Domestic Product (GDP) of Bangladesh in 1999/2000 was an estimated Tk²2,412.70 billion (US\$ 48 billion) (US Department of State, 2000). Exports and imports contributed about 15 per cent and 22 per cent respectively to GDP in 1997/98. International overseas traded goods in 1999/2000 were 18.14 million metric tons. Trade (domestic as well as international) is expected to increase with the size of, among others, GDP and per capita income (Hassan, 2001). Bangladesh is one of the most densely populated countries in the world and had a population of 138 million in 2003. But, because of low per capita income it has a small domestic market (US Department of State, 2000; Subramanian and Arnold, 2001). So, international trade plays a vital role in the economy. Bangladesh achieved an annual growth rate of real GDP at 4.9 per cent and 5 per cent in 1995 and 1996 respectively, as against Asia's real GDP growth rate of 8.9 per cent and 8.2 per cent in the same periods (IMF, 1997). Bangladesh achieved an average annual growth of exports (in value terms) of 19.5 per cent and 37 per cent over the period July' 76 to June' 85 and 1994/95 respectively (calculated from Maola, 1992 and Ministry of Finance, 1998). Developing countries achieved in general 9.2 per cent and 1.3 per cent over the same periods respectively (IMF, 1997). For the same periods Bangladesh achieved an annual growth of imports 19.9 per cent and 39.2 per cent whereas developing countries in general achieved 6.6 per cent and 0.7 per cent. So, comparatively the international trade of

¹ Transparency International (<http://www.transparency.org>) has ranked Bangladesh number one for corruption for last three years.

² The Taka is the Bangladeshi unit of currency abbreviated as Tk.

Bangladesh is progressing well, although in recent years the annual growth of exports and imports in Bangladesh has been slower (see table 4.2). The international trade of Bangladesh is disadvantaged in the following main areas: a long-standing trade deficit (see table 4.2); imports of a wide range of products, but export dependency on only a few products and countries.

Financial Year	Exports (Growth %)	Imports (Growth %)	Total Trade (Growth %)	Trade Deficit
1984/85	939 (-)	2647 (-)	3586 (-)	1709
1985/86	819 (-12.8)	2381 (-10.0)	3200 (-10.7)	1562
1986/87	1074 (31.1)	2621 (10.1)	3695 (15.5)	1547
1987/88	1231 (12.7)	2986 (13.9)	4217 (14.1)	1756
1988/89	1292 (04.9)	3375 (13.0)	4667 (10.6)	2099
1989/90	1524 (17.9)	3759 (11.4)	5283 (13.2)	1867
1990/91	1718 (12.7)	3472 (-7.6)	5190 (-1.8)	1792
1991/92	1994 (16.1)	3516 (01.3)	5510 (06.2)	1533
1992/93	2383 (19.5)	4071 (15.8)	6454 (17.1)	1688
1993/94	2534 (06.3)	4191 (02.9)	6725 (04.2)	1657
1994/95	3473 (37.0)	5834 (39.2)	9307 (38.4)	2361
1995/96	3882 (11.8)	6881 (17.9)	10763 (15.6)	2999
1996/97	4427 (14.0)	7162 (04.1)	11589 (07.7)	2735
1997/98	5172 (16.8)	7524 (05.0)	12696 (09.5)	2352
1998/99	5324 (02.9)	8018 (06.6)	13342 (05.1)	2694
1999/2000	5762 (08.2)	8403 (04.8)	14165 (06.2)	2641
2000/2001	6467 (12.2)	9335 (11.1)	15802 (11.6)	2868
2001/2002	5986 (-7.4)	8540 (-9.3)	14526 (-8.1)	2554

Table 4.2 Value of international trade of Bangladesh (In US\$ million)

Source: Compiled from Ministry of Finance, 1998; 2001 and 2003.

N.B. a) Figures in parenthesis represent corresponding financial years' annual growth.

b) The annual growth for 1984/85 could not be calculated as the previous years' figures were not available.

Table 4.2 shows the value of international trade of Bangladesh in US\$ million over the period 1984/85 to 2001/ 2002. Over this period the country had an annual average growth rate of international trade in value terms of 17.9 per cent, with exports at 31.6 per cent and imports 13.1 per cent. Although exports have grown faster than imports, Bangladesh continues to suffer from a chronic trade deficit. In the financial year 1974/75 the trade deficit was about Tk 7,700 million (approximately US\$ 868 million) (Maola, 1992). By

1984/85 the trade deficit had grown to US\$ 1711 million, by 1995/96 to US\$ 2,999 million and by 2001/ 2002 to US\$ 2554 million. If we compare table 4.1 and table 4.2 then we can see that 1995 was a crucial year in Bangladesh. In this year the top customs duty rate was reduced to 60 per cent from 300 per cent in the previous year. Sudden reduction of customs duty resulted in the highest trade deficit year in 1995/96, although the deficit has subsequently gone down (Ministry of Finance, 1998; 2001 and 2003). In 1985/86, 1990/91 and 2001/02 Bangladesh had a negative annual growth of international trade of -10.7 per cent, -1.8 per cent and -8.1 per cent respectively.

The imports of Bangladesh can be classified into the two broad categories of 1) imports for consumption (e.g. wheat, petroleum) and 2) imports for production and export (e.g. raw materials for garments). Bangladesh imports a huge amount of items for consumption. In contrast the export trade of Bangladesh is dependent on a very few products. Table 4.3 reveals that in 1984/85, 1990/91, and 2001/2002 only about six items accounted for 94.4 per cent, 90 per cent, and 89.6 per cent of the total respectively, of which ready-made garments including knitwear accounted for 12.4 per cent, 50.4 per cent, and 75.2 per cent of total export earnings in the corresponding years. The 'other category' (five) export items earned only 6.6 per cent, 10 per cent and 11 per cent in the corresponding years. It is also notable that out of the five items, jute and jute goods' export earnings did not increase, but rather fluctuated and slightly declined. The earnings of frozen food and leather have increased by about three times, whereas the earnings of chemical products and ready-made garments have increased substantially. Lastly, over the years the export sector has become single-item-based on readymade garments, which is the most vulnerable side of its international trade and balance of payments. It can be noted that over the years the economy of Bangladesh could not enlarge the number of export items. The major export item (garments) is dependent on imports (about 52 per cent of total imports in 1996/97).

Table 4.3 Major export/ import items over 16 years (in US\$ million)

Commodities	Export			Commodities	Import		
	1984/85 (%)	1990/91 (%)	2000/01 (%)		1984/85 (%)	1990/91 (%)	2000/01 (%)
Raw jute	151 (16.1)	104 (6.8)	67 (1.1)	Rice/ wheat	498 (18.8)	331 (9.5)	380 (4.1)
Tea	61 (6.5)	43 (2.5)	22 (0.4)	Crude petroleum	226 (8.5)	212 (6.1)	273 (2.9)
Frozen food	87 (9.3)	142 (8.3)	363 (5.7)	Raw cotton	106 (4.0)	93 (2.7)	375 (4.0)
Other primary commodities	19 (2.0)	18 (1.0)	18 (.3)	Oil seeds	6 (-)	1 (-)	70 (.75)
Total primary commodities	318 (34.0)	307 (17.9)	484 (7.5)	Total primary goods	836 (31.6)	637 (18.3)	1098 (11.7)
Jute goods	390 (41.7)	290 (16.8)	230 (3.62)	Edible oil	103 (3.9)	208 (6.0)	230 (2.4)
Leather	70 (7.5)	134 (7.8)	258 (4.0)	Petroleum products	133 (5.0)	207 (6.0)	575 (6.1)
Chemical products	7 (0.8)	40 (2.3)	97 (1.5)	Fertiliser	137 (5.2)	91 (2.6)	132 (1.4)
Ready-made garments	116 (12.4)	736 (42.8)	3368 (52.1)	Cement	26 (1.0)	106 (3.1)	132 (1.4)
Knitwear	-	131 (7.6)	1496 (23.1)	Staple fibres	3 (-)	6 (-)	42 (0.4)
Other manufacturing products	35 (3.7)	80 (4.7)	521 (8.0)	Yarn	31 (1.2)	72 (2.1)	325 (3.5)
Total manufacturing products	618 (66.0)	1411 (82.1)	5983 (92.5)	Total intermediate goods	433 (16.4)	690 (19.9)	1436 (15.3)
				Capital goods	691 (26.1)	1231 (35.5)	2400 (25.6)
				Other goods	697 (26.3)	914 (26.3)	4429 (47.3)
Total export	936 (100)	1718 (100)	6467 (100)	Total import	2647 (100)	3472 (100)	9363 (100)

Source: 1) Ministry of Finance, 1998. Bangladesh Economic Review 1998, Economic Adviser's Wing, Finance Division, Government of Bangladesh, Dhaka: 127-128

2) Ministry of Finance, 2002, Bangladesh Economic Survey 2002, Economic Adviser's Wing, Finance Division, Government of Bangladesh, Dhaka: Appendix 41-43/ 45

3) Ministry of Finance, 2003, Bangladesh Economic Survey 2003, Economic Adviser's Wing, Finance Division, Government of Bangladesh, Dhaka

Destination/ Year	1995/96	1996/97	1997/98	1998/99	1999/2000
U. S.	1197.5 (30.8)	1432.2 (32.4)	1929.2 (37.4)	1967.6 (37.0)	2273.3 (39.5)
Canada	69.1 (1.8)	69.1 (1.5)	106.8 (2.07)	104.9 (2.0)	110.6 (1.92)
Germany	369.2 (9.5)	428.3 (9.7)	510.9 (9.9)	625.2 (11.7)	658.0 (11.4)
U.K.	417.1 (10.7)	437.7 (9.9)	440 (8.5)	491.3 (9.2)	500.0 (8.7)
France	272.9 (7.02)	312.7 (7.1)	369.1 (7.1)	345.1 (6.5)	367 (6.38)
Netherlands	183.2 (4.7)	208.6 (4.7)	236.1 (4.6)	251.6 (4.7)	283.0 (4.9)
Italy	207.1 (5.3)	203.6 (4.6)	270.5 (5.2)	269.9 (5.1)	248.0 (4.3)
Belgium	186.9 (4.8)	210.6 (4.7)	210.1 (4.1)	227.4 (4.3)	226.1 (3.9)
E.U.	1817.1 (46.8)	1986.9 (44.9)	2244.2 (43.5)	2462.8 (46.4)	2555.5 (44.43)
Others	979.4 (20.6)	1115.5 (21.1)	1088.5 (17.1)	1029.9 (14.6)	1086.2 (14.1)
Total Export	3882.4 (100)	4418.3 (100)	5161.2 (100)	5312.9 (100)	5752.2 (100)

Table-4.4 Value (million US\$) of exports of Bangladesh according to export destination
Source: The Daily Ittefaq, 2000

Table 4.4 shows the share of export destinations of Bangladesh (in million US \$). The table reveals that Bangladesh's export trade depends on the import policy of only a few countries or trading blocs. In 1999/2000 39.5 per cent of export earnings (US\$ 2274.3 million) came from the U. S. and 44.4 per cent (US\$ 2555.5 million) from the EU (The Daily Ittefaq, 2000). Germany, UK and France were at the top among the EU countries and were the source of 11.4 per cent, 8.7 per cent and 6.4 per cent of total export earnings in 1999/2000 respectively. The remaining 16 per cent (US\$ 923.4 million) of export earnings came from about 125 other countries of which Canada was the source of 1.9 per cent export earnings in the same year. From an economic and sustainability point of view the dependency on just a few countries or blocs means that the export trade is vulnerable to a loss of market share. For example, the European Commission penalised Bangladesh's garment exporters for violating the Generalised System of Preferences (GSP) rules in

1996, and until 1997 also imposed a ban on shrimp imports from Bangladesh because of its failure 'to comply with quality regulations' (Chittagong Port Authority, 1998). Moreover, the economic slowdown in those countries or blocs (notably July-August 2000 in the U. S., due to the 11th September 2001 attack on the World Trade Centre) also has a large influence on the volume and price of exports of Bangladesh. However, from a transport point of view these few markets or transport routes with a high volume of cargo may offer potential to the transport service providers to offer lower freight rates, which will be reflected in the final price of products and the marginal profitability of the producers.

Another threat comes from the fact that although jute and jute products were Bangladesh's top export item until the 1970s, the subsequent rise in the use of synthetic materials has taken over its market. At the end of the 1980s and during the 1990s ready-made garments and knitwear became the top export item and formed the basis of the health of the international trade of Bangladesh, which has used the potential offered by the 'quota system'. It is questionable whether the country can maintain international competitiveness in this export product after the MFA (multi-fibre agreement) phase-out in 2005 (The Daily Star, 2001c). The threat of losing market share will continue unless the list of export items is widened and dependence on only a few countries is removed. In the global market the export-import policy is constantly changing. For example, the U. S. approved 48 developing countries for tax-free entry of their exports, which had a negative effect on Bangladeshi producers and exporters. As a result the ready-made garments (RMG) exports to the U. S. market have declined from 39.52% in 1999/2000 to 28.6 per cent in 2003/2004. In contrast, the share of the E.U. market has increased from 44.4 per cent to 64.2 per cent during the same period due to, among others, preferential treatment as a LDC and stronger Euro (€) (The Daily Star, 2004b). Moreover, China, one of the main competitors of Bangladesh in international trade, has entered the WTO, which has stiffened the competition for Bangladesh in the world trade market. In such cases the foreign trade

of Bangladesh faces the threat of losing world markets as well. On the other hand, the EU is expanding to include some former socialist countries such as Poland. The new countries offer cheap factors of production, which is also offered by developing countries like Bangladesh. To overcome such competition will largely depend on the steps taken by companies to produce quality products with low prices where transport costs and transit times are important factors.

4.2.4 Trade and Transport

The physical movement of goods in Bangladesh has increased at about half the rate of trade growth. This is due to the lower growth in trade for high volume and low value cargoes such as grains, raw jute or fertilisers compared with manufactured goods (Chittagong Port Authority, 1998). The growth of international trade results in opportunities for the growth and expansion of international transport, as the derived demand for transport dependent on the level of international trade (McConville, 1999). Although Bangladesh has witnessed a rapid growth in terms of export-import trade the development of the transport infrastructure, including rail, road, ports and terminals, did not take place accordingly. As a result, transit time and transport cost of international trade has become costly and unreliable (ADB, 2003) and has been working in a very conventional form. Bangladeshi transport network is shown in figure 4.1. Service providers and users complain that the Chittagong Port needs immediate modernisation. However, recently ship turnaround time has reduced from 5.91 days in 2001 to 2 days in 2003. Freight handling charges are high in this port, which affects international trade severely (Thorby, 2003a). For example, the main inputs of the main export item of RMG, are imported. Thus the high cost of transport affects the sector twice.

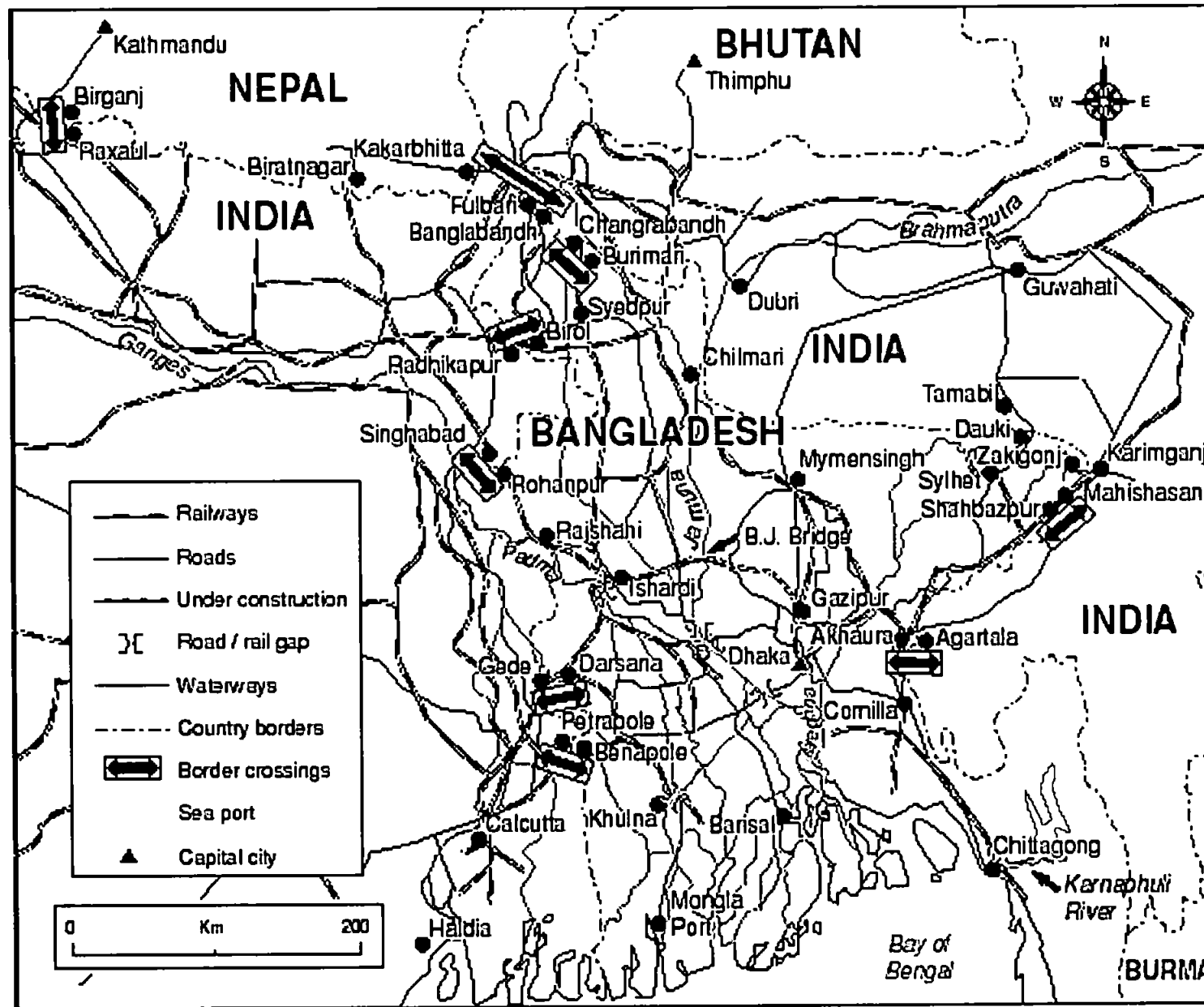


Figure 4.1 Transport network of Bangladesh

4.3 DEMANDS FOR OVERSEAS FREIGHT TRANSPORT

Bangladeshi internationally traded goods increased from 9.92 million tons in 1984/85 to 13.2 million tons in 1997/98. A pessimistic study estimated that this would increase to 23 million tons and international transport demand would be for about 29 million tons by the year 2014/2015 (Planning Commission, 1998b). In fact the estimated volume of 23 million tons of international trade cargo had nearly been achieved by 2002/2003 (collected informally from Chittagong Port and Mongla Port sources). Another study in 1998 forecast 10 per cent annual growth of cargo for international trade during 2001/2006 and 7.5 per cent annual growth during 2006/2010. There would be 26.08 million tons of cargo (consisting of 872,000 TEUs of container throughput) in 2005/206 and 43.11 million tons (1,678,000 TEUs container) throughput in 2016/17 (Chittagong Port Authority, 1998). Chittagong Port handled 0.56 million TEUs of containers in 2002/2003. Table 4.3 shows the major export/ import items in value terms for 1984/85, 1990/91 and 2000/01. Imports show an irregular pattern. This can be explained, in part, by the fact that some products (e.g. petroleum) are exclusively imported, whereas others are domestically produced with any deficit imported (e.g. sugar, wheat, and rice). Another important aspect of imports is the steady decrease in imports of rice, as the country appears to be moving towards food self-sufficiency. The share of primary imports has fallen from 31.6 per cent in 1984/85 to 11.7 per cent in 2000/01 (although in value term it has increased from US\$ 836 million to US\$ 1098 million). On the other hand the share (as a percentage) of manufactured items has remained stagnant (but in value terms it has increased from US\$ 433 million in 1984/85 to US\$ 1436 million in 2000/01). Yarn import has increased, more than ten times, from US\$ 31 million in 1984/85 to US\$ 325 million (from 1.2 per cent to 4.5 per cent of total import value). This particularly highlights the importance of RMG in imports as well. Capital goods imports have increased in value terms from US\$ 691 million in 1984/85 to

US\$ 2400 million in 2000/01 although they remained stagnant in percentage terms. Imports of 'other goods' (substantially) increased from US\$ 697 million in 1984/85 to US\$ 4429 million in 2000/01 (nearly double in percentage terms).

Overall, the main export items are raw jute, jute goods, tea, leather, frozen food, ready-made garments and knitwear (see table 4.3). In 1984/85 raw jute (16.1 per cent) and jute products (47.7 per cent) accounted for a total of 57.8 per cent of total export earnings, followed by ready-made garments (12.4 per cent), but with no significant exports of knitwear. Then in 1990/91 the share of raw jute (6.8 per cent) and jute products (16.8 per cent) fell to a total of 23.6 per cent whereas knitwear achieved 7.7 per cent. Also there was an increase in the share of garments to 42.8 per cent. Sixteen years later the position of jute and jute products had further decreased due to a decline of demand in the world market, replaced by a synthetic substitute. In 2000/01 they contributed only 9.8 per cent of total export earnings, whereas garments (52.1 per cent) and knitwear (23.1 per cent) together contributed 75.2 per cent. The contribution of tea has also fallen from 6.5 per cent to 0.4 per cent in 2000/01. The share of frozen food (primary products) has also declined from 9.3 per cent to 5.7 per cent, leather from 7.5 per cent to 4 per cent. Thus the feature of depending on one or two export item(s) has not changed over the 16 years. Table 4.5 shows how the volume (in tons) of international trade suffers from fluctuations. For example, in 1985/86 there was negative annual growth of international trade of -14.6 per cent, but in 1987/88 there was a positive annual growth of 24.4 per cent. The latter was partly the result of severe floods in 1987 and 1988 requiring higher food imports. However, with 1984/85 as a base year, there was an average annual growth (in tons) of 3 per cent up to 1995/96.

The transportation of raw jute is mainly in break-bulk form but jute products are by both break-bulk and container transportation. An important share of raw jute is exported to India

mostly in break-bulk form by conventional truck. On the other hand jute products are exported to the American and European markets by container. North America and Europe are the main markets for tea, garments and knitwear, which are also transported by containers. In contrast the imports for garments are from Asian countries led by India followed by China, Singapore and Korea. Such imports are in containers (except border imports from India). Bangladesh has imposed a ban on imports of cotton from India by overland transport and now imports of cotton and cotton fibre are by overseas transport. Thus, it can be assumed that there has been a shift in demand for international transportation from break-bulk to containerised transportation. This is also reflected in the higher growth rates containerised cargo handling in Chittagong Port, on average 15.6 per cent over the period 1995/96 to 1999/2000 (Chittagong Port Authority, 2000).

Financial Year	Exports	Imports	Total Trade	Annual Growth
1984/85	971	8949	9920	
1985/86	1100	7375	8475	-14.6%
1986/87	1136	7393	8529	+0.6%
1987/88	1266	9344	10610	+24.4%
1988/89	1471	9000	10471	-1.3%
1989/90	1391	8691	10082	-3.7%
1990/91	1476	8187	9663	-4.2%
1991/92	1365	8323	9688	+0.3%
1992/93	1748	8255	10003	+3.3%
1993/94	1657	8202	9859	-1.4%
1994/95	2123	10758	12881	+30.4%
1995/96	2189	10993	13181	+2.3%

Table 4.5 Volume of international trade of Bangladesh (tons 000s)

Source: Planning Commission, 1998b

4.4 THE INLAND TRANSPORT SYSTEM FOR OVERSEAS TRADE

About 95.5 per cent of Bangladeshi export-import tonnage was transported by sea in 1995/1996 (Planning Commission, 1998b). The share of the total inland tonnage for the

three surface transport modes over the period 1974/1997 is shown in table 4.6. From the table it is clear that the share of road transport has increased at the expense of rail and, to a certain extent, inland waterways. The transport system of Bangladesh ranges from a modern transport system using containers to primitive means of transport by bull-cart or rickshaw. Most man-made transport systems, as opposed to the large natural inland waterways, date from the middle of the nineteenth century when railways were constructed under British colonial rule. Until 1947 the rail and, subsequently, road systems focused on Calcutta in the wider context of British India, but from 1947 the internal transport network was developed to serve East Pakistan centered on Dhaka. The speed of development got further momentum from 1971 (Sharif, 1986). Two seaports, Chittagong and Mongla, serve as gateways for the overseas international trade of Bangladesh. Chittagong port has direct inland access by all three surface transport modes and Mongla port has direct access to road and waterways only. In terms of overseas export-import cargo handled (in tons) the share of Chittagong port is 83.5 per cent (Chittagong Port Authority, 2000 and Mongla Port Authority, 2000).

Mode /Year	1974/75	1984/85	1996/97
Road	35%	48%	63%
Rail	28%	17%	7%
Water	37%	35%	30%

Table 4.6 Change in modal share (tons) over 1974/1997

Source: Planning Commission, 1998.

N.B. This includes domestic as well as international transport.

Bangladesh's port and transport infrastructure is in need of modernisation and the usage costs to shippers and carriers are disproportionately high. Some studies suggest that the shipping lines identified infrastructure as the primary problem in the development of door-to-door multimodal services. The physical infrastructure is not developed to suit quick and efficient transfer from one mode to another and the inland transport of containers.

Although most shipping lines offer port-to-port services, only a few extend their service as 'port-to-point' (up to Dhaka ICD) and a few offers a door-to-door service (Chowdhury, 1995; CPA, 1998; Thorby, 2003b; ADB, 2003). Facilities for the inland movement of containers are highly inadequate and weak. For example, there is only one ICD at Dhaka for containerised cargo movements. Recently some private ICDs have been developed around Chittagong port, which has reduced ship delay in port, but no private ICD has been developed at inland destinations. Also the situation of infrastructure apart from the Dhaka-Chittagong highway has not changed much.

Table 4.7 shows the allocation and expenditure of the Bangladeshi government for the surface transport sector. Over the period July 1973 to June 1997 a total of Tk 153,335 million was allocated for the surface transport sector against which 158,462 million was spent. Of the total expenditure the road sub-sector spent 72.4 per cent with 109 per cent of the allocation for the sub-sector. The rail sub-sector spent 15.6 per cent with 90 per cent of the allocation for the sub-sector. The water transport sub-sector spent 12 per cent with 90 per cent of the allocation for the sub-sector. In the Fifth Five Year Plan (1997/98 to 2001/2002) a total of Tk. 102,455 million was allocated for the surface transport sector, of which road received 63.3 per cent, rail 23.4 per cent and water transport 13.2 per cent. Over the period (1997/98 to 2001/2002) the government committed investment to five main road corridors: Dhaka-Chittagong, Dhaka-Northwest, Dhaka-Khulna, Dhaka-Sylhet and Khulna-Northwest suitable for containerised overseas cargo movement (Planning Commission, 1998a). Even the Dhaka-Chittagong road corridor has not yet been made suitable for containerised cargo movement, although about 70 per cent of container traffic in Chittagong port is moved through this corridor. The condition of feeder connecting roads is more desperate. Table 4.7 also shows that the government has given little importance to developing both the natural resource of navigable waterways and the railway system is inherited from the British colonial era. Unlike the road sub-sector, which

overspent on its allocation, rail and water transport could not even utilise the inadequate amount of allocation. Up to the Two-Year Plan 1978/1980 rail and water transport received an adequate share of government investment, but subsequently road was considered of prime importance.

Plan Period	TK versus \$* exchange rate	Allocation			Expenditure		
		Road	Rail	Water	Road	Rail	Water
FFYR (1973/78)	12.48770	1,496	1,261	1,862	1,450	1,650	2,583
TYP (1978/80)	15.35665	1,688	1,231	1,099	1,553	1,843	8,79
SFYP (1980/85)	22.20532	4,090	4,134	3,169	6,168	5,442	3,510
TFYP (1985/90)	31.36380	13,853	8,360	5,710	16,628	6,642	4,394
FFYP (1990/95)	38.63228	44,650	8,350	7,930	52,851	5,160	6,412
TY (1995/97)	41.76865	39,146	3,987	1,319	39,146	3,960	1,218
Total 1973- 1997		104,923	27,322	21,088	114,796	24,669	18,996
FFYP 1997- 2002	51.01386	64,905	24,000	13,550	-	-	-

Table 4.7 Allocation and expenditure for surface transport sector (In million taka)

*Average exchange rate of Bangladeshi currency TK versus US \$

- Data not available

Source: Planning Commission, 1998a; Ministry of Finance, (2002)

4.4.1 Road Transport

As in other countries road freight transport provides a flexible and dynamic service in Bangladesh, although in a conventional form. The superiority of road comes from the fact that, although there is a government carrier, about 99 per cent of road freight transport is provided by private operators (Planning Commission, 1998b). Most of the trucking companies are small and have less than 10 trucks of low capacity (Subramanian and Arnold, 2001). Although there are no formal studies, reports from the daily newspapers and available secondary material in the transport sector of Bangladesh suggest that these

truckers have little access to information technology and knowledge beyond its modal operation. In 1970 there were 3,200 km of main road, which had increased to 12,300 km by 1990. There were also 22,000 km of rural feeder roads. The main and rural roads represent one of the highest density networks in Asia with Bangladesh having a density of 86 km of road per 100 sq. km of area compared with 50 for Sri Lanka, 45 for India, 18 for Malaysia, and 15 for Thailand (Howe, 1996). Although there is a higher investment and higher density of road the mode has not yet become suitable for heavy cargo movement. However, the higher share of road freight transport (and passenger transport as well) justifies "the higher investment" in road infrastructure development by taking over the share of other modes' freight. Whereas road had a share of 35 per cent in 1974/75, it had increased to 63 per cent in 1996/97 in terms of ton-km (Planning Commission, 1998a; Planning Commission, 1998b).

The six to seven hour transport haul between the main cargo centres and seaport terminals allows road transport to offer a competitive service for domestic as well as international road multimodal transport. However, the performance of road transport in terms of containerised cargo is not good. The road network is unsuitable for full container load (FCL) cargo owing to inadequate road design, weak road bridges and poorly equipped road, vehicles. As a result the door-to-door movement of containers is restricted. Restrictions, in particular, result from axle load limitations on bridges (maximum 8.2 tons), which generally prevents the use of full container loads. Movement of a 20-foot containerised garment cargo having payloads of 10/12 tons may be possible on the main corridor but the feeder roads are not yet suitable. Importantly, the movement of 40- or 45-foot containers is difficult owing to curvature restriction on bridges along the major corridors. However, there is hardly any door-to-door container movement for inland destinations in Bangladesh by road with the exception of the export processing zone (EPZ) and private ICDs in Chittagong (Subramanian and Arnold, 2001 and Thorby, 2003b).

Most import containers are unstuffed (unloaded) within port terminals, although recently developed private ICDs in Chittagong are used for stuffing but only for export cargo (Thorby, 2003b). Thus the goods are transported in break bulk form to and from inland destinations and origin by thousands of medium-size trucks (seven to eight tons payload) (Subramanian and Arnold, 2001). This results in congestion on the Dhaka-Chittagong road, the main road network international trade and transport, requiring much higher transport time (The Shipping Times, 1998). Low utilisation level of truck (average of 45, 000 km per year) is another cause of higher road transport freight rates in Bangladesh (Chittagong Port Authority, 1998). The limitations of container transport in Bangladesh can be summarised as:

‘The final customer probably does not have the capacity to receive and / or store containers.

The national highway between Chittagong and Dhaka needs to be widened and strengthened to handle increased loads.

About 5 bridges will have to be strengthened or replaced to handle increased loads and traffic.

Congestion through towns and villages is a major problem and consideration should be given toward by-passing them.

ICDs should be established around Dhaka with appropriate equipment in order to service and process the cargoes to their final destination.

A traffic control system in and around Dhaka is urgently needed if there is to be any hope for door-to-door container movement’ (CPA, 1998 p6-30).

‘There is a corresponding shortage of HGVs suitable for the long distance carriage of containers’ (CPA, 1998 p.14-31)

4.4.2 Rail Transport

Bangladesh railways consists of truncated sections of the former British Indian railway system and has 1786 route miles, comprising 1187 and 590 miles of broad gauge (5.5 feet or 1.68 metres) and one metre (3.28 feet) gauge track respectively in 1972/73. The strength of rail transport is that it can offer cheaper freight rates by utilising economies of scale compared to road, but this is not the case in Bangladesh. The average transport haul is low at less than 300 km (see table 4.8). The rail network is mostly single track. Rail freight is

dominated (89 per cent) by nine major commodities: food grain, fertiliser, cement, coal, stone and ballast, petroleum products, jute, salt and sugar cane (see table 4.9) (Bangladesh Railway, 1999). The volume of rail freight declined from 4.88 million tons in 1969/70 to 2.73 million tons in 1994/95 followed by a slow increase in recent years, for example 2.94 million tons in 1996/97 and 3.42 million tons in 1998/99. The decline is due partly to the government's consistent emphasis on investment in roads (already discussed in section 4.4).

For containerised cargo transport, although not a door-to-door service, rail leads over all other modes on the Dhaka-Chittagong route. Presently rail carries only 60 TEUs per train in each direction every day because of capacity limitations, which is equivalent to 11.6 per cent of the available container traffic in 2002/03. The rail freight service is under-utilised due to, among other reasons, the higher freight rate but slower and more unreliable service than road. Average haulage cost in this corridor is US\$ 150 by trucks and US\$ 300 by rail. On the other hand it takes 24 to 36 hours by rail in contrast to trucks freight loading in the evening and delivering in the morning (Thorby, 2003b). Thus it is not true in the case of Bangladesh that rail is a cheaper mode of transport. A study conducted in 1998 recommended an additional, two-way block train service but it could not be implemented until recently. Acquisition of new container wagons and engines could improve its carrying capacity and performance (Chittagong Port Authority, 1998). Many claim that the door-to-door movement of containers has not been possible due to the fact that the railway is a government organisation, which is non-commercial and bureaucratic. Also rail offers less schedule reliability, and infrequent and insecure service for export-import cargo to the ocean shipping lines. There is less return cargo, thus the shipping lines tend to recover the cost of return empty haul of containers, and they charge more for the inland destination by rail than by road transport (Chittagong Port Authority, 1998).

Bangladesh Railway occasionally carries transit cargo (for example, 27,000 tons of transit cargo of Nepal in 1997). It also has potential to tender service to the transit cargoes of the north-eastern Indian states, which have a population of 31.4 million (CPA, 1998). If both governments could agree to the use of Chittagong port for transit cargo movement of these Indian states, then the Bangladesh rail system could increase utilisation.

Financial Year	No. Of Locomotives	Freight Wagon (Units)	Freight Carried million ton	Ton-km (million)	Average Haul (km)
1969/70	486	16,823	4.9	1265	259.3
1979/80	n/a	n/a	3.2	855	268.7
1984/85	n/a	n/a	3.0	813	270.1
1985/86	290	16,430	2.3	612	261.5
1989/90	307	15,536	2.4	643	267.0
1994/95	279	17,684	2.7	759	278.5
1996/97	284	16,092	2.9	782	294.2
1998/97	279	11,152	3.4	896	296.4

Table 4.8 Capacity and performance of Bangladesh Railway

Source: 1) Planning Commission, 1998b p.51-54, 2) BBS, 1999 p.283, 3) Bangladesh Railway, 1999 p.2, 69-71

n/a= data not available.

Commodity	Tons	Per cent of total tons carried	Tons-km	Per cent of total ton-km	Per cent of total earning
Rice	904	26.4	206,775	23.3	22.8
Wheat	594	17.4	172,027	19.2	18.6
Cement	349	10.2	58,590	6.5	6.1
Fertiliser	251	7.3	73,106	8.2	7.6
Oil fuel	138	4.0	42,079	4.7	4.5
Stone	126	3.7	26,870	3.0	2.8
Container	304	8.9	102,415	11.4	15.4

Table 4.9 Principal commodities carried by Bangladesh railway in FY 1998/99 (in '000)

Source: Bangladesh Railway, 1999 p.73

Apart from the above problems Bangladesh Railway also faces a number of challenges. First, there is the inherent technical problem of operating on two networks (eastern and western) with two different gauges (broad gauge and one metre gauge). With the opening

of Banga Bandhu Jamuna Bridge there is a visible move to connect physically both networks with each other. Secondly, a large number of rivers necessitate the maintenance of many rail-bridges, which is costly and also sometimes poses the risk of interrupted service during floods. The third problem, applicable to road as well as rail, is that the soil is very soft and is washed away by strong rainfall and floods, which occur every year, sometimes very severely. Thus, constant maintenance of transport infrastructure is a big challenge in Bangladesh.

4.4.3 Inland Water Transport

Among the available inland transport systems, inland shipping or waterway transport (IWT) is considered the cheapest as it can utilise economies of scale. It is also an environmentally friendly mode of transport. Estimates of the total length of waterways vary and there is evidence that this has suffered some reduction over the years owing to silting and shoaling in the upper reaches of rivers. There are 13,620 km of waterways but the length of navigable waterway is 5,896 km in monsoon and 3,793 in the dry season (Planning Commission, 1998b; Islam, 1995).

The two most important trade and production centres of Bangladesh, Dhaka and Chittagong, are connected by 307 km of at least 3.6 metre deep waterways. Dhaka is also connected to Mongla by at least 3.6 metre deep waterways (338 km in length). More than half of the country's total area and three quarters of the economic activities can be reached within 10 km of a navigable waterway. The seaports of Chittagong and Mongla, are connected with each other (distance 369 km) with navigability of at least 3.6 metres waterways (Islam, 1995). A study conducted in 1995 found that the majority of the shipping lines calling at Bangladesh ports hold the opinion that inland water transport

would be the cheapest and most suitable mode for inland transport of containers. This is also because of the geographical location of important industrial and commercial areas (Chowdhury, 1995). However, the potential has not yet been realised due to lack of river ports or terminals with appropriate container-handling equipment in major cargo centres (e.g. Dhaka, Khulna), which is discussed in detail in section 4.6. The waterway system carries the international cargo of north-eastern Indian states through Chittagong port, although it could carry more (Islam, 1995; Planning Commission, 1998b).

4.5 REVIEW OF SEAPORTS

Two seaports serve the international seaborne trade of Bangladesh. Chittagong Port is the main seaport, handling about 80 per cent of seaborne trade cargo all three transport modes (Planning Commission, 1994; ADB, 2003). Mongla Port, in the South-West, should serve the western part of the country, but has inadequate hinterland access and problems of silting (Planning Commission, 1994).

4.5.1 Mongla Port

Mongla port has no direct rail connection, and can only be reached by rail up to Khulna, which is about 48 miles from the port, thus requiring a pick-up or delivery service either by road or inland water. Costly and time-consuming transshipment makes rail transport a poor option through Mongla port. On the other hand, the ferry crossing on the Rupsa River at Khulna is a major constraint on the utilisation of road transport. Bridges under construction over the rivers Rupsa is expected to improve direct road connection to the whole country. However, to date inland waterways have been serving as the main transport mode for this

port, particularly to and from the Dhaka area. These constraints have slowed down the growth of cargo handling of this port. Mongla Port handled about 2.84 million and 3.00 million metric tons of cargo in 1995/96 and 1999/2000 respectively (Ministry of Finance, 1998; Mongla Port Authority, 2000). Similarly the growth of containerised cargo is very slow. For example, the port handled 18,820 TEUs and 19,459 TEUs in year 1995/96 and 1999/2000 respectively (Mongla Port Authority, 2000). Nepalese cargo interests are very interested to use Mongla port as an alternative (to some extent a shorter) route to have access to overseas transport (details in section 5.8.1) and talks have been going on between the authorities of Bangladesh, India and Nepal for a long time but there is little development. transit through India is the main barrier to such use.

4.5.2 Chittagong Port

Chittagong port has direct inland accessibility by all three surface transport modes to its hinterland for conventional cargo handling, although in terms of containerised cargo it is only accessible by rail and to a very limited extent by road around the proximity (1 to 14 km) of the port. It has been mentioned before that all import containers are unloaded within the port terminal area, and a substantial volume of export containers are filled within the port of Chittagong. Recently ten container freight stations (CFS) or ICDs have been developed by private parties, which are allowed to fill export containers. This partial deregulation has improved the performance of Chittagong port with less ship delay (at present 2 days). However, the carriage of imports by road, unloaded in the port area, sometimes creates congestion resulting in delays. The situation is exacerbated by the inadequacies of the inland waterway and rail systems discussed earlier.

Table 4.10 shows the comparative handling capacity of Chittagong port for the years 1971 and 1999. Although the volume of trade and the number of vessels calling at Chittagong Port have increased threefold, its capacity has not increased at the same pace. Indeed, in some areas the facilities have declined. For example, the number of Chittagong Port Authority (CPA) operated berths has reduced from seventeen to thirteen and break bulk cargo handling equipment has increased from only 126 units to 174 units (Chowdhury, 2000). A total of six berths are used for container ships and in normal circumstances they can meet the demand. But if several ships arrive at a time then it faces problems. Moreover in the monsoon heavy rainfall also hampers normal work (Thorby, 2003b). Half of the containers are handled in general cargo berths (ADB, 2003). A study estimated the acquisition of container gantry cranes, eight rubber-tyre transtrainers (yard cranes), two container forklifts (front-end loaders) etc. as costing about US\$ 45 million (Planning Commission, 1994), but until recently many of them were not procured. For example, the port has ordered to acquire four gantry cranes and some yard equipments by October 05.

Container stacking spaces are insufficient as well as inadequate, although over the years the number of containers has increased more than four fold. The failure to develop the main seaport of Bangladesh also results from the failure on the part of government and studies to forecast growth properly or more precisely. Some studies took a very pessimistic view of cargo handling growth, particularly containerised cargo. For example, a study (Planning Commission, 1994) forecasted that traffic in Chittagong would grow about 3 per cent annually reaching around 12 million tons in 2010, compared with actual average growth of 9.4 per cent for seaborne trade through CPA for the period 1995/96 to 1999/2000. The forecast 12 million tons of cargo was reached in 1998/1999 (Chittagong Port Authority, 2000) and it handled 19 million tons of cargo in 2000/2001 (The Daily Janakantha, 2001a).

The handling of LCL cargo is very slow, for example the unstuffing period is typically one to seven days (Chittagong Port Authority, 1998). The average vessel turnaround time in Chittagong port is two days compared with one day in Singapore port. The delay and inefficiency of ports is directly related to insufficient facilities in and around the port and inland transport system. It has been estimated that the delay in Chittagong port increases the transport costs of a 20 ft container from Chittagong to the West Coast of the U. S. by 5.5 per cent and to Europe by 9.4 per cent (Cookson and Ahmed, 2000). Corruption, in the form of a toll collection in the port operational area, is informal but normal and has a debilitating influence on the international transport system, being directly connected with port delays and inefficiency (Cookson and Ahmed, 2000). The toll collection is estimated about US\$ 250 per 20-foot container, which increases the transport cost to the West Coast of the U. S. by 9.3 per cent and to Europe by 15.6 per cent. The amount of the toll increases as companies become desperate to ship faster. The toll collection in the inland leg of the international transport cost has to be calculated separately. Such factors contribute to Chittagong port being one of the costliest and most inefficient ports in the region (Babul, 2000).

The entire port operation is performed by a range of institutions including port workers, merchants, stevedores, mariners, port equipment operators, customs personnel, transport workers and owners involved with the port activities. There are as many as 22 labour unions. If one group stops working, the port is paralysed, and there are frequent incidents of labour unrest (The Daily Star, 1997; Thorby, 2003b) between factions fighting for political control rather than for workers' welfare. Port operations were disrupted for 36 days in 1998 and 32 days in 1999 mainly for labour strikes, thus hampering overseas trade. Port disruptions fuelled by labour unrest cost the country about US\$ 1.1 billion in foreign exchange earnings a year (The Daily Star, 2000b). Importers have to pay at least US\$ 5000 as compensation for a ship that has to overstay in port because of the shutdown, e. g. a total

of 528 hours from January to August in 2000. Work suspension has occurred due to a range of problems involving nation-wide or local hartals (local version of a strike) (The New Nation, 2000). Another report informs that 30,000 people hold union cards from one or other labour unions in Chittagong port (The Shipping Times, 1998).

Facilities/ Quantities	Type/ Ownership	1971	1999
Berths	CPA Berth	17 (including 2 pontoon Jetties)	13
Container berths	CPA Berth	nil	2
ERL Dolphin	Non-CPA Berth	Nil	1
Grain Silo Berths	Non-CPA Berth	1	1
Cement Clinker Berth	Non-CPA Berth	1	1
TSP Jetty	Non-CPA Berth	1	1
CUFL Jetty	Non-CPA Berth	Nil	1
KAFCO Jetty	Non-CPA Berth	Nil	1
Dry Dock Jetty	Non-CPA Berth	Nil	2
Mooring Berths	Non-CPA Berth	7	7
Shore Crane	Break bulk handling equipment	27	31
Mobile Crane	do	18	22
Fork-lift Trucks	Do	27	68
Tractors	Do	2	13
Trailers	Do	51	39
Yard Crane	Do	1	1
Straddle Carrier	Container handling equipment	Nil	8
Fork-lift Trucks	do	Nil	51
Tractors	Do	Nil	38
Trailers	Do	Nil	36
Roll Trailers	Do	Nil	12
Low Must Forklift	Do	Nil	23
Dredger	Vessels & Crafts	3	1
Tug Boats	Do	9	6
Pilot Vessel	Do	3	5
Water Barge	Do	1	3
Anchor & Buoy Lifting Vessel	Do	1	2
Import/ Export Trade Volume		4,166,944 Tons (1970-71)	14,858,850 Tons
No. of Vessels Calling at Chittagong Port		502 (1970-71)	1425
Population of Bangladesh		75 million	130 million

Table 4.10 Comparative Handling Capacity of Chittagong Port
Source: Chowdhury, 2000

Despite its problems, there are opportunities for Chittagong. For example, it could also provide transit facilities to the cargoes of seven north-eastern Indian States. Development of adjacent economies including Bhutan, Nepal, north-eastern Indian States (particularly Assam), and Myanmar and greater liberalisation of cross-border cargo flow are likely to yield additional opportunities for the transport system of Bangladesh in general and Chittagong port in particular (Chittagong Port Authority, 1998).

4.6 OVERVIEW OF INLAND TERMINALS

A rail dedicated ICD at Dhaka was set-up in 1987/ 88 with a capacity of 4,000 TEUs per annum. Then its capacity was upgraded first to 25,000 TEUs and then to 90,000 TEUs in 1998 to facilitate inland penetration of containers (Planning Commission, 1998a; Planning Commission, 1998b; Alim, 2000; Babul, 2000). Against this capacity it handled 65,051 TEUs in 2002/2003, which is about 11.6 per cent of total TEUS handled by the Chittagong Port Authority (The Daily Janakantha, 2001a; Thorby, 2003b).

Academics, experts and users identified a number of problems including location at a congested city centre, a delayed and infrequent rail transport service, inadequate container handling equipment both in Chittagong port and in the ICD and poor operational status. In fact the ICD has a capacity of only handling or transshipment of about 15 per cent of total container traffic (CPA, 1998). Thus the inland clearance and value adding facility in Bangladesh is inadequate both in number and capacity. Therefore, more ICDs are urged to set up in different cargo centres.

The river ports, mentioned in table 4.11, could be used for customs clearance, container consolidation, and other value adding activities (Islam, 1995). But none of the river ports are containerised and so, cargo handling is done in a very conventional labour-based method in these inland terminals. The main ports (in terms of cargo handling), are shown in table 4.11, which suggests that Khulna river port has highest amount of cargo followed by Dhaka and Narayangonj river ports. But since Dhaka and Narayangonj (18 km apart) together form the biggest commercial as well as production centre there could be a potential river port or terminal. A private container terminal is due to be built in Dhaka.

Recognising the potential of natural waterways and the inherited railway network and the necessity of logistics centres, the Bangladesh government initiated a development programme of building a river container terminal at Dhaka and a rail dedicated second ICD in Gazipur (close to Dhaka) (Planning Commission, 1998a; Planning Commission, 1998b; Planning Commission, 1994; CPA, 1998). But as there is a repeated inconsistency in the investment decisions of consecutive governments (Razzaque, 1997; CPD, 2003) the decision to build a river terminal was cancelled mid-way through development work to enable the building of the container terminal by a private investor. The government could allow the planned second rail ICD instead, which would not destroy the on-going progress of river container terminal, and would create a competitive environment.

River port	1972/73	1977/78	1992/93
Dhaka	480	809	1206
Narayangonj	1368	1099	529
Chadpur	94	58	52
Barisal	60	102	93
Daulatdia	n/a	n/a	273
Nagarbari	n/a	n/a	259
Khulna	1189	1531	2120

Table 4.11 Performance of River Ports (in thousands tons)

Source: Sharif, 1986: 39; Islam, 1995; BBS, 1999

The private investor was supposed to build the terminal by 2001 (The Daily Janakantha, 2001b), but was not able to start work due to opposition from different stakeholders. Finally, the investment decision was ended by a court order. The court found that the company was offered the investment decision without following legal and systematic measures such as floating tender and/ or considering other company's offers. Also the company did not submit any feasibility study report and economic appraisal with the investment proposal. The company even submitted some false statements or documents (The Daily Janakantha, 2002; The Daily Star, 2002). This failure has not only affected the investment environment in the transport and logistics arena but also the total foreign investment environment in Bangladesh. This probably emphasises the fact that there is no short-cut way to development, which must take place steadily and systematically. Furthermore, the aforesaid second rail dedicated ICD had not yet been developed until April 2005.

Recognising the importance of private investment in such a potential area the government decided in 1997 to allow the formation and establishment of ICDs by private parties. There has been some investment in Chittagong area, but it has been already noted that there is hardly any success in the Dhaka area (The Daily Star, 1997a; Ministry of Shipping, 2002; CPD, 2001; CPD, 2003; Thorby, 2003). The private sector seems reluctant to participate in establishing inland container terminals in the main production and consumption area. Therefore, the government has taken the initiative- a joint venture project among Chittagong port, Bangladesh Inland Waterways Transport Authority and Bangladesh Inland Waterways Transport Corporation, as the case of Nepal's ICDs and multimodal transport project (The Rising Nepal, 2000) to establish river container terminal and logistics centres outside the main city (Dhaka) with adequate facilities including

accessibility, customs and telecommunications, and subsequently transfer these to the private sector for efficient operation.

There is also a shortage of efficient freight forwarders, which is partly because there are no qualifying requirements for entry to the sector. Freight forwarders and multimodal transport operators (MTO) are not legally recognised or registered as yet (Omar, 2000a and Babul, 2000). There are also complaints against a section of freight forwarders of unlawfully realising various charges from exporters and importers in Bangladesh although they are supposed to collect no objection certificate (NOC) charges only (The Daily Star, 2003a; The Daily Jugantor, 2003). Thus, the door-to-door movement of containers for international trade is restricted through the absence of inland terminals and ICDs and operators.

4.7 LOGISTICS PRACTICE

Already we have found that logistics is a new discipline in Bangladesh. Razzaque (1997) describes how there is no infusion of new ideas among the executives, and modern logistics concepts such as JIT have no practical value to them. Many of the business executives are from the civil bureaucracy and army services. Zaman (1996) expresses the opinion that the Bangladeshi trading community has yet to attain the culture and practices of international business. Also service companies in Bangladesh are not well equipped or standardised. For example, published freight rates and transit times, easy access to information systems, shipment information, up-to-date news on shipping etc. are unavailable in Bangladesh (Islam and Gray, 2003). Moreover the presence of local firms in the international transport service is insignificant. For example Bangladesh exported US\$91 million whereas imported US\$ 1013 million of international transport service in

2000 (UNCTAD, 2003b). The membership list of the International Freight Forwarder Association of Bangladesh (IFFAB), collected in 2001, showed a concentration of logistics activities around Chittagong port (see table 4.12). No member companies have offices outside Dhaka and Chittagong, suggesting that the transport and logistics services have not yet reached to the users in the hinterland. The table also indicates that they are restricted by lack of modern information systems. There is no EDI system for port, customs (ADB, 2003; ADB, 2005). Moreover, international shipping lines calling at Bangladeshi ports mostly finish their service at the port i.e. do not provide a door-to-door service. The shipping lines are performing a port-to-port transport function and the trucking companies are performing the inland part of international transport haul under a separate arrangement.

Companies with information technology	Chittagong Based	Dhaka Based	Based in Both Centres	Total
Without any phone, fax number and email address	1	1	n/a	2
With at least one phone/ fax number	1	2		3
With at least one phone and one fax number T+F	7	3	1	11
With at least one telephone, one fax number and one email address T+F+E	44	1	5	50
With more than one telephone and fax but one email address 2(T+F)+E	15	-	3	18
With more than one telephone, fax numbers and email addresses 2(T+F+E)	2	-	6	8
With more than one phone number and email addresses but one fax number 2(T+E)+F	3	-	3	6
Total no. of freight forwarder	73	7	18	98

Table 4.12 Accessibility of freight forwarder in Bangladesh to information technology

Source: International Freight Forwarders Association of Bangladesh, Chittagong

There are no standards or regulations that a company must meet to qualify as a freight forwarder, and anyone can offer freight forwarding services without establishing their credibility or trustworthiness (Omar, 2000a). There is widespread use of terms of sale developed many years ago for the processing of break bulk general cargo carried by

conventional ships when time was less critical in international transport and logistics (Chittagong Port Authority, 1998). These traditional terms of sale such as FOB (free on board) and CIF (cost, insurance, and freight), indicating that the point of transfer of ownership of goods from seller at the ship's rail or hook, are still frequently used in Bangladesh (Huq, 2000). With the growth of containerised cargo movement the point of transfer of ownership has shifted from the traditional ship's rail to anywhere suitable for both buyer and seller (Omar, 2000b).

4.8 PUBLIC VERSUS PRIVATE ROLE

Containerisation and multimodal transport systems are extremely sensitive to complex and cumbersome control procedures (De Castro, 1999). The publications of the government of Bangladesh indicate that there are multiple ministries such as the Ministry of Shipping and Ministry of Communication responsible for formulating policy regarding the transport system and development. Existing publications or documents (MOF, 2002, 2001, 1998; Planning Commission, 1998a, 1998b, 1994; Bangladesh Railway, 1999; BBS, 1998 etc.) do not clearly spell out who is responsible e.g. for policy formulation, legal liability, and for multimodal freight transport systems (UNCTAD, 1994a). In the absence of such policy-making institutions the focus of development probably does not move in the right direction. Many argue that the private parties should take the initiative in the form of the much discussed private-public partnership, to fill up such a vacuum and help the government to adopt a uniform policy and regulations to facilitate multimodal transport (UNCTAD, 1994b). As the country has been following greater private sector involvement is recommended in the operation of ports and terminals and other logistics facilities including freight forwarding, customs clearance, financial services, storage and warehousing, transit and shipping services (Subramanian and Arnold, 2001). However, the

government policy targets gradual withdrawal from such commercial services, and transfer to private sector facilities provision (Ministry of Shipping, 2002).

The international supply chain generally faces at least two sets of customs procedures. So, a simplified and effective procedure is essential for smooth flow of trade cargo and for investment (Temple, 2001; The New Nation, 2003; ADB, 2003). If customs procedures do not allow deeper penetration of containers then the flow is hampered and the ICD will be less effective. It will result in more transit time, transport cost and uncertain schedule reliability due to multiple handling of cargo and ultimately a conventional fragmented transport system, which is the case in Bangladesh. On the other hand if there are frequent cases of tax fraud and illegal import/ export then the customs inspection rate will be increased, which is good neither for exporters or importers nor for carriers and the national economy.

The government of developing countries such as Bangladesh place high priority on maximising revenue collection (e.g. customs duties) due to resource constraints (Molla, 2001). On the other hand, the traders and manufacturers place a high priority on maximising profit. The contrasting interests sometimes raise complaints of 'not doing enough'. However, there is general agreement that the Bangladesh customs authority has not yet been able to introduce an effective system to allow the operation of door-to-door multimodal transport service. Customs clearance speed is very slow due to the use of many old and unnecessary documents and formalities and on average it takes four to five days in the Port of Chittagong (CPA, 1998; ADB, 2003).). However, there is a progress although slow e.g. the introduction of Automated SYstem for CUstoms DAta (ASYCUDA) and a participatory value added tax (VAT) systems. But corruption has crippled the systems, which need further simplification, and which can be implemented by a Public-private joint collaborative effort (Molla, 2001; The Daily Star, 2003d). Thus the business practice needs

to be improved so that there are few or no tax frauds and illegal imports or exports. Recently Bangladesh government has taken a project to establish a modern customs clearance system supported by EDI in port, Customs and other service providers and users.

4.9 SUMMARY

Although Bangladesh has been following a liberal economic policy over two decades, many of the port, terminal and rail services are offered by government bodies or autonomous organisations. Government is incurring a huge amount of loss from her scarce resources whereas private parties could better offer these services. Government could take vigorous steps to withdraw from such commercial services, and transfer to and provide facilities to develop the private sector. During the last decade the Bangladesh economy had grown at a faster rate than previously, particularly the export and import trade. There is a visible shift in the dominance of manufactured/ finished goods against the primary/ raw materials for international trade. This has resulted in a higher demand for containerised freight transport. The movement of containers has increased substantially through Chittagong Port to and from Dhaka, the main load centre. There are sufficient volumes of containerised cargo between these two points needed for multimodal services. But the port and inland terminals could not be developed with adequate handling equipment and facilities. The ship turnaround time in port is high resulting in higher transport costs, transit times and unreliability. Mongla port is now nearly disabled and thus there is virtually no port competition. Moreover, the inland transport infrastructure by road, rail and waterway has not been developed to accommodate door-to-door movement of containers. The ship delays in Chittagong port are directly related to insufficient and inadequate facilities in and around the port and a fragmented inland transport system. The corruption in the form of toll collection on the inland leg of international transport is directly connected with this

long delay. In brief, the accessibility of seaports in terms of door-to-door containerised cargo movement is very poor. Thus the port system has appeared as the greatest barrier to an efficient and integrated transport system.

A sufficient number of logistics centres or ICDs have also not been developed close to load centres. These restrict the freight forwarders in offering door-to-door pick-up and delivery services leading to door-to-door transport. There are no standards or regulations for a company to be a freight forwarder. The freight forwarders have yet to be equipped with sufficient information systems on freight rates and transit times. Shippers or consignees are unable to get sufficient information about their consignments because of inadequate modern communication technology (e. g. EDI). Moreover, many shippers lack knowledge of this service as to what benefits it can provide and thus are reluctant to use the service. The door-to-door movement of cargo is also restricted by government regulations such as customs clearance procedures. The service is also restricted by the use of old INCOTERMS such as FOB and CIF.

As the main cargo centres are within six to seven hours of each other, road transport has potential for contributing to an integrated and efficient door-to-door service by performing the inland leg of international multimodal transport. Bangladesh has spent about fifteen per cent of its development budget on the surface transport sector over the years (refer to discussion in section 4.4). Yet the users are not getting freight transport and logistics services at their doors. The users feel that the Dhaka–Chittagong road corridor is now adequate for container movements, but feeder roads are still unsuitable. Only locations very close to the main corridor may be suitable for multimodal transport by road. As with the Nepalese government, the Bangladeshi government should invest more in transport infrastructure including terminals or ICDs to facilitate international trade. Due to many factors such as scarcity of wagons, locomotives, handling equipment, insecurity of cargo,

infrequent service (once a day), availability of containers and, above all, lack of a commercial attitude, the main line operators do not encourage participation in door-to-door movement of containers by rail. On the other hand, although inland shipping is considered a lowest cost mode, due to the lack of inland container handling facilities such as container terminals, such potential cannot be realised. Thus, in brief, the inland transport infrastructure has imposed serious obstacles to both trade and investment.

There is hardly any origin-to-destination transport and logistics service. Absence of an integrated, efficient, reliable door-to-door service increases transport-related logistics costs and thereby affects the competitiveness of products in the global market. Due to all these negative factors the inland transport system has appeared as a barrier to multimodal transport and logistics systems and ultimately to international trade. Changes towards efficient containerisation and multimodal transport are taking place at a very slow pace. As there are multiple ministries and departments for transport services and there is a lack of a single government institution responsible for multimodal transport development, the private parties or associations should take the initiative to adopt a uniform policy and regulation to facilitate multimodal transport.

CHAPTER 5

THE TRANSPORT SYSTEMS OF BANGLADESH FOR REGIONAL TRADE

5.1 INTRODUCTION

This chapter examines the suitability of the transport systems for cross border regional trade particularly in the South Asian Growth Quadrangle (SAGQ) context, initiated in 1997 and centring on Bangladesh. It includes Bangladesh, Bhutan, India and Nepal, to be operated within the South Asian Association for Regional Co-operation (SAARC), established in 1985 (ADB, 2002). Apart from the SAGQ countries SAARC includes Maldives, Pakistan and Sri Lanka (see figure 5.1). One important feature emerges that India has the highest share of this regional SAARC trade and also is the main trading partner of Bangladesh among SAARC countries. This chapter discusses briefly the challenges of development for surface transport infrastructure linking the SAGQ countries. The increased trade volume of Bangladesh with SAGQ countries, in particular India, has resulted in demand for greater use of the surface transport systems. Rail, road and inland waterways transport are available to service options, but road transport plays the major role, despite high congestion, delay and bureaucracy.

Bangladesh is virtually surrounded by India in the west, north and east with around 4000 km of common border. The remaining land border is with Burma (Myanmar), which is not in SAARC. Most trade (95 per cent) with India moves through the western border, particularly through Benapole Dry Port (Pohit and Taneja, 2003). Nepal and Bhutan are the next closest SAARC countries, both landlocked and requiring transit through India, and

trade with these countries is mainly by surface land transport. Trade with other SAARC countries requires overseas transport, which has been discussed in chapter 4.

This chapter reviews the freight transport systems of Bangladesh for trade with those neighbouring SAGQ countries where there is a surface transport link. It examines bilateral and regional trade, the change in demand for regional freight transport, transport options, transport and logistics related constraints and facilities at border crossings.

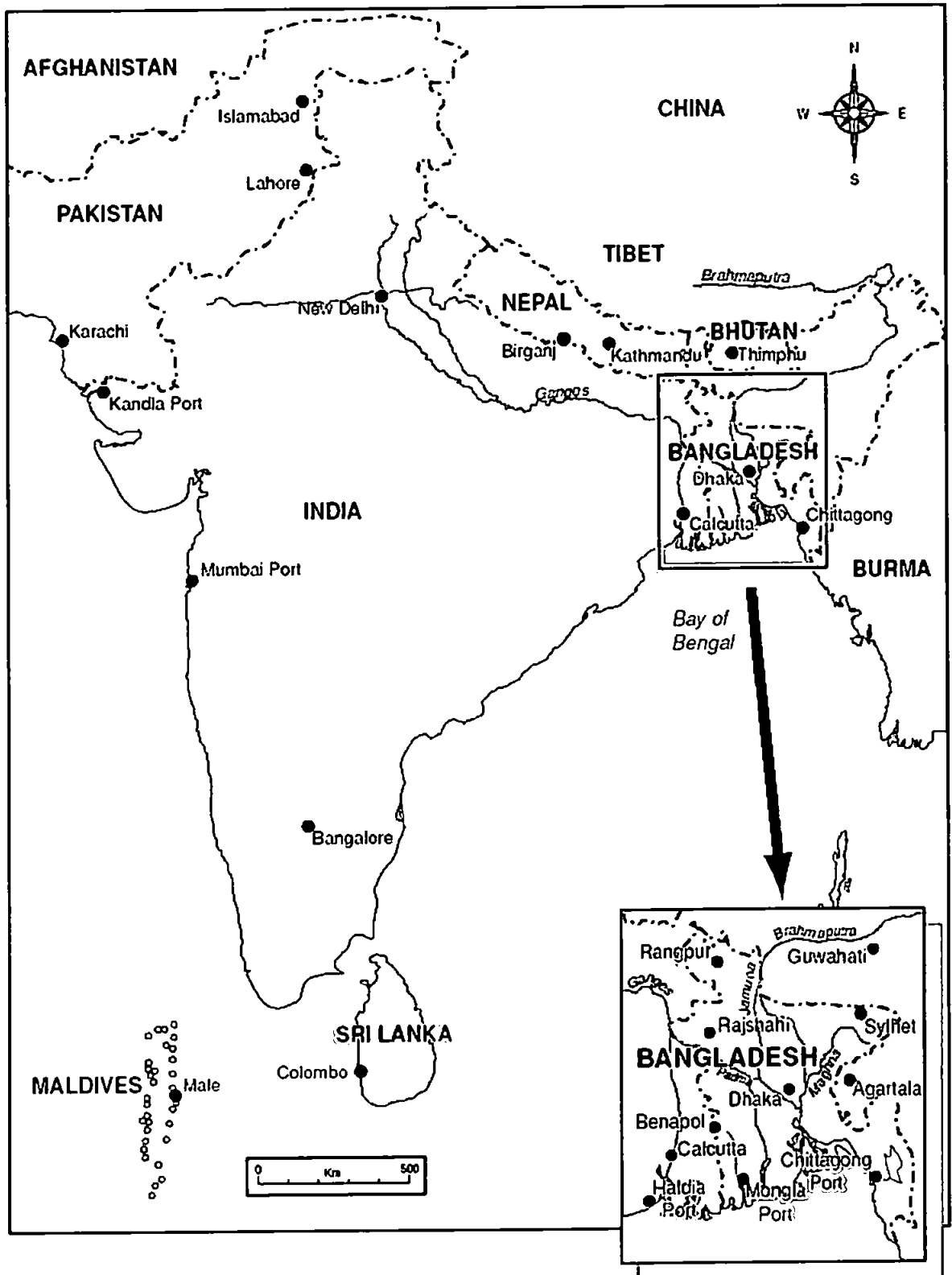
5.2 TRADE WITH SAGQ COUNTRIES

Bangladesh started trade liberalisation in the late 1980s and India in 1991 (Maxwell, 1999). In 1998 trade represented 33 per cent of GNP in Bangladesh, 58 per cent in Nepal and 25 per cent in India (Subramanian and Arnold, 2001). In all cases India is the main SAARC trading partner. There is a persistent and growing trade deficit with India. Imports from India have increased from US\$ 65 million in 1985, to US\$ 170 million in 1990, and to more than one billion US\$ in 2004 (The New Nation, 2004).

5.3 TRADE WITH INDIA

As stated before, Bangladesh has a huge trade deficit with its large neighbour, India, and in 1999/2000 had a trade imbalance to the ratio of 1:13 with India (The Daily Star, 2001c). Experts strongly suggest the need for diversification of export items (The Daily Star, 2004b).

Figure 5.1 Map of SAARC



In chapter 3 we found that exports of Bangladesh consist largely of only a few items dominated by ready-made garments. The situation is even more acute in the trade with neighbouring countries. Rahman (2001) found that:

Six items including Jamdani sari, chemical fertilisers, raw jute and frozen fish accounted for about 95 per cent of the country's total export to India in 1999. This trend has remained more or less the same over the 1990s, as India expanded its export base. Bangladesh has imported as many as 2,129 commodities from India during the 1990s including cereals, textiles, machinery, equipment, chemicals and base metals

With so few major export items (also discussed in chapter 4 section 2) in contrast to a large number of import items, there is obviously a strong argument that Bangladesh needs to diversify and expand its export base to include goods and services suitable for the Indian as well as other South Asian markets. It also needs to increase production of those items that already have a demand in India. Another important reason behind this large trade deficit is the faster liberalisation of trade in Bangladesh compared to neighbouring countries, a source of government complaint in Bangladesh (The Daily Star, 2001a). The import tariff in India was reduced from an average of 71 per cent in 1993 to 35 per cent in 1998 (World Trade Organisation, 1998) whereas the tariff in Bangladesh was reduced from an average of 23.6 per cent to 16.0 per cent during the same period (World Trade Organisation, 2000b). Moreover, the internal tariff structure of Bangladesh also encourages imports of final consumer goods from neighbouring countries. For example, the average weighted tariff for intermediate inputs and final consumer goods were 24.1 per cent and 47.3 per cent in 1991, reduced to 21.4 per cent and 11.2 per cent in 1999 (World Trade Organisation, 2000b). As a result, Indian final products enter easily into the Bangladeshi market, whereas Bangladeshi products face difficulties entering the Indian market.

In international trade Bangladesh, India and Nepal are competitors in the production of the main export items of Bangladesh. Table 5.1 shows that India's export earnings for such products are more than those of the Bangladeshi main export items, suggesting that the main export items of Bangladesh are unable to obtain a good market in India. Furthermore, other items on the very short list of products exported from Bangladesh have difficulty entering the Indian market because of high and complex tariff and non-tariff barriers. Examples of non-tariff barriers include, apart from the Indian higher tariff, mandatory certification by the Bureau of Indian Standards for certain Bangladeshi products such as cement (The Hindu Business Line, 2003). Apart from the above reasons, procedural complexity is also creating a trade barrier. A study identified the following five areas of complexities:

'1) obtaining different licenses, 2) obtaining various refunds, 3) problem associated with customs authorities, 4) problem relating to bank and 5) problem associated with transportation of goods' (Pohit and Taneja, 2003 p. 17).

The study also found that Bangladeshi traders face more barriers compared to Indian traders (details are mentioned in tables 5.2 and 5.3), particularly from their respective authorities e.g. licensing, refunds and customs dealings (Pohit and Taneja, 2003). Pohit and Taneja also found that the combined transaction cost in terms of payments to officials as bribes, in the stages of licenses, refunds, customs, banks and transport, is higher in Bangladesh (see table 5.3 for details). As a result, the trade deficit with India has been widening since its inception.

Product Group	Bangladesh	India	Nepal
034 Fish, Live/ Fresh/Chilled/ Frozen	16604	283515	--
036 Crustacean Molluscs etc	260719	910538	--
054 Vegetables Fresh/ Chilled/ Frozen	24748	197845	13178
074 Tea and Mate	47398	504,985	178
264 Jute/Bast fibre Raw	83023	2806	--
334 Heavy Petrol/Bitum Oils	11239	352916	--
562 Manufactured Fertilizers	36886	6808	--
611 Leather	106013	295907	6286
612 Leather Manufactures	3	112118	--
634 Veneer/ Plywood/ etc	13877	23127	--
651 Textile Yarn	59345	1993971	--
652 Cotton Fabrics woven	60441	974505	--
653 Man-Made Woven Fabrics	33128	375355	--
654 Woven Textile Fabric Nes	72455	268011	--
657 Special Yarn Fabrics	50399	69154	--
658 Made-up Textile Articles	149657	845512	--
723 Civil Engineering Plant	10929	36632	4095
728 Special Industries Machinery	20067	87062	--
813 Lighting Fixtures etc	10887	4811	--
841 Men/Boys Wear, Woven	2083510	966854	57544
842 Women/Girls Wear, Woven	640787	1641565	15492
843 Men/Boys Wear, knitted/ crocheted	103486	307851	3337
844 Women/Girls Wear, knitted/ crocheted	81739	210619	697
845 Articles of Apparel	867601	592024	18267
846 Clothing Accessories	6823	160039	755
851 Footwear	39003	537721	--
893 Articles of Plastics	18414	135611	--
894 Baby Car/Toy/Game/Sports	44414	86836	--

Table 5.1 A comparison of main exports of Bangladesh with India and Nepal (US\$'000)

Source: compiled from International Trade Centre (ITC) Database: International Trade Statistics, Exports 1995/1999, Geneva.

Note: Exports from Bangladesh and India represent the data for 1997. Exports from Nepal show the data for 1998 (1997 not available). Only the main export items from Bangladesh (US\$ 10 million and above) are included (apart from leather manufactures and clothing accessories, which are included because garments and leather are the main export items of Bangladesh.) Exports of Bhutan were not available.

Stages of transaction cost	Per cent of traders indicating positive cost	
	Bangladesh	India
Licenses	93	86
Refunds	90	80
Custom	55	36
Bank	68	84
Transport	67	88

Table 5.2 Profile of transaction cost* for trade between Bangladesh and India

Source: Pohit and Taneja, 2003.

- Transaction cost has been calculated in terms of the additional time taken at different stages of transaction. The additional time is the difference between the actual time taken and the average time that should be taken according to traders' perceptions.

Transaction cost as per cent of their turnover	Bangladesh (in per cent)	India (in per cent)
Less than 10 per cent	22	24
10 per cent to 20 per cent	0	40
20 per cent to 30 per cent	20	36
More than 30 per cent	58	0
Total	100	100

Table 5.3 Comparative scenario of aggregated transaction cost

Source: Pohit and Taneja, 2003

The main export items to India are vegetable products, animal or vegetable fats, oils and by-products, prepared edible fats, animal or vegetable waxes, mineral products, products of chemical or allied industries, and textile and textile articles (Bangladesh Bureau of Statistics, 1999). The main import items from India are live animals, vegetable products, prepared foodstuffs, beverages, spirit and vinegar, tobacco and manufactured tobacco substitutes, mineral products, products of chemical or allied industries, wood pulp, waste and scrap paper or paper board, plastics and products, rubber and products, vehicles and transport equipment (Bangladesh Bureau of Statistics, 1999).

5.4 TRADE WITH NEPAL AND BHUTAN

Table 5.1 shows that Nepal has ten export items, which are present in the Bangladeshi export basket of 28 main items. This results in a balanced export-import trade between the two countries. However, trade with Nepal faces procedure- and transport-related barriers as it is a land locked country. The export-import trade flow must route through a third country, India, which also exports the same items to Nepal. The main export items to Nepal are products of the chemical or allied industries, and textiles, and the main import items are live animals, animal, vegetable and mineral products, and products of the chemical or allied industries (Bangladesh Bureau of Statistics, 1999). Bangladesh only imports from Bhutan. The main import items are vegetable products, prepared foodstuffs, beverages, spirits and vinegar, tobacco, mineral products, wood and articles of wood (Bangladesh Bureau of Statistics, 1999). As with Nepal, trade with Bhutan faces transport-related barriers.

The countries under review can be '*characterised by an almost identical pattern of comparative advantage implying a lack of strong complementarity in the bilateral trade among these countries. For example, - the export structure of Bangladesh, India and Nepal indicate that these countries have comparative advantage in food and live animals, basic manufactures, and miscellaneous manufactured goods. Second, Bangladesh and Nepal enjoy comparative advantage in a relatively narrow range of products unlike India. Third, though not surprising that none of the countries have comparative advantage in capital intensive and high value added products i.e. the products that are normally imported by countries in the region*' (SCCI, 20001c p.2).

5.5 TRADE WITH MYANMAR

Although trade and transport with Myanmar (Burma) is not in the main focus of this work, it should be noted that Bangladesh has a trade deficit with Burma as well. Exports decreased from US\$ 6.60 million in 1990/91 to US\$ 4.40 million in 1997/98 and US\$ 1.09 million in 2000/2001 but imports rose from US\$ 10.50 million to US\$ 70.40 million in 1997/98 and US\$ 24.69 million in 2000/2001 (The Independent, 2001; The Daily Star, 2003b). As with trade with India discussed in the previous section there is illegal trade and smuggling (Daily News, 2002a). Despite a very low level of trade and other exchanges, there is a sign of improvement, with recently high-level exchange visits. Both countries have agreed to build a road link between Dhaka and Yangon (Daily News, 2002b) and a bridge over the Teknaf river, which separates the countries, is under construction and the Asian Highway and Trans-Asian Railway are planned to connect both countries' load centres (ESCAP, 1999; ESCAP, 2003). All these developments increase the hope of improved co-operation, trade and transport. As Bangladesh aspires to be a member of the

Association of Southeast Asian Nations (ASEAN) Burma would be the bridge to membership.

5.6 INFORMAL TRADE WITH NEIGHBOURING COUNTRIES

Official trade among South Asian Countries is low compared to other regional blocs, but it should be examined in the context of significant informal trade (Subramanian and Arnold, 2001). In 1992/93 official trade with India was US\$ 357 million and unofficial trade was US\$ 313 million (Taneja, 1999). The Centre for Policy Dialog (CPD), a leading think-tank organisation in Bangladesh, estimated import from India of US\$ 1.84 billion through unofficial channels (The Daily Star, 2001c). Obstructions to normal trade, whether for economic or other reasons often lead to unofficial trade, especially where there is a long land border to make it easier. In some circumstances it may even dominate trade between certain countries. It generally exists where there are price differences between two countries and where there are high import duties such as between India and Bangladesh (Rahman and Razzaque, 1998). Such trade will take place either through authorised or unauthorised channels (Taneja, 1999). It can be achieved through official channels by means of incorrect invoicing, product classification or weight declaration. Clandestine movement of goods, otherwise known as smuggling, is possible through borders where there are inadequate controls, or it may take place in collaboration with bribed law enforcement agencies (Rahman and Razzaque, 1998). Taneja (1999) considers that this practice is widespread between India and other SAARC countries, including Bangladesh. According to Subramanian and Arnold (2001) unofficial exports from India to Bangladesh are approximately equal to official exports. They mention that:

'The composition of unofficial trade flows is generally complementary to, but markedly different from, official trade flows. A large portion of unofficial exports (85 per cent) takes place through West Bengal, comprised largely of food items, live animals (mainly cattle) and consumer goods. The unofficial flow from Bangladesh to India is dominated by a few major products, including synthetic yarn, electronic goods, and spices. A sizeable percentage (44 per cent) of the unofficial imports consists of gold and / or Bangladesh currency to pay for Indian goods that are smuggled into Bangladesh. There is also an unofficial flow of consumer items, ready-made garments from Bangladesh to Tripura (one of the seven Eastern states of India). By some estimates this flow is eight to ten times higher than the official flow' (p. 19).

Pohit and Taneja (2003) found that most of the items illegally exported from India to Bangladesh are from other states than West Bengal or bordering states and this trade is performed in an organised way better than through the normal channel. Chaudhury (1995) found that a substantial percentage (ranging from 20 per cent to 60 per cent) come from the Indian public distribution systems, as leakage from the government administered and priced goods. Food and live animals form nearly three-fifths of the total illegal imports from India to Bangladesh, with basic manufactures forming about a quarter of illegal imports. In contrast, food and live animals account for only 7 per cent of official imports from Bangladesh to India. It is evident that the legal and illegal exports are dominated by different sets of commodity groups (Taneja, 1999). However, Rahman and Razzaque (1998) found that out of 42 items the border price differential of 30 items declined quite rapidly between 1990 and 1998. This lower price difference has made smuggling now less profitable, which is a positive achievement for trade among neighbouring countries. Nevertheless Rahman and Razzaque (1998) point out that the shortages of particular commodities in Bangladesh will still produce a good profit for smugglers. A recent study

found that whereas Indian informal traders do not get money from the bank, the 18 per cent of Bangladeshi informal traders get such financing. The other common sources of financing are friends and relatives, and informal money lenders (Pohit and Taneja, 2003). Pohit and Taneja (2003) also found that informal traders in both countries made payments mostly in Bangladeshi currency and there are rare uses of barter, gold and silver but there are greater uses of hawala (the term used in India) / hundi (used in Bangladesh), a unique method of payment where there is no physical transfer of money.

Two features emerge from the above discussion. First, formal and informal trade both are roughly the same volume and, second, India has a huge trade surplus with Bangladesh for both official and unofficial trade. Unofficial trade is overwhelmingly with West Bengal (96 per cent), with only 3 per cent and 1 per cent accounted for by Assam and Tripura in the North Eastern region (Taneja, 1999).

5.7 CHANGES IN DEMAND FOR REGIONAL FREIGHT TRANSPORT

In 1984/85, 99 per cent of international trade by volume went overseas or in other words only 1 per cent of trade required surface land transport with neighbouring countries. It has been mentioned in previous sections that the trade with neighbouring countries is increasing rapidly, and this share has risen (by volume) to 3.6 per cent in 1994/95 and 4.5 per cent in 1995/96 (Planning Commission, 1998b). Thus, there is a positive, although slight, change of demand in the use of surface land transport for regional trade. Nevertheless, this change is mainly the result of an increased volume of imports from India. The growth in container traffic, discussed in chapter 3, does not apply to this trade, since it is done mainly by road transport in break bulk form. Speed and connectivity are usually advantages for shippers using road freight transport, but such benefits have been

restricted because of transshipment at border crossings, load restrictions, overcrowded roads and an absence of unitised loads.

Illegal cargo movements tend to use very traditional transport modes while crossing the border. Taneja (1999) describes how truckers bring goods to border villages, a variety of forms of transport (cycle-rickshaw vans, bullock carts, etc.) then take them to the border. Head-load porters perform the transshipment across the border. The closer to the border, the higher the number of people involved, although the cost of this form of transport is negligible. The subsequent delivery of illegal goods to local markets within Bangladesh is performed in an organised way and on a larger scale requiring the hire of large vehicles such as trucks or even rail but used in a conventional way (Rahman and Razzaque, 1998).

A major feature of the transport systems for trade with India is largely one-way traffic. This one-way traffic results in under-utilisation of transport services and expensive empty running raises the transport cost. Furthermore, border delays for legal channels are a normal feature for this trade, adding one to five days' delay at the Benapole-Petrapole border crossing (Subramanian and Arnold, 2001).

5.8 TRANSPORT OPTIONS FOR TRADE WITH SAGQ COUNTRIES

Over a long period a varied and complex transport systems has been developed in Bangladesh based on her geographical features and historical facts (Ministry of Communications, 1996). India and Bangladesh both have options of using all modes of surface transport for trade with neighbouring countries. On the other hand, Bhutan and Nepal, both landlocked, have mainly road transport (Subramanian and Arnold, 2001) with the exception of 53 km of broad gauge rail link from the ICD at Birgunj, Nepal to Raxaul,

India (The Rising Nepal, 2000) and ropeways for uphill transportation and the waterway route for Bhutan through Dhubri (SAARC Chamber of Commerce and Industry, 2000d).

The proposed Asian Highway (AH) and Trans-Asian Railway pass through and connect Pakistan, India, Nepal, Bangladesh and Sri Lanka. Bhutan has access to the highways only through the Indian highway network. The various countries' governments are improving the network by undertaking projects in the required areas on their own part. UNESCAP, the World Bank and ADB are co-ordinating as well as co-operating through technical, financial and co-ordinating roles (ESCAP, 1999; ESCAP, 2001). The total length of AH in Bangladesh is 1834 km, including missing links of about 81 km. Of the existing routes, 96 per cent are of two or more lanes and can be classified as of AH standard class II, and the remaining 4 per cent are single lanes which fall below AH standard (SCCI, 2001d).

5.8.1 Rail versus Road Option

In both Bangladesh and India the rail network has a mixture of broad gauge (1.68 metres) and one metre gauge. At the time of the partition of India in 1947, the previously united Bengal and Assam Railway was broken up (Bangladesh Railway, 1999) and Bangladesh (then East Bengal and later called East Pakistan) gained part of the network. Since then the western part of Bangladesh has mainly broad gauge consisting of 914 km, and the eastern part one metre gauge consisting of 543 km (Chittagong Port Authority, 1998; Planning Commission, 1998b). In the case of trade with the north-eastern states of India there is no rail gauge problem and Chittagong port could be reached directly. The other possible links to these states are by road through the border crossings Akhaura (Bangladesh) to Agartala (India), or Dauki (Bangladesh) to Tamabil (India) and by waterways through Zakigonj-Karimganj or Chilmari (Bangladesh) to Dubri (India) (see figure 4.1 in chapter 3).

However, unlike international overseas trade, rail does not carry containerised goods to and from neighbouring countries although developments are afoot. The establishment of a dual-gauge rail track across the Jamuna Bridge should provide a significant increase in containers once the broad gauge connection is extended to Dhaka. The network in Eastern India is broad gauge and Nepal can be reached at Birganj by both road and rail, one of three ICDs, by a broad-gauge link through India (The World Bank, 2003). ICD at Biratnagar has only direct road access and is nearer than Birganj to both Mongla and Chittagong port. Mongla port is nearer to Birganj or Biratnagar by about 200 km than Chittagong port (Chittagong Port Authority, 1998). But, Biratnagar requires either a road connection or a one-metre gauge rail link. All options of access to Nepal must transit through India as Nepal is a landlocked country and has no direct access to a seaport. The available options for access to Nepal are:

- Direct road transport to and from Bangladesh through Kakarbhitta (Nepal) - Banglabandh (Bangladesh) or Biratnagar (Nepal) - Radhikapur (India) - Birol (Bangladesh);
- Road-rail combined transport through Kakarbhitta (Nepal) - Changrabandh (Bangladesh) border crossing; or
- Road-waterway combined transport through Dubri (India)- Kakarbhitta (Nepal); and
- A mix of broad gauge and metre gauge rail transport through Birol (Bangladesh) - Radhikapur (India) or Rohanpur(Bangladesh)-Singhabad (India) border crossings to Biratnagar (Nepal).

It is noteworthy that over 98 per cent of Nepal's foreign trade (in value terms) is transported by road and rail, with transit through India. The East- West Highway in Nepal, which connects Fulbari- Banglabandh to Dhaka, is part of Asian Highway no. 2. It starts at

the Iran-Iraq border and passes through Pakistan, India, Nepal Bangladesh, Myanmar, Lao PDR, Thailand, Malaysia and ends at Singapore (SCCI, 2001d). It has been mentioned earlier that Bhutan has only road transport and it needs connection through India. Subramanian and Arnold (2001) identify the potential for medium-value break-bulk cargoes if the Indian and Bangladesh railways continue to integrate their systems and extend their broad gauge network.

Road transport continues to be the most dynamic mode in Bangladesh (Planning Commission, 1994). Third party road freight services in all the SAARC countries under review are almost entirely from the private sector. Medium-size trucks (seven to ten ton payload) operate over two-lane asphalt roads (5.5 metres wide in Bangladesh and 5.5 to 7 metres in India) at a relatively low speed over 200 to 400 km per day. Most cross-border movements are in two to three-axle trucks with payloads up to 18 tons. The load limit for India, Bhutan and Nepal is 10 tons per axle or similar, and Bangladesh is expected to increase its current limit of 8.2 tons per axle to 10 tons (Subramanian and Arnold, 2001 and SCCI 2001d). There is, however, a chronic problem with flooding during the monsoon season for about 20 per cent to 35 per cent of the land area, so that roads require embankments up to 15 feet high (Sharif, 1986). The cost of road building and maintenance, based on alluvial soil, is 60 per cent higher per km in Bangladesh than in India although the flood problem is there as well (Howe, 1996).

Government-owned railways carry goods and passengers in Bangladesh and India. Passenger and goods trains were operated from Calcutta to Khulna until the India-Pakistan war in September 1965, when all railway links were severed. After Bangladesh's independence, a goods-only service was reintroduced in 1972 for a brief period but was again closed due to the low volume of goods (The Daily Star, 2001c). Therefore, most goods are transported by road through the Benapole border crossing, resulting in

congestion and delays. As mentioned earlier, the volume of trade with neighbouring countries has increased, leading to the re-commencement of freight rail service along the Benapole-Petrapole route in January 2001 (The Daily Ittefaq, 2001).

Freight trains between Bangladesh and India also are operated on four other routes (Shahbazpur-Mahishasan, Rohanpur-Sinhabad, Birol-Radhikapur and Darsana-Gede). Most of the goods, voluminous and bulky in nature, moving by rail between India and Bangladesh are fertilisers, food grains, boulders, and cement (The Daily Star, 2001c). Out of these rail routes Gede-Darsana is the busiest and on average 50 trains of 2000 tones capacity run through this route every month. On the other hand, through Singhabad-Rohanpur route, 12 to 15 trains of similar capacity carry goods (SCCI, 2001e). The main advantage of rail transport appears that it does not need transshipment at the border, although it does need to be loaded and unloaded at each end of the transit, when it becomes dependent on the services of road transport. However, the inferior road infrastructure, poorly maintained and highly congested, and the resulting restrictive weight limits, in particular on bridges, means that rail could offer a better and cheaper containerised door-to-door service for a wider range of goods than it is doing at present.

A frequently asked question is whether the existing status of rail freight operation could be reliable and flexible enough under government management. In India, rail-road container services have grown substantially following the formation of the Container Corporation of India and the introduction of a large fleet of rail-cars to carry ISO containers. In contrast, Bangladesh has experienced a 40 per cent decline in rail tonnage over 25 years with a lack of cars and no commitment to containers (Subramanian and Arnold, 2001). There has been little increase in track length since 1947 when there were 2604 route-kilometres, with 2858 km in 1970 and 2734 km in 1999 (Bangladesh Railway, 1999; Planning Commission, 1998b). Another problem is the long border with India with many border-crossing points

for both road and rail. This is more of a problem for rail transport since each route through the crossing point needs a large volume of cargo to be economically viable. Thus, the success of rail transport among SAARC countries is constrained by both low volume and an imbalance of cargo (largely one-way from India to Bangladesh). Nevertheless, the problem of empty running also applies to road transport.

The traditionally low regional trade volume has prevented the development of a regional transport network from gaining priority. However, as the share of regional trade, particularly import trade from India, is increasing, the development of a regional transport network is now in the spotlight. For example, the Dry Port Authority in Bangladesh was established in 2001 to facilitate regional trade by improving infrastructure at different crossing points. Accordingly, Bangladesh has developed some border crossings, particularly Benapole. Estimates vary but this border-crossing handles cargo in the range of 80 to 95 per cent of the trade with India (Taneja, 1999; Pohit and Taneja, 2003; Rahman and Razzaque, 1998). This border crossing has become virtually an alternative for import-export trade with India to the sea route via Mongla Port. A major development programme of US\$2.7 million began in 1993 for the Benapole border crossing (Chittagong Port Authority, 1998) and its present facilities are shown in table 5.4.

Facility/ equipment	Number	Capacity (where known)
Warehouses	26	
Open Storage Area	3	
Transshipment Area	1	150 trucks can be handled at one time
Truck Terminal	1	1000 trucks can be handled at one time
Mobile Crane	4	10-35 tons
Forklift	6	3-5 tons
Weigh Bridge	3	20 tons

Table 5.4 Facilities and equipments at the Benapole Dry Port in 2000

Source: Mongal Port Authority, 2000

Item	1987/88	1997/98
Cargo from Bangladesh to India	1000	0
• By Bangladeshi vessels	0	0
• By Indian vessels	1000	0
Cargo from India to Bangladesh	500	15564
• By Bangladeshi vessels	0	8113
• By Indian vessels	500	7451
Indian transit traffic to and from Calcutta	100010	6415

Table 5.5 International freight movement by Bangladeshi and Indian vessels (tons)

Source: Bangladesh Inland Water Transport Authority, 1999

At present there are about 23 road linkages between Bangladesh and India of which 12 are on the western, 5 on the northern and 6 on the eastern borders (SCCI, 2001d). Apart from Benapole, other border crossings lack facilities. For example, except for Benapole, there are no bonded warehouse facilities at any other crossing and formal trading through these crossing points is nominal (SCCI, 2001d). The growing importance of trade with neighbouring countries and the general lack of adequate border crossing facilities led to the formation of the Bangladesh Land Port Authority in May 2001 covering twelve border crossings including Benapole (Prothom Alo, 2001). Because of the long land border, three further border crossings may also be included.

5.8.2 Inland Waterways Transport Options

A 'Protocol on Inland Water Transit and Trade' was in place in the late 1950s allowing use of each other's waterways for transit of goods of India. This continued until September 1965, when it was suspended due to the India-Pakistan War. Following the independence of Bangladesh in 1971 the governments of Bangladesh and India revived the agreement in 1972 and it is updated from time to time (Bangladesh Inland Water Transport Authority,

1999). Table 5.5 shows the volume of cargo handled by Bangladesh inland water transport over the two decades. The table reveals that there is an irregular amount of cargo movement (both inter-country trade and transit cargo). For both rail and road the predominance of one-way traffic results in substantial empty running for this mode as well. In 1997/98 there were 15,564 tons of inter-country trade cargo, of which 8,113 tons were carried by Bangladeshi and 7,451 tons by Indian vessels. All cargo was carried from Calcutta to Dhaka (Narayanganj). There was no movement of cargo from Bangladesh to India. This means that Bangladeshi vessels had empty journeys to Calcutta and Indian vessels had empty back hauls from Dhaka to Calcutta, resulting in a higher cost of transport, which from a transport economic point of view is not acceptable.

Table 5.6 reveals another feature of the inter-country trade using inland waterways. Between 1988 and 1991 there was a significant trade from Bangladesh, and Bangladeshi vessels also had a good share of the cargo movement. Then the trade flow became largely one-way, moving only from India to Bangladesh. This resulted in a minor share for Bangladeshi vessels up to 1996/97. In 1997/98, although all traffic was from India, Bangladeshi vessels had a 52 per cent share of the total carriage. The India-Bangladesh Infrastructure Summit, held in December 2000, organised by Bangladesh-India Chamber of Commerce and Industries, (SCCI, 2001e) has summarised the following problems/ issues of using inland waterways transport:

- At present there is no exclusive jetty both at Calcutta and Narayanganj, Dhaka for loading and unloading vessels for intra- and inter-country trade;
- Night navigation is not available or adequate over the entire route;
- Barges of the Indian operator Central Indian Water Transportation Corporation (CIWTC) are not in good condition;

Financial Year	From Bangladesh (share in per cent)	From India (share in per cent)	Total volume of cargo (100 per cent)	Annual change (percent)	Carried by Bangladeshi vessels (share in per cent)	Carried by Indian vessels (per cent)
1988/89	18608 (97.2)	528 (2.8)	19136	(+)92.2	11336 (59.2)	7800 (40.8)
1989/90	33422 (73.0)	12345 (27.0)	4576741	(+)58.2	20332 (44.4)	25435 (55.6)
1990/91	1049 (48.3)	1121 (51.7)	2170	(-)2000.3	1049(48.4)	1121 (51.7)
1991/92		4570 (100.0)	4570	(+)52.5		4570 (100.0)
1992/93		17090 (100)	17090	(+)73.3	3620(21.2)	13470 (78.0)
1993/94	300 (1.3)	22050 (98.7)	22350	(+)23.5		22350 (100.0)
1994/95		35642 (100.0)	35642	(+)37.3	6842 (19.2)	28800 (80.8)
1995/96	7015 (6.8)	96586 (93.2)	103601	(+)65.6	30066 (31.5)	73536 (68.5)
1996/97		71248 (100.0)	71248	(-)45.4	24628 (34.6)	46620 (65.4)
1997/98		15564 (100.0)	15564	(-)357.8	8113 (52.1)	7451 (47.9)

Table 5.6 Inter-country (Bangladesh and India) trade cargo carriage by inland waterways transport (tons)

Source: Bangladesh Inland Water Transport Authority, 1999 p. 23.

Note: Table shows trade to nearest ton. Percentages are based on actual tonnage.

- The Bangladeshi barge operator Bangladesh Inland Water Transport Corporation (BIWTC) insists on booking cargo on a FOB basis, which is not easily allowed by banks;
- In case of booking on a CIF basis, CIWTC needs to collect cargo for BIWTC. This causes delay in the transfer of funds and thereby despatches;
- The river port in Calcutta is on the opposite side (bank) of the railway siding (for cement handling) of the River Hoogly;
- Container handling facilities need to be developed at both (countries') river ports; and
- More loading points along the Ganges are needed to be developed.

5.9 TRANSPORT AND LOGISTICS RELATED CONSTRAINTS

The existing inadequate transport and logistics systems between Bangladesh and India have led to higher costs and unreliable services. A study found the following sources of higher transport cost are: port congestion, excessive documentation, delays, slow movement of goods, transshipment and other indirect costs (Pohit and Taneja, 2003). Presently the transit authority at the Benapole-Petrapole border crossing (along with other offices) remain closed on Thursday half day and Friday in Bangladesh. On the other hand Sunday is closed in India. This two-and-a-half days closure results in longer truck delays. Trucks have to wait for 8 to 10 days before documents are endorsed and checked at customs (Pohit and Tanaeja, 2003). Kopicki (1999) stresses the importance of integrating customs procedures into commercial supply chains, rather than delaying international trade to ensure collection of customs duties and other taxes or to impose veterinary or

agricultural quarantine procedures. Facilitation of international trade must be seen as important as collecting revenue. According to the existing protocol or agreement all Bangladeshi export traffic is transhipped into warehouses 500 metres inside the Indian border (Chittagong Port Authority, 1998). A similar requirement exists for India's exports to Bangladesh at Benapole Dry Port. Thus the requirement of transshipment results in not only higher freight transport costs and transit time but also restricts through movement of cargo from origin-to-destination.

Other specific infrastructure factors also cause delays. For example, in road transport between India and Bhutan landslides create temporary blockages. Because of the terrain of Nepal, building and maintaining roads are both difficult and expensive (Taneja, 1999). The road infrastructure (particularly bridges) in Bangladesh is not built to bear the weight of heavy road goods vehicles, especially cross-border payloads up to 18 tons. A typical road freight maximum payload in Bangladesh is seven tons, whereas it is ten tons in India (Subramanian and Arnold, 2001). In effect the movement of Indian heavier vehicles on Bangladeshi roads is constrained by infrastructure weakness. From the Bangladesh point of view there is a fear that the heavy vehicles might damage the inferior road infrastructure of Bangladesh. Experts suggest that a higher level of road damage could be covered by collecting tolls from the vehicles (Subramanian and Arnold, 2001). However, in order to increase the regional movement of road freight vehicles, a consensus on the truckload tonnage limit is essential so that the Bangladeshi road infrastructure can be developed over a long period to bear long and heavy vehicle-loads in a larger number.

Although containerisation and multimodalism (discussed in chapter 2) have been central to the development of regional transport and logistics services in European and North American countries, the penetration of container traffic into this sub-region is low and uncertain. About one third of total containerisable goods are in the range of

containerisation (De-Castro, 1999). This figure is more frustrating in the case of regional trade centred on Bangladesh. For example there are almost no articulated vehicles from either India or Bangladesh for inland distribution (Chittagong Port Authority, 1998). The 11 tons gross vehicle weight (GVW) rigid truck is used in Bangladesh, in contrast to the 15 tons GVW trucks used in India (Subramanian and Arnold, 2001).

5.10 FACILITIES AT BORDER CROSSINGS

Four types of border crossing can be identified: rail, road, river-ports and seaports. Discussion here is restricted to rail, road and river ports, since seaports are predominantly for overseas trade (discussed in chapter 3). In the regional trade goods have to pass through border crossing points. Delays caused by transshipment procedures, inefficient customs clearance and physical infrastructure constraints create substantial inefficiencies and poor use of transport capacity at border crossings. Subramanian and Arnold (2001) cite the case of the Benapole-Petrapole crossing where more than 80 per cent of trade is severely congested, with queues of up to 1500 trucks and waiting times of up to five days in both directions. Pohit and Taneja (2003) even cited 8 to 10 days truck delay at the border crossing.

Table 5.7 shows the number of transit documents, copies and signatures required for both Bangladesh and India. The requirement for documents in European countries is much lower than in South Asian countries. European countries require 12 to 14 basic transport documents, representing 46 per cent of basic trade documents in domestic trade, 45 per cent in intra-Europe trade and 41 per cent in foreign trade outside Europe. This excludes special documents such as for dangerous goods (Sauna-Aho, 1998).

Country	Types of Documents	Copies	Signatures
Bangladesh	22	116	55
India	29	118	256

Table 5.7 A Comparison of transit documentation and procedures

Source: Subramanian, 1999

A free market requires liberalised and dynamic international transport (Reynaud, 1998). Although Bangladesh and her neighbours are following a market economy, the transport sector has not progressed accordingly and the existing opportunities also cannot be explored. The seaports of Bangladesh could be the gateway to a vast area including Nepal, Bhutan, and the eastern part of India (see figure 4.1 in chapter 3). This could attract a huge foreign direct investment (FDI) in transport infrastructure and services. Bangladesh could develop its freight industry and create employment opportunities for many people in the service sector just by providing access to seaports for seaborne transit cargo. For example, Nepal could have a shorter access to the sea through Bangladesh. Indeed, a transit agreement between Bangladesh and Nepal was signed in September 1997. Under an agreement with India, the transit route of 61 km between Kakarbhitta (Nepalese border town) and Banglabandh (Bangladeshi border town) is operative twice a week on Saturdays and Sundays. However, the route has still not become attractive due to a number of reasons: lack of a motor vehicle agreement between Bangladesh and Nepal allowing inland penetration, poor cross-border infrastructure, lack of a regular transit customs point, and lack of auxiliary facilities such as banking or warehousing at the transit point (The Daily Star, 2000c).

Although the volume of trade with Bhutan is low and is only from Bhutan to Bangladesh, a good transport network and efficient transit facilities could increase the traffic. Bhutan also

requires a transit facility for access to international trade as well as trade with Bangladesh. Thus similar problems exist for Bhutan as for Nepal. Subramanian and Arnold (2001) found that intra-regional shipments of fruits and vegetables from Bhutan and Nepal to India and Bangladesh require much better logistics. This type of cargo should move in a single road vehicle/unit from origin to destination with a total clearance time at the border of no more than six hours. Another potential transit route for medium-value goods is for East and Northeast India through Bangladesh. Again, this would be effective with efficient border crossing and customs procedures requiring few delays or transshipment.

Much of the success depends on a co-operative attitude among the countries, in particular from India (Chittagong Port Authority, 1998). The problem remains that India's *'primary interests lie in transit/ trans-shipment facilities for easy access to the north eastern states in a bilateral framework, not transport co-operation in a multilateral or sub-regional framework'* (SCCI, 2001d p. 2). Apart from moves by government, private initiatives among the South Asian countries are in progress to make border crossings more efficient. Business leaders of the region consider that a joint inter-governmental private company should be established to build road links to connect all important territories and areas of the region. Chittagong Port could be a regional hub for the trade of Nepal, Bhutan and north-eastern states of India. The business leaders also called for a new rail and road network connecting important areas in South Asia for overall economic development of the region (The Daily Star, 2000a).

5.11 SUMMARY

Bangladesh trade with SAGQ countries is increasing, particularly with India, although it is one-way i.e. a surplus from India in both formal and informal channels. Exports are

negligible compared to the higher volume of imports of hundreds of items. The trade deficit with India has widened at a faster rate than the overall national trade deficit. Exports from Bangladesh to neighbouring countries suffer from a very limited range of export products, faster trade liberalisation than neighbouring countries, and higher tariff and non-tariff barriers in India. Bangladesh needs to both diversify and expand its export base, particularly for goods that already have a steady market in India. India also needs to remove trade barriers. This one sided trade has resulted in the empty running of transport and logistics services causing higher costs and unreliable service. One way trade is not only damaging to the Bangladesh economy but also is the main barrier to developing an efficient and reliable door-to-door transport and logistics service. Transport and logistics inefficiencies translate into higher commodity costs and reduce the trading credibility and status of the countries in the regional and international market. It is important to have a regional strategy to ensure effective and efficient transport corridors (Subramanian and Arnold, 2001). However, the success of transport corridors is constrained by:

- Documentation and procedural inefficiencies: the procedures involved in customs inspections, excessive documentation requirements, and multiple signatures, lack of transparency, informal payments etc. lower the efficiency of goods movement and regional competitiveness (see table 5.7). Also different weekly holidays result in inefficiencies in the regional and international trade and transport.
- Constraints caused by protocol: these include the various restrictions on cross-border movement of trucks and restrictions on route choice.
- Physical infrastructure gaps: poor, inadequate and incompatible physical transport links, lack of physical facilities at border crossings (e.g. warehouses, parking and storage), and terminal facilities.

- **Natural barriers:** there are hundreds of rivers flowing through Bangladesh and its neighbours. Although since 1972 many road bridges have been built, in 1998 about 80 unbridged river gaps on the road network required ferries (Planning Commission, 1998b). These rivers restrict road and rail transport in the rainy season through flooding, even where there are bridges.
- **Knowledge and institutional inefficiencies:** efficient trade facilitation and customs management is lacking (Islam and Gray, 2002).

Rail, road, and inland waterways transport are available to serve trade with neighbouring countries, but road transport plays the major role. The load limit on road presents rail transport an opportunity of carrying more cargo and, unlike road, rail does not require transshipment at border crossings. But rail has not been able to attract substantial traffic. Presently, five rail routes are in operation for trade with India. The rail service is provided by government-owned rail operating organisations in both Bangladesh and India. Thus the question might be asked as to whether economies of scale could be achieved by closing down any of the less attractive or viable routes or by changing the operating status? The reliance of importers or exporters on road transport, despite high congestion, supports these questions. Apart from the present bulk cargo, rail could capture some medium-value cargo. To do so the rail network needs to be integrated. Efforts are in place, for example, to extend the broad gauge to Dhaka through 'Banga Bandhu Jamuna Bridge'. Rail needs to acquire adequate compatible rolling stock, and cargo handling equipment, rail cars and locomotives. The rail service may need to be privatised or be more commercially autonomous capable of offering and responding to an efficient door-to-door containerised transport service. The prospect for inland waterway transport is not so bright, mainly

because of longer transit times. The low availability of cargo for inland waterway transport also questions this mode's service quality and demand.

In general, the advantage of road freight over other modes is supposed to be flexibility and door-to-door service, but it is not so in this case. As road hauliers do not have the right to carry cargo on the roads of neighbouring countries, they require transshipment at the border-crossing resulting in longer transit times, higher transport costs and greater damage to goods. Moreover, factors such as the imbalance in traffic, the lack of facilities at border crossings, the inferior road infrastructure in Bangladesh, and the absence of other trade facilitation measures work as barriers to trade with neighbours. Because of its dynamic nature compared with rail, and the existing operation of more than one dozen border crossings, road is expected to continue dominating the transport of higher-value goods for trade between Bangladesh and India. The consensus on load limits on roads and development of infrastructure accordingly will help this mode to offer through transport, although may be restricted to one mode. Road could also offer combined transport, with short haul collection and delivery services for rail or waterways in the case of long transport haul. This needs '*prioritised co-operation to develop an integrated transport systems and developing infrastructure through collective action*' (SCCI, 2001d p. 1). This sort of service requires equipped logistics centres or inland terminals, which are not in place at the moment. This may be possible by establishing confidence and co-operation among the SAARC countries and by improved relations between private parties.

CHAPTER 6

MULTIMODAL TRANSPORT IN NORTH AMERICA AND EUROPE

6.1 INTRODUCTION

The so-called container revolution in the 1960s-1970s and intermodalism in the 1970s-1980s have caused a tremendous impact on every facet of the transport system (Hayuth, 1987; OECD, 2001). There has also been evolution in the size of carriers such as larger and specialist container ship, bloc trains and also in the unit of cargo, for example larger containers (45 ft or 53 ft) used in the U.S. In chapters 3 and 4 we found that the U. S. and Europe are the two main export destinations of Bangladesh. In the age of globalisation, knowing the transport and logistics system of trading partners is an important step for international trade of developing countries like Bangladesh. These two regions can also be considered as examples of 'best practice' in multimodal development. This chapter therefore examines best practices of international multimodal freight transport in the context of logistics management and the role of users and government in these two regions.

6.2 LOGISTICS MANAGEMENT

6.2.1 Focus of Logistics Management

In the past when organisations tried to reduce logistics costs, their initial studies looked at individual functions such as procurement, inventory control and transport. With the

advancement of logistics management they stopped looking at, for example, transport separately, but rather moved to broader concepts: first stage physical distribution in the 1960s and 1970s, second stage integrated logistics management in the 1970s and 1980s and finally supply chain management in 2000 (Waters, 1999 ; Coyle et al., 2003). In the new forms of logistics relationships we find such terms as 'nets', 'web' or 'virtual organisations' instead of 'chains'. Experts also foresee the fourth stage of 'demand satisfaction networks' (Hewitt, 2002). From the Darwinian point of view, traditionally companies in a supply chain have viewed themselves as individual entities and have tried to compete with each other to survive in the market place. So, many companies have simply transferred costs upstream or downstream to achieve cost reduction and profit maximisation, without realising that this may not help them to be competitive in the supply chain (Christopher, 1998). The underlying paradigm is that all companies will be better off if they focus on joint problem solving, because all costs, even in the upstream, contribute to the final price for the final customer (Bowersox and Closs, 1996).

Logistics management is primarily concerned with optimising flows within the organisation. On the other hand, supply chain management recognises that internal integration by itself is not sufficient (Christopher, 1998). Supply chain management focuses on the improvement of a company's competitive position through cost savings (efficiency) and/ or better customer service (effectiveness) in the global market and the ability to sustain such position in spite of intensive competitive forces and rapidly changing customer needs (Coyle et al., 2003). Table 6.2 shows the comparison of key characteristics of a traditional logistics system and supply chain management. Here 'landed cost' refers to the final, total actual cost to the customer at the point where they are going to use it, including the initial purchase price and delivery cost, inventory cost and other costs (Coyle et al., 2003). Supply chain management seeks to achieve linkage and co-ordination between processes of the other entities in the pipeline i.e. suppliers and customers.

Factor	Traditional firm-oriented Logistics System	Supply Chain Management
Inventory Management	Firm focused	Pipeline co-ordination
Inventory flow	Interrupted	Seamless/ visible
Cost	Firm minimised	Landed cost
Information	Firm controlled	Shared
Risk	Firm focused	Shared
Planning	Firm oriented	Supply chain team system approach
Interorganisational relationships	Firm focused on low cost	Partnership focused on landed cost

Table-6.1 Comparison of key characteristics of traditional logistic system and supply chain management.

Source: Coyle et al., 1996 p. 11

In a supply chain at least three types of organisations: supplier, manufacturer, and intermediaries (distributor and retailer) play important roles in bringing a consignment to the final customer. The intermediary companies import or export a large variety of items, acting on behalf of retailers and wholesalers in North America and Europe. These companies even take over the logistics operations on behalf of the retailers (Thorby, 2003a). However, interfaces between organisations may appear as a barrier to co-ordination and collaboration, which is a crucial element of a successful supply chain. Transport or logistics service providers work as the physical link in such interfaces and a higher degree of integration and independence are required to maintain relationships. As the extent to which they are integrated in the supply chain, and the degree of collaboration that is achieved, increase so does the competitiveness of the supply chain. Competition in the global market has shifted from 'company against company' to 'supply chain against supply chain' (Christopher, 1998). In such a situation the very important task for a transport and logistics service provider is to provide the best possible customer-oriented service for a

well-balanced price/quality ratio (Wiegmans et al., 2001). As the world market is now very competitive, the access to such a market and survival as well is very cost- and time-sensitive. So, getting the right product, at the right price, at the right time to the customer at the right place is not only the linchpin to competitive success but also the key to survival (Christopher and Towill, 2001; Coyle et al., 2003).

6.2.2 Third Party Logistics

The example of the use of third party logistics (TPLs) providers has already been mentioned in the previous section. TPL is defined as activities carried out by a logistics service provider on behalf of a shipper and consisting of at least management and execution of the transport and warehousing functions (Seeck, and Vanroye, 1999). The concept of third-party logistics providers has become a growing reality in Europe and the U.S. in recent years, allowing shippers to outsource logistics activities and concentrate on their core business (Eno Transportation Foundation, Inc., 1999). As manufacturers/shippers are increasingly concentrating on cost reduction, the transport or logistics service provider focuses on how the customers can be provided at a lower cost but with a higher quality service. So, there must be innovation to produce the new forms of transport which users and society want (Gercek, 1998). For example some TPLs even extend their range of service to arranging customs clearance of imports, warehousing at different locations and managing transport haulage including seafreight via non-vessel owning common carriers (NVOCC) (Thorby, 2003a).

A freight forwarder is usually not a carrier, rather an auxiliary person or professional intermediary between the cargo interests and the carrier who arranges and organises the carriage of goods from origin to destination, but does not undertake to carry or accept the

liability as a carrier (Wit, 1995). In a traditional transport market the sea carriers perform their service for the port-to-port transport haul, but in a competitive changing market many multimodal services are now offered by sea carriers who subcontract the other connecting activities of carriage and transshipment, which is the traditional business of freight forwarders. Under such circumstances the freight forwarders have reorganised their working methods and now they are also offering multimodal services. Since forwarders do not own vessels, they take responsibility for the origin-to-destination transport haul but procure its performance entirely through other carriers, thus acquiring the name of NVOCCs in some countries (Kindred and Brooks, 1997). Thus, freight forwarders play a comprehensive role in the origin-to-destination transport haul through their consolidation services, multimodal service and expertise in trade transactions. Obviously they also play an important role in the choice of selecting transport modes. Moreover, in the multimodal transport system the main operators are the conventional mode specific operators.

As the control, response, tracking and tracing, and responsibility of cargo are key issues of the multimodal transport system, the involvement of new organisations in multimodal movements is welcome. Thus, third-party non-equity participants like NVOCCs or more recently IMCs in the U.S. are taking an increasing share of the through-transport service (Hayuth, 1987). In the 1996/97 period, the use of third-party logistics services grew at an annual rate of over 10 percent in both the U.S. and Europe (Eno Transportation Foundation, Inc., 1999). A large share of cargo represents either small or less-than truck load (LTL) shipments. These shippers are best served by consolidation services offered by logistics companies or freight forwarders. The lack of ICDs restricts the use of door-to-door transport services for these shippers. On the other hand, the concentration of high-volume trunk lines between logistics centres and major market centres allows deeper hinterland penetration and introduces direct competition among terminals or logistics centres as well as transport operators.

volume trunk lines between logistics centres and major market centres allows deeper hinterland penetration and introduces direct competition among terminals or logistics centres as well as transport operators.

A carrier gives volume discounts to customers with large quantities of freight at one time. A freight forwarder exists by offering a service to shippers that must use less-than-full load rates because they do not generate enough volume to use full load rates. A freight forwarder collects from the origin small shipments and consolidates these at a logistics centre into large unit loads and sends the consolidated shipments to carriers (Coyle et al., 2003). At destination, the freight forwarder breaks the load down into individual shipments at a logistics centre and delivers them to the correct consignees (Coyle et al., 2003). Thus, the freight forwarder gains from the rate difference and the small shipper benefits from the better service, including a lower transit time and a better pick-up and delivery service, but at less cost.

6.3 MULTIMODAL TRANSPORT OPTIONS

6.3.1 Market and Competition

A competitive as well as innovative freight market has been developed over the years in developed countries such as the U. S. The competition in the multimodal freight market has at least three basic active areas: the customer (e.g. shipper), supplier (e.g. carriers) and new entrants (potential customer and supplier) (Muller, 1999). Today globalisation (discussed in section 2.3) has become a crucial factor for economic growth for any country or region. As a result of this universal process the flow of high value-added products between companies and within the global companies with production facilities in different regions of the world has increased. This development has led the growth of container

logistics companies to offer a suite of services including tracking and tracing, warehousing and inventory management, distribution, and financial transactions online 24 hours a day. As a result, logistics service providers are able to organise the flow of transport from the factory or farm to distribution centres and onwards to the final customer (ESCAP, 2000).

The road networks in the U. S. and Europe seem to pose the fewest constraints on operators. Road vehicle manufacturers are able to offer operators suitable chassis and trucks, for example, with relatively low platforms if they are ready to pay extra for the special design and small-diameter tires (ECMT, 1998). Another positive side for this mode is that road transport was deregulated at an early stage resulting in fierce competition, that trucking operators were bound to provide inexpensive, efficient and customer-tailored services to survive in the market. In contrast rail companies in Europe are enjoying national monopolies and lack the required market incentives and commercial attitude to offer innovative services to customers (Seeck and Vanroye, 1999). Moreover, the inherent nature of high entry cost of rail, barge or ship operations compared to the road freight industry will remain an important inhibiting factor in even a complete open access market (ECMT, 2001). The barge and ship operations are further disadvantaged by low speed resulting in slow movement of cargo.

It was indicated in the previous section that two contrasting factors exist in the U.S. and European context. The U.S. load centres are widely scattered giving an incentive to rail freight operations and in some cases barge operations, whereas the situation is different in Europe. The load centres are densely situated in an area little bigger than Canada consisting of around 30 countries (Cooper et al., 1994). As long transport haul by road may not be viable, the operators and customers consider a wide spectrum of decisions about how a transport system could operate with maximum efficiency. The following key issues are encouraging operators to examine the benefits of the multimodal transport system:

- Creation of the single European Market;
- Opening of the Channel Tunnel;
- A move towards global sourcing;
- New E. U. transport legislation;
- Increasing road congestion;
- An increasing recognition of the importance of the distribution element within companies' manufacturing strategies;
- The development of pan-European and multi-national companies with plant specialisation as a manufacturing strategy;
- Development of single source logistics support units for European markets (e.g. the central European warehouses);
- Technical advances such as the development of EDI systems for ITU movement (Institute of Logistics, 1994 p.3-4); and
- Very recent adoption of the single European currency the Euro (€) by some ten European countries and others are expected to follow, and the extension of the E.U. boundary.

Transshipment costs including the intermediate terminal costs and their share in the total transport costs largely determine the competitiveness of the inland multimodal option (ECMT, 2001). Multimodal solutions based on inland navigation and rail transport are profitably exploited in a number of high-density traffic corridors for example, the Rhine axis, some Alpine routes and the Channel Tunnel traffic or in some specific niche markets in Europe. But often they are not profitable enough to become a European-wide alternative to road or rail haulage due to technical and operational inefficiencies. The following four criteria are used to select multimodal transport:

- High traffic volume;
- High traffic potential;

- Several problems with road transit traffic (in case of rail and water option);
- Possibility of using inland waterways in multimodal transport (ECMT, 1998 p.29)

By nature road-rail-maritime multimodal transport (road-inland navigation-sea multimodal transport as well) involves additional cargo handling, posing the risk of delay, damages or mistakes.

6.3.2 Road-Sea Multimodal Transport

Quality standards, demanded by the market or more precisely by shippers or manufacturers, of road transport are flexibility, speed and reliability (ECMT, 1998). Road transport is commonly used at both ends of an overseas port-to-port transport haul from the premises of a shipper to the nearest port or terminal (origin side) and from the nearest port or terminal to the consignee's premises. In contrast to multimodal transport this is termed as conventional fragmented transport (see also section 2.2 and figure 2.1). In the framework of a multimodal transport chain, road transport is also used for the segments between the port terminal and inland terminal or logistics /load centre and the origin or final destination (ECMT, 2001). However, the main difference between these two systems is the operation or performance of the transport function under a single operator's own responsibility in the case of a multimodal transport system. On the other hand, in a conventional transport system the responsibility is segmented and individual and thus applies to many operators within the total transport haul. A study found that about 95 per cent of the container flows by road to and from the port of Antwerp are realised within a limited radius of some 300 km of the port (ECMT, 2001). Thus, it can be seen that road transport will almost always perform the main trunk haul for journeys up to 300 km. The road transport haul could

increase to 600 km or more if the cargo is regrouped at a distribution centre to reach the final destinations in a conventional non-containerised road form (ECMT, 2001).

Table 6.2 shows the share of freight transport in Europe where road transport is dominant in Western, Central and Eastern European countries and has increased over the years but in CIS countries rail is dominant but road is slowly increasing its share. In Western European countries in 2001 and 2002, whereas road freight had a growth of 1 per cent and 1.8 per cent, rail had a decline of 3.6 per cent and 2.6 per cent respectively. The inland waterway share had a growth of 1.4 per cent in 2001 but a decline of 1.2 per cent in 2002 (ECMT, 2004). As with the Western, Central and Eastern European countries, in the U. S. rail freight share has decreased from 31 per cent in 1970 to 25 per cent in 1998. Thus in both regions the share of rail freight has declined but the decline in Europe is much more than in the U. S. On the other hand the share of road in the U. S. has increased from 36 per cent to 49 per cent over the same period (Duff, 2000). Road plays a dominant role for the U. S. cross-border trade with Canada and Mexico as well. In 2002 goods worth U.S. \$ 236.2 billion for trade with Canada and U.S.\$ 161.5 billion for trade with Mexico were transported by road compared to U.S.\$ 60.94 billion and U.S.\$ 30.9 billion respectively by rail (U.S. Bureau of Transport Statistics, 2004). Data for cross-border trade by inland waterway transport were not available. However, the following factors led road transport to achieve such success: a) high speed collection/ delivery service with no double-handling unless desired, b) the only method of delivering economically to a constantly changing range of delivery points (specially within a limited radius of some 300 km around the port), c) flexibility, d) service quality potential is not constrained, e) operational entry into the industry is fast and simple, and f) more economical than rail or barge transport over shorter distances (Institute of Logistics, 1994).

Year/ Modes	1980			1990			2001		
	WEC	CEEC	CIS	WEC	CEEC	CIS	WEC	CEEC	CIS
Rail	23.6	71.5	87.6	17.7	66.2	84.7	14.0	41.4	86.6
Road	66.0	25.1	6.7	74.1	30.4	10.0	79.4	56.3	9.0
Inland	10.4	3.4	5.7	8.2	3.4	6.1	6.6	2.3	4.4

Table 6.2 Trends in market share (in per cent) of various modes of transport in Europe over 1980 to 2001 (freight transport in ton-km)

Source: ECMT, 2003 p.18, 24 and 29

Note:

WEG- Western European Countries

CEEC- Central and Eastern European Countries

CIS- Commonwealth of Independent States (former Soviet states)

6.3.3 Road-Water Multimodal Transport

European navigable waterways are becoming an increasingly important medium for transporting unitised freight, mainly maritime traffic (Institute of Logistics, 1994). Barge traffic has grown from 27% to 36% of all hinterland traffic handled in the port of Rotterdam over the last five years (Beddow, 2000). In 1997 total European container traffic by inland barge amounted to some 2.2 million with a double-digit growth each year. On the other hand Antwerp port handled more than 1 million TEU in barge traffic in 1997 compared to 128,700 TEUs in 1985. An impressive 560,000 TEUs were transported by inland barge between Antwerp and Rotterdam in 1996, thus representing a market share of 35 per cent in the modal split of container traffic between both ports (ECMT, 2001). In general the number of TEUs moved by multimodal transport rose from 29 million in 1996 to 37 million in 1999 with average annual growth of 9 per cent. The growth of inland waterway transport during the same period is much higher; for example, the volume rose by 13 per cent in ton-kilometre terms and 19.5 per cent in TEU terms (EUROPA, 2004).

Some European barges accommodate stackable containers up to four layers, offering a cheaper freight service. As there is hardly any infrastructure charge for river use they are becoming competitive in container transport as well (ECMT, 1998). Now, a large number of container barge operators have extended their logistics service by operating a road-barge door-to-door transport service and new inland terminals are coming into operation in the Rhine basin. Many of the new barge terminals are even located close to the load centre ports. This development proves that if there are sufficient container volumes, a container barge operation can be both cost effective and competitive over relatively short distances as well (ECMT, 2001).

Although inland waterways transport is the cheapest and most environmentally friendly mode compared with rail and road, so far it has only a minor share of total traffic in Europe. Multimodal inland waterway vessels account for only a very small part of total freight volume, consisting almost entirely of the carriage of ISO containers between sea ports and their hinterland (ECMT, 1998). In the European context, the following features are challenging this multimodal transport option (other than its inherent problems, for example, slow speed, additional terminal handling cost): a) increasing use of non-stackable loading units, b) non-compatible logistics distribution systems c) lack of draught and bridge clearance, and d) lack of availability of navigable waterways. Firstly, as European multimodal transport increasingly concentrates on non-stackable swap bodies, they are unsuitable to inland waterways transport. A barge can carry only one layer of non-stackable units so that only one-quarter of the capacity of a vessel can be utilised. But, the operating costs remain the same resulting in a higher cost for transport.

Secondly, the ISO container is not compatible with the logistics distribution system used by European industry, and thus is not compatible for transport between European shippers. This is the main reason why this transport option is virtually confined to carrying ISO

containers. In other words, in the case of trade outside Europe, multimodal inland water transport becomes an attractive option. ISO containers are only used for overseas import and export trade, and only exceptionally for intra-European domestic cargo. This is a big challenge to the potential for multimodal transport in Europe. Further expansion of the market for this option is dependent on the introduction of newly designed stackable swap bodies (ECMT, 1998).

Thirdly, bridge clearance, the width and time-table of locks and water level are very important in the utilisation of multimodal transport. Many locks are closed at night, and as a result a barge arriving slightly late may have to wait up to eight hours. Moreover, upstream the navigability of river traffic is decreased resulting in the lower utilisation of container barge capacity. Fourthly, not all logistics or load centres in Europe are accessible by this type of multimodal option, nor are navigable inland waterways available all over Europe. For example, the Rhine normally has sufficient water and bridge clearances to allow the operation of vessels with a capacity of more than 200 TEUs and freight containers are stacked four layers high. But as the ships move upstream into the Rhine-Main-Danube Canal, the bridge clearances become smaller and only two layers of containers can be carried (ECMT, 1998).

6.3.4 Road-Rail-Maritime Multimodal Transport

Rail-multimodal (with water) transport incurs the additional cost of terminal handling. The additional cost has to be offset by the savings accruing from the concentration of loads, and savings are greater with longer distance as handling cost is independent of distance (ECMT, 2001). It is generally accepted that frequent block and shuttle trains with 30 TEUs to 80 TEUs capacity become an attractive alternative in the European network. The rail

multimodal network becomes fully integrated when all inland hubs and spokes at ICDs or logistics or load centres are interconnected via high frequency block or shuttle trains (ECMT, 2001). The minimum distance for rail multimodal transport is usually considered to be 450-650 km although efforts are in place to lower this distance to 250 km or less (ECMT, 1998).

In Europe the rail networks are still nationally oriented and operated. National railway companies too often lack commitment and a commercial attitude, with major complaints relating to their bureaucratic attitude, unannounced rate changes, the long lead time required to make bookings, the limited tracking and tracing, and limited cost-effective integration in door-to-door transport (ECMT, 2001). The current rail network is very dense, particularly in Germany, England and the Benelux countries. The rail lines serve both passenger and goods movement, with very few lines dedicated to goods movement (Eno Transportation Foundation, Inc., 1999). However, plans for the Transeuropean Transport Networks and liberalisation are expected to change this situation in the coming years (Buck and Kooijman, 1999). Under an E.U. proposal, the 'Rail Freight Freeways' concept has been implemented in some routes by railway companies of member states and freight shippers and this service together with rail shuttle and block services look promising in the context of a multimodal freight service (Janic and Reggiani, 2001). On some routes, a road-rail multimodal service is successful and dominant, consisting mainly of piggyback, rolling highway, swap body and container movement (Institute of Logistics, 1994). A block train service on a multimodal basis has taken over nine per cent of the total volume of trade between Germany and Romania from road to rail. Also a successful multimodal rail/ maritime service between Spain and Germany has taken over about 6500 trucks journeys per year from the congested road corridor (Janic and Reggiani, 2001). In contrast the share of road-rail multimodal transport carrying containers and swap bodies

has gone down from 72 per cent of total ITUs in 1997 to 68 per cent in 2000 (EUROPA, 2004).

The following factors work negatively in a European rail multimodal service: a) national monopolies on the level of rail infrastructure and traction, and b) a complex structure of subsidiaries and operational units (ECMT, 2001). So, easy open access and competition to the operation of rail freight service is advised (Duff, 2000). Thus privatisation, merger, alliance, acquisition, joint ventures and above all commercialisation have been common features in the U.S. and Europe to create a competitive transport market. The railway companies in these countries work as joint ventures with road, shipping lines and even with other countries' railway companies. The shipping lines or other multimodal transport operators buy capacity from the national railway freight companies and then sell it to their customers in Europe. By doing so European national railway companies in fact are not acting as multimodal operators directly but through their subsidiaries and participants (ECMT, 2001). But in the U.S. railroad companies have their own road vehicles or shipping lines by acquiring or making joint ventures or partnerships with road or rail companies (Duff, 2000).

For short haul traffic road freight usually operates on an intramodal basis whereas for long-haul traffic rail has to carry on a multimodal truck-rail-truck basis (Muller, 1999). Road hauliers normally form a buffer between market demand and continental multimodal transport with a rail operator. Multimodal transport operators and railways normally try to improve the service for full-truck load consignments, although part-truck load traffic is the fastest growing segment of the freight transport market and more profitable than the full-truck load business (ECMT, 1998). To increase market share multimodal operators must respond to this market.

Along with transit time and speed, reliability is a necessity for modern logistics applications (Christopher, 1998). One important cause of unreliable service is the lack of co-operation among railway companies, road haulers and freight forwarders. A key to offering higher quality freight transport service by rail lies in better co-operation between operating companies (Fossey, 1999). One possible way of improving co-operation might be to form one railway company to act as reference partner for each line, bearing responsibility for the slot. For example, IMC in the U.S. works in favour of rail multimodal freight service. Even a new form of alliance between operating companies and third parties could provide some impetus to service improvement (Fossey, 1999).

6.4 USER ROLE FOR MULTIMODAL TRANSPORT

6.4.1 Change in Consignment

Over the past few decades both the European and American industrial production methods have changed significantly. The manufacturing sector has shifted from extraction of raw materials or production of intermediate goods to the production of final goods. Again within manufacturing industry there is a shift from production of traditional low value-added products to high technology-based high value-added products. Therefore, goods are comparatively light but need high care and speedy movement (Gercek, 1998). On the other hand they import less costly higher volume consumption items such as garments or food items from developing countries. In the 1970s and early 1980s many cargo owners took little interest in deliveries. Their primary thrust was production unless there was a customer complaint (Kindred and Brooks, 1997). But, things have changed and awareness in the supply chain has increased the status of supply chain managers along with responsibility of

buying transport or logistics services, so that companies now expect managers to have a much wider understanding of the total supply chain (Eller, 2000).

In the past shippers or manufacturers have focused on mainly cost during the selection of a transport mode. But now as the global market is becoming increasingly time-sensitive they consider a range of factors including transit time, transport cost, reliability, distance, shipment size, value of cargo, volume-weight ratio, time constraints, product fragility and perishability (Rushton and Oxley, 1989; Coyle et al., 2003; Christopher, 1998; Eno Transportation Foundation, Inc., 1999). If a firm decides upon faster delivery of materials, then the firm can reduce inventory level by shortening transit time, but the cost of transport may go up. The use of the just-in-time approach (discussed in section 2.7.2) has expanded throughout the industrialised world, using a cost reduction policy by trade-offs of cost against speed and reliability. Such terms as zero defects, logistics, and EDI have evolved in the last decade (Gercek, 1998).

6.4.2 Change in Supply Chain Control

Logistics supply chains were traditionally determined by manufacturers or distributors as consignors or consignees (ECMT, 1987), with a considerable influence on the choice of route and mode. But as multimodalism is offering choice of routes, ports of call and modes of transport the shipper is losing influence (Hayuth, 1987). Routes and modes are now increasingly controlled by either a multimodal transport operator or by freight forwarders or by large shippers. Freight forwarders and third party logistics companies mainly provide service for small and medium shipments and thus have a great influence on these shippers in the choice of route and mode. Major freight forwarders, shipping lines, transport operators, terminal operators, and other logistics service providers are engaged in a battle

for the control over door-to-door transport chain in the U.S. and Europe. However, as discussed in section 6.4.1 it would appear that competition among companies in a supply chain needs to be replaced by co-operation and collaboration to make the supply chain effective. The relationship of shippers and other organisations in the supply chain network (e.g. outsourcing or partnership with carrier) shapes the shippers' demand for accessibility on the logistical and transport level (ECMT, 2001).

Now in most trades, the seller is not the manufacturer of the goods and the buyer is not its final customer. Instead intermediaries play the role of buyer as well as seller and require a strict management of a sophisticated and expensive flow of goods resulting in high demand of quality transport service (UNCTAD, 1990). Another aspect of international trade is the trade between subsidiaries of the same companies (intrafirm trade), which represents a large share particularly in developed countries. For example, now one third of U.S. export products are being sent by American companies to their overseas subsidiaries, and another third are being sent by foreign manufacturers back to their home market (Waters, 1999).

6.5 GOVERNMENT ROLE

6.5.1 Creation of Service Environment

The transport sector has traditionally been subject to many kinds of government intervention and regulation regimes with periodic changes. Experts mark the first part of the 20th century as a period of regulation and control and the latter part as increasing liberalisation and greater private sector involvement (Gercek, 1998). In the age of globalisation the role of government mainly lies with the creation of a free market for transport, allowing free and fair competition among transport modes and operators, based

on the harmonisation of national transport regulation (ECMT, 2001; Ockwell, 2001). The major break-through occurred in the 1980s in the U.S. for air, road and rail deregulation with many other countries following. Encouraging greater competition through price and service and permitting more flexibility in multimodal relationships were the motives for deregulation in the U.S. (Muller, 1999). Deregulation focuses on the removal of barriers to entry to and exit from the market and the restrictions on pricing to achieve a free and fair competitive market (Abdel-Fattah, 1997). The move to a single market in the E.U. required removal of certain transport-related barriers including co-ordinated investment in transport infrastructure on a Europe-wide, institutional basis (Gercek, 1998).

Privatisation of seaports has been taking place against the background of three world trends: globalisation, privatisation itself in general, and the need for modernisation (Marges, 1999). Privatisation of seaports in the UK has been taking place since the 1980s. Privatisation of British Railway (BR), both infrastructure and operations, was introduced under the Railways Act 1993 during the 1990s (White, 1998). This privatisation had a major impact on the nature of freight transport operation (Woodburn, 2001). For example, Freightliner, a British rail freight operator, operates a multimodal service between at least seven ports and eight inland terminals using the rail and road network and over 100 trains and 180 vehicles daily. It transports yearly over one million standard containers (Freightliner web site, 2001). Thus to get a multimodal transport service there is a need for partnership between the road and rail or road and waterways. However, government also has an essential role because transport is largely influenced by legislation and competition (Burkhardt, 1998; Candemir, 1998).

6.5.1.1 Deregulation in Europe

The European Commission issued a directive in 1991 (91/440/EEC), asking each Member State to introduce a degree of open access rights to enable third-party train operators to gain access on fair commercial grounds to the rail system. Members were also asked to separate their accounting systems for rail infrastructure from their operations. The aim was to facilitate transparency of track access costs (Kain, 1998), although the infrastructure and operations could stay in government ownership (White, 1998). Some countries, for example Great Britain, went beyond this directive by privatising separately. The development of containerisation in the early 1960s led ten railways to create Intercontainer as a pan-European organisation, which could act as a single point of contact for shipping lines, co-ordinating cross-border rail movement. Thus Intercontainer became the railway organisation for moving ISO containers internationally. Over the years, Intercontainer has grown to become the subsidiary of 27 European railways and has set up a network of nationally based agents, with an effective monopoly in the international rail transport of ISO containers (Institute of Logistics, 1994).

Traditional road-based forwarders and hauliers saw the benefit of using rail for long distance trunk haulage but also recognised fundamental problems with the equipment used by shipping lines. The road industry has always seen railways as competitors and would certainly be reluctant to use rail if there was a risk that customer information could be used to gain their business. Thus the International Union of Combined Road-Rail Transport Companies (UIRR) companies were created in each European country, comprising a number of hauliers and forwarders together with the railways. These companies offer only terminal-to-terminal rail services i.e. no road collection or delivery, on a strictly neutral basis. One of the first developments that accelerated the growth of UIRR traffic was the

concept of piggyback, whereby trailers are put on specially built rail wagons. The UIRR obtained a monopoly on this type of international transport (Institute of Logistics, 1994).

The historic development of Intercontainer and UIRR led, by the mid-1980s, to a rigid market split which was no longer suited to an increasingly flexible, globalised transport industry, and resulted in the following monopoly situations (Institute of Logistics, 1994):

- Intercontainer monopoly on international transport of ISO containers;
- UIRR: monopoly on international piggyback transport; and
- Railway subsidiaries: restricted to national transport only and agents for Intercontainer in international transport.

By agreement all such monopolies and protective measures were abolished in 1991-92 so that each of these organisations was able to operate freely in the international transport market and any organisation could enter the market (Institute of Logistics, 1994).

6.5.1.2 Deregulation in the U.S.

The 108-year-old Interstate Commerce Commission (ICC) performed the responsibility of economic regulation of the U.S. surface transport until 31 December 1995 (Spychalski, 1997). Over the years a set of mode-specific economic regulations was developed each with their own character (Eno Transportation Foundation, Inc., 1998). The regulations proved a major constraint for a multimodal transport system. For example, early attempts to publish through-transport rates were always confronted with the threat of legal action under the anti-trust laws. Neither the Interstate Commerce Commission nor the Federal Maritime Commission (FMC) would approve multimodal agreements because of jurisdictional disputes (Hayuth, 1987). Until the Motor Carrier Act (MCA of 1980), trans-

border shipments to deliver directly to the final destination in the U.S. by either Canadian or Mexican truckers was prohibited by the ICC. The movements of most truckers importing goods into the U.S. were confined to the limits of the commercial zones around the ports of entry. This reminds the present situation in the border trade and transport between Bangladesh and India discussed in chapter 4. Nearly all inbound foreign trucks had to leave their trailers or unload their cargo at the border so that the U.S. trucks could pick up the freight and transport it into the U.S. The signing of the MCA made it easier for the ICC to enable Canadian and Mexican truckers to have easier access into the U.S. (Jones, 1999). The ICC Termination Act of 1995 reduced *'the once comprehensive framework of control over entry, pricing, corporate financial practices, and other key elements of commercial behaviour which governed rail, motor and water carriage to a vestigial residue'* (Spychalski, 1997).

The above deregulation of transport was started in the late 1970s and was implemented in the 1980s in the U.S., but with separate deregulation for each of the modes (Muller, 1999). The MCA in 1980 enhanced multimodal transport development (Hayuth, 1987) and the Staggers Rail Act of 1980 allowed for rail to sell non-revenue-producing operations and to eliminate or price competitively non-remunerative services (Muller, 1999). Thus rail became competitive and now offers multimodal service.

The U.S. now has 35% less track, 32% fewer locomotives, and 60 % fewer employees, but carries 48% more freight. Productivity has increased three-fold. A number of steps including deregulation, mergers and alliances, new equipment, a systems concept, increased co-operation among ports or terminals and shipping lines and other carriers, have reformed the U.S. rail freight industry (Hayuth, 1987). Only four mega-railroads dominate railroad traffic with 95 % of gross ton-miles and 94 % of revenues (Duff, 2000).

6.5.2 Government Role in Infrastructure Development

Multimodal transport consists of infrastructure (road, waterways, tracks, dedicated transfer areas); superstructure (safety, power supply and transfer equipment); vehicles (tractor-trailer and rail rolling stock, ships/barge); information systems; and management (ECMT, 1998). An important part of the E.U. transport policy deals with the effort to increase the market share of multimodal transport discussed in section 6.2 (ECMT, 2001). Governments play a major role in the planning and construction of infrastructure, at both the national and international level (Lehmacher, 1998), and also encourage the development of information technology particularly EDI, E-Commerce, and the Internet to improve efficiency and transparency in transport system, and thereby in international trade (ECMT, 2001). Private entrepreneurs perform the investment in superstructure, information and human resources. On the other hand governments in the form of grants or aid, direct and indirect subsidies, support the investment in infrastructure. For example, many European countries offer investment grants for multimodal transport, mainly for building and upgrading of terminals. Then the operators finance and install the superstructure, such as the cranes for lifting loading units, the special vehicles to move such units and within the terminal area (ECMT, 1998). However, a report, updated up to 11 June 2004, of the European Commission on Council Directive (92/106/EEC of 7 December 1992) allows state aid to investment for site and equipment and operation for combined transport subject to notification (EUROPA, 2004).

Strong competition among ports has resulted in the concept of the hub and spoke port systems, and ports are under tremendous pressure to upgrade and expand their facilities (Eno Transportation Foundation, Inc., 1999). However, a case study of the largest ports in the U.S. revealed deteriorating economic performance, mainly because of apparent

diminishing returns on investment. Experts identified two causes: lack of growth in productivity in the use of a terminal's revenue-earning facilities (lift per acre), and the lack of the growth in facility pricing commensurate with investment costs (Ricklefs et al., 1999). Under such a situation a study conducted by the U.S. Department of Transportation's Maritime Administration covering the period 1985-94 recommended '*the future growth of most ports will have to be funded through taxes and sources other than port revenues*' (Ricklefs et al., 1999 P.54), justifying the funding for infrastructure development by government.

6.5.3 Public-Private Partnership

In many countries, the role of government has not been uniform and little co-operation and co-ordination exist, as the transport-related government ministries are single mode based. This has an impact on subsequent planning policies that overlook or give insufficient emphasis to multimodal transport development. In such a situation the private parties and government should jointly take the initiative to achieve solution of trade and transport problems (UNCTAD, 1994a). The trade and transport related private sector, for example, associations of freight forwarders or shippers' councils, are taking initiatives with many multimodal developments where government legislation has enabled such development, generally through laws associated with the deregulation of transport. The governments in the U. S. and European countries support transport-related research and infrastructure development in the form of grants or subsidies. For example, the U.S. Maritime Administration sponsored Cargo Handling Co-operative Programme's (CHCP) efforts to achieve an enhanced integrated transport system for the movement of international and domestic freight, based on advanced technologies in infrastructure design, seamless international transport networks, and more efficient communication and information flow.

The programme, conceived as a public-private partnership, works to foster research and technology development among U.S. multimodal companies. The initiatives are mainly based on a system-level approach to freight transport from origin to destination (U.S. Department of Transportation Maritime Administration, 2001). In the third EU-U.S. Intermodal Forum held in 1999 the experts recommended a strong public-private partnership (Eno Transportation Foundation, Inc., 1999).

6.5.4 Government as Accelerator

One of the main objectives of the multimodal transport system, 'zero' or 'minimum' delay at modal interchange points, may not be achieved because of inefficient customs procedures. The door-to-door service, offered by transport and logistics companies requires a time-definite service to customers. This requires certainties within the supply chain including no delay for customs clearance. Customs Freight Simplified Procedures (CFSP) were introduced in the UK in 1998 to offer rapid customs clearance at the ports. It focuses on the principles of less paperwork requiring completion at the frontier, and the utilisation of EDI for the submission of supplementary declarations to HM Customs and Excise at a later date (Thorby, 2000).

The U.S. Customs authorities offer an even further advanced electronic Automated Export System (AES). To discourage the carriers it even imposes '*surcharge on shippers who submit paper Shippers' Export Declaration (SED)*' (Containerisation International, 2000b p.29). U.S. importers are allowed to file entry summaries even if some of the data elements are not available at the time of goods importation. The data elements, namely goods value, commodity code and NAFTA eligibility, can be submitted to customs at a later date. The importer 'flags' these entries in the Automated Commercial System (ACS) at the time the

entry is filed (Containerisation International, 2001). Thus, in the U.S. and Europe the Customs procedures work as an accelerator. Some experts even propose an allocation of some Customs duties to port authorities to expedite the flow of goods through modal transfer points (Eno Transportation Foundation, Inc., 1999).

The governments of both the U.S. and European countries encourage shippers towards a multimodal option by:

- Infrastructure investment in road, rail and modal transfer points (terminals);
- Defrayment of infrastructure operating costs, for example, through road taxes;
- Regulation of maximum outside dimensions, gross weight and other safety features for road vehicles; and
- Enforcement of driving and operating rules for road vehicles (Burkhardt, 1998 p.6).

6.6 IMPLICATIONS FOR DEVELOPING COUNTRIES

The door-to-door multimodal freight services using more than one mode under the responsibility of one operator is working efficiently in developed countries. In previous chapters it was found that the transport system in developing countries, in particular in Bangladesh, is working inefficiently. These countries need to follow the practices of developed countries (see sections 6.1 and 6.2). It is true that multimodal transport in Europe has not achieved as much as has been achieved in the U.S. The advantages of the latter include long and continental transport hauls, early deregulation for all transport modes, private-public efforts for multimodal transport, and the existence of a competitive market regime. In contrast, in Europe rail transport haul is short, as the cargo centres are densely situated and thus road has a lead over other modes. Large loads carried over long

distances make transport services efficient and attractive, as the cost per unit load decreases but the terminal handling and other fixed costs remain unchanged. In the U.S. the average haul is 1050 km, in contrast it is only 200 km in Europe (Eno Transportation Foundation, Inc., 1999). With this short haul it is difficult for rail to compete with road. In a multimodal transport system rail and waterways are dependent on road for door-to-door pick-up and delivery services. Also in a short haul the road hauliers always look for an opportunity to offer unimodal services. Road hauliers are in some cases creating a buffer between market demand and the multimodal options and thus is a competitor of rail or waterway rather than a co-operator.

Thus, a bigger country like India or China has a higher potential of developing multimodal transport system than a smaller country like Bangladesh. But if the transport services could be efficient then a smaller transport haul with no intermediate load unloading, for example the Dhaka-Chittagong route, would be a potential for a multimodal transport service as in the case of Europe. To develop such an efficient transport system, deregulation in the transport sector is essential. The governments of developing countries need to make sure that competition is there and the users are not affected by a lack of competition. The governments may even need to impose a moratorium on mergers or alliances, as in the case of the U.S., to ensure a competitive market. The governments also need to invest directly or indirectly in infrastructure development such as terminals and to support private initiatives in this field by offering grants or other forms of help. The government and the private sector need to work in a public-private partnership environment. In particular the customs authority can help shippers and consignees in achieving the goal of 'zero' or 'minimum' delay by clearing consignments quickly. There should be a system of clearing cargo using an automated information system, which is not present in Bangladesh (ADB, 2003). Once the automated system starts working the authority may even impose a surcharge on the shippers who would submit hard copy for customs clearance to

discourage the time consuming paper work. Thus the flow of goods, irrespective of national or international trade, would be seamless even in the case of using more than one mode of transport.

With the actions suggested above an ideal multimodal transport system, summarised in figure 6.2, could be developed in developing countries. The shippers at both ends have access to door-to-door service either directly from factory premises to port or through ICDs. The small and medium shippers at any range of inland transport haul are getting stuffing/ un-stuffing services, customs clearance, documentation etc through freight forwarders and other agents using ICDs. On the other hand, big shippers do not need to use the freight forwarders' specialist expertise as they have logistics managers as well as access to main line carriers. If the shippers are within 300-km radius of the port (details in section 6.3) then they can easily be served from the port terminal by trucker's pick-up and delivery services under a multimodal freight service instead of using ICDs. Thus all shippers/ consignees in the country or region, either directly through port or indirectly inland terminal services would be within the availability of multimodal door-to-door services.

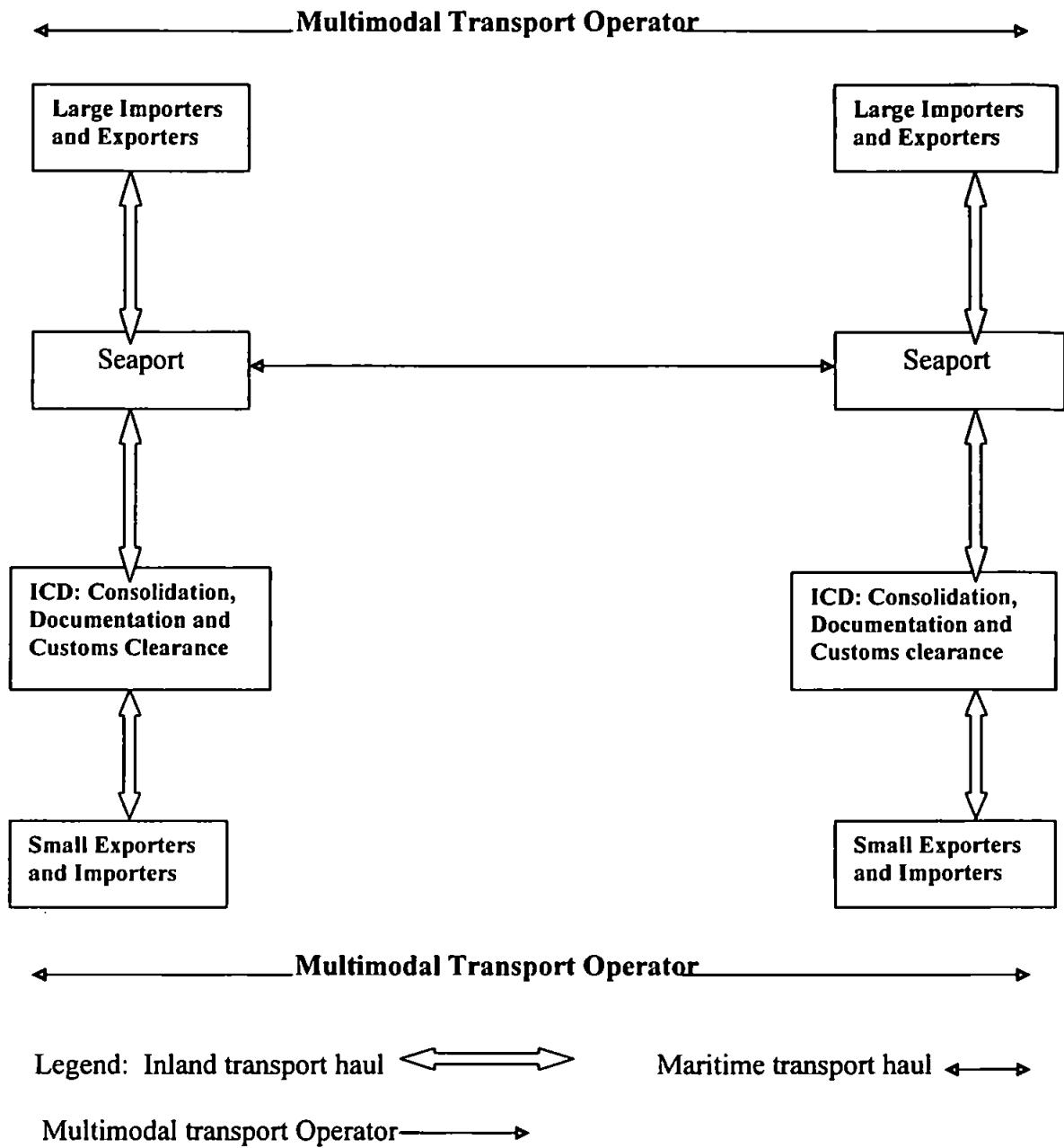


Figure 6.1 An ideal multimodal freight transport system.

Source: The Author

CHAPTER 7

CONCEPTUAL MODEL DEVELOPMENT

7.1 INTRODUCTION

This chapter develops a conceptual model for this research project. A model can be defined as a formalised representation of a theoretical system, designed through the use of symbols or other such physical analogues. The model represents a theoretical system so that it can be tested, examined and analysed by those who create it (Davis, 2000). Also a model is defined as an abstracted representation of reality and simplification of some aspects of the world (Cvitkovic, 1992 and King et al., 1994). A concept is an '*idea expressed as a symbol or words*' (Neuman, 2000, p.35). Thus a model is a physical, pictorial, verbal, or algebraic expression (King et. al., 1994). Conceptualisation refers to the process of specifying '*what we mean when we use particular terms*' (Babbie, 1998, p.114). According to Miles and Huberman, (1995) a conceptual model framework should be '*either graphically or in narrative form, the main things to be studied*' (p.18). It includes key factors, constructs, variables and the relations between them in a format, which can subsequently be transformed into an empirical study. Sekaran (1992) states that

'The theoretical framework or conceptual model is the foundation on which the entire research project is based. It is a logically developed, described, and elaborated network of associations among variables that have been identified through such processes as interviews, observations, and literature survey. These variables are deemed relevant to the problem situation'. (p.73).

Saunders et al. (2000) also mentioned similar ways of conducting exploratory research. '*A problem can not be described until it has been determined. It cannot be explained until it has been described*' (Arbnor and Bjerke, 1997, p.284). Figure 7.1 shows a plan for study that determines issues and problems in freight transport multimodal development.

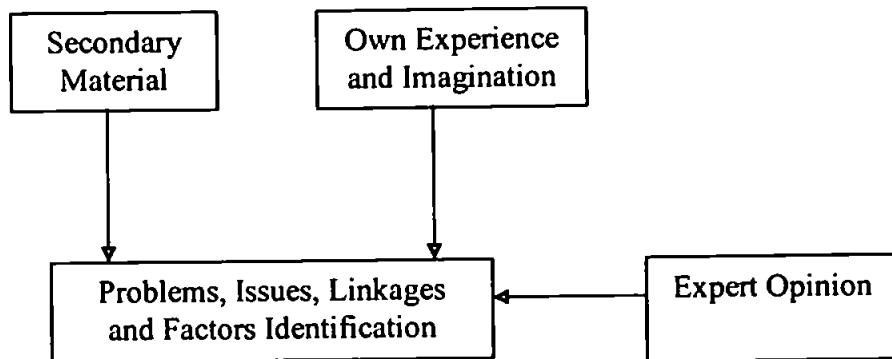


Figure 7.1 Identification of problems, issues, linkages and factors

Source: The author

The research objectives are mentioned in chapter 1 and also are repeated here.

- a) By reviewing (in chapters 2 to 5) relevant published materials, the categories, dimensions, sub-dimensions, issues and problems of freight transport multimodal development are identified.
- b) These issues, problems and concepts will form a conceptual model for the freight transport multimodal development in Bangladesh and also will be used to form a questionnaire. Through a two-round qualitative Delphi study among a Bangladeshi panel the major issues in the field will be finalised and the conceptual model will be revised (in chapter 8). Then these final issues will be used to summarise the dimensions and sub-dimensions of freight transport multimodal development in Bangladesh (in chapter 10). Also the issues will be used to derive variables in a quantitative study among the developing countries.

- c) Identify the dimensions of measures for the freight transport multimodal development in these countries by means of factor analysis.
- d) Discover whether there is a difference in the perception and actual development of freight transport.
- e) Locate the status and ranking of the Bangladeshi multimodal freight transport system among the countries under study and also priority areas to improve her freight transport system will be identified. In section 7.2 the conceptual model development and in section 7.3 the hypotheses, dimensions and statements are discussed.

7.2 CONCEPTUAL MODEL DEVELOPMENT

7.2.1 Introduction

Sekaran (1992) suggests the following phase or procedure for conceptual model development here applied to this research. First, identify the problems and issues of freight transport multimodal development through an in-depth literature review. Secondly, identify the variables, which contribute to the research problem. Determination of such problems, issues and variables can be considered as an exploratory study (Arbnor and Bjerke, 1997). The issues are converted into sub-dimensions, which constitute the categories or dimensions of the conceptual model. Through two rounds of Delphi study the issues are identified, tested and finalised and thus the conceptual dimensions and sub-dimensions for the freight transport multimodal development in Bangladesh will be established in chapter 8. Thirdly, once the variables are identified the associations among them will be analysed in chapter 9 through factor analysis. The issues, established through a Delphi study, will constitute the basis of the quantitative study among developing

countries to validate the hypotheses mentioned in the next section. By this research process, summarised in figure 7.2, the hypotheses, sub-dimension and statements will be identified, finalised, established, and validated. Fourthly, through establishing a mulimodalism ranking index, using different methods, the actual and perceived freight transport multimodal development will be found out and priority areas of action to be taken by the Bangladeshi stakeholders will be recommended.

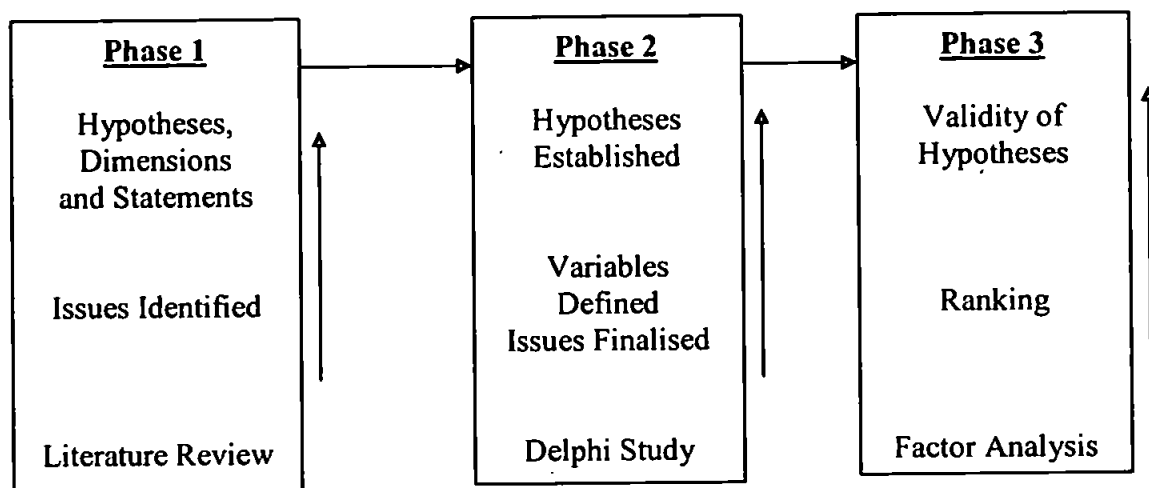


Figure 7.2 The process of establishing research hypotheses, dimensions and statements

Source: The Author

7.2.2 International Trade Barriers

In previous chapters we have performed a literature review for an in-depth study of related secondary published material including relevant books, journals including online, documents and Bangladeshi daily online newspapers (both English and Bengali). Immersion in the setting allows a researcher directly to hear, see and begin to experience reality (Marshall and Rossman, 1999). The long experience and education in the transport sector helped this researcher to understand the barriers to international trade of Bangladesh. UNCTAD (1994a) identified six areas of barriers to the smooth flow of cargo for international trade and thereby investments (refer to section 1.1 and figure 1.1 for detail

discussion): transport, customs, business practices, knowledge and skill on logistics management, information technology, banking and insurance.

If the transport infrastructure is weak and ports and terminals lack multimodal access and other facilities then the goods movement and modal transfer will result in higher transit time, transport cost, loss or damage and higher uncertainty and unreliability. If customs procedures do not allow deeper penetration of containers then the goods flow will be hampered requiring higher time and cost. On the other hand if there are frequent cases of tax fraud or other bad business practice, then the customs inspection will be increased, which is good neither for exporter and importer nor for carrier. Also, if the business organisations and executives do not update their knowledge and skill on modern logistics management, they will be behind in the competition due to the fact that today's business has become highly time and cost sensitive. Another important fact of today's business is the shift of competition from 'company versus company' to 'supply chain versus supply chain'. If the companies of a supply chain are not integrated, their products as well as services cannot be competitive and thus they will be out of business in the global market. The unavailability of information, for example on the market trend, lack of access to and the use of information technology, can also be important barriers to being competitive in the market. Access to and the use of information technology influences not only international trade efficiency but also the transport and logistics services. Moreover, the banking system and insurance companies may also act negatively for example by opening faulty letters of credit (L/C) for international trade.

7.2.3 Multimodal Freight Transport Systems as Remover of Trade Barriers

The in-depth study in chapters 1 to 5, suggests that among the above mentioned trade barriers, transport is an area which if transformed properly, can have a very positive effect on most of these barriers. Because freight transport service providers fill the gaps among the organisations along a supply chain, they must be integrated into the supply chain to make it effective and competitive. In this way the reliability of the supply chain can be increased and all business partners will benefit from such system development (as discussed in section 6.3). Both government and private parties have important roles for such transformation (refer to sections 3.4 and 6.5).

Figure 7.3a shows an ideal multimodal freight transport system, which is developed over the years through changes or transformation in the existing freight transport system (as discussed in chapter 5). This includes changing role of government such as regulation and deregulation, investment in infrastructure development and encouragement to the private parties, for example, to adopt a systems approach, technology change and business-friendly automated customs clearance system (as discussed in section 6.5). In this deregulated environment the private parties work with the government as partners and in some cases take the initiative to develop a systems approach (as discussed in sections 6.4 and 6.5.3). It includes technology changes such as containerisation and information system (dealt with in detail in sections 3.5 and 6.2) and modern logistics concepts and practice such as third party logistics, updated knowledge and information, availability of logistics centres, supply chain co-ordination and integration and above all adopting a systems approach (as discussed in sections 3.7 and 6.2). The national economy joins the global economy and the companies become competitive and take the advantages and opportunities offered by globalisation (as discussed in sections 3.3 and 6.3). The transport infrastructure such as road and rail developed for heavy cargo, for example carrying full container load (FCL),

vessels or vehicles movement, and in particular the interchange points are equipped with necessary facilities to allow faster movement of containers (dealt with in detail in sections 2.2, 3.8, and 6.3). With all these changes the modal transport operator achieves standard capacity, quality and skills and can offer door-to-door multimodal freight transport services (as discussed in section 3.6, 3.7, 6.2 and 6.3). He thus becomes a multimodal transport operator (MTO), offering the carriage of goods by at least two different modes from origin-to-destination under a single contract involving more than one operator for the total transport haul (refer to chapter.2 for detailed discussion).

7.2.4 Present Freight Transport System in Bangladesh

Figure 7.3b summarises the present freight transport system in Bangladesh, which is fragmented and has not yet been able to integrate all parties along the international supply chain (as discussed in sections 4.9 and 5.11). From the literature review in chapters 4 and 5 we have found that the freight transport system is fragmented due to a number of facts. Multiple ministries and departments are responsible for the development and policy making matters related to multimodal transport system (as discussed in sections 4.4 and 4.9). The customs authority has not been able to introduce a system to facilitate door-to-door services (as discussed in section 4.5 and 5.10). There is insufficient investment in such infrastructure as inland container depot, slow progress in the public-private initiative (as discussed in sections 4.5, 4.8 and 5.9). The inland transport network is not yet suitable for heavy cargo movement (refer to sections 4.4, 4.5 and 5.8 for detail); conventional small capacity but numerous trucks or vessels and small companies are in operation (as discussed in sections 4.4.1 and 5.8). A government owned organisation operates rail freight services (dealt with in details in section 4.4) and there is poor technology change for example lower level of containerisation, inadequate access to and the use of information technology and

unequipped inland terminals (detail discussed in sections 4.4 and 4.5). Fragmentation also comes from the application of outdated logistics concepts and practice such as the use of old INCOTERMS; the lack of knowledge, skills and institutions, little presence of foreign transport operators, and the lack of trust, commitment and cooperation among the parties (detail discussed in section 4.6 and 5.9); slow progress of globalisation and the absence of a competitive environment due to the facts that a little deregulation has occurred in the transport sector, rampant corruption and bureaucracy, undisciplined labour unions, national political fighting, and insufficient containerised cargo on a particular route to utilise economies of scale and scope (detailed in sections 4.9 and 5.10).

7.2.5 Multimodal Transport Systems in Developing Countries

Generally, as in Bangladesh, the freight transport system in developing countries is fragmented and is a barrier to international trade (discussed in section 3.2). But many developing countries, in particular the newly industrialised countries such as Malaysia, South Korea, are introducing multimodal transport systems following the lessons from multimodal transport systems in developed countries such as the U. S. (dealt with detail in sections 3.7 to 3.9). Figure 7.3c shows the freight transport multimodal development in developing countries. The development includes some dimensions of transformation. National government plays an important role by improving the customs clearance system. This is coordinated investment in infrastructure, deregulation and privatisation, in particular deregulation in the transport sector (refer to section 3.4 for detail discussion) with technology, organisational, and spatial change in inland transport, maritime transport, and interchange points (dealt with in detail in section 3.8). The system comprises modern logistics concepts and practice such as the greater importance of logistics in the national economy, contrasting logistics concepts, presence of foreign transport operators, improved

trust, commitment and cooperation among the organisations in the supply chain (detail discussed in section 3.7). There is steady progress of globalisation and competitive environment with the improvement of local entrepreneurial skills, leading to the removal of tariff and non-tariff barriers and political stability (as discussed in section 3.3); and achievement of standardisation in terms of standard cargo units, information regarding transit time, schedule and transport costs and the use of a standard format of EDI (refer to section 3.6 for detailed discussion).

7.2.6 Freight Transport Multimodal Development in Bangladesh

The research proposes that following the lessons from the ideal multimodal transport system (figure 7.3a and section 7.2.3) and freight transport multimodal development in developing countries (figure 7.3c and section 7.2.5), the fragmented freight transport system in Bangladesh (figure 7.3b and section 7.2.4), can be transformed into a multimodal transport system. The transformation is shown in figure 7.3d, the two-way arrow indicates that developing countries can learn from the freight transport multimodal model in Bangladesh developed through the Delphi study, whereas the potential multimodal transport system in Bangladesh is shown in figure 7.3e. The potential multimodal transport system can be developed by implementing a number of dimensions of transformation:-

- a) The changed role of government by applying a customs clearance system for door-to-door cargo movement, the change in the structure of ministries and departments, and government investment in such infrastructure as ICDs, and public- private partnership;
- b) Change in the inland transport system with improved transport network, sufficient number of ICDs, effective border crossings, suitable infrastructure for container movements and encouragement from international shipping lines;

- c) Technology change including effective containerisation in seaports, terminals including inland and improved port system;
- d) Modern logistics concepts and practice including publications, institutions, education, knowledge and skills, use of modern INCOTERMS; Freight forwarders as MTOs, users' increasing awareness of the benefits of a multimodal transport system;
- e) Globalisation and competition including foreign operators in the local market, a deregulated and competitive market allowing fair competition among ports, terminals and operators, sufficient volume of cargo in important routes, non-profit rail freight operation and rail privatisation, a few but big and established trucking companies; and
- f) Achievement of standardisation with easy access to and use of information technology and transport companies with published freight rate, transit time and schedules.

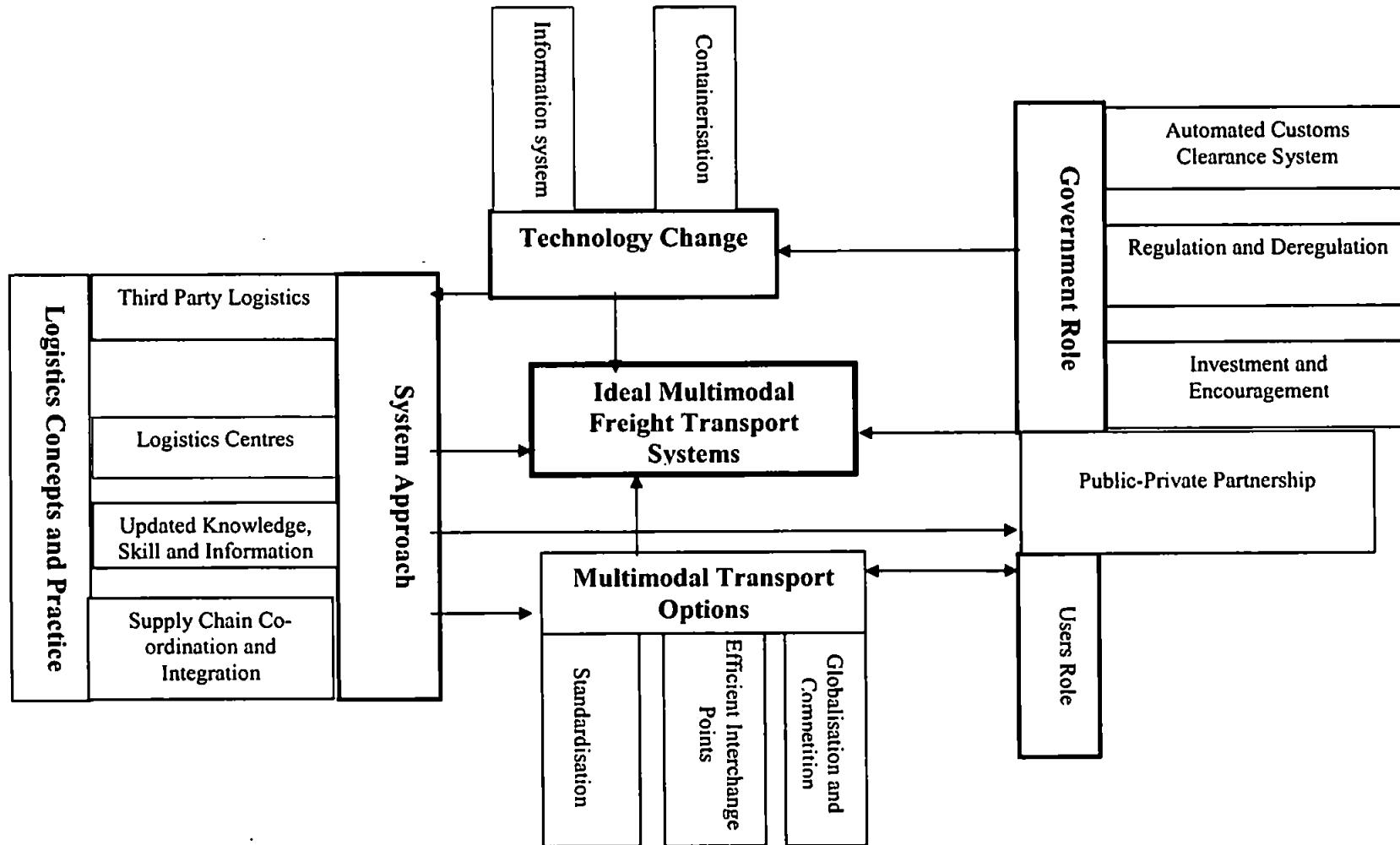


Figure-7.3a Conceptual Model Part A: Ideal Multimodal Freight Transport System

Source: The author

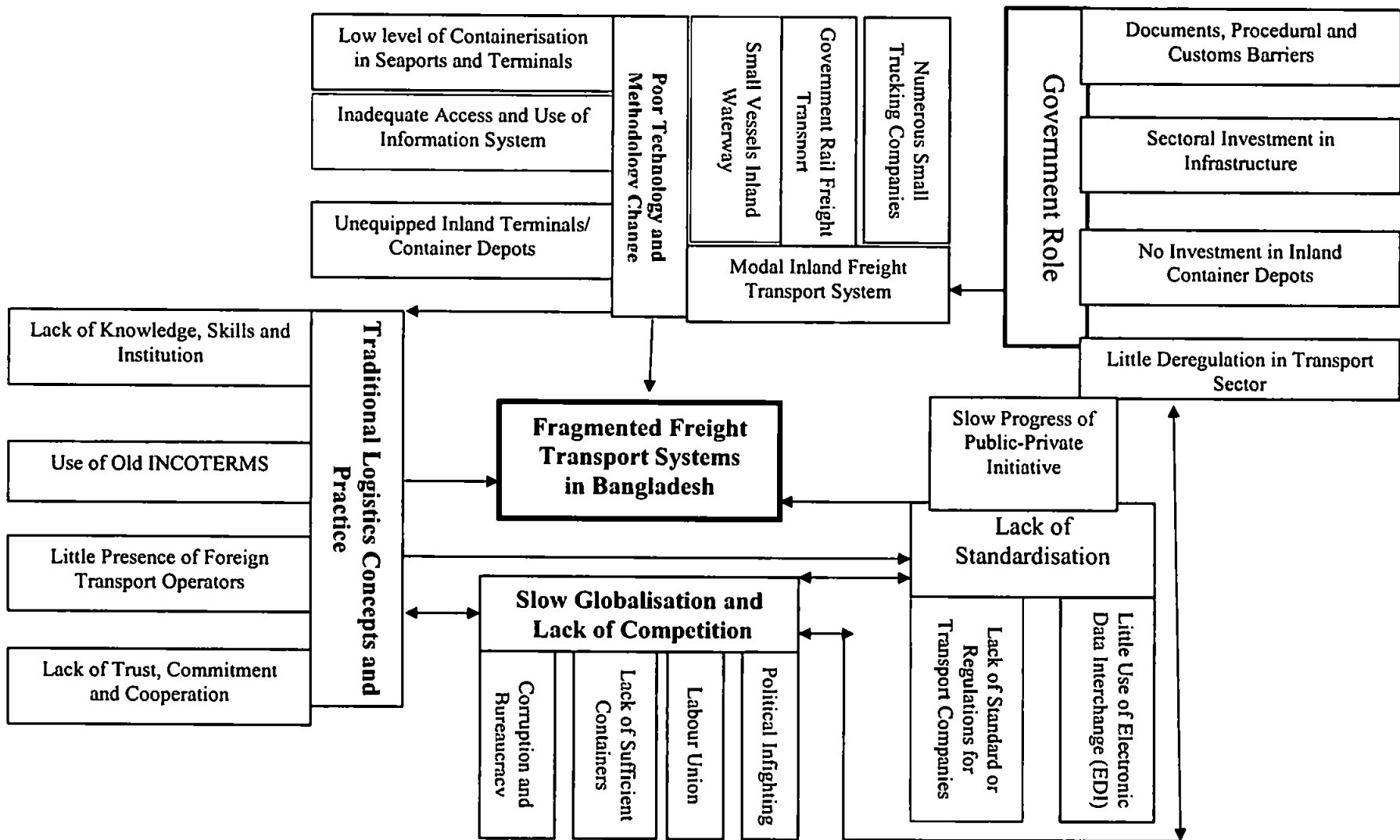


Figure-7.3b Conceptual Model Part B: Current Fragmented Freight Transport System in Bangladesh (Source: The author)

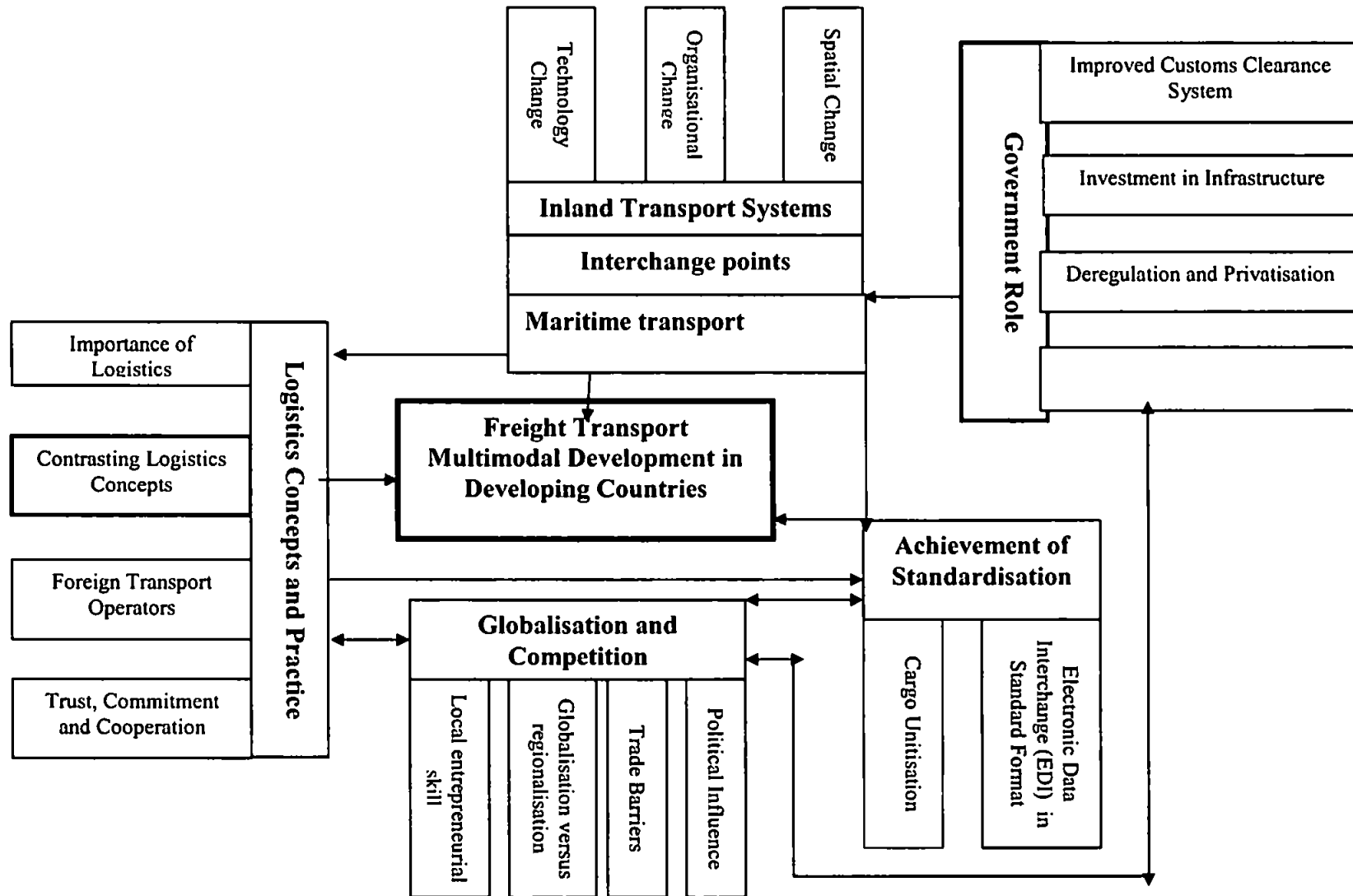
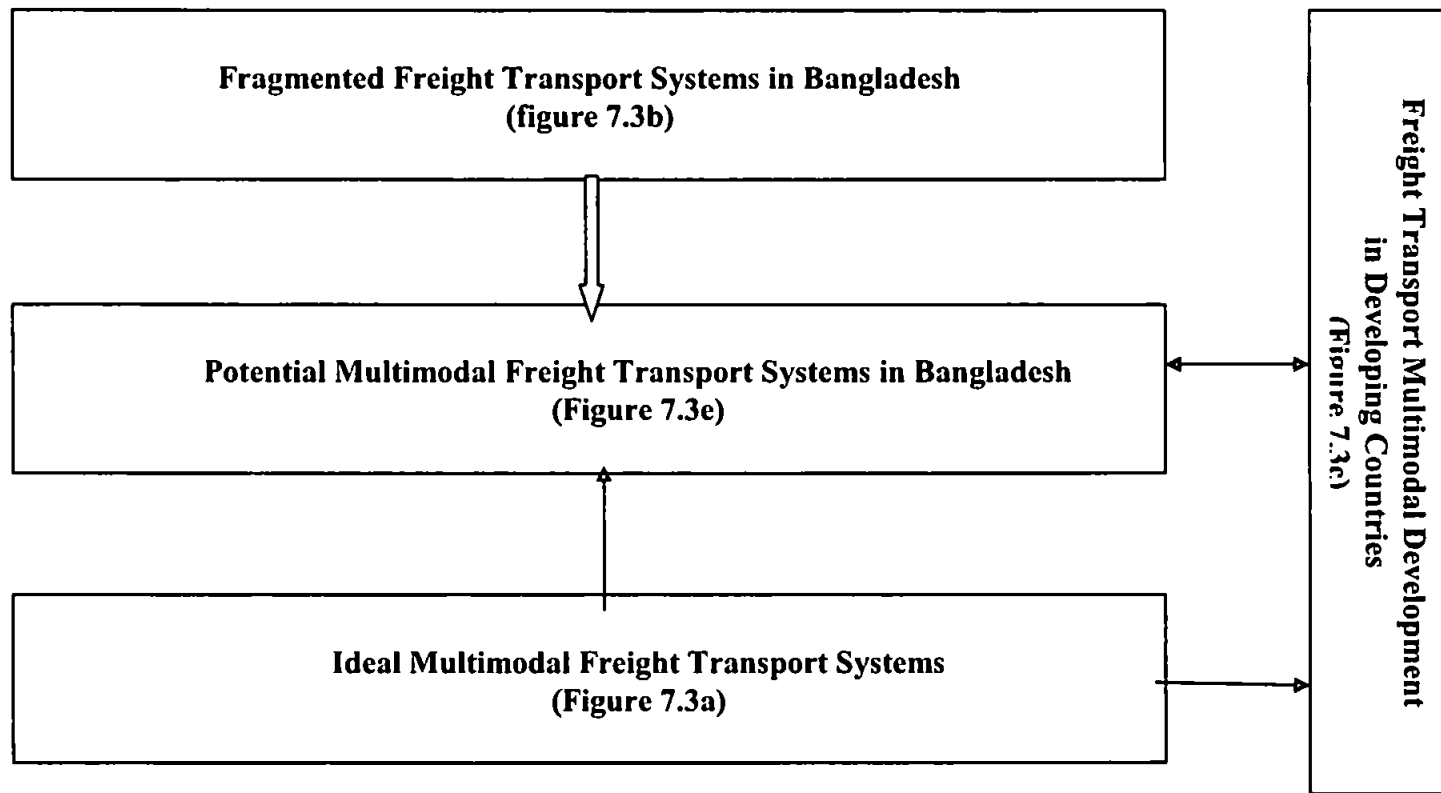


Figure-7.3c Conceptual Model Part C: Freight Transport Multimodal Development in Developing Countries (Source: The author)



Legend: Lesson from → Two-way lesson ↔ Transformation ⇨

Figure 7.3d Conceptual Model Part D: Freight Transport Multimodal Development in Bangladesh

Source: The author

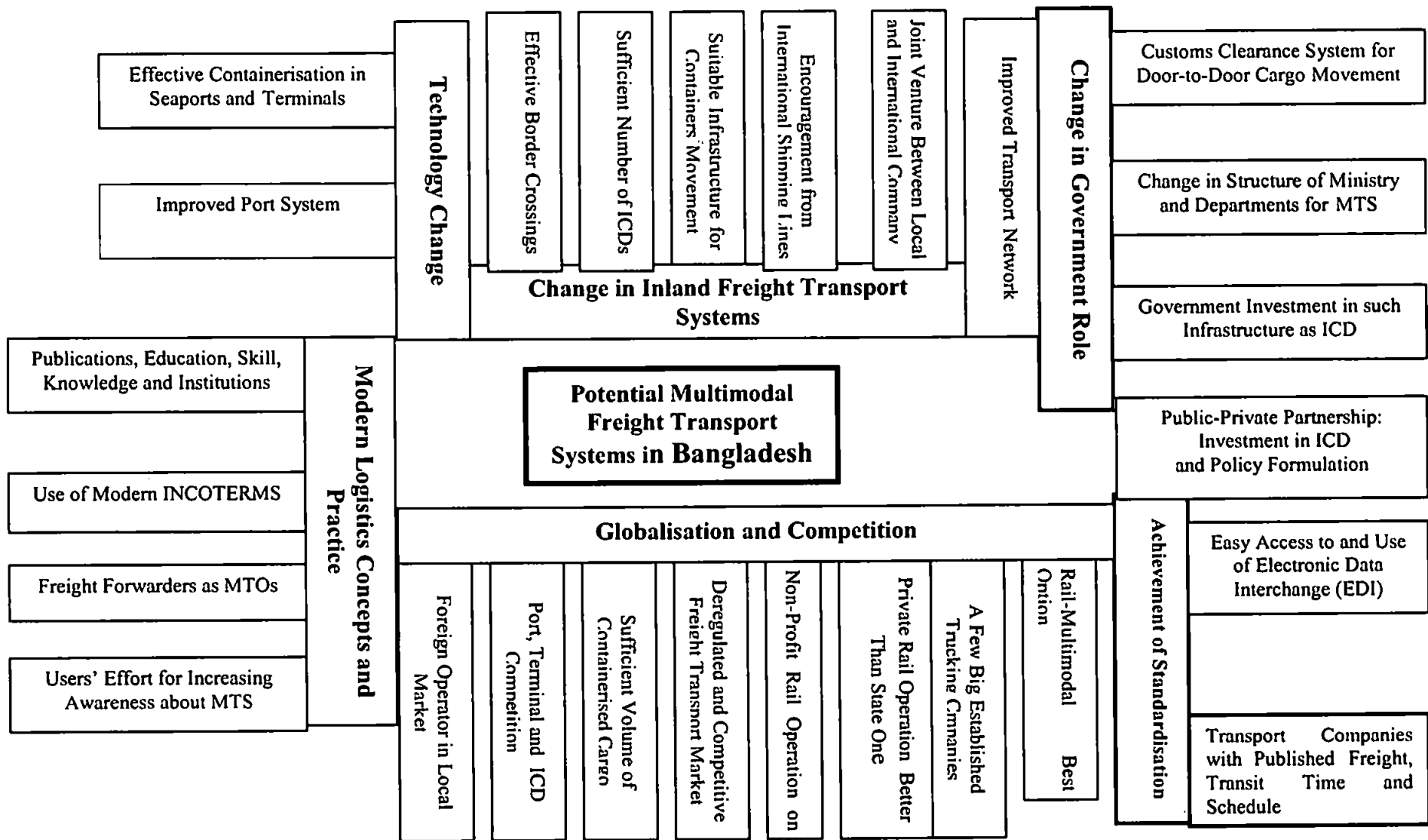


Figure-7.3e Conceptual Model Part E: Potential Freight Transport Systems Development in Bangladesh
 Source: The author

7.3 THE HYPOTHESIS AND ASSUMPTIONS

7.3.1 The Hypothesis

There are two basic types of propositions: hypotheses and empirical generalisations. '*A hypothesis is a proposition that is stated in testable form and predicts a particular relationship between two (or more) variables*' and '*By test we mean either to confirm it to our satisfaction or to prove it wrong*' (Bailey, 1984 p. 43). On the other hand '*an empirical generalisation is a relationship that represents an exercise in induction. Rather than hypothesising that a relationship exists and then testing this hypothesis, an empirical generalisation is a statement of relationship that is constructed by first observing the existence of a relationship (in one or a few instances) and then generalising to say that the observed relationship holds in all cases (or most cases)*' (Bailey, 1984 p. 44).

A hypothesis is a hunch, assumption, suspicion, assertion, statement or idea about a phenomenon, relationship or situation. More formally a conjectural statement of the relationship of two or more variables is a hypothesis (Kumar, 1996). The Cassell Dictionary and Thesaurus (1999) defined hypothesis as '*a proposition assumed for the purpose of an argument*'; alternatively '*a theory assumed to account for something not understood*' or '*a mere supposition or assumption*'. Such a hypothesis may be proved totally valid, partially valid or completely wrong. Kumar (1996) thinks that although a hypothesis is not an essential for a study it brings clarity, specificity and focus to research. The present research hypothesises that

The extent to which a fragmented freight transport system can be transformed into an integrated multimodal transport system depends on the present state of the country.

Here fragmented freight transport system refers to conventional carriage of goods where the carriers are mode-based operators; in the case of a transport haul requiring more than one mode, thus requiring the transfer of cargo, from one mode to another at a modal transfer point, the transport operations, from origin to destination, are performed under different operators' responsibility and under separate contracts (refer to section 3.2.1 for details). In contrast, an integrated multimodal transport system refers to the performance of the carriage of goods from origin to destination involving more than one mode, thus requiring the transfer of cargo unit from one mode to another, under a single operator under a single contract (refer to chapter 2 for detail). Present state refers to the level of development of the transport and logistics related facilities, facilitators, regulators, users and above all operators in a country or region.

7.3.2 Assumption of Dimensions, Sub-Dimensions and Statements for Bangladesh

The above hypothesis with some (in the case of Bangladesh six) categories or dimensions will be examined, established and validated as mentioned in figure 7.2. The sub-dimensions in each dimension have a set of statements, which forms the basis for the empirical Delphi study. From the literature review it is evident that most issues are in negative form. To avoid monotonous impact and to explore more issues and problems, from the Delphi panel some statements have been re-framed in terms of 'affirmative to negative' and 'negative to affirmative', which is expected not to affect the findings. The number in parenthesis at the end of the statement below indicate the corresponding

statement's serial number in the questionnaire for first round Delphi, which can be seen in Appendix A1.

CONCEPTUAL DIMENSION 1: CHANGE IN BANGLADESH GOVERNMENT'S ROLE

Sub-dimension 1.1: Government has an important responsibility to develop adequate infrastructure such as road infrastructure and ICDs and inland terminals to allow origin-to-destination cargo movement. Although the Bangladesh government has been investing a large share of development budget for transport infrastructure development she has not been able to develop adequate infrastructure such as feeder roads and inland river terminals that allows origin-to-destination containerised cargo movement.

Statement:

Bangladesh government should not invest any more for the development of inland terminal or inland clearance depots. (4)

Sub-dimension 1.2: International trade faces at least two sets of customs procedures and in many cases it appears as a barrier to the smooth flow of cargo. Customs procedures must be flexible and simple enough to allow door-to-door movement of containerised cargo. But the Bangladesh customs authority has not yet developed simplified customs clearance procedures. As a result, it has appeared as a barrier to the development of an origin-to-destination multimodal transport system for international trade.

Statement:

Customs procedures do not restrict the operation of door-to-door transport of containerised cargo. (10)

Sub-dimension 1.3: The structure of government transport ministries and departments is an important element to develop a multimodal transport system in any country. The present transport structure based on single modes in Bangladesh does not encourage such development. In the absence of an organisation responsible for developing uniform and comprehensive policy the private bodies such as the shippers council and freight forwarders association should take the initiatives. For this, there should be a public-private partnership environment.

Statements:

The structure of government transport ministries and departments in Bangladesh is not suitable for multimodal transport system development. (12)

A uniform policy and regulation for the development of multimodal transport is better developed by private parties (such as shippers association, freight forwarders association) than by a government (13)

CONCEPTUAL DIMENSION 2: GLOBALISATION AND COMPETITION

Sub-dimension 2.1: A competitive and deregulated freight market regime is an essential element for adopting globalisation, which is an important part of multimodal transport system development. The Bangladesh economy has not yet adopted globalisation to the full extent. For example there is no port competition, which restricts the quality of service and increases transit time and cost for the movement of containerised cargo.

Statements:

There is insufficient port competition to make port services efficient. (7)

Inland operators are restricted by government regulation and this prevents competition (9)

Sub-dimension 2.2: The Dhaka-Chittagong corridor has sufficient volume of cargo for multimodal transport system but the companies providing inland transport services are unable to meet the demand as they are small in size, numerous and incapable. Instead a smaller number of bigger capacity companies could meet the demand, create a healthy competitive market as well as attract foreign investment for an origin-to-destination international transport system.

Statements:

There is sufficient volume of cargo on the Dhaka-Chittagong route for running a commercial multimodal rail freight service at a profit. (17)

A smaller number of trucking companies with bigger capacity carriers (with costly tractor-trailer) could create a healthy competitive market in Bangladesh suitable for the origin-to-destination international transport haul. (14)

An effective multimodal system requires that international sea shipping lines take ownership of local carriers or freight forwarders. (21)

Sub-dimension 2.3: The road-rail-maritime combination is the best available option for a multimodal transport system in Bangladesh. But the present ownership and operational status of rail freight services is an important barrier to developing such services and thus the rail freight services needs privatisation to provide commercial services. This is because a private operator with a commercial attitude is likely to offer better rail freight services than a government one with a bureaucratic attitude. However, it is also important that to encourage multimodal transport development it is not necessary for rail to operate at a profit.

Statements:

The road-rail-maritime multimodal service is better than road-maritime or road-inland water-maritime multimodal option for international overseas trade. (15)

A privatised rail freight service is better than a state-owned one for multimodal development. (16)

To encourage multimodal transport development it is not necessary for rail to operate at a profit. (18)

CONCEPTUAL DIMENSION 3- CHANGE IN INLAND TRANSPORT SYSTEM

Sub-dimension 3.1: To make containerisation effective the inland transport infrastructure must be developed so that faster transfer at modal transfer points and door-to-door movement of containers are possible. But the inland transport system in Bangladesh has become the main barrier to a multimodal transport system as it takes a longer at ports and is also not suitable for origin-to-destination containerised cargo movement resulting in a conventional transport system that requires higher transit time. Similarly the development of multimodal transport services for trade with neighbouring countries has been hampered due to the requirement of transshipment at border crossings.

Statements:

The present inland transport system is a barrier to multimodal transport as inland transit time is too high. (1)

The inland transport infrastructure is suitable for origin-to-destination containerised cargo movement. (2)

Cross border trade with neighbouring countries will increase if there is a multimodal transport service without transshipment at the border. (26)

Sub-dimension 3.2: The change in transport system for multimodal transport system development must include the establishment and operation of a sufficient number of ICDs, logistics centres and inland river terminals with container handling equipment and other

facilities. But an effective and sufficient number of ICDs does not exist in Bangladesh. This has restricted the door-to-door cargo movements.

Statement:

A sufficient number of ICDs has not been developed to handle containerised cargo

(3)

Sub-dimension 3.3: With the development of containerisation and multimodal transport systems the shipping lines now offer point-to-point transport and logistics services. But the international shipping lines presently are offering port-to-port or port-to-point transport services in Bangladesh. The changes required for multimodal transport system development must include the extension of transport and logistics services beyond seaport to and from origins and destinations. For this development the international shipping lines can offer to form joint ventures or partnerships with local carriers or freight forwarding companies. Alternatively they can take over or merge with local companies.

Statements:

The preference of individual shipping lines calling at Bangladeshi ports on the maritime leg discourages local carriers from becoming the part of the international origin-to-destination transport haul. (19)

An effective multimodal system requires that international sea shipping lines have joint ventures or partnerships with local carriers or freight forwarders. (20)

CONCEPTUAL DIMENSION 4- TECHNOLOGY CHANGE

Sub-dimension 4.1: Containerisation has changed the cargo handling methodology and technology in the ports and terminals of all countries. But Bangladeshi ports have not yet been containerised to the full extent. Even the lower level of containerisation could not be capitalised due to lack of a direct multimodal accessibility of port terminals to their hinterland. This has resulted in higher transit time, transport cost and uncertainty.

Statements:

The main ports are not sufficiently (such as not equipped with ship-to-shore cranes) developed to act as container terminals. (5)

The port system is a barrier to a multimodal transport system as the average ship turnaround time at port is too long. (6)

CONCEPTUAL DIMENSION 5- ACHIEVEMENT OF STANDARDISATION

Sub-dimension 5.1: A multimodal transport system development requires standardisation such as use of standard cargo units, and flow of information by using a standard format such as EDI. Also well-equipped or established companies with standard information on freight rate or transit time are crucial to such services. But such standardisation has not yet been achieved in Bangladesh.

Statements:

The service providers and users are restricted by lack of access to information technology such as electronic data interchange (EDI). (8)

Sufficient information about multimodal freight rates or transit times is generally not available to shippers. (11)

CONCEPTUAL DIMENSION 6: LOGISTICS CONCEPTS AND PRACTICE

Sub-dimension 6.1: There is a change in the concept and applications of modern logistics management, for example supply chain management. But such changes have not taken place in Bangladesh. Executives and management are not aware what benefits can be achieved through such changes. For example, they do not see any problem in using outdated INCOTERMS or conventional logistics practices. They do not know that adoption of multimodal transport systems would improve the international trade and investment environment. So, shippers are reluctant to use door-to-door services, as they see no advantage in it.

Statements:

Freight forwarders should not be multimodal transport operators if they do not own vehicles or vessels. (22)

Most letters of credit use old INCOTERMS such as f.o.b. and c.i.f. for international shipments and this practice prevents the development of multimodal transport. (23)

The problem with multimodal freight transport in Bangladesh is that nobody knows it is there to improve the international trade and investment environment. (24)

Shippers are reluctant to call for door-to-door transport service as they see no advantage in it. (25)

CHAPTER 8

EMPIRICAL RESEARCH METHOD

8.1 INTRODUCTION

Several writers suggest general topics and dimensions, as there are no set formats for research (Creswell, 1998). However, there are four, more common, methodological dimensions in the social research process. The first one is the research design (such as sample survey and case study) and second one is the data collection and elicitation (such as interviewing by a mail and observation). The third one is the task of recording, managing and analysing data (such as content analysis) and the fourth is the knowledge interest or outcome of the study (such as consensus building and emancipation) (Bauer and Gaskell, 2000). Apart from these dimensions there should be an introduction to state the problem, significance, focus, purpose and limitations of the research; and also a research questionnaire, methodology and verification or validation of the research instrument to complete the study (Creswell, 1998).

8.2 RESEARCH DESIGN AND TYPOLOGY

A research design is defined as a structure or framework of a research plan to solve a particular problem. *'Research design can be thought of as the road map for researchers. It is the means by which investigators plan the collection of data to answer a pertinent research question'* (Davis, 2000 p.126). In other words, a research design is a master plan

detailing the methods and procedures for collecting and analysing data. An inadequate design will yield information that is incapable of answering the research questions. There can be as many as five basic research design techniques: observation, desk research (secondary data), continuous, surveys, and experimental (Zikmund, 2000; Moser and Kalton, 1971; Abdel-Fattah, 1997), which are shown in figure 8.1. Of these, an observation involves the act of noticing some object or incidence of some phenomenon in our environment (Davis, 2000). An observation is considered as the '*basis of laboratory experiments, field studies, participant observation, interviews and the ultimate source of all secondary data*' (Chadwick et al., 1984 p.74). '*The accumulated knowledge of biologists, physicists, astronomers and other natural scientists is built upon centuries of systematic observation, much of it of phenomena in their natural surroundings rather than in the laboratory*' (Moser and Kalton, 1971 p.244). A desk research is performed in an exploratory phase (Abdel-Fattah, 1997) and relies on secondary data including library research, searching records, database, on-line Internet, buying data and reports from commercial organisations (Abdel-Fattah, 1997).

As every research work includes some sort of observation and desk research so there remains three basic types of research: continuous, survey and experimental research. A constant monitoring on a continuous or regular basis is 'continuous research', where '*secondary data provides the impetus for problem recognition*' (Davis, 2000 p.57). In fact, continuous research can be done in two ways: obtaining data from the same source on a continuous or regular basis or selecting a sample of respondents for every research (Kent, 1993). It is important that the sample be representative by selecting a proper tool (Antonius, 2003). In an experimental research the researcher tries to observe and measure the results instead of relying on the individual answers to questions as in a survey research. In this method the researcher controls the variables, by keeping one constant, to see the effect of independent variables on other variables (Abdel-Fattah, 1997). Thus experimental

research is more quantitative than qualitative in nature. However, *'the policymakers and practitioners are sometimes unable to derive meaning and useful findings from the experimental research and that the research technique themselves have affected the findings'* (Marshall and Rossman, 1999 p.57). Thus a research design is a procedural plan adopted by a researcher to answer the questions validly, objectively and accurately (Kumar, 1999)

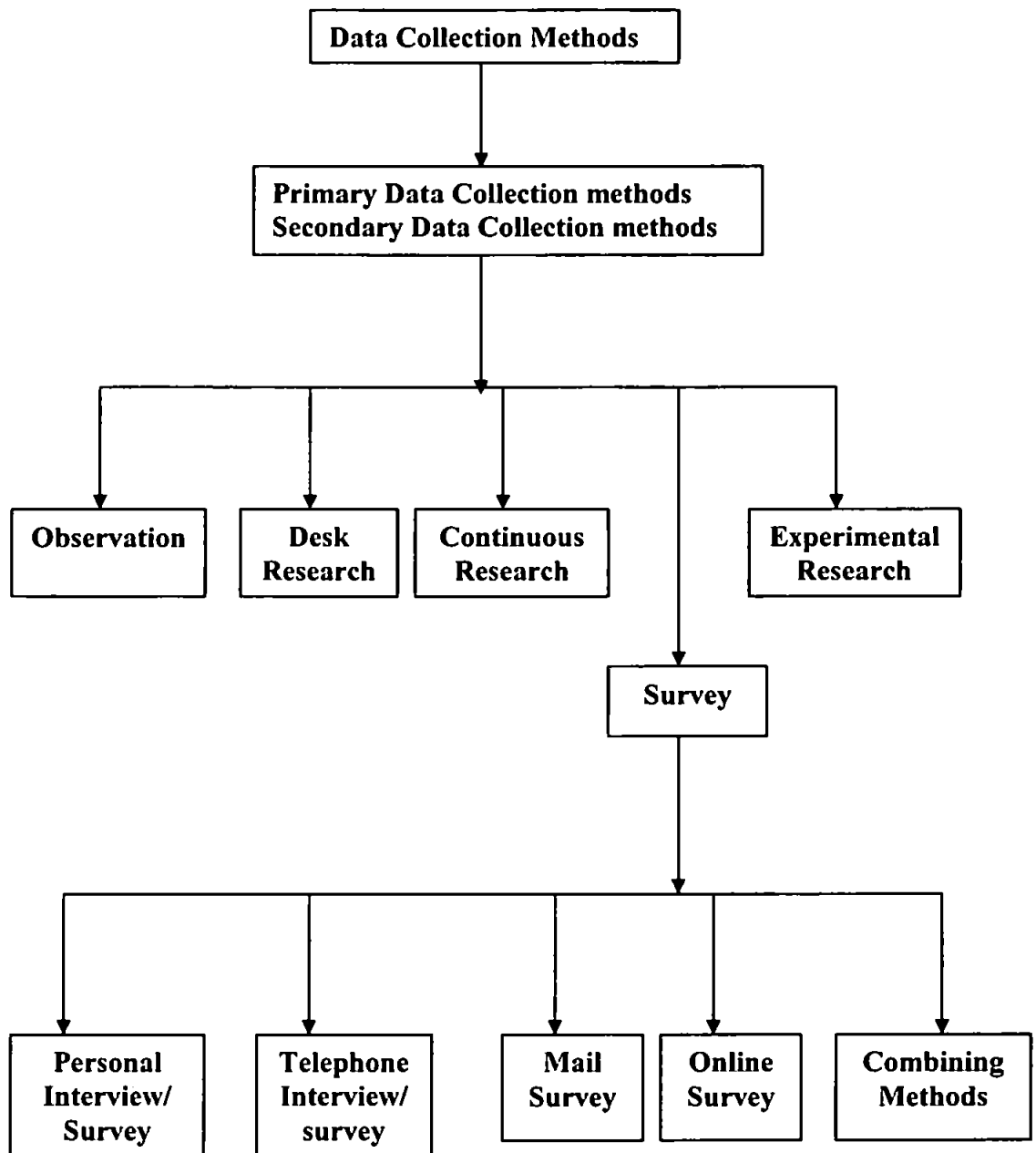


Figure 8.1 Data collection methods

Source: The Author (information from Zikmund, 2000; Moser and Kalton, 1971; Abdel-Fattah, 1997)

8.2.1 Research Design According to Objective

'From the perspective of objectives, broadly, a research endeavour can be classified as: descriptive, correlational, explanatory or exploratory' (Kumar, 1999 p.6). Social researchers frequently ask two fundamental questions: what is going on? which is answered by descriptive research and why and how is it going on? and that is answered by explanatory research (David, 2001). Whereas descriptive research attempts to describe systematically a situation, such as problem, phenomenon, service or program, explanatory research clarifies the relationship between two aspects of a situation or phenomenon. Correlational research is conducted to discover or establish the existence of a relationship, association or interdependence between two or more aspects of a situation. Exploratory research attempts to investigate the possibilities of undertaking a study in less known fields, sometimes termed a feasibility or a pilot study (Kumar, 1999).

8.2.2 Research Design According to the Number of Responses

Kent (2001) suggests that if there were very low responses, for example thirty or less, from the potential respondents in a survey then quantitative analysis would not be so fruitful. In such case qualitative methods should be applied. In the present study, analysed in the next chapter, there were only thirteen respondents in Delphi study, thus the sample size is not appropriate to employ a quantitative analysis method.

8.2.3 Research Design According to Data Required

Another important aspect is to identify the type of information needed for the research: qualitative or quantitative. This classification is based on three criteria: a) what is the purpose of the study? b) how the variables are measured? and 3) how the information is analysed? (Kumar, 1999). The two approaches have different data collection methods, recording and analysing processes. Qualitative research is conducted in the natural world and a number of interactive and humanistic methods are used for it, thus it is emergent rather than tightly prefigured. In fact, it is basically interpretative to explain the data (Marshall and Rossman 1999). The qualitative research deals with texts and is considered 'soft'. In contrast quantitative research deals with numbers, statistical methods and models and thus is considered 'hard' (Bauer and Gaskell, 2000). The differences between these two types of research are shown in table 8.1.

Social research data can be structured or unstructured. Structured data are coded in terms of research analytical categories, for example, observed frequencies of various predefined sorts of activities (Sapsford and Jupp, 1996). In contrast unstructured data are those that have not yet been coded. *'Qualitative data and unstructured data are often treated as synonyms, although unstructured data are also used outside qualitative research'* (Sapsford and Jupp, 1996 p.284). Qualitative data *'consist, but not exclusively, of written texts of various sorts: published and unpublished documents (including official government reports, personal diaries, letters, minutes of meetings and so on) as well as field note description written by researchers and transcripts of audio and video recordings'* (Sapsford and Jupp, 1996 p.284). Data for social research can be represented in informal or formal ways of communication and the medium of communication can be texts, images or even sound materials (Bauer and Gaskell, 2000).

	Qualitative research	Quantitative research
Aim	Exploration of participants' meaning Understanding, generation of theory from data	Search for causal explanations Testing hypothesis, prediction, control
Approach	Broad focus Process-oriented Context-bound, mostly natural setting Getting close to the data	Narrow focus Product-oriented Context-free, often in artificial setting
Sample	Participants, informants Sampling units such as place, time and concepts Flexible sampling which develops during research	Respondents, subjects Sample frame fixed before research starts
Data collection	In-depth non-standardised interviews Participant observation/ fieldwork Documents, photographs, videos	Questionnaire, standardised interviews Tightly structured observation Documents Randomised controlled trials
Analysis	Thematic, latent content analysis Grounded theory, ethnographic analysis etc.	Statistical analysis
Outcome	A story, an ethnography, a theory	Measurable results
Relation- ships	Direct involvement of researcher Research relationship close	Limited involvement of researcher Research relationship distant
Validity	Trustworthiness, authenticity	Internal/ external validity, reliability

Table 8.1 Differences between qualitative and quantitative research

Source: Holloway and Wheeler (2000 p.10)

A research concept is highly subjective as its meaning and understanding may vary according to perception and therefore, may or may not be measurable (Kumar, 1999). Whereas a transport and logistics service provider may claim that we are providing excellent service to our customers, this may not be recognised by their customers. The transport service users may say that the service could be improved by reducing cost and time. So the perception or judgement about the same subject is different. Moreover, whereas six hours delay in the U. S. and European countries may not be acceptable to customers, 24 hours (one day) delay may be highly satisfactory to most customers in developing countries, for example in Bangladesh. Thus, if the research has to depend on perception or judgement then the satisfaction level will vary and accurate measurement

may not be possible. On the other hand if and when this concept is measurable then it becomes a variable. For example, to find male and female ratio or age groups in a certain population we can set variables. If a manager is asked 'how many employees are there in the company?' or 'how many men and women are in the company?' the answer would be a number and obviously measurable. Variables have characteristics that '*they vary at a minimum between two scale values (binary), up to potentially an infinite number of scale values for continuous metric scales*' (Kent, 1999 p.32). Thus, it is very important that, according to quantitative or qualitative, an appropriate technique(s) has been chosen to operationalise the concept of the research.

8.2.3.1 Combination and Triangulation

Table 8.1 shows the basic differences between qualitative and quantitative analysis techniques. In broad terms the descriptions and logical expressions dominate the qualitative data analysis. In contrast the quantitative analysis mainly deals with data with fewer uses of description. However, in both techniques description and data are essential elements. For example, in a quantitative data analysis technique the data have to be interpreted, such as in factor analysis discussed in chapter 9. Many researchers think that the drawbacks of one technique can be overcome by another technique. Thus a wide range of methods both from qualitative and quantitative approaches are used. Martin (1996) contends the following two points:

'A combination of qualitative and quantitative methods can ensure that the results reflect a deeper understanding of public values and an appreciation of the public's agenda (qualitative)
They are generalisable to the wider community (quantitative)' (p.13).

Despite the views supported by the proponents of both qualitative and quantitative methods, table 8.1 indicates that both quantitative and qualitative methods tend to have

their strengths and weaknesses and both methods have long been used as research tools for social scientists. According to Sarantakos (1993), there is no absolutely 'right' methodology. A research methodology is chosen in the given research conditions, the research questions to be answered, the available resources, and, above of all, the types of data required. Thus, the use of both methods is acceptable, as they are not mutually exclusive (Van Maanen, 1979), and can be mixed and matched (Reichardt and Cook, 1979; Cooper et al., 1993). For example, Hwang (2004) used combined methodologies in his research.

The aim of theorising is to develop a useful theory and any technique, whether qualitative or quantitative, can be employed to accomplish the set aim. Berg (2001) contends that qualitative and quantitative are not distinct approaches. Also combining both methods is not new (Strauss and Corbin 1998) who suggest intermediate positions. They think that '*combining methods may be done for supplementary, complementary, informational, developmental, and other reasons*' (p. 28). Triangulation is a term commonly used in surveying activities, map making, navigation and military practices. Many researchers (such as Banomyong, 2000) adopt triangulation by using multiple data-gathering techniques to investigate the same phenomena (Berg, 2001; Seale, 1999). For this research an in-depth literature review, the Delphi technique and quantitative techniques are employed to make use of the triangulation technique. Triangulation is '*interpreted as a means of mutual confirmation of measures and validation of findings*' (Berg, 2001 p. 5).

8.2.3.2 *Quantitative Research-Merits and Demerits*

In many cases the explanation and interpretation of some phenomenon, such as the hypothesis 'the improvement of transport infrastructure brings in economic growth', are

deemed impossible or difficult by qualitative study due to the complexity of the relationship and association of the variables (Sharp et al., 2002). On the other hand a quantitative approach deals easily with such complex associations of variables. In a quantitative research technique the respondents express opinion in the degree of 'yes', 'agree', 'very good' or 'no', 'disagree', and 'very bad' rather than in terms of direct 'yes', 'agree', and 'very good' or 'no', 'disagree', and 'very bad' and the questionnaire has 'closed choice'. For example, strongly agree (5) to strongly disagree (1) where 'neither agree nor disagree' situation might be 3 and for situation like 'not applicable' or 'I do not know' 0. The limited and definitive choices make the analysis easier. The quantitative (factor) analysis is discussed in chapter 10. Reid (1996) found the following advantages and disadvantages with quantitative techniques.

Advantages:

- Large data and sample can be analysed and standardised very quickly.
- Variety of ways of administration.
- Anonymous- respondents may express views more confidently.
- Quick analysis can give rapid feedback.
- Results easily and immediately accessible (such as tables, graph etc).
- Also Berg, (2001) maintains that the quantitative method is given more respect in much social science research.

Disadvantages:

- Lack of flexibility, if the respondent wishes to express other than the given option.
- Sample size needs a higher as a small sample size may become disastrous.
- Need to know key issues or problems beforehand.
- Also Strauss and Corbin (1998) think that it may yield shallow or completely misleading information or results.

It has already been indicated in the previous section that the present research employs a combined (triangulation) method. Multivariate analysis techniques such as factor analysis, cluster analysis and ranking are discussed in chapter 9.

8.2.3.3 *Qualitative Research Merits and Demerits*

'Qualitative research is used to explore issues and generate questions or hypotheses' (Piterman, 1999 p.111). It is naturalistic and phenomenological to explore the issues from the stakeholders' perspective. *'Quality refers to the what, how, when, and where of a thing- its essence and ambience. Qualitative research thus refers to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things'* (Berg, 2001 p.3). According to Marshall and Rossman (1999) qualitative research methodology is suitable for the following types of research:

- Research that delves in-depth into complexities and processes.
- Research on a little known phenomenon or innovative systems.
- Research that seeks to explore where and why policy and local knowledge and practice are at odds.
- Research on informal and unstructured linkages and processes in organisations.
- Research on real, as opposed to stated, organised goals.
- Research that cannot be done experimentally for practical or ethical reasons;
- Research where relevant variables have yet to be identified (p.57).

Advantages:

Holloway and Wheeler (2000) identified the following features of qualitative research:

- The insider's point of view including experiences, feelings and perceptions of the participants.

- Researchers immerse and involve in the settings and the culture under study.
- The data are primary; the theoretical framework is not predetermined by data, but rather derives from it.
- The method employs 'thick description', detailed portrayals of the participants.

Disadvantage:

- Berg, (2001) thinks that '*qualitative research takes much longer, requires greater clarity of goals during design stages, and cannot be analyzed by running computer programs*' (p. 2). He maintains that the method is not '*associated with high-tech society in the ways quantitative techniques may be.*' (p.2).
- Critics argue, moreover, that the method is non-scientific and thus invalid (Berg, 2001), as qualitative research ignore representative sampling, with findings based on a single or a few cases (Strauss and Corbin, 1998).

8.2.3.4 Recording, Managing and Analytical Approaches

Once necessary data are collected the task of recording, managing, analysing, interpreting and presenting the data becomes crucial. It requires the researcher's own judgements and skills (Moser and Kalton, 1971). '*The preparation stage of an analysis involves devising a good form in which to reproduce the data so that they (a) provide a fair summary of what has been studied and (b) can be analysed readily to answer the researcher's questions*' (Sapsford and Jupp, 1996 p.162). Data analysis is a process of making order, structure, and interpretation of collected data. It starts with a messy, ambiguous, time-consuming task but finishes with creative and fascinating work (Marshall and Rossman, 1999). The collected data are rarely obtained in a readily analysable form (Sapsford and Jupp, 1996). So they must be prepared in a structure or framework before starting analysis. Analysis can be

performed in as many as six phases: a) organising the data; b) generating categories, themes and patterns; c) coding data; d) testing the emergent understandings; e) searching for alternative explanation; and f) writing report (Marshall and Rossman, 1999). The analytical approach is based on the assumption that reality is independent of its observation. Logic and mathematics have a dominant position in the analytical approach and the results from logical and mathematical analyses are universal and valid; they are not normally subject to change (Arbnor and Bjerke, 1997).

8.3 QUALITATIVE ANALYSIS TECHNIQUES

Qualitative research is characterised by two main features: a) it is based on open-ended interview or survey methods and b) largely qualitative type data are collected in the form of narrative rather than isolated statements (Kent, 1999). This research will first obtain qualitative information and then undertake quantitative research and analysis. The remaining part of this section will discuss qualitative research techniques, of which there are three major techniques: depth interview, group discussion and Delphi technique (Abdel-Fattah, 1997).

8.3.1 Depth Interviews

A Depth interview method is performed to collect opinions and judgements of the respondents that allow in-depth questioning (Abdel-Fattah, 1997). It is defined as an unstructured personal interview using '*a single respondent to talk freely and express detailed belief and feelings on a topic*' (Kinnear and Taylor, 1996 p.320). However, it needs invitation of carefully identified and stratified experts (Czinkota and Ronkainen,

1997). Alternatively, an interviewer may need to travel extensively to reach a respondent in random sampling. But many respondents may be missing at the scheduled time (Hester, 1996). There is a basic difference between depth and face-to-face interviews. As qualitative research is based on open-ended interview methods the interviewer is not constrained by pre-coded and highly structured questions or even by a fixed sequence of questions. Thus depth interviewing is '*more along the lines of a conversation on an agreed topic, and the data are captured in the form of narrative rather than isolated statements*' (Kent, 1999 p.83). On the other hand, '*a large number of structured and unstructured questions*' (Hester, 1996 p.186) are used in the face-to-face interview to provide a comprehensive and informative database for analysis. The followings are the main advantages and disadvantages of depth interviews.

Advantages:

- Interview method is more appropriate in complex situations and the interviewer can explain (such as by repeating) the question to the respondents (Kumar, 1999).
- Very intimate and personal material can be discussed.
- Interviewing expertise can overcome the tendency to express socially acceptable norms of attitude and behaviour.
- Recruitment difficulties can be overcome (Gordon and Langmaid, 1988).
- It is possible to identify exactly who said what.
- Both majority and minority opinions can be captured irrespective of personalities and group process (Kent, 1993).
- It is useful for collecting in-depth information (Kumar, 1999).

Disadvantages:

- Convening a group of experts at one location may be difficult (Czinkota and Ronkainen, 1997).

- It is time consuming in terms of conducting an interview, as it needs frequent travelling to respondents and analysing the tapes (Gordon and Langmaid, 1988; Hester, 1996).
- Language may appear as a barrier.
- It may give a wide range of opinions and judgements without any attempt to gain consensus (Abdel-Fathah, 1997).
- Higher cost than group discussion.
- Less opportunity of creativity (Kent, 1993).
- The quality of data depends on the quality of interaction between a respondent and an interviewer as well on the quality of interviewer.
- The quality of data may vary in case of using multiple interviewers.
- The interviewer may bias a respondent.
- The researcher may introduce his or her bias (Kumar, 1999).

Because of the above limitations, the Depth interview is seldom used in marketing research (Kinnear and Taylor, 1996). This method is not applied in this research considering the above disadvantages, in particular time and cost factors. Also it could yield a wide range of opinions and judgements without any attempt to gain consensus (Abdel-Fattah, 1997).

8.3.2 Group Discussion

A Group discussion is sometimes known as a focus group (McDonald and King, 1996). It is formed with participants from different backgrounds and viewpoints to generate discussion, varying insights and opinion (Hester, 1996), although, some researchers prefer to have homogenous group members (Kinnear and Taylor, 1996). Close physical proximity of group members to interact with each other is required in a group discussion (Delbecq et

al., 1975). Qualified and representative panellists and a good focus group moderator are the keys to success (Mcdaniel and Gates, 1998). A focus group typically consists of eight to twelve, occasionally five or six, participants led by a moderator in an in-depth discussion on a particular topic or issue (Mcdaniel and Gates, 1998; Hester, 1996). Kinnear and Taylor (1996) emphasised a careful screening of the respondents to get a successful use of the technique. They think that the group members should have adequate knowledge and experience on the topic to be discussed and that motivation is another important aspect for respondent selection. Another important aspect for a group member to take part in a lengthy group discussion is that of interest in the subject.

A moderator's role is very important to the success of a group discussion technique. A highly skilled and unbiased moderator can direct the discussion in the right direction and yield a proper respondent rapport. The spontaneous participation of the group members largely depends on the skill of the moderator (Kinnear and Taylor, 1996). The main objective of a group discussion is to know what people have to say and why, as it is not simply a question-and-answer interview. The main difference between depth interviews and group discussions is that whereas an interaction between an interviewer and a respondent occurs in the former, interactions happen among group members in the latter. In group discussion a number of people meet at one location to perform a task or tasks. The group members interact with each other over a prolonged period and try to come to a consensus on a specific issue(s). The participants sit so that they can see each other easily (Hester, 1996), and they may be recorded through a one-way mirror (Mcdaniel and Gates, 1998).

Advantages:

- Spontaneity of response is highly encouraged in a group discussion (Gordon and Langmaid, 1988).

- Group tends to be more dynamic and creative (Kent, 1993).
- Interaction among the participants stimulates new ideas and issues, which may not yield in a one-to-one interview.
- Group discussion can be executed more quickly than other approaches.
- It offers opportunity to observe group from behind a one-way mirror (Mcdaniel and Gates, 1998).

Disadvantages:

- Group members may react negatively to the moderator, subjects of discussion, and environment.
- A strong personality may dominate or even overawe other participants of the group resulting in withdrawal or simple agreement (Gordon and Langmaid, 1988).
- Group discussion may inhibit some participants to contribute and others may become audience.
- In terms of proceedings, writing it up becomes sometimes impossible, unless the discussion is videoed (Kent, 1993).
- Group discussion creates an impersonal feeling, making honest conversation unlikely (Mcdaniel and Gates, 1998).
- The participants are neither numerous nor selected at random. So, the conclusion can not be projected with any confidence (Hester, 1996).
- Lack of anonymity may prohibit participants' response (Abdel-Fatthah, 1997).

A group discussion is not used for this research because of the above disadvantages. In particular, according to Gordon and Langmaid, 1988, the disadvantage of a strong personality dominating the discussion and others may withdraw and simply agreed or keep silent and play an audience role. This is particularly true in Bangladesh where the social

structure, position and ranking of the participants may not encourage a spontaneous response.

8.3.3 Delphi Technique

A Delphi technique has been used for both quantitative and qualitative data (Wellington, 2003). A Delphi technique is an approach to collecting, aggregating and analysing the informed judgements of a group or panel of experts on previously identified issues (Saldanha and Gray, 2002). It is a method for a '*systematic solicitation and collation of judgements on a particular topic through a set of carefully judged sequential questionnaires interspersed with summarised information and feedback of opinions derived from earlier responses*' (Delbecq et al., 1975 p.10). The aim of the Delphi technique is to explore the courses of action, estimate their feasibility and understand their operational consequences (Ariel, 1989). The purpose of this technique is to elicit information and judgements from panel members to achieve problem-solving, planning, and decision making (Dunham, 1998). Delbecq et al. (1975) summarised the objectives of the Delphi technique as follows:

- To determine or develop a range of possible program alternatives.
- To explore or expose underlying assumptions or information leading or different judgements.
- To seek out information which may generate a consensus on the part of the respondent group.
- To correlate informed judgements on a topic spanning a wide range of disciplines.
- To educate the respondent group as to the diverse and interrelated aspects of a topic.

A Delphi technique is designed to steer consensus (Ariel, 1989) among a diverse group of participants (Czinkota and Ronkainen, 1997). It integrates the judgement of a number of experts who cannot come together physically but facilitates feedback, debate and comment (Czinkota and Ronkainen, 1997). A Delphi technique involves a number of considerations such as the selection of panellists, the design of the questionnaire, the provision of feedback, and a decision on the number of rounds to be conducted (Yong et al., 1989). Each round consists of a series of statements in the questionnaire and the panel members are asked to make judgements and supply comments on specific issues (Abdel-Fattah, 1997). Helmer (1972 p.15) maintains that

'Delphi is a systematic method of collecting opinions from a group of experts through a series of questionnaire, in which feedback of the group's opinion distribution is provided between question rounds while preserving the anonymity of the responses' (Wellington, 2003 p.122).

Thus the Delphi technique can be characterised by some features: 'expert panel member', 'feedback', 'a series of questionnaire', and 'anonymity of response', which are discussed in the next section.

Advantages:

- The main strengths of a Delphi study is the utilisation of experts in the field by an inexpensive method.
- Some capacity to forecast the future such as trends in skill needs, education, training and skill shortage (Wellington, 2003).
- It does not require face-to-face contact of panel members and researcher.
- An individual panel member cannot dominate others.
- It generates opinions and consensus among a group of experts whilst keeping anonymity.

- It is a useful tool where panel members might be hostile to one another.
- It is very useful where individual personality styles would be distracting in a face-to-face setting (Delbecq et al., 1975 p. 84; Linstone and Turoff, 1975; Wellington, 2003).

Disadvantages:

- The main weakness of the Delphi technique lies in the fact that it operates without theory and that it focuses on consensus irrespective of historical truth (Wellington, 2003).
- Williams and Webb (1994) noted that panel size and composition or criteria of panel members are important limitations of the Delphi method. They also think that it is a time-consuming method and '*there is no evidence that Delphi method is reliable*' (p.182).
- Sackman (1975) and Goodman (1987) think that the Delphi technique is not necessarily a substitute for all types of data collection techniques or a solution for unexpected and unanticipated phenomena in the future.
- Goldschmidt (1975) considers that the effectiveness of the Delphi method has never been scientifically demonstrated, as the result of analysis is not based on traditional empirical methodology.
- There might be a lower degree of responsibility regarding offering opinions as the panel members do not meet face-to-face (Sackman, 1975; Woudenberg, 1991).
- The sample may not be representative, in particular if the panel size is too small (Goodman, 1987).

- The researcher may be biased in the interpretation of the findings, as it is open to distortion due to manipulation of opinions (Williams and Webb, 1994).

Considering the advantages and disadvantages of the three qualitative research methods - depth interview, group discussion, and Delphi technique, it was decided to adopt the Delphi technique for the research. The detailed justification is given below.

8.3.4 Justification for using Delphi Study

A number of studies (Linstone and Turoff, 1975; Delbecq et al., 1975; Yong et al., 1989; Michigan State University Extension, 1994; Dunham, 1998; Meier et al., 1998; Stuter, 1998; Cline, 2000; and Hwang, 2004) justify the use of the Delphi method, and consider the method suitable in the following circumstances.

- Delphi method attempts to generate constructive and systematic use of informed intuitive judgement.
- Through administering a series of statements, the method seeks to combine the knowledge and expertise of a selected group of experts.
- It can identify the likely occurrence of specific future events and the probability that these events will take place within a specified time period (Yong et al., 1989).
- When a problems and issues are not suitable for analytical techniques, they could benefit from subjective and collective judgements of experts.
- Interaction of a number of individuals without coming into proximity or be known to each other.
- When frequent group meetings are impractical or unsuitable due to time, cost and other problem or limitations.

- There is an insufficient amount of empirical data.
- By drawing up the current knowledge of experts, a more updated scientific or technical information can be obtained (Linstone and Turoff, 1975; Delbecq et al., 1975).
- Where a large survey may not be suitable; rather a small group of acknowledged experts would give better opinions in the field (Meyrick, 2003).

The followings are the main reasons for employing the Delphi method for the qualitative data of this research.

8.3.4.1 *Avoiding Difficulties of Group Discussion and Depth Interview*

The most important reason for choosing the Delphi method is to avoid the difficulties of arranging group meetings (group discussion method) or scheduling interviews (depth interviews) with panel members. The present research includes overseas experts from Bangladesh from diverse fields. It would be very difficult to bring them together in one place on several occasions due to high costs. Also it would be very difficult to conduct depth interviews, even by telephone, because of technological difficulties and time zone difference. Another important reason is that the Delphi method helps secure consensus without bias, which can occur in group discussions (by one dominating member or even by the moderator) and in Depth Interview (by the interviewer or investigator). Also the hierarchical structure may discourage some panel members in providing spontaneous opinion in contrast to the Delphi study anonymity, where all panel members are free from peer pressure. Another advantage of using Delphi is that it allows a larger group of experts than a group discussion meeting.

8.3.4.2 *Lack of Empirical Data*

As discussed in the literature review, the concepts of multimodal transport and logistics services are relatively new in developing countries in particular in Bangladesh. A few studies on multimodal freight transport system have been conducted (discussed in chapter 1). Moreover those studies have not been based mainly on an empirical effort. Delbecq et al. (1975) noted that the Delphi technique can be used for pilot or exploratory research as well as for other research where variables are already developed. Thus the Delphi study would be an appropriate technique for this research to obtain valuable and appropriate information in this largely unexplored field.

8.4 CHARACTERISTICS OF THE DELPHI TECHNIQUE

8.4.1.1 *Expert Panel Members*

A common characteristic in Delphi studies is the use of expert panel members (Wellington, 2003). The notion is that a small group of experts can provide a guide to best practice in a particular field, for example health, instead of a large survey with general people (Meyrick, 2003). The experts are selected considering their knowledge and experience in the field and relationship with the issues or problems. However, researchers often endeavour to seek opinions from a panel consisting of a diversity of expertise (Wellington, 2003).

8.4.1.2 *Feedback*

A questionnaire is developed from a literature review and is sent to a Delphi panel for expert opinions (Delbecq et al., 1975; Meier et al., 1998). Linstone and Turoff, (1975)

maintain that the panel members should provide 'controlled feedback' in more than one round. The responses from each participant are collected and the results of the whole group on the previous round are distributed to all participants for reconsideration or providing fresh opinion. Thus, findings are utilised in two ways (Wellington, 2003). First, the respondents are asked to reconsider their previous opinions and to revise their ratings, if they wish (Shneiderman, 1988; Wellington, 2003) on each statement (for example, on a scale of one to five for the assessment of participant's own degree of expertise). Secondly, the findings of one round are used to develop a new questionnaire, which is sent to the same group of experts or a modified group of experts (Wellington, 2003) The feedback procedure assures that statements 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). A slight increase in accuracy over rounds is found in several Delphi studies (Hwang, 2004), although consensus is achieved at the maximum level after the second round (Dalkey and Helmer, 1963).

8.4.1.3 *Use of a Series of Questionnaires*

A Delphi study starts with an in-depth literature review to identify the issues and problems in the field and a preliminary questionnaire is developed. Generally a broad range of topics is examined in the first round and open-ended statements are included in the questionnaire (Wellington, 2003). More than one round is carried out and in each round a questionnaire

is used. The number of rounds can vary from two to ten (Green et al., 1990; Clark and Friedman, 1982), although most use two iterations (see next section). In the later rounds a limited range of issues is explored in a more structured way (Wellington, 2003). However, iteration is usually determined according to the achievement of consensus by the panel. Even though a certain level of improvement or refinement 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).

8.4.1.4 Anonymity of Response

'Anonymity of response' is another important feature of a Delphi study, as the panel members never meet face-to-face. Thus they provide opinion without hierarchical or any other pressure such as bias by the researcher or interviewer (Williams and Webb, 1994), and participants are not influenced or dominated by any individuals (Woudenberg, 1991). As a result, the Delphi study findings should be free from bias. Also, panel members have options to change their original opinions freely without losing face value if they receive better arguments from other participants (Fadda, 1997). Thus, there is no chance of a dominant participant's or leader's influence, which reduces the 'bandwagon effect', common in a group discussion (Linstone and Turoff, 1975; Williams and Webb, 1994). The advantages of anonymity have been generally acknowledged as panel members show a strong level of satisfaction (Boje and Murnighan, 1982; Miner, 1979). Nevertheless, the use of anonymous questionnaires has been criticised due to likely lower commitment by the participants (Hwang, 2004).

8.4.2 The Use of Delphi Technique

There is a difference of opinions as to who first used this technique. Woudenberg (1991) mentioned that the first experiment using the Delphi methodology was performed in 1948 to improve 'betting scores at a horse race' (p.205). Abdel-Fattah et al. (1999) noted the use of this technique for technical forecasting in defence research in the early 1950s by the Rand Corporation in the U. S. On the other hand Delbecq et al. (1975) mentioned that the technique was '*created by Dalkey and his associates at the Rand Corporation in 1950*' (p.13) and Ariel (1989) mentioned that the technique originated at the Rand Corporation and was developed by Dalkey, Helmer and Gordon in early 1960s. 'Principia Cybernetica Web' mentions that Olaf Helmer and Norman Dalkey developed the technique at the Rand Corporation whereas Wellington (2003) notes that Olaf Helmer developed the technique. However, the Rand Corporation Researchers issued a series of publications in the early 1960s on this technique (Abdel-Fattah, 1997). It appears that the Rand Corporation and Dalkey and his associates had a leadership role in establishing the widely acceptance of the Delphi technique. However, since then and with increasing use it has been refined and adapted to research in different fields. Since the 1970s there have been many uses of the Delphi technique.

- In 1975, Mathews et al. used the Delphi technique for planning educational courses for dietitians (Williams and Webb, 1994).
- In 1980, Bond, S and Bond J used the technique for establishing the clinical nursing research priorities of nurses in UK (Abdel-Fattah, 1997).
- In 1983, Lawrence et al. used the technique for determining the curriculum content, by using a series of panels, which covered all medical schools in the U. S. (Williams and Webb, 1994).

- In 1986-1987, Ariel used the technique (three rounds) to obtain the views of industry leaders on a host of issues governing dry bulk shipping (Ariel, 2000).
- In 1987, Kapoor used the technique (two rounds) *'to examine the system of international trade in terms of flow between institutions, and to develop a model of the system to identify areas of system failures in terms of actual or potential fraud'* (Kapoor, 1987 p.255). A panel of 40 members representing 15 categories and 11 countries participated in this study.
- In 1989, Yong et al. used the technique to forecast for the Singapore Tourism Industry. In this study two panels participated in two rounds. One panel consisted of key individuals of local tourism industry and another consisted of top executives, who frequently travel, of international groups (Yong et al., 1989). They describe a further 16 Delphi studies not listed here.
- In 1991, Beech used the technique for nursing students in order to evaluate their most recent clinical allocation and the students were asked to mention changes they would make returning to these clinical areas (Williams and Webb, 1994).
- In 1992, Cranfield Centre for Logistics and Transportation, Cranfield University, UK, used the technique (two rounds) to forecast the future of logistics in Europe. A panel of 200 members from six countries participated in this study (Abdel-Fattah, 1997).
- In 1993, Crotty used the technique to identify the change in the role of the nurse teacher in UK (Crotty, 1993).
- In 1993, Scott and Green used the technique to identify actions that affect the international business communication field and its practitioners. A panel of 22 experts over three rounds were used in this study (Scott and Green, 1993).
- In 1993, Duffield used the technique to identify the competencies expected of first line nurse managers. A panel of 156 members participated in the study.

- In 1994, Williams and Webb used the technique to identify the aspects of supervisor behaviours that affect student learning. A panel of 24 members participated in this study.
- In 1997, Abdel-Fattah used the technique (two rounds) to compare the attitudes towards the privatisation of the road freight industry in Egypt with Great Britain and Hungary. Two panels, one from Egypt with 23 members and another from Hungary with 12 members) participated in this study (Abdel-Fattah, 1997).
- In 1997, Czinkota and Ronkainen used the technique for assessing or forecasting changes in the international business field in the next decade. The panel consisted of three groups of academics, policy makers and business people. The study was performed in three rounds with 34 experts from three continents (Czinkota and Ronkainen, 1997).
- In 1998, Ronald et al., used the technique to examine purchasing role in achieving agile and competitive advantage. In this study the researchers investigated and identified buying behaviours that optimise a firm's relationship with key suppliers. A panel of 16 members (consisting of practitioners, scholars and consultants) participated in this study of three rounds (Ronald et al., 1998).
- In 2002, Saldanha and Gray used the technique (two rounds) to investigate whether coastal shipping could be integrated into multimodal door-to-door supply chain (Saldanha, and Gray, 2002). A panel of 11 members participated in this study.
- In 2004, Hwang used this technique to identify the difference between logistics services and traditional shipping services and also to find out the environmental factors that stimulates services providers to adopt the concept of logistics service in their business (Hwang, 2004).

Czinkota and Ronkainen (1997) mentioned a number of uses of Delphi technique: Linstone and Turoff (1975) (in the medical discipline); Czinkota (1986) and Czinkota and

Ronkainen (1992) (in the business field); Buckley (1995) (in the library and information science); and Coates (1997) (for future potential developments in science and technology).

8.4.3 Selection of Delphi Panel

There are as many as three stakeholder categories in a research activity: the participants or panel members, the researcher, and the funding body. The panel members can be chosen from individuals, groups or communities in the field under study (Kumar, 1999). There is no consensus on the knowledge and experience required for selecting Delphi panel members (Yong et al., 1989). However some experts think that the selection of qualified people is a prerequisite for a successful Delphi study (Delbecq et al., 1975; Saldanha and Gray, 2002). Most of the available studies, mentioned in section 8.6, show that the panel members should be interested with issue(s) under study and have expertise in the field. In many cases the consent of panel members is taken beforehand to increase response rate or to avoid uncertainty of sample size (such as the study of Kapoor, 1987). By selecting the respondents involved in either the use or providing of transport services, in the present study, it is expected that the study would be effective (Delbecq et al., 1975). Czinkota and Ronkainen (1997) found that a Delphi technique is a powerful forecasting tool but success largely depends on addressing the following factors:

- The selection of the panel members
- Panel members' knowledge on the research issue and
- Degree of their enthusiasm in taking part in the survey.

There are no fixed rules as to panel size for a Delphi study (Yong et al., 1989 and Williams and Webb, 1994) and there have been from some 11 to 214 panel members in different studies (see section 8.4.2). It is also important that a Delphi study takes panel members

from more than one group, category and components (Czinkota and Ronkainen, 1997) but they should have interest in and knowledge of the research issue (Meyrick, 2003).

8.4.4 Convergence of Consensus in Delphi Study

Stuter, (1998) contends about the consensus that

‘The Delphi Technique and consensus building are both founded in the same principle- the Hegelian dialectic of thesis, antithesis, and synthesis, with synthesis becoming the new thesis. The goal is a continual evolution to “oneness of mind” (consensus means solidarity of belief) – collective mind, the wholistic society, the wholisite earth etc’ (p.1).

Thus achieving a consensus is an important criterion in a Delphi study, although Saldanha and Gray (2002) contend that the result of a Delphi study does not necessarily need the achievement of consensus. However, they agree that such a consensus serves a useful measure of the agreement among the panellists on a policy area. Hwang (2004) contends that ‘*consensus of opinion does not necessarily mean 100 per cent agreement among the participants in the panel*’ (p.123). However, a number of studies (such as Kapoor, 1987; Abdel-Fattah, 1997; Hwang, 2004) accepted consensus as the majority of responses in their Delphi studies. The meaning of consensus from different dictionaries is listed in table 8.2. Ariel (1989) thinks that Delphi study is an appropriate technique to steer a consensus and Kapoor (1987) thinks that a Delphi technique seeks solutions to a complex problem by taking opinions of a diverge group of experts. Thus the overall aim of the study is to achieve a consensus among the participants. To determine whether a consensus has been achieved or not any arbitrary figure could be used, although some justification should be made (Kapoor, 1987; Abdel-Fattah, 1997; Abdel-Fattah et al., 1999). Kapoor (1987),

Abdel-Fatthah (1997), Saldanha and Gray (2002) and Hwang (2004) used the following formula, which is used in the present research as well, to find out the cut-off point for a consensus.

$$\text{Average Percent of Majority Opinions (APMO)} = \frac{(\text{Aggregate of Majority Agreements} + \text{Aggregate of Majority Disagreements})}{\text{Total Opinion expressed}} \times 100$$

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

Table 8.2 Definition of consensus

8.5 SELECTING DATA COLLECTION METHODOLOGY

In figure 8.1 we have shown that a survey is one of the data collection methods. Three factors in conducting a survey need consideration: a) from whom to collect data, b) what methods to be used for collecting it and c) how to process it (Moser and Kalton, 1971). Marshall and Rossman, (1999) suggested the following seven categories of assumptions. First, *the nature of the research*: is the research technical or social? or is it controversial and critical with an explicit agenda? Second, what is the *researcher's positioning relative*

to the participants. Does he view himself as distant or intimately involved in the lives of the participants? Third, *direction of his or her gaze*: is it outward with others externalising the research problem or does it include explicit inner contemplation? Fourth, *Purpose of the research*: is the research intended for a professional and essentially private interest (such as career advancement)? or to be useful and informative for the participants, the sites and professional or private interests as well? Fifth, the *audience of the study*; is the scholarly community or practitioners involved in the research subject area or the participants from both? Sixth, *political positioning*: does the researcher view the study as neutral? or has he an explicit political agenda? Seventh, *exercise of agency*: does the researcher view himself and the participants as essentially passive or as engaged in local praxes? These assumptions shape how the research methods are conceived and implemented throughout the study. Explicit discussion of assumptions strengthens the overall logic and integrity of the proposal. As secondary data alone, in particular in the case of developing countries, may not suit the research needs, contemporary business research relies on active primary data collection (PDC) methods (Davis, 2000).

8.5.1 Primary Data Collection Methods

When a research design has been formalised (such as decisions about undertaking qualitative research, population, sample size and respondents) the process of collecting information from respondents begins (Zikmund, 2000). It has been already indicated that there are two types of data collection methods (see also figure 8.1): PDC and secondary data collection (SDC). Generally the SDC method is exhaustively used in every research to explore the possibilities of identifying issues and problems and collecting data that could solve the research problems. Frequently, however, secondary data proves to be inadequate or is simply unavailable (Davis, 2000). Qualitative researchers mainly rely on four PDC

methods for collecting information: a) participation, b) observation, c) review of documents and d) in-depth interviewing (Marshall and Rossman, 1999). Here in-depth interviewing basically refers to a survey method, which can be performed in a number of ways, for example, personal interviewing, telephone interviewing, mail interviewing (survey), and more recently internet-based online surveys (Davis, 2000). On the other hand SDC methods include a) life histories and narrative inquiry, b) historical analysis, c) films, videos, and photographs, d) kinesics, e) proxemics, f) unobtrusive measures, g) surveys and questionnaires and h) projective techniques and psychological testing (Marshall and Rossman, 1999).

8.5.2 Personal Interview or Survey

A personal interview or survey is defined as person-to-person discourse or face-to-face contact, initiated by an interviewer to collect relevant information. This is a very effective method if a higher degree of personal interaction can be achieved. But the interviewer has to be good enough to achieve such success. The important limitations of this method include higher cost and time, as the respondent (for example a chief executive of a transport company) might not be available at the pre-scheduled time. The interviewer might influence the respondent and thus the research outcomes may be biased. Also the sex, age, weight and appearance of the interviewer might affect the response (Davis, 2000). For an international survey this method might not be appropriate as it increases further the cost and time. In many cases a personal interview is combined with a mail follow-up.

Dimension	Methods of collecting data/information			
	Personal Interview	Telephone Interview	Mail Interview	Computerised Interview
Respondent identification	Excellent	Good	Fair	Fair
Flexibility	Excellent	Good	Fair	Good
Anonymity of respondent	Poor	Fair	Excellent	Good
Accuracy on sensitive data	Fair	Fair	Good	Good
Control of interviewer bias	Poor	Fair	Excellent	Excellent
Rigidity of scheduling requirements	Poor	Fair	Excellent	Good
Time required	Fair	Good	Fair	Very good
Probable response rate	Good	Fair	Fair to poor	Fair to poor
Cost	Poor	Good	Good	Fair/ good

Table 8.3 A comparison of survey methods for primary data collection

Source: Davis, (2000 p.284)

8.5.3 Telephone Interview or Survey

This method might not be appropriate where accessibility is a problem (in Bangladesh only four per thousand people have access to telephone). A marketing researcher uses this method to conduct exploratory interviews and structured surveys to gather primary data (Hester, 1996). The advantages of this method include cost- and time-effective collection of information for both structured and unstructured investigations. In many ways a telephone interview is similar to a personal interview (Davis, 2000). Many researchers combine a telephone interview with other primary data collection methods, for example a personal interview or a mail survey.

8.5.4 Mail Survey

A mail survey is viewed as the superior to other methodologies for several reasons. First, a mail survey offers a relatively low cost for data collection from a large group of respondents (Davis, 2000). Second, a respondent can complete a mail survey questionnaire at his or her convenience and third, it offers an opportunity for respondent's anonymity. Fourth, a mail survey is viewed as an acceptable methodology because the relevant selection factors are established either through a literature reviews or interviews with a group of customers (Murphy et al., 1997). However, as with other data collection methods a mail survey has distinct limitations (see table 8.3) including potential for non-response bias. The questionnaire has to be sufficiently simple and straightforward for the respondents, and this method is inappropriate where a spontaneous response is desirable (Moser and Kalton, 1971). Moreover there is an uncertainty of receiving the questionnaire because of poor postal services (for example the author's many letters could not reach some recipients in Bangladesh). To diminish the low response rate problem many researchers adopt a mail survey with a telephone follow-up.

8.5.5 Online Survey

The availability, use and level of computer technology vary widely from country to country and even from culture to culture. So, these affect the use of computerised interviews and thus, computer-assisted interviews should be thoroughly explored before choosing this method (Davis, 2000). With the advancement in information technology the computerised survey is being used more and more. Compared to a face-to-face interview and a telephone interview, a computerised survey has advantages as a respondent can complete and return the questionnaire according to his or her suitable time. As with the

mail survey it offers an opportunity for respondent's anonymity. Moreover compared to a postal survey this tool has a delivery advantage if the email address is correct and active. However, seeing the subject and an unknown sender many respondents may delete the email-questionnaire without opening it. Thus, some experts suggest careful use of this tool as '*using Internet samples resembles playing Russian Roulette*' (Davis, 2000 p.250).

8.5.6 Combined Survey Methods

From table 8.3 and the above discussion we understand that none of the data collection methods is best for all situations, and a method is chosen in the light of its strengths and weaknesses (Davis, 2000). So, many researchers combine more than one data collection methods to remove the limitations of one method through the strength of another method. The main focus of a researcher has to be whether the chosen method would provide adequate information to satisfy the research objectives, be cost-effective, and be feasible in terms of time span, subtleties of the setting and resources available for the study (Marshall and Rossman, 1999).

8.5.7 Interviews versus Surveys

Generally an interview complements a survey method. Most surveys tend to contain structured questions and fixed-response answers rather than open-ended queries. For example, in a mail survey normally no interaction occurs between the questioner and the respondent other than what is written on the questionnaire. Even in a telephone survey, surveyors try to minimise conversation other than the exact wording on the questionnaire. This is done to ensure standardisation so that there is no different interpretation among the

respondents. On the other hand much of the understanding emerges from face-to-face meeting and dialogue. This dialogue is also done by a telephone interview (Hester, 1996).

8.6 SUMMARY

Considering the strength and weakness of the qualitative and quantitative methods, a triangulation technique, which includes in-depth literature review, Delphi study and quantitative techniques such as factor analysis, was adopted for this research. On the other hand, an email survey, supported by telephone, is chosen for primary data collection primarily to achieve higher speed and reliability and lower cost.

CHAPTER 9

THE EMPIRICAL STUDY - TWO ROUNDS OF DELPHI

9.1 INTRODUCTION

In the previous chapter it is decided to use the Delphi technique for qualitative data collection with email as a survey tool. This chapter describes the collection and analysis of qualitative data from a Delphi panel in Bangladesh. As explained earlier, the Delphi technique is a systematic procedure for soliciting and organising expert opinion about the future (Sullivan and Claycombe, 1977). Some studies (such as Ariel, 1989; Fadda, 1997; University of Manchester, 1994; Yong et al., 1989), have employed the Delphi technique to predict likely events in the future. On the other hand some studies used the technique to investigate or identify mainly the current situation (Hwang, 2004; Cottam et al., 2003; Nanus et al., 1973; Anderson and Schroeder, 1994; Meier et al., 1998) for exploratory purposes. Thus the Delphi technique is suitable as long as it has the basic characteristics of expert panel members, anonymity of response, use of a series of questionnaires (iteration), and feedback.

Taking into account the earlier discussion of the Delphi technique, we will discuss the Delphi survey questionnaire design, administration and Delphi panel in the context of the current research.

9.2 DELPHI QUESTIONNAIRE DESIGN AND ADMINISTRATION

There is no fixed guideline or rule as to how many statements should be in the first-round questionnaire as a pool of statements is drawn from an in-depth literature review in a Delphi study. In many cases these statements are pre-tested by experts and academics in the field for addition, deletion, simplification or any other changes (Kapoor, 1987). Then the final statements are included in the Delphi questionnaire. There are examples of using from 26 statements (Yong et al., 1989) to 46 statements (Ronald et al., 1998) in the first round. There are 26 statements in the first round of this research. Each statement has options of 'agree', 'disagree' and 'unable to comment'. In the case of disagreement the respondent is asked to explain it. An example (statement number one of this first round Delphi survey) is given below:

1 The present transport system is a barrier to multimodal transport as the inland transit time is too high.

Agree?

Disagree?

Unable to comment?

In case of disagreement please mention why-

Subsequently, a questionnaire for the second round Delphi survey is prepared from the responses of the panellists on the first-round statements having no 'average percentage majority opinion' (APMO, see section 8.4.4). It is very important that the second round questionnaire is prepared carefully with each item or issue conveying accurately the opinions expressed by respondents in the first round (Delbecq et al., 1975). Available examples suggest that in the second and third round the number of statements may be higher than the first round (Ronald et al., 1998). The present study has a higher number (46) in the second round. A typical second-round statement is shown below:

1. Original statement: The present transport system is a barrier to multimodal transport as the inland transit time is too high.

The panellists have expressed the following opinions disagreeing with the above statement.

1.1 Customs law and formalities are a greater barrier to a multimodal transport system than the inland transport time.

Agree

Disagree

Unable to Comment

Please comment if you disagree---

A decision on the number of rounds to be conducted is mainly predetermined but may need to continue until a consensus is achieved on the issue(s). The generation of consensus in general was discussed in section 8.4.4 and is also discussed in the next section for this research.

9.3 DELPHI STUDY IN BANGLADESH

9.3.1 Formulation of Questionnaire for the First Round

The formulation of the first round Delphi questionnaire is shown in figure 9.1. An in-depth literature review resulted in a preliminary questionnaire, which was pre-tested by two experts to finalise the questionnaire. The preliminary questionnaire was then sent by email to three experts, one practitioner and two academics in the field of transport and logistics in Bangladesh. Two experts (one academic and one practitioner) have provided valuable comments. In the light of their comments the preliminary questionnaire was revised and

thus the first round Delphi questionnaire was developed or finalised and then the assumptions of the conceptual model (in section 7.3) were also finalised.

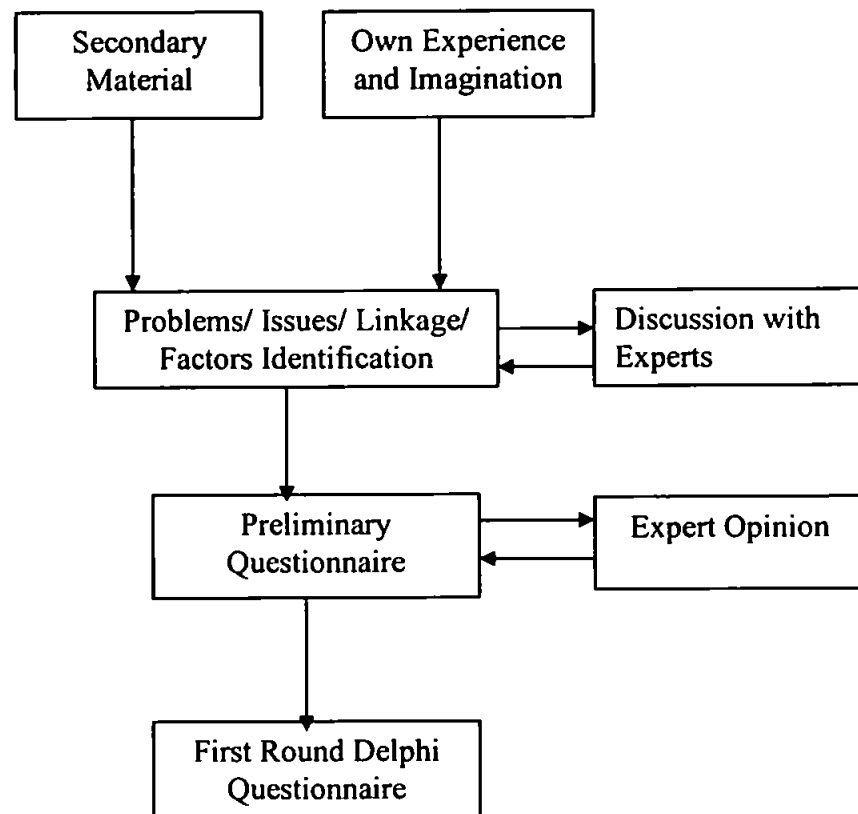


Figure 9.1 Formulation of Questionnaire for First Round Delphi

Source: The Author

Based on the comments of the two experts the number of statements for the first round Delphi survey questionnaire was increased from 24 to 26. One respondent found difficulty in opening an attached file, and so, it was decided to add the questionnaire in the main text of the email at the end of forwarding letter, which was written to explain the aim and objective of the survey and what was expected from the respondents. The questionnaire for the first round survey with the forwarding letter can be seen in appendix A1.

9.3.2 Panel and Process of the Delphi Study

The selection of an appropriate panel is very important for a successful Delphi study. The panel members are chosen so that they have a deep interest in the problems and issues and can share their experience and expertise (Delbecq et al., 1975). Bangladeshi manufacturers, importers and exporters were chosen as potential panel members in the category of transport and logistics service receivers or users. Shipping lines and their agents, trucking companies, rail operators, barge operators, port and terminal operators and freight forwarders in Bangladesh were chosen as potential panel members in the category of transport service providers. Apart from these individual organisations their representative bodies and associations (for example the Shippers' Council of Bangladesh) were also selected as potential panel members. Because these associations are well aware of the problem and also put efforts into improving the transport and logistics environment for international trade, for example, they sometimes organise seminars, conferences or workshops related to this area. Other associations include the International Freight Forwarders Association of Bangladesh (IFFAB), Dhaka Chamber of Commerce and Industries, Federation of Bangladesh Chamber of Commerce and Industry (FBCCI), Bangladesh Garment Manufacturers and Exporters Association (BGMEA), Bangladesh Knitwear manufacturers and exporters association (BKMEA) and the Association of Cargo Agents of Bangladesh. The selection of the survey tool is discussed in section 8.5. It was decided that only respondents with an email address would be selected as panel members for this research.

Published postal and email addresses in developing countries are not abundant. In particular a single source with complete information is unavailable. So the email addresses were collected from a number of sources (such as Shippers Council of Bangladesh, Shipping News and IFFAB). Many email addresses were unavailable, which reduced the

size of 'potential panel members' to 122. Before conducting the main survey a pilot survey was conducted to test the response rate. The questionnaire was sent to fifteen potential respondents selected from both service provider and service receiver categories randomly, but only one responded. Given the poor response rate it was decided to send the questionnaire to as many respondents as possible. Despite multiple efforts through email the response rate was very low (nine out of 122). Efforts were made to increase the response rate by telephoning 22 potential panel members based in Dhaka. Dhaka was chosen due to the cheaper telephone cost and the assumption of respondents more likely to be interested in the topic under study. The respondents were found encouraging during conversation and according to their requests the questionnaire was sent repeatedly by email. They were asked to reply within a week and then they were reminded again (up to eight email requests and at least one telephone call). The author had to be satisfied with a low response rate (10.65 %) and low panel size of thirteen respondents.

Out of these thirteen panel members only two were from the transport and logistics service receiver or user groups, six from shipping line agents (none from shipping lines) and three from the freight forwarder group, one representing both shipping line agents and freight forwarders and one from port and terminal operators. The panel broadly represented the three levels of management: six from top management (responsible for strategic management), three from middle management (responsible for management of a functional unit or department) and two from junior management (responsible for operational or supervisory works) (Hannagan, 2002). The remaining two panel members did not mention their position in the company in the first round.

9.3.3 A Comparison of Two Rounds of Delphi

A comparison of the level or position of panel members in the first round and second round Delphi survey is shown in table 9.1. The table suggests that the top management dominate the Delphi panel. This category probably has the most to gain and lose from freight transport multimodal development and therefore a greater interest in responding. Second, because of their need and understanding of international links, service providing intermediaries are likely (see table 9.2) to have better communications than some other business categories.

9.3.4 Result of the First Round Delphi Survey

There are 26 statements in the First Round Delphi Survey of which twenty three statements were responded to by all thirteen panel members and three statements by twelve panel members. We decided in section 8.4.4 to apply the following formula for Average Percent of Majority Opinions (APMO).

$$\text{APMO} = (\text{Aggregate of Majority Agreements} + \text{Aggregate of Majority Disagreements}) / \text{Total Opinion expressed including UCs} \times 100$$

$$\text{Thus APMO} = (144+88)/335 \times 100 = 69.25 \% \approx 70 \%$$

Although using the above formula we have chosen a 'cut-off' point for achieving consensus of 70 %, the choice of such an arbitrary figure can never be fully justified (Kapoor, 1987) as discussed in section 8.4.4. Any statement having 70 % or more opinion is said to have either supported or not supported the hypothesis (or assumption).

Statements having less than 70 % opinion are included in the second round questionnaire to determine the importance of not having consensus among the panel members. A higher level of consensus on any statement means more certainty, reliability and acceptability on the issue.

Level or position in the company	Participant (%) in 1 st round	Participant (%) in 2 nd round
Top Management	6 (46.0 %)	6 (50.0 %)
Middle Management	3 (23.0 %)	3 (25.0 %)
Junior management	2 (15.5 %)	2 (16.67 %)
Position or level unknown	2 (15.5 %)	1 (8.33 %)
Panel size	13 (100 %)	12 (100 %)

Table 9.1 A Comparison of the level or position of panel members in the two rounds

Category of panel member	Participants (%) in 1 st round	Participants (%) in 2 nd round
Manufacturer, Exporter and Importer	2 (15.5 %)	1 (8.33 %)
Shipping Lines Agent	6 (46.1 %)	6 (50.0 %)
Freight Forwarder	3 (23 %)	3 (25.0 %)
Terminal Operator	1 (7.7 %)	1 (8.33 %)
Shipping Line Agent and Freight Forwarder	1 (7.7 %)	1 (8.33 %)
Panel size	13 (100 %)	12 (100 %)

Table 9.2 Structure of the Delphi panel in the two Rounds of Delphi survey

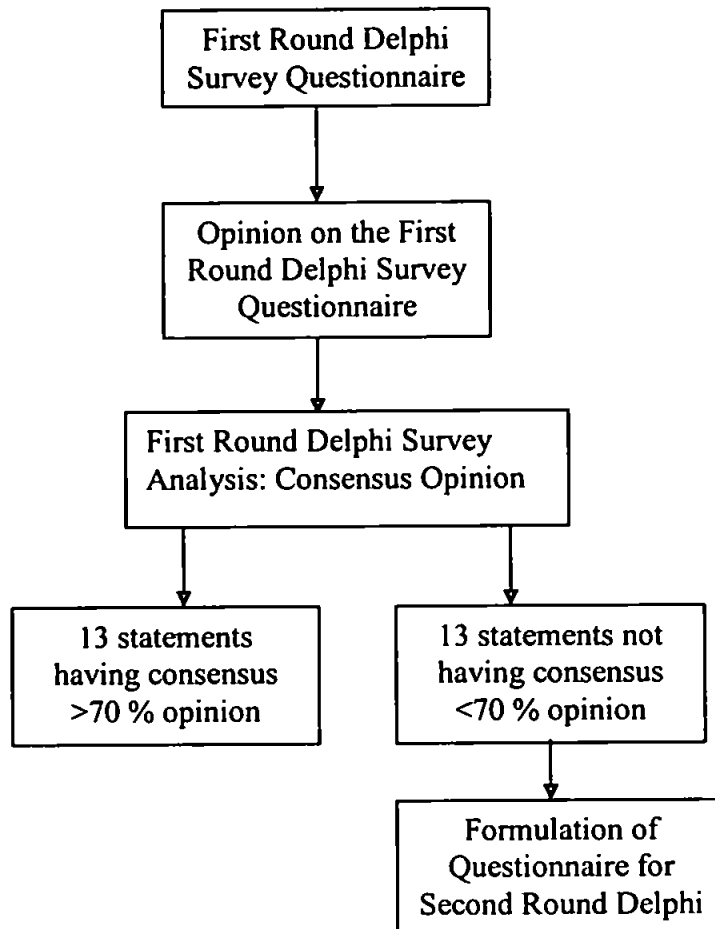


Figure 9.2 Formulation of questionnaire for second round Delphi

Source: The Author

9.4 SECOND ROUND DELPHI STUDY

Formation of the second round questionnaire (refer to appendix B1) is shown in figure 9.2. It was mentioned already that 13 panel members were sent the questionnaire for the second round of which twelve responded. There are 46 statements (against the thirteen original statements in the first round not having consensus) in the second round Delphi survey and all the twelve panel members have provided opinions or comments on every statement. The same APMO formula was applied. Thus $APMO = 458/552 \times 100\% = 82.97\% \approx 83\%$

and out of 46 statements 31 statements achieved consensus (APMO) and six statements achieved 'near consensus' (having 75 % opinion). Detailed results of the 46 statements in the second round Delphi survey are shown in Appendix B2.

9.5 RESULTS OF THE DELPHI STUDY IN BANGLADESH

The summary of the results (opinions) for achieving consensus is shown in table 9.3. The findings of the survey are discussed under the six headings mentioned below and the relevant survey statement numbers (refer to the appendices A1 and B1) are shown in parentheses. In chapter 7 (refer to section 7.3 and figures 7.3a to 7.3e) we identified the following conceptual dimensions or categories for the freight transport multimodal development:

- Globalisation and Competition
- Government Role
- Changes in the inland freight transport
- Technology and methodology change
- Standardisation
- Logistics concepts and practice

9.5.1 Present State of Globalisation and Competition in Freight Transport Market

Bangladesh has adopted globalisation in the name of a liberal economy in 1982 (Hossain, 2003), but achieved a slow and mixed progress. However, if this process is continued then a competitive and deregulated freight market regime, which is an important factor in the development of a multimodal transport system, can be achieved.

Items	Panellist opinion in 1 st round	Panellist opinion in 2 nd round
Aggregate of Majority Agreements	144	458
Aggregate of Majority Disagreements	88	-
Total Opinion expressed including “unable to comment”	335	552
Average Percent of Majority Opinion	69.25 \approx 70 %	82.97 \approx 83 %
Number of statements achieved APMO	13	31
Very Strong consensus (>90)	4	24
Strong consensus (>80 <90)	5	7
Moderate consensus (>70 <80)	4	6
Near consensus	-	6
Total number of statements achieved consensus 50		

Table 9.3 Summary of the results of the two rounds of Delphi

9.5.1.1 *Freight Transport Market*

The panellists very strongly agreed that the Dhaka-Chittagong corridor has sufficient volume of cargo (statement no. 17), which is an important element of the multimodal transport market and there are skills and expertise to operate a multimodal freight transport system in a joint venture or as an agent of international shipping lines (statement no. 11.1). They also very strongly argue for the joint venture or partnership or agent (in contrast to the idea of taking over of a local company by international shipping lines) due to the fact that a local company can meet local challenges better than an international company (statement no. 11.2). However, currently companies offering an inland road freight transport service are small, and it was agreed that a healthy market needs companies of all sizes ranging from small to big to avoid monopoly (statement no. 8.1).

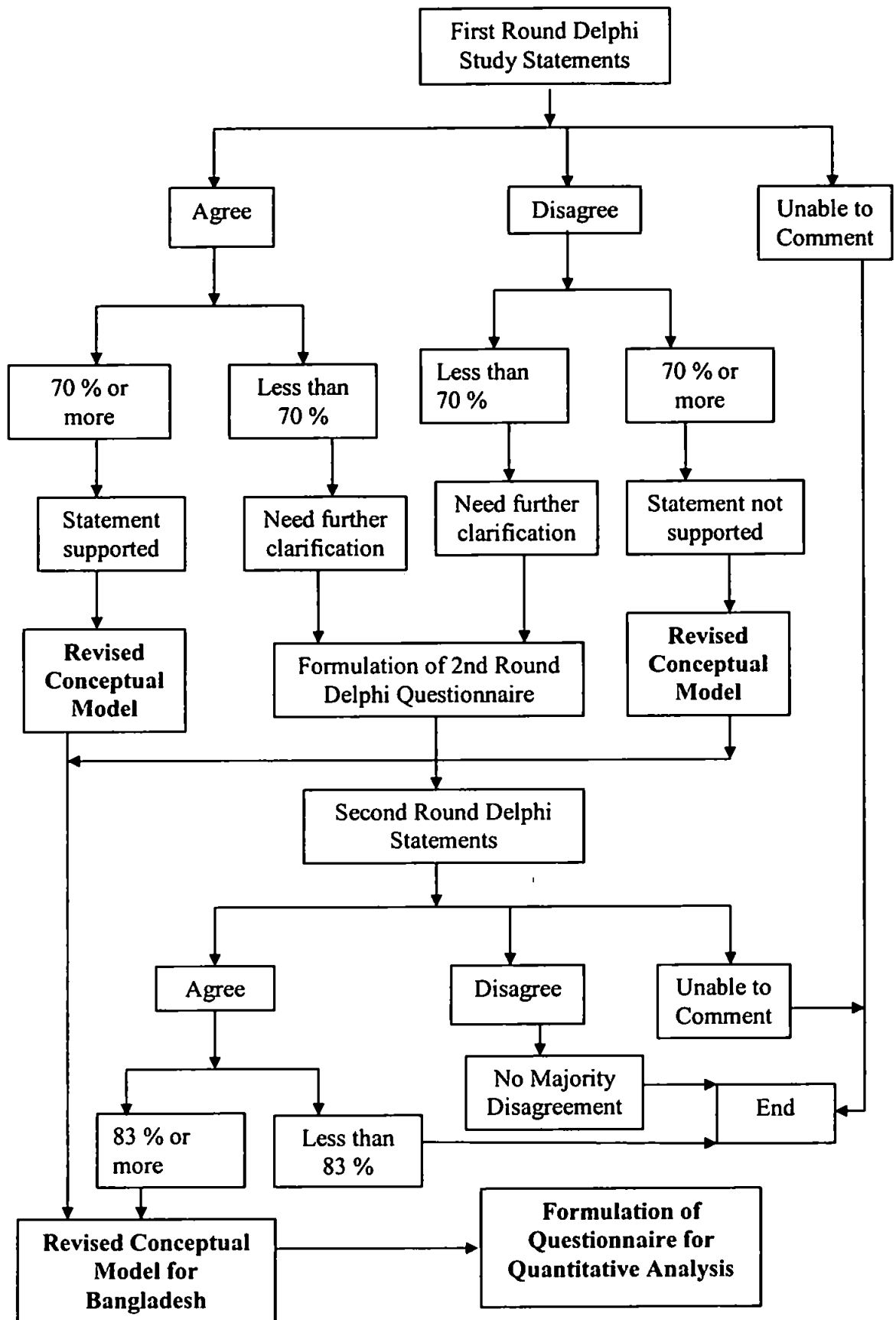


Figure 9.3 Analysis of the two rounds of Delphi

Source: The author

9.5.1.2 Present Competitive Regime

The panellists generally agreed that the inland freight transport market is enjoying an effective competitive regime, which is free from government control and restriction (statement no. 4.1). In contrast they very strongly agreed that there is insufficient port and terminal competition (statement no. 7), which has resulted in inefficient port-related services. Thus it can be generalised that the Bangladesh economy is at an intermediate stage in the adoption of an inland freight transport sector suitable for the international market.

9.5.1.3 Position of Commercial Operators

The panellists held the view that a road-rail-maritime based multimodal service is a better option for international overseas trade in Bangladesh than road-maritime or road-inland waterway-maritime options (statement no. 15). However, the present government ownership and operational status of the rail freight service is an important barrier to developing such a service in Bangladesh. A privatised rail freight service is considered better than a state-owned one for multimodal development (statement no. 16). As to whether the government should subsidise a rail freight operation to encourage multimodal transport development, the panellists hold the opinion that all transportation either in the private or public sector should run at a reasonable profit (statement no. 9.3), because the rail freight service would not improve or last long without making a profit (statement no. 9.2). However, to encourage multimodal transport system development it is also important that the rail freight option be cheaper (statement no. 9.4).

9.5.2 Government Role for Freight Transport Multimodal Development

With the advancement of globalisation private parties are playing main role in providing an appropriate level of transport and logistics, and having commercial value. The government has an important role in creating a competitive market environment as well as infrastructure for such services.

9.5.2.1 Infrastructure Development

The development of adequate infrastructure such as road, rail infrastructure, ICDs and inland terminals is essential for origin-to-destination cargo movement in a multimodal transport system. Although the Bangladesh government has been investing a large share of its development budget for transport infrastructure development it has not been able to develop adequate infrastructure such as feeder roads (statement no. 2.1) and inland river terminals suitable for container movements. The rail dedicated ICD can meet only a small portion (about 15 %) of the total demand. So, there is a need for more inland terminals or ICDs (statement no. 2.3). Not only the government, but also private parties need to invest in such infrastructure to allow origin-to-destination containerised cargo movement (statement no. 3.1).

9.5.2.2 Role of Bangladeshi Customs Authority

There were divided views on whether the Bangladesh Customs authorities have yet to develop a system or procedure to facilitate the door-to-door movement of containers (statement no. 5.2). However, there was consensus that certain procedures such as

arranging escorts and the bonded warehouse system have restricted effective door-to-door delivery (statement no. 5.1), as has the 'out-dated' attitude of trust-distrust in the customs-client relationship (statement no. 5.4). The recently introduced Automated System for Customs Data (ASYCUDA) is improving the customs clearance system (statement no. 5.5), but the procedures should be more simplified to facilitate faster clearance of consignments (statement no. 5.6). Corruption in customs and port clearance has resulted in a higher price of Bangladeshi product (statement no. 5.3)

9.5.2.3 Restructuring of Freight Transport Industry

The structure of government transport ministries and departments is likely to be an important element in the development of a multimodal transport system in any country. The present mode-based structure of the transport ministry and departments in Bangladesh is not suitable for such a development (statement no. 7.1). In the absence of an organisation responsible for taking uniform and comprehensive policy, private bodies such as the shippers' council and freight forwarders' association could take the initiative. Such private parties can better develop a uniform policy and regulation of the development of multimodal transport (statement no. 13) than the government. Moreover, transport ministries and departments should employ people with knowledge and experience in transport and logistics (statement no. 7.2).

9.5.3 Inland Freight Transport Systems

9.5.3.1 Suitability of the Inland Transport Network

To make containerisation effective the inland transport infrastructure must be developed to make the door-to-door movement of containers faster. The panellists agreed that the inland transport network is not yet suitable for door-to-door delivery of containers. Road transport infrastructure is not yet adequately developed and also rail infrastructure is capacity constrained (statement no. 2.1). Limitations in infrastructure have led to higher inland transit time. But the panellists did not agree that the inland transport system is a barrier to a multimodal transport service (statement no. 1.2), and consider that Customs law and formalities is a greater barrier (statement no. 1.1). The requirement of transshipment at border crossings is hindering the development of a multimodal transport service for trade with neighbouring countries (statement no. 26).

9.5.3.2 Extension of Transport Service beyond Port

With the development of containerisation and multimodal transport systems, international shipping lines offer point-to-point transport and logistics services in developed countries, but at present they only offer port-to-port or port-to-point transport services in Bangladesh. To develop an effective multimodal system, international shipping lines need to establish joint ventures or partnerships with local carriers (statement no. 20) as it is claimed that these local companies are able to meet local challenges better than an international company. But the panellists agreed that effective co-operation between local companies and international shipping lines would be very important to provide quality services (statement no. 11.4). The panel saw scope for non-asset based freight forwarders to be multimodal transport operators (statement no. 22). On the other hand, there was no consensus on whether local carriers have the capacity to own international shipping lines (statement no. 11.3). The local carriers in the shape of feeder services have already become part of the international transport haul (statement no. 10.1). However, they (local carriers)

need to upgrade their skills and knowledge (statement no. 10.3). Panellists are in consensus that bookings should be routed through freight forwarders and not directly with shipping lines to enable a competitive door-to-door service (statement no. 13.2).

9.5.4 Technology and Methodology

Well-equipped and efficient ports and terminals are the important points for a multimodal transport service. Modern ports and terminals are equipped with ship-to-shore cranes (such as gantry cranes) as well as computerised terminals so that they are able to transfer containers from one mode to another and handle efficiently without any delay.

9.5.4.1 Port Operational Method

Containerisation has revolutionised cargo handling methodology and technology in ports and terminals in many countries. However, for Bangladesh, the panellists agreed that the main ports are not sufficiently developed to act as container terminals (statement no. 5), and as mentioned in section 9.5.1, there is insufficient port competition. Furthermore the average ship turnaround time is too long (during the survey period it was on average 6 days) and has made the port system a barrier to a multimodal transport system (statement no. 6). Despite the time-ineffectiveness limitation, the panellists are in consensus that port operations are not a barrier to a multimodal transport system (statement no. 1.3).

9.5.4.2 Inland Container Depots or Terminals

An effective multimodal transport system development must include the establishment and operation of a sufficient number of ICDs, logistics centres and inland river terminals with container handling equipment and other facilities. However, an effective and sufficient number of ICDs does not exist in Bangladesh (statement no. 3), which restricts door-to-door cargo movement. Bangladesh has long navigable waterways and all production centres are connected by this natural mode of transport, but river ports are not developed. The panellists hold a consensus view that more terminals and ICDs must be established (statement no. 2.3), and in particular important inland water terminals must be developed with such facilities as container handling equipment and container freight stations (statement no. 3.3).

9.5.5 Standardisation

A multimodal transport system requires standardisation including the flow of information by standard format. In Bangladesh, shippers or consignees are unable to get sufficient information about their consignments because of the incapability of carriers or freight forwarders to offer effective tracking and tracing of shipments (statement no. 8). Unlike developed countries, news about shipping is not published sufficiently and is not up-to-date in Bangladesh (statement no. 6.3). Overall the quality and standard of transport and logistics service providers are such that shippers do not know where to get sufficient information about multimodal freight rates (statement no. 6.5). Also service providers are unable to publish freight rates or transit time or schedules constrained by the uncertainty of cost and time (statement no. 6.1). There are complaints against some service providers regarding their spurious activity in the absence of standard quality requirements for

operators. To avoid such spurious operators the panellists very strongly agreed that multimodal transport operators should be registered or licensed (statement no. 7.3).

9.5.6 Adoption of Modern Logistics Concepts and Practice

9.5.6.1 Knowledge

Modern developments in logistics and supply chain management have only taken place in Bangladesh to a limited extent and Bangladeshi shippers appear largely unaware of what benefits can be achieved through changes by applying modern logistics concepts and practices. For example, there is consensus that nobody knows that adoption of a multimodal transport system would improve the international trade and investment environment (statement no. 24). Bangladeshi shippers are not aware what benefits multimodal transport can offer (statement no. 6.4). So, they are reluctant to use a door-to-door service (statement no. 25) and they are unable to distinguish what a freight forwarder can do and what a shipping line should do to assist door-to-door transport services (Statement no. 13.1).

9.5.6.2 Use of International Commercial Terms

Traditional international trading procedures/ terms do not meet the objectives of the multimodal transport system. For example, traditional terms of sale or INCOTERMS such as f.o.b. (free on board) or c.i.f. (cost, insurance, freight) tend to split shipment responsibility, usually at ports in contrast to the door-to-door delivery. However, the panellists agreed that these traditional INCOTERMS do not affect the use of multimodal

transport (statement no. 12.1), although, they acknowledge that internationally accepted INCOTERMS suitable for multimodal transport systems enhance widespread acceptance of freight forwarders (statement no. 12.3). In fact, there was consensus that government procedures, dishonesty, lack of awareness and infrastructure limitations are much greater deterrents to a multimodal transport system than INCOTERMS (statement no. 12.2).

9.6 SUMMARY

For qualitative data collection the Delphi technique based on an email survey has been applied. Apart from the email survey, other methods such as telephone, post, fax, and even contact through friends and official channels were used to increase the response rate. The Delphi panel size was thirteen in the first round and twelve in the second round. Using the APMO formula, mentioned in section 9.3.4, the two rounds of study found consensus in 44 statements. Also six statements achieved a 'near consensus'. These fifty statements were used in the further study in the next chapter.

In section 6.3 we hypothesised that *'the extent to which a fragmented freight transport system can be transformed into an integrated multimodal transport system depends on the present state of the country'*. In the case of Bangladesh we assumed that the present fragmented freight transport system can be transformed into a multimodal freight transport system through six categories of changes (with twelve sub-categories and 26 issues): change of the government role in Bangladesh, globalisation and competition, change in the inland transport system, technology change, achievement of standardisation and the adoption of modern logistics concepts and practice. The Delphi study supports the assumptions of the research, although the number of sub-categories has increased from 12 to 13, and the number of specific issues from 26 to 50.

CHAPTER 10

ANALYSIS OF THE FINAL ROUND SURVEY

10.1 INTRODUCTION

The following hypothesis is established in Chapter 9:

The extent to which a fragmented freight transport system can be transformed into an integrated multimodal transport system depends on the present state of the country.

In this chapter we will examine the validity of the above hypothesis for developing countries in general by means of quantitative analysis organised in the following steps. Firstly the final round survey is briefly discussed (section 10.2) followed by a factor analysis (in section 10.3) to validate the hypothesis. This is followed by a ranking of freight transport multimodal development using the survey data and data from independent sources (in section 10.4) to establish the stages of development of multimodal freight transport in Bangladesh in a wider context of developing countries.

10.2.0 FINAL ROUND OF SURVEY

10.2.1 Conducting Survey

In conducting a survey the sample size is an important issue, and more of an issue in quantitative study than in qualitative study (Kline, 1994; Kent, 2001). Kline (1994) suggests that the ratio of the number of respondents versus variables should be at least 2:1. If the number of respondents is fewer than this there might be a problem in using a statistical technique.

The fifty statements of the Delphi study are used in the questionnaire of the present empirical study. These statements were located in the context of Bangladesh and all panel members were from Bangladesh. One of the aims of this quantitative study is to identify the dimensions or categories of freight transport multimodal development in a wider context, which will enable us to compare with the findings of the Delphi study specific to Bangladesh. Thus the statements of the Delphi study questionnaire were revised to make them suitable for any country's perspective particularly emerging, developing and least developed countries.

As the research focuses on the emerging, developing and least developed countries it was important to take a sample from such countries. The World Maritime University (WMU) has been training experienced manpower of the transport sector (in particular of ports and shipping) from such countries (including the author) who was able to use the 'Directory of Graduates 2000' as a database. A pilot survey performed in September 2003 suggested a potential response rate of 20 per cent. Apart from the response rate the pilot survey identified the problem of apparent duplication of one statement and omission of another in the questionnaire.

Most graduates from the continent of Africa, Asia and South America with an email address in the directory were included in the potential respondent list and were sent an email (a total of 343). But only a total of 181 (Africa 50, Asia 109 and S America 22) appear to have received the questionnaire. The reasons of non-receipt of emails are a) email address does not exist any more, b) delivery problems, c) wrong address and d) unspecified problem. The respondents were requested four times over the period of September to November 2003. A total of 46 responses were received of which 5 were invalid. Thus there were 41 valid responses. The response rate for Africa was highest (32 per cent) and then South American (22 per cent) and Asia (17.4 per cent). Participants from 28 countries took part in this on-line survey (see table 10.1). The questionnaire consisted of 50 basic statements on freight transport multimodal development using a six point rating scale (see appendix C1).

10.2.2 Profile of the Respondents

Tables 10.2 to 10.5 show the profile of respondents. A total of 41 respondents from three continents took part in the survey of which 16 were from Africa (39 per cent), 19 from Asia (46.3 per cent) and 6 from South America (14.6 per cent). A total of 39 respondents mentioned the type of employer of which 14 were in government organizations (35.9 per cent), 12 were in transport service providing companies (30.8 per cent), and the remaining 13 were in other service providing companies (33.3 per cent).

Country	Continent	No. of Respondents
Bangladesh	Asia	2
Benin	Africa	1
Brazil	South America	1
Cambodia	Asia	1
Cameron	Africa	1
Chile	South America	1
China	Asia	1
Colombia	South America	2
Costa Rica	South America	1
Egypt	Africa	1
Eritrea	Africa	1
Ghana	Africa	2
India	Asia	3
Indonesia	Asia	4
Iran	Asia	1
Jordan	Asia	1
Kenya	Africa	2
Malaysia	Asia	2
Morocco	Africa	1
Mozambique	Africa	2
Nigeria	Africa	1
Pakistan	Asia	1
Philippines	Asia	1
Senegal	Africa	1
Singapore	Asia	1
Tanzania	Africa	3
Uruguay	South America	1
Vietnam	Asia	1
Total		41

Table 10.1 Countries and continents of valid respondents

Continent	Frequency	Percent
Africa	16	39.0
Asia	19	46.3
S America	6	14.6
	41	100

Table 10.2 Respondents in terms of continent

Experience in years	Frequency	Percent
<10	17	41.6
> 10 <20	9	22
> 20	10	24.4
Sub-total	36	87.8
Unknown	5	12.2
Total	41	100

Table 10.3 Respondents in terms of work experience in transport

Management Level	Frequency	Percent
Top	5	12.2
Middle	9	22
Bottom	11	26.8
Sub-total	25	61
Unknown	16	39
Total	41	100

Table 10.4 Respondents in terms of job title or position in the organisation

Employer	Frequency	Percent
Public	14	34.1
Private	27	65.9
Total	41	100

Table 10.5 Respondents in terms of private and public sector organisation

10.3 FACTOR ANALYSIS

A factor analysis is defined as a method for simplifying complex sets of data (Kline, 1994). A factor analysis addresses the structure of the interrelationship or correlation of a factor among a large number of variables by defining a set of common underlying dimensions (Hair et al., 1995). Factor analysis aims to condense a number of issues to a reduced number of factors. Another aim of factor analysis is to establish the reliability of data (Bryman and Cramer, 2001). The present research uses factor analysis to achieve the above aims as a part of triangulation technique.

10.3.1 Data Entry and Manipulation

The data consisting of 41 valid responses with 54 variables or issues was entered in SPSS. Before entering data the variables were defined. A total of eight variables had missing values of less than 15 per cent and were replaced using the series mean method (George and Mallery, 2001). One variable 'job title' had missing values of 39 per cent.

To perform a factor analysis a reliability test is a prerequisite to see the internal consistency of the data and to decide whether or not the scale variables with missing values are reliable to be used for factor analysis, Cronbach's alpha (α) test was conducted. This is designed as a measure of internal consistency on the same scale as a Pearson r (correlation coefficient). The closer the alpha (α) value is to 1, the greater the consistency of issues in the instrument being measured (George and Mallery, 2001).

Multimodalism Issues	Cronbach's Alpha (α) Value
Sufficient volume of containerised cargo	.8103
Rail-multimodal freight service better option	.8112
Road infrastructure unsuitability for containerised cargo movement	.8040
Railway capacity for containerised cargo movement	.8045
Navigable waterways availability for containerised cargo movement	.8109
Seaports not sufficiently developed to act as efficient container terminal	.8032
Ship turnaround time in seaport	.8102
Certainty and reliability of port and terminal services	.8028
Inland transit time and transport cost	.8047
Sufficient development of important inland water terminals	.8075
Sufficient number of inland terminals	.8052
Investment in infrastructure by government and private parties	.8096
Sufficient port and terminal competition	.8076
Competitive inland freight transport market	.8106
Small, medium and big companies for a competitive freight market	.8084
Co-operation between local freight forwarder and international shipping lines	.8063
International shipping lines in every segment of the door-to-door business	.8037
Enough skill and expertise to operate multimodal services	.8074
The local carriers as part of international transport haul	.8117
Upgrading skill, knowledge and capacity to be competitive	.8096
Take-over of local company by international shipping lines	.8067
Welcoming attitude for FDI in transport service sector	.8103
Joint venture between local company and international shipping lines	.8077
Commercial freight transport market principle	.8068
No profit, no improvement of rail freight services	.8113
No subsidy for commercial freight services	.8058
A private rail freight service better than a state-owned one	.8054
'Under-the-counter' payment for customs and port clearance	.8002
Restrictive customs procedures for door-to-door services	.8012
Outdated attitude of trust-distrust in the Custom-clients relationship	.8020
An automated system for Custom clearance	.8123
Simplified customs procedures	.8084
Customs system/ procedure for door-to-door transportation of container	.7987
Private parties better than government for uniform policy development	.8029
Change in the structure of government transport ministries/ departments	.8079
Knowledgeable and experienced people in transport ministries/ departments	.8089
Customs law and formalities versus long inland transit time	.7987
Multimodal transport services for cross border trade	.8059
Modern communication technology (such as EDI)	.8047
Regular, sufficient and up-to-date publication of shipping news	.8011
Shippers' knowledge about the whereabouts of multimodal freight rates	.7986
Availability of published multimodal freight rates or transit times	.7973
Registration or licensing system for multimodal transport operators	.8095
The use of traditional INCOTERMS for multimodal transport services	.8056
Greater deterrents than INCOTERMS for multimodal transport	.8019
Shippers' ability to distinguish a freight forwarder and a shipping line	.8010
Shippers' awareness about the benefits of multimodal freight transport	.7998
Availability of multimodal freight transport services	.8001
Freight bookings must through freight forwarders	.7992
Freight forwarders as multimodal transport operators	.8084

Table 10.6 Reliability analysis: Cronbach's alpha test

Number of 50 items, Number of cases 41,

Alpha = 0.8088 and Standardised item alpha = 0.7974

The Cronbach alpha (α) = $kr / \{1 + (k-1)r\}$

Here k is the number of issues in the scale and r is the average correlation between pairs of issues. Craig (1981) states that if the variables have an alpha value greater than 0.6, in a social science research they are acceptable. On the other hand, George and Mallery (2001) are of the opinion that alpha value greater than 0.7 are acceptable. Table 10.6 shows the result of the reliability analysis using Cronbach's Alpha. None of the 50 variable's alpha value was less than 0.7 and only six variables had slightly less than 0.8 and all others had more than 0.8 alpha value (considered good by George and Mallery, 2001). Thus it was assumed that all variables (issues) were reliable, internally consistent and measuring the same thing (multimodalism) and thus no variable needed to be deleted. So, all 50 variables were included in the factor analysis.

10.3.2 Factor Analysis Procedure

A factor is a dimension or construct, which is a condensed statement of the relationships between a set of variables (Kline, 1994). Royce (1963) defined a factor as a construct operationally defined by its factor loading. A factor analysis is defined as a method for simplifying complex sets of data (Kline, 1994). The meaning of the factor is deduced from the factor loadings, which are the correlations of a variable with a factor (Kline, 1994). Thus the general objective of factor analysis is to condense the information contained in a number of original variables into a smaller set of new, composite dimensions or varieties (factors) with a minimum loss of information (Hair et al., 1995). The technique searches for and defines the fundamental constructs or dimensions assumed to underlie in the original variables. More details on the factor analysis can be seen in appendix C2.

10.3.3 Findings of Factor Analysis

The tables 10.7 to 10.23 show 17 factors each with issues consisting of the top ranked variables (with highest loading or correlation). In other words one issue is included in a factor once only. It is typical for a factor analysis that the researcher considering the variable(s) and loadings (maximum value one) of factors chooses the names of the factors. The tables also reflect the public versus private opinion in terms of agreement (or non-agreement) with the statement in the questionnaire (complete statement can be seen in appendix C1). The first factor (here procedural barrier), having the greatest amount of variance, is the most important and the seventh factor is the least important one (detail discussed in appendix C2).

Statement no.	Issues or Variables	Public	Private	Factor Loading
30	Outdated attitude of Customs prevents effective door-to-door services	Agreed	Agreed	.865
28	'Under-the-counter' payment in Customs and port makes product price high	Agreed	Agreed	.830
29	Customs procedures have restricted door-to-door services	Agreed	Agreed	.703
44	Traditional INCOTERMS do not affect the use of multimodal transport	Not Agreed	Agreed	-.474

Table 10.7 Procedural barriers

Statement no.	Issues or Variables	Public	Private	Factor Loading
8	Uncertain and unreliable port and terminal services	Agreed	Not Agreed	.830
13	Insufficient port and terminal competition	Agreed	Not Agreed	.778
7	Average ship turnaround time in seaport too long	Not Agreed	Not Agreed	.722
11	Insufficient number of inland terminals for door-to-door services	Agreed	Agreed	.459

Table 10.8 Modal transfer points

Statement no.	Issues or Variables	Public	Private	Factor Loading
42	Unavailability of published multimodal freight rates due to uncertainty of cost and time hinder	Not Agreed	Agreed	.801
33	Customs authority has not yet developed an adequate system	Agreed	Agreed	.688
37	Customs procedures greater barrier than a long inland transit time	Agreed	Agreed	.665

Table 10.9 Preconditions to standard systems development

Statement no.	Issues or Variables	Public	Private	Factor Loading
26	No subsidy for a commercial freight services	Agreed	Agreed	.820
14	Presence of competitive inland freight transport market	Agreed	Not Agreed	.566
1	Sufficient volume of containerised cargo available	Agreed	Agreed	.574

Table 10.10 Competitive freight market

Statement no.	Issues or Variables	Public	Private	Factor Loading
32	The Customs procedures needs more simplification	Agreed	Agreed	.898
43	Multimodal transport operators should be registered or licensed	Agreed	Agreed	.868
31	An automated system will improve the custom clearance system	Agreed	Agreed	.475

Table 10.11 Standard systems requirements

Statement no.	Issues or Variables	Public	Private	Factor Loading
25	Without profit rail freight services will not improve or last long	Agreed	Agreed	.885
23	Joint venture or partnership for effective multimodal transport system	Agreed	Agreed	.706
18	Enough local skill or expertise available to work in joint venture or partnership	Agreed	Agreed	.501
50	Freight forwarders not as multimodal transport operators	Agreed	Agreed	.500

Table 10.12 Multimodal transport operator

Statement no.	Issues or Variables	Public	Private	Factor Loading
47	Shippers lack knowledge on benefits of multimodal transport	Agreed	Agreed	.870
46	Shippers unable to distinguish freight forwarder and shipping lines	Divided Opinion	Divided Opinion	.820

Table 10.13 Users knowledge

Statement no.	Issues or Variables	Public	Private	Factor Loading
2	Rail-multimodal freight services better than other options	Agreed	Agreed	.675
3	Road infrastructure unsuitability for containerised cargo movement	Agreed	Agreed	.605
39	Inadequate communication technology leads to lack of tracking and tracing	Agreed	Agreed	.475
22	International shipping lines are welcome to direct investment	Agreed	Agreed	-.474
17	International shipping lines cannot enter in every segment of business	Agreed	Agreed	.405

Table 10.14 Suitability of inland transport network

Statement no.	Issues or Variables	Public	Private	Factor Loading
20	The local carriers need upgraded skills, knowledge and capacity to be competitive	Agreed	Agreed	.767
21	Take-over of local company for effective multimodal system requires	Not Agreed	Not Agreed	-.743
24	All freight transportation should run at a reasonable profit	Agreed	Agreed	.617

Table 10.15 Progress towards multimodal transport systems

Statement no.	Issues or Variables	Public	Private	Factor Loading
40	Publication of shipping news irregular, insufficient and not up-to-date	Agreed	Agreed	.863
41	Shippers do not know source of information about multimodal freight rates	divided opinion	divided opinion	.632
48	Availability of multimodal freight services	Agreed	Agreed	.495
38	Multimodal transport services will increase cross border trade	Agreed	Agreed	.481

Table 10.16 Availability of information

Statement no.	Issues or Variables	Public	Private	Loading
49	Freight bookings must through freight forwarders	Not Agreed	Not Agreed	.871
16	Co-operation rather than taking over more important for effective multimodal system	Agreed	Agreed	.823
27	A private rail freight service better than a state-owned one	Agreed	Agreed	.359

Table 10.17 Regulation and deregulation

Statement no.	Issues or Variables	Public	Private	Factor Loading
36	Experienced people should work in transport ministries or departments	Agreed	Agreed	.780
15	Competitive freight market needs small, medium and big companies	Agreed	Agreed	.519
35	Structure of government transport ministries or departments needs change	Agreed	Agreed	.492

Table 10.18 Restructuring of freight transport industry

Statement no.	Issues or Variables	Public	Private	Factor Loading
6	Seaports are insufficiently developed	Not Agreed	Not Agreed	.784
45	There are more deterrent factors than INCOTERMS	Agreed	Agreed	.566
4	Railway is capacity constraint for containerised cargo movement	Agreed	Agreed	.462

Table 10.19 Inland transport systems: capacity

Statement no.	Issues or Variables	Public	Private	Loading
5	Navigable waterways available for containerised cargo movement	Not Agreed	Not Agreed	.877
19	The local carriers as feeders are part of international transport haul	Agreed	Agreed	.473

Table 10.20 Inland transport systems: waterways transport

Statement no.	Issues or Variables	Public	Private	Factor Loading
10	Important inland water terminals are not developed with sufficient facilities	Agreed	Agreed	.810
9	Higher inland transit time and transport cost barrier to multimodal system	Agreed	Agreed	.601

Table 10.21 Inland transport systems: terminal

Statement no.	Issues or Variables	Public	Private	Loading
34	Private parties can better develop a uniform policy for multimodal transport	Not Agreed	Agreed	.887

Table 10.22 Public-private partnership: policy adoption

Statement no.	Issues or Variables	Public	Private	Factor Loading
12	Both government and private parties should invest in inland terminal	Agreed	Agreed	.808

Table 10.23 Public-private partnership: investment

10.3.4 Triangulation Technique: Literature Review, Delphi study and Factor Analysis

It has already been discussed that a triangulation technique including an in-depth literature review, followed by an exploratory two rounds of a Delphi study, and a factor analysis, is used in this research. The remaining part of this section is dedicated to give a summary view of the findings from these techniques.

10.3.4.1 Findings from Literature Review

The in-depth literature review, in chapters 1 to 6 (in particular in sections 1.1, 3.3, 3.4 and 6.6 and figure 1.1), discussed the important role of a) service providers and users, b) national governments and c) regional and international bodies for freight transport multimodal development. The role of regional and international bodies is important in encouraging national governments to adopt globalisation, deregulation, funding and technical assistance. Figure 3.1 in chapter 3 and figures 7.3a to 7.3e in chapter 7 proposed (in section 7.2.6) a transformation approach for freight transport development in Bangladesh that contained six categories of changes: adoption of globalisation and competition, change in government role, technology and methodology change, change in inland transport systems, achievement of standardisation and modern logistics concepts and prices. The literature review identified twenty six issues (see appendix A1) under these categories. Based on the in-depth literature review, we hypothesised that *'The extent to which a fragmented freight transport system can be transformed into an integrated multimodal transport system depends on the present state of the country'* (see section 7.3.1). In chapter 8 we discussed the research methodology. Accordingly we conducted, first, two rounds of Delphi study with the Bangladeshi panel and then quantitative analysis, summarised in the following sub-sections.

10.3.4.2

Findings from Delphi Study

A Delphi study, second step of the triangulation, with two rounds was conducted among a Bangladeshi panel and it identified fifty issues in the presumed six categories or dimensions (but thirteen sub-dimensions: one addition to the literature review) of changes in freight transport multimodal development in Bangladesh. The dimensions of freight transport multimodal development in Bangladesh are: a) change in Bangladesh government role with three sub-dimensions of infrastructure development; role of Customs authority and restructuring of transport industry and infrastructure development, b) globalisation and competition with three sub- dimensions: availability of freight transport market, competitive freight regime and commercial operators, c) change in inland transport systems with the sub- dimensions; suitability of transport network and extension of services beyond port, d) technology and methodology change with two sub-dimensions; port operations and inland clearance depot, e) standardisation and f) logistics concepts and practices with two sub- dimensions; Knowledge of the benefits and use of international commercial terms. Thus figure 3.1 is revised by the findings of the Delphi study in figure 10.1, which shows the transformation model for the freight transport systems in Bangladesh.

10.3.4.3

Findings from Factor Analysis

A factor analysis was performed with a survey questionnaire consisting of the fifty issues found in the Delphi study. All fifty issues were found valid and consistent to measure multimodalism. Moreover, seventeen factors are identified for the multimodal transport

development in developing countries. The factors (related issues can be found in the respective tables in section 10.3.3) are: 1) procedural barriers, 2) modal transfer point, 3) preconditions to standard systems development, 4) competitive freight market, 5) standard systems requirement, 6) multimodal transport operator, 7) user knowledge, 8) suitability of transport network, 9) progress towards multimodal transport systems, 10) availability of information, 11) regulation and deregulation, 12) structure of freight transport industry, 13) inland transport systems: capacity, 14) inland transport systems: waterways, 15) inland transport systems: terminals, 16) public-private partnership: policy adoption, and 17) public-private partnership: Investment. Thus the figure 2.1 is revised to reflect the factors are shown in figure 10.2 for the transformation of freight transport systems in developing countries.

10.3.4.4 *Similarities and Dissimilarities*

Figures 2.1 (derived from literature review), 10.1 (outcome of Delphi study) and 10.2 (outcome of factor analysis) provide some instant similarities among the dimensions (or sub-dimensions) and factors. In particular the parities between figure 10.1 and figure 10.2 are evident due to fact that a) they are drawn based on the same issues and with similar country background (developing countries) although with different respondents (sample size, employment, expertise, knowledge and experience level). The source of difference also derives from the application of different analytical techniques.

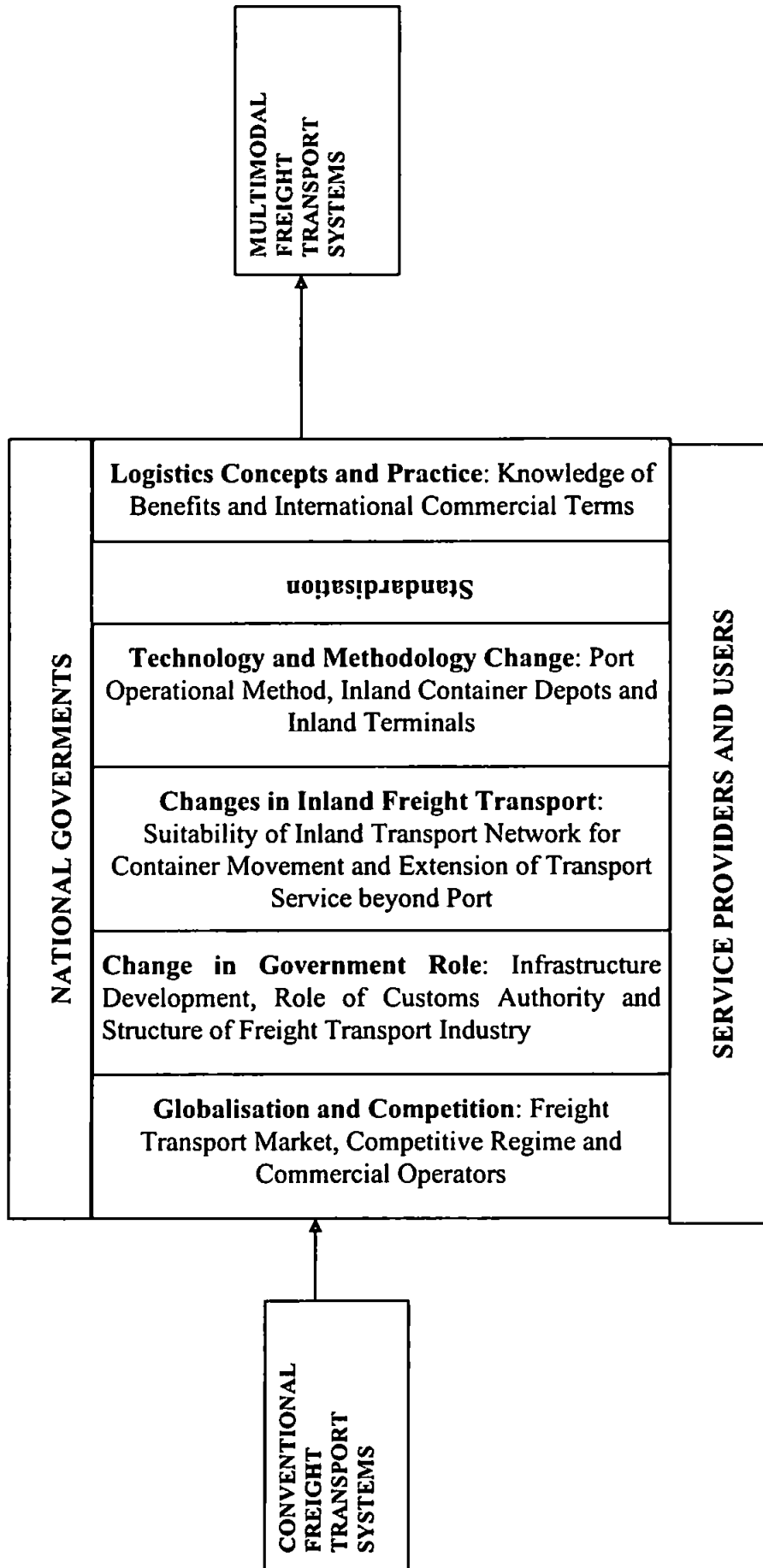


Figure 10.1 Freight transport multimodal development in Bangladesh

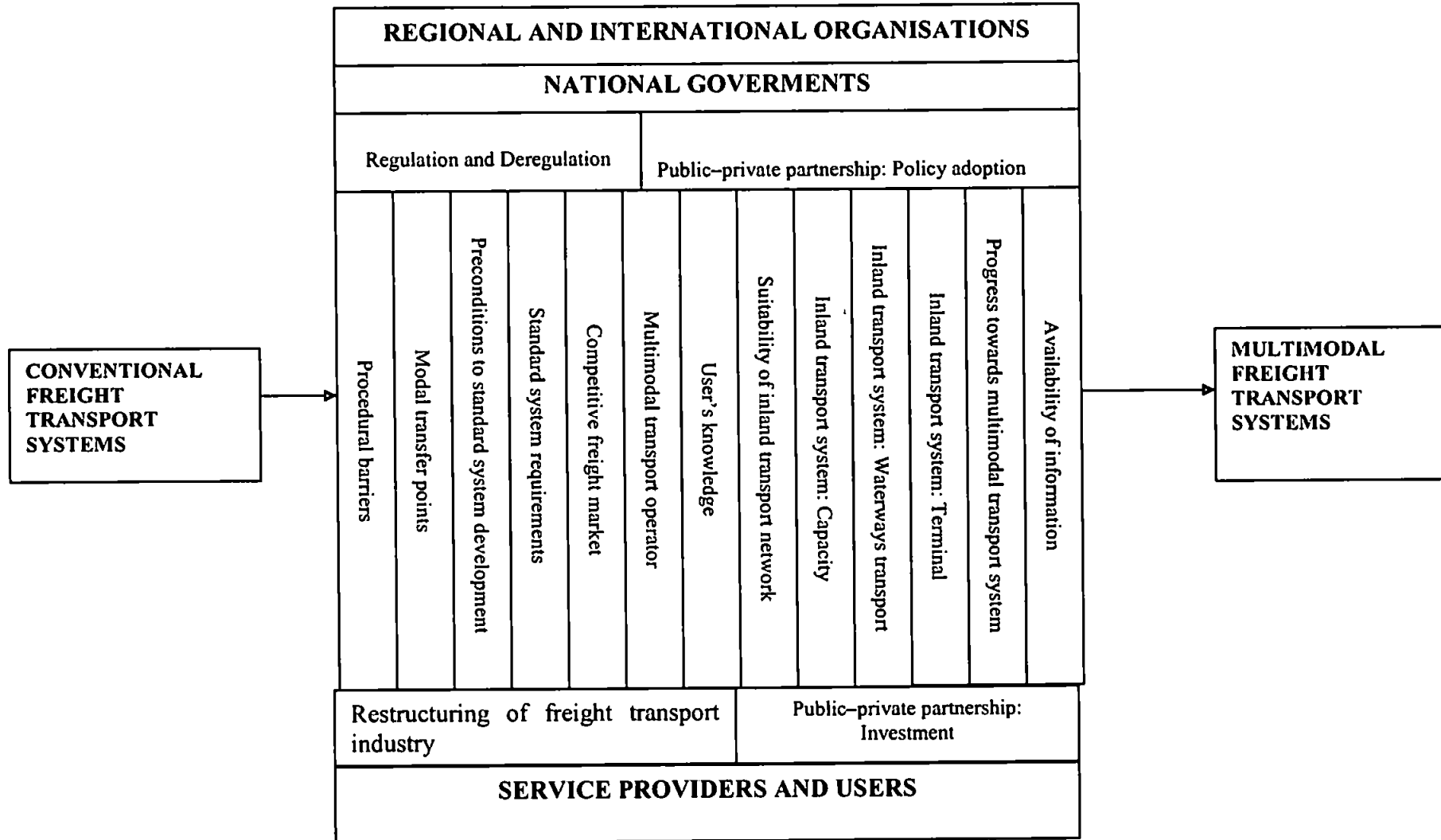


Figure 10.2 Freight transport multimodal development in developing countries

10.4 RANKING, SCALE, PERCEPTION AND ACTUAL DEVELOPMENT

A ranking is an important feature in the research arena. Numerous data analysis techniques have been developed over the years to perform ranking. There is no established scale for measuring freight transport multimodal development so that the difference, for example, between countries or between actual and perceived development can be drawn. Here we will consider a range of options to see such differences. Firstly, we have ranked the countries according to the respondents' perceptions of the development stage of their countries (refer to table 10.2). Secondly, we have found that freight transport multimodalism consists of as many as 17 factors discussed in section 10.3. The factors include, among others, transport service, modal transfer point, investment climate, knowledge, information technology, availability of cargo, and above all alternative transport modes. Moreover gross domestic product (GDP) is a crucial indicator for any economic analysis.

An area of a country is another important factor, as a freight transport multimodal service needs a minimum length of transport haul to be economically viable. The population is at the centre of production and consumption although influenced by the purchasing capacity. The present position of these factors, collected from independent sources can be used to form a scale, which will determine the ranking of the country. On the other hand the mean score (the six-point scale, 0 to 5, of agreement or disagreement) of the survey will form another scale of the countries. If we compare these rankings of countries then we can understand the stage and position of freight transport multimodalism of any country, including Bangladesh, among the 28 countries and thus be able to suggest what factors should be at the focus of development of an efficient transport system. The ranking system also indicates if a particular country is under-performing in the development of transport.

Name of country represented in the survey	Ranking with replaced values (series mean)	Ranking with missing values
Colombia	1	1
Morocco	2	2
Chile	3	3
Pakistan	4	4
India	5	5
Jordan	6	6
China	7	8
Malaysia	8	7
Nigeria	9	9
Singapore	10	10
Egypt	11	11
Uruguay	12	12
Kenya	13	14
Mozambique	14	13
Tanzania	15	18
Iran	16	15
Vietnam	17	16
Indonesia	18	17
Cambodia	19	19
Philippines	20	20
Cameron	21	25
Brazil	22	21
Senegal	23	22
Ghana	24	23
Benin	25	24
Bangladesh	26	26
Eritrea	27	27
Costa Rica	28	28

Table 10.24 Ranking of multimodalism perceived by experts and stakeholders

10.4.1 Ranking of Multimodalism Based on Expert Opinion

The respondents had options of scoring 0 to 5 in each statement in the survey questionnaire (refer to appendix C1). A multimodalism score for each respondent was calculated by summing up all the scores for 50 statements. Out of the fifty statements there were thirty statements where highest score (5) means worst situation on the issue in the country. These were re-coded (i.e. reversed the coding) to make them consistent with other issues or statements (George and Mallery, 2001). Also some statements had missing values which were replaced by the Series Mean method. The re-coding was performed using SPSS version 11.5.1. Then an average multimodalism score (as some countries have multiple respondents) for a country was computed from all individual total scores to produce the mean score of the 28 countries. Also a ranking was carried out including missing value to determine how it affects the position of the countries. Table 10.24 shows the multimodalism ranking of these countries where Colombia is at the top position and Bangladesh is at 26th position in both cases. Ranking is also produced based on data collected from independent sources.

10.4.2 Ranking Based on Average Score from Independent Data

Data on eleven types of indicators or variables were collected (refer to appendix D1) from a number of independent sources. The variables are: a) area in square km, b) population in number, c) total paved road length in km, d) total length of railways in km, e) total length of waterways in km, f) total number of telephones- main lines in use, g) GDP of the country in U. S. \$, h) literacy rate in per cent, i) total number of TEUs in year 2002, j) number of foreign companies in national economy, and k) international (export + import) transport services in million US \$. The data on first eight variables were collected primarily from an online source (Bartleby, 2003) and supplemented by another online

source Central Intelligence Agency (CIA, 2003). These sources contain different types of information and are up-dated occasionally.

The information was collected in December 2003. The data were compared between these two sources and no significant difference was found. Data on GDP Per Capita purchasing power parity is in 2002 (estimated) as available in the source(s). On the other hand, the data on area, population, road length, railways, waterways, literacy rate and land telephone line use range from 1996 to 2002/2003 as available in the source(s). Data on TEUs in 2002 were collected from UNCTAD (2003a). The data for China consists of only the top three Chinese ports: Shanghai, Shenzhen and Qingdao as the total actual figures were readily available in the same source. Thus the actual number of TEUs for China must be much more than 19.33 million TEUs (moreover Hong Kong is not included in any variable) but till then China is at the top for this variable among the countries listed. Data on foreign companies were collected from UNCTAD (2003b) and data on total international transport services (export + import) from UNCTAD (2003c). Both Microsoft Excel and SPSS were used for analysis.

10.4.2.1 *Summation and Deduction of Relative Weights Method*

A straightforward method, by summing the fractional relative weights of the variables, for the ranking of the countries under review was developed using SPSS. First, the respective countries were coded from 1 to 28 and entered in the 'Data View' of SPSS. Then the data for eleven variables (see appendix D1) mentioned in previous section are entered in the 'Data View' of the SPSS. Some variables such as length of waterways had missing values. The missing values were replaced by the series mean method of SPSS. Then the data were converted into fractional relative weights in the scale and entered in the SPSS technique by using following command:

Transform → Rank Cases → 11 variables added → ✓ Rank Type → ✓
Fractional Rank → ✓ Sum of Case Weights → Continue → OK

Thus the computer produced the relative fractional weights of all variables against the countries. In this method the SPSS tool computes fractional weight relative to the highest value and the lowest value of a variable and all others are computed in-between values. It can be noted from the appendices D1 and D2 that although theoretically the highest value and the lowest value could be one and zero respectively, in this method, none of the fractional relative weights, produced by the above SPSS command, is zero. The relative weights of all variables can be seen in Appendix D2. Then a total score for each country was calculated using the following SPSS command:

Transform → Compute → Target (totscore) → 10 fractional score added in
the Numeric Expression box by using '→' and '+' signs then click ✓ OK

Then the countries were re-coded and ranked by using command in Word (Sort). Some may argue that a straightforward addition of the fractional scores will not reflect the real position of the countries. For example Singapore is a small country (island) but is improved in most aspects compared to many countries under review. In this method the weight of the 'area' factor for Singapore would be almost zero, which will apparently position the country in a wrong place. In response to this criticism it can be noted that a minimum (such as 300 km) transport haul is required for a viable and efficient multimodal transport services and thus 'area' is an important factor for such services. It can be argued that Singapore, because of its restricted area, cannot be developed in multimodal transport, other than in conjunction with other countries.

The focus of this ranking is to get an insight into the comparative influence of the issues and variables that affect freight transport multimodal development. First total scores for eleven variables were calculated and then step-by-step the total scores were calculated for ten variables by taking away one variable at a time from the total eleven variables to see its influence on a particular country's position. Table 10.25 summarises the ranking of multimodalism by summation and deduction of relative weight method. The relative weights of eleven variables can be seen in the appendix D2. Thus the influence (positive or negative) of GDP, telephone density, foreign company investment, international transport services and literacy rate were detected and discussed in the following section. However, considering the limitations of this method the ratio method with eight indicators as numerator and three factors (area, GDP and population) as denominator is discussed below.

10.4.2.2 Eleven Variable's Effect on Freight Transport Multimodal Development

Option 1 in table 10.25 produces a ranking consisting of eleven variables of relative weight of (area + population + road length + rail length + telephone +GDP + waterways length + TEUs + foreign companies in national economy + international transport services + literacy rate). In this scale China is at the top followed by Brazil, Indonesia , and India . Singapore is at 14th position and Bangladesh is at 18th position. Although Singapore and Bangladesh are dissimilar in terms of economy they are not the most developed in multimodal transport due to, for example, restricted area discussed before.

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Country	Total Effect of 11 variables	GDP Effect	Telephone Density Effect	Foreign co. Investment Effect	International Transport Services	Literacy Rate Effect
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
China	1	1	1	1	1	1
Brazil	2	2	2	2	2	2
Indonesia	3	3	3	3	3	4
India	4	4	4	4	4	3
Colombia	5	6	6	5	5	6
Vietnam	6	5	5	6	6	9
Malaysia	7	7	7	7	9	8
Egypt	8	8	8	10	7	5
Philippines	9	9	11	12	7	11
Pakistan	10	12	9	8	8	7
Chile	11	11	12	13	13	13
Nigeria	12	10	10	11	12	10
Iran	13	13	13	9	11	12
Singapore	14	14	14	15	15	14
Kenya	15	15	15	14	14	15
Morocco	16	18	18	19	17	17
Tanzania	17	16	16	18	16	18
Bangladesh	18	20	19	16	18	16
Jordan	19	17	17	17	20	19
Uruguay	20	21	21	21	19	21
Cameron	21	25	20	26	22	20
Ghana	22	24	22	22	21	22
Costa Rica	23	23	24	23	23	24
Eritrea	24	22	23	27	25	23
Cambodia	25	25	25	26	24	25
Mozambique	26	26	26	25	26	27
Benin	27	27	27	24	27	26
Senegal	28	28	28	28	28	28

Table 10.25 Ranking of multimodalism by summation and deduction of relative weights method

10.4.2.3 GDP effect on Freight Transport Multimodal Development

Option 2 in table 10.25 produces a ranking consisting of ten variables by deducting the relative weight of GDP from option 1 that shows the GDP effect. In this Option table China is again at the top followed by Brazil, Indonesia, and India. The position of the top nine countries remains unchanged in this scale. The position of Bangladesh has gone down from 18th to 20th position.

10.4.2.4 Telephone Density effect on Freight Transport Multimodal Development

Option 3 in table 10.25 produces a ranking consisting of ten variables by deducting relative weight of telephone density from option 1 to show its effect. In this Option table China is again at the top followed by Brazil, Indonesia, and India. The position of Bangladesh has improved slightly from 18th in option 1 to 19th position.

10.4.2.5 FDI Effect on Freight Transport Multimodal Development

Option 4 in table 10.25 produces a ranking consisting of ten variables by deducting relative weight of foreign companies' investment from the total in option 1 to see the FDI effect on the overall investment environment in the national economy. In this option the position of the countries from China at the top to the seventh ranking of Malaysia remains unchanged. The position of Iran changes from 13th to 9th and Bangladesh from 19th to 16th in this option, which also indicates a poor FDI environment in both countries.

10.4.2.6 International Transport Services Effect on Freight Transport Multimodal Development

Option 5 in table 10.25 produces a ranking consisting of ten variables by deducting the relative weight of international transport services. In this option the positions of the top six countries remains unchanged, although many country's position changes. Bangladesh goes to 18th position indicating that the presence of international transport services is probably better than the overall investment climate. However, it should be noted that national flag vessels or vehicles make little contribution with only US \$ 91 million (8.24 per cent) from the total of US \$ 1104 million of international transport services in Bangladesh in 2000. This indicates a big gap between the earning from export and import of international transport services and shows the poor capability of the local or national companies compared to foreign transport companies.

10.4.2.7 Literacy Rate Effect on Freight Transport Multimodal Development

Option 6 in table 10.25 produces a ranking consisting of ten variables by deducting the relative literacy rate from the total in option 1. In this option the positions of China at the top and Brazil at second position remained unchanged. This issue has affected most countries. For example, the position of India has improved whereas the position of Vietnam has gone down. The position of Bangladesh has improved, which indicates the poor position of this factor in the national economy.

The above options indicate that in terms of freight transport multimodal development Bangladesh is below the average for emerging, developing and least developed countries. However, the overall investment climate has not yet been able to attract foreign companies.

If the investment climate could be improved then more foreign companies would invest. As with many other countries such as recently liberalised Vietnam, her position would be improved. If we look at the different weights of corresponding variables (in appendix D2) then we see that Bangladesh scored more than 0.5 in only two variables (road length infrastructure and GDP) apart from population. When we consider 'population' the poor score of 'area' (only 0.1786) clearly negates the stronger contribution of population. In fact population is a great, but so far negative influence in Bangladesh due to low per capita income. However the poor weighting of area indicates that for the domestic market multimodal freight transport may not be an attractive option. The worst scores are for 'number of foreign companies' in the national economy (0.0714), 'literacy rate' (0.1071) and 'international transport service' (0.25). Thus, these issues should be priority areas in developing effective multimodal transport services as well as in the development of the overall national economy.

10.4.3 Ranking of Multimodalism by Ratio Method

The ratio method has been used considering limitations of the aforesaid methods. In this method the eight indicators, road length, rail length, waterways length, telephone line, TEUs, literacy, foreign company and international transport services, are numerators. On the other hand area, population and GDP U.S. \$ are the denominators sequentially. The same data used in the previous method (Summation and Deduction of Weights Method) in section 10.4.2 are used in this method. The ranking of multimodalism of the countries using the ratio method can be seen in table 10.26. In all three rankings, not surprisingly, Singapore is at the top.

Country	Multimodalism Ranking per person	Multimodalism Ranking per square km	Multimodalism Ranking per GDP U. S. \$	Average Multimodalism Ranking
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
Singapore	1	1	1	1
Malaysia	2	3	2	2.3
Bangladesh	3	7	15	8.3
Philippines	4	4	9	5.6
Chile	5	6	3	4.6
Uruguay	6	9	19	11.3
Vietnam	7	17	24	16
India	8	10	18	12
China	9	2	20	10.3
Indonesia	10	11	14	11.6
Egypt	11	8	5	8
Pakistan	12	13	12	12.3
Nigeria	13	24	21	19.3
Ghana	14	16	11	13.6
Colombia	15	12	13	13.3
Costa Rica	16	22	10	16
Morocco	17	14	28	19.6
Kenya	18	18	4	13.3
Cambodia	19	15	8	14
Iran	20	19	17	18.6
Brazil	21	5	16	14
Tanzania	22	21	7	16.6
Cameron	23	25	23	23.6
Benin	24	27	25	25.3
Mozambique	25	20	6	17
Senegal	26	23	26	25
Eritrea	27	28	22	25.6
Jordan	28	26	27	27

Table 10.26 Ranking of multimodalism by ratio method

Total score of multimodalism = aggregate of scores from one numerator/ one denominator

Numerators: Road length, rail length, waterway length, telephone line, TEUs, literacy rate, foreign company in national economy and international transport services.

Denominator: Area, Population and GDP one at a time.

10.4.3.1 Ranking of Multimodalism per PERSON

In this ranking (table 10.26 column *b*) Singapore is at the top followed by Malaysia (2nd) but surprisingly Bangladesh is at third position, whereas India is at eighth, China ninth and Iran twentieth position.

10.4.3.2 Ranking of Multimodalism per SQUARE KM

In this ranking (table 10.26 column *c*) Singapore is again at the top of the table followed by China, Malaysia, Philippines, Brazil and Chile. In this table Bangladesh is at seventh position whereas India is tenth.

10.4.3.3 Ranking of Multimodalism per GDP U. S. \$

In this ranking (table 10.26 column *d*) Singapore is at the top of the table followed by Malaysia, Chile, and Kenya. In this table Bangladesh is in fifteenth position just below Indonesia.

Country	Multimodalism Ranking	Final Multimodalism Ranking Score	Total Multimodalism Ranking	Average-1 Multimodalism Ranking	Average-2 Multimodalism Ranking	Average-3 Multimodalism Ranking
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	
Malaysia	1	5.4	7	7	2.3	
Chile	2	6.2	3	11	4.6	
China	3	6.4	8	1	10.3	
Colombia	4	6.4	1	5	13.3	
India	5	7	5	4	12	
Singapore	6	8.3	10	14	1	
Pakistan	7	8.7	4	10	12.3	
Egypt	8	9	11	8	8	
Indonesia	9	10.5	17	3	11.6	
Philippines	10	11.5	20	9	5.6	
Brazil	11	12.3	21	2	14	
Morocco	12	12.5	2	16	19.6	
Vietnam	13	12.6	16	6	16	
Nigeria	14	13.4	9	12	19.3	
Kenya	15	14.1	14	15	13.3	
Uruguay	16	14.4	12	20	11.3	
Iran	17	15.5	15	13	18.6	
Tanzania	18	17.2	18	17	16.6	
Jordan	19	17.3	6	19	27	
Bangladesh	20	17.4	26	18	8.3	
Mozambique	21	18.6	13	26	17	
Cambodia	22	19.3	19	25	14	
Ghana	23	19.5	23	22	13.6	
Costa Rica	24	22.3	28	23	16	
Cameron	25	23.2	25	21	23.6	
Senegal	26	25	22	28	25	
Benin	27	25.4	24	27	25.3	
Eritrea	28	25.5	27	24	25.6	

Table 10.27 Composite ranking of multimodalism

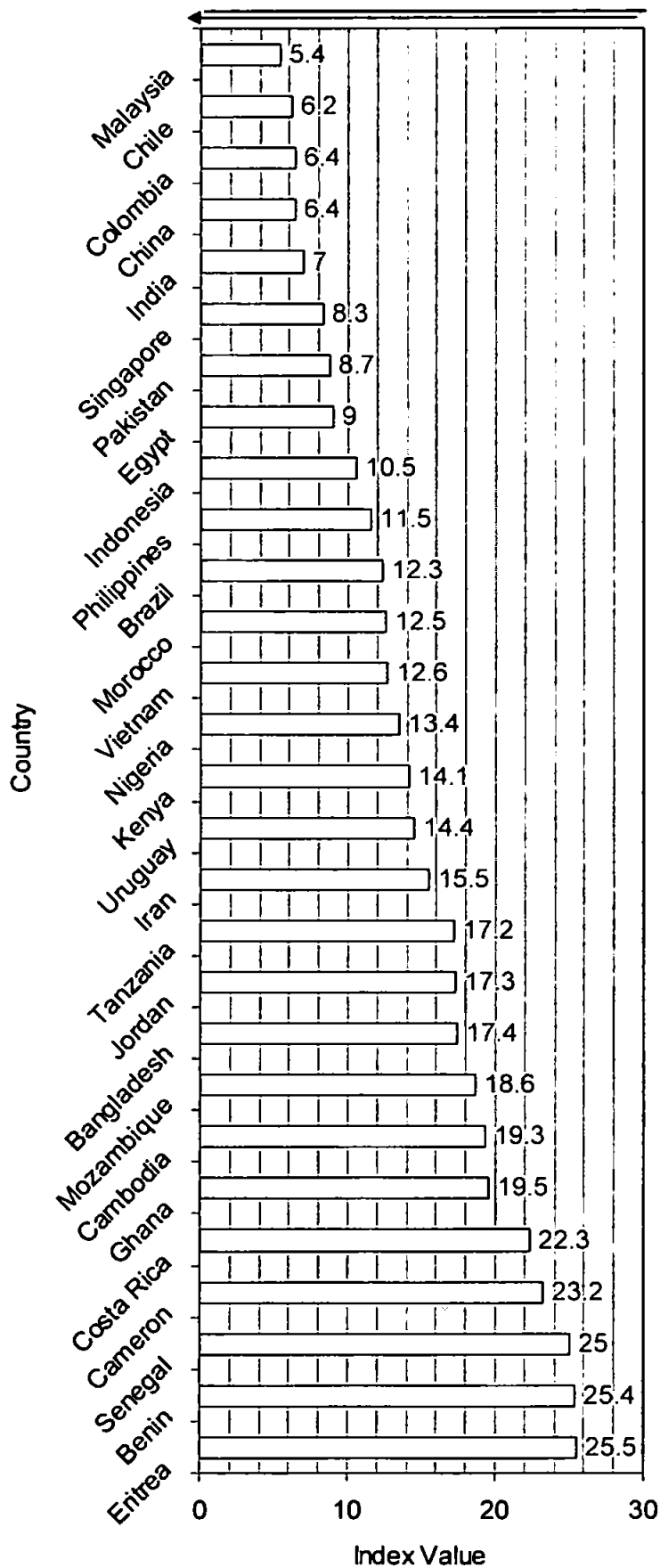
Notes:

- a) Multimodalism ranking (column *b*) derives from the Final Multimodalism Ranking Score in column *c*.
- b) Final Multimodalism ranking score (column *c*) derives from the average of column *d*, *e* and *f*.

- d) Average-1 Multimodalism Ranking (column *d*) derives from the ranking of survey respondents (with missing value, refer to column *c* of table 10.24).
- 3) Average -2 Multimodalism Ranking (column *e*) is taken from the option 1 (total effect of 11 variables, refer to column *b* of table 10.25)
- f) Average-3 Multimodalism Ranking (column *f*) derives from the average score in table 10.26 (column *e*)

method (six options). In this table option 1 (column *b*) displays the total effect of eleven variables, whose data are collected from independent sources, and the remaining five options (column *c* to *g*) indicate the effect of each variable on the overall position of a country. In the third table (10.26) we have used the above eleven variables data, but used the ratio method as outlined above. An average score (column *e*) is derived from these three ranking (column *b*, *c* and *d*). A fourth and final ranking table (see table 10.27) is developed using findings of the above three methods. Also a multimodalism ranking index is shown in figure 10.3 where 0 is the highest achievable level and 30 is lowest level. From table 10.27 and figure 10.3 it can be concluded that none of the twenty-eight countries considered achieved the highest level of multimodalism (some experts term it intermodalism) and none is at the bottom level. However, Malaysia is at the top of the ranking index and Eritrea at the bottom and Bangladesh is at the twentieth position.

Figure 9.3 Multimodalism Ranking Index (0- highest level achievable)



10.5 SUMMARY

A total of 41 respondents participated in the final round of the survey from 28 countries in Africa, Asia and South America. A factor analysis found seventeen factors of freight transport multimodal development, in contrast to thirteen sub-dimensions under six dimensions in the Delphi study. Data collected from independent sources were used to develop a multimodalism ranking of all 28 countries. It was found that the lack of investment of foreign companies (FDI) and the low literacy rate are the major negative influences on Bangladeshi multimodal development followed by the existing international transport services, in particular the poor participation of national transport service providers. Freight transport multimodal development has occurred in all countries including Bangladesh although she is below the average of the scale. In a composite ranking index Bangladesh is placed in twentieth position. However, the freight transport system is not as bad as described by experts, stakeholders or in published works. Multimodal transport is a systems approach rather than simply a technical or physical development, and the negative perception is probably due to the fact that the developed system has not been taken to the doors of the users.

CHAPTER 11

CONCLUSIONS AND RECOMMENDATIONS

11.1 INTRODUCTION

The research aimed to identify the issues, problems, dimensions and factors for freight transport multimodal development in developing countries with particular attention to the case of Bangladesh. To achieve this objective the research applied a triangulation technique by undertaking an in-depth literature review, followed by an exploratory two rounds of a Delphi study. The literature review identified a total of twenty-six issues (appendix A1) under six dimensions (globalisation and competition, change in government role, change in inland transport system, technology and methodology change, standardisation and logistics concepts and practice). The two rounds of the Delphi study were conducted among a Bangladeshi panel. The study found fifty issues (appendix A2 and B2) in the above six dimensions. These issues were then generalised to use in a questionnaire (appendix C1) for quantitative study, third part of triangulation, under twenty-eight developing countries of Asia, Africa and South America. Factor analysis of the results of the questionnaire found seventeen factors of freight transport multimodal development. The countries were ranked according to a multimodal development index using four ranking methods. These different ranking approaches helped to identify the issues associated with freight transport multimodal development.

Based on the in-depth literature review, we hypothesised that *'The extent to which a fragmented freight transport system can be transformed into an integrated multimodal*

transport system depends on the present state of the country' (see section 7.3.1). For the case of Bangladesh we assumed (detailed discussed in sections 7.2.6 and 7.3.2) that the present conventional fragmented freight transport system of Bangladesh can be transformed into an integrated multimodal transport system through transformation in six dimensions (and twelve sub-dimensions). The literature review identified twenty-six issues under the six dimensions.

Then the Delphi study with two rounds found the presumed six dimensions (but thirteen sub-dimensions) of changes in the freight transport multimodal development in Bangladesh. The dimensions of freight transport multimodal development in Bangladesh: a) change in Bangladesh government role with three sub-dimensions of infrastructure development, role of Customs authority and restructuring of transport sector, b) globalisation and competition with three sub- dimensions of joining a global village, competitive regime and commercial operators, c) change in inland transport system with the sub- dimensions of suitability of transport network and extension of service, d) technology and methodology change with the sub- dimensions of port operations and inland clearance depot, e) standardisation and f) logistics concepts and practices with the sub- dimensions of knowledge and use of international commercial terms.

In contrast a factor analysis, as a part of the triangulation technique, found seventeen factors of freight transport multimodal development in developing countries. Moreover, data collected from independent sources were used to develop a multimodalism ranking of all 28 countries represented in the survey.

Using the findings of the triangulation techniques, conclusions and recommendations are drawn for Bangladesh (in section 11.2) followed by developing countries (in section 11.3).

11.2 CONCLUSIONS AND RECOMMENDATIONS FOR BANGLADESH

The findings (dimensions and sub-dimensions of freight transport multimodal development) of the Delphi study are applicable for making specific recommendations for the transformation of the freight transport systems in Bangladesh. It is notable that a further study (factor analysis) has found that the issues identified by the Delphi study are valid and reliable. Moreover, the ranking technique complements the findings of the Delphi study and indicates that the lack of investment of foreign companies (FDI) and the low literacy rate are the major negative influences on Bangladeshi multimodal development followed by the existing international transport services, in particular the poor participation of national transport service providers. In a composite ranking index, Bangladesh is placed in twentieth position. However, the freight transport system is not as bad as described by experts, stakeholders or in published works. As multimodal transport is a systems approach rather than only a technical or physical development, the development needs to reach to the door of the users. The remainder of this section discusses the conclusions and recommendations for the Bangladeshi stakeholders.

11.2.1 Change in Bangladeshi Government Role

11.2.1.1 Infrastructure Development

Although the Bangladesh government has been investing a large share of its development budget in transport infrastructure development she has not been able to develop adequate infrastructure such as road and inland river terminals. Along with the government, private parties also need to invest in such infrastructure as ICDs and inland river terminals to achieve an efficient origin-to-destination containerised cargo movement.

11.2.1.2 *Role of Customs Authority*

Bangladesh customs procedures appear as a barrier to door-to-door movement of containerised cargo. Customs procedures must be flexible and simple enough to allow door-to-door services, but Bangladesh has not yet been able to develop a system or procedure to facilitate door-to-door movement of containers. The procedures such as arrangement of escorts, bonded warehouse system etc have appeared as restrictive measures to effective door-to-door delivery. The recently introduced ASYCUDA is improving the customs clearance system. However, the procedures should be further simplified to facilitate faster clearance of consignments. Moreover, the out-dated attitude of trust-distrust in the customs-client relationship and rampant corruption has made the system costly and ineffective.

11.2.1.3 *Restructuring of Transport Industry*

The mode-based present structure in Bangladesh is preventing the adoption of an aggressive approach to such development. The structure of government transport ministries is an important element to develop multimodal transport system. In the absence of an organisation responsible for developing uniform and comprehensive policy, the private bodies such as the shippers' council and the freight forwarders' association should take the initiative. For this, there should be a public-private partnership environment. Moreover transport ministries and departments should employ people with knowledge and experience in transport and logistics.

11.2.2 Globalisation and Competition

11.2.2.1 *Joining a Global Village*

A competitive and deregulated freight market regime is an essential element for adopting globalisation, an important part of freight transport multimodal development. The Bangladesh economy is in a mixed stage of adoption of globalisation. On the one hand, there is no port and terminal competition, which restricts the quality of services and increases transit time and transport costs. On the other hand, the inland transport market is virtually enjoying an effective competitive regime, which is free from government restrictive regulation.

11.2.2.2 *Freight Transport Market*

The Dhaka-Chittangong corridor has sufficient volume of cargo for a multimodal transport system, but the inland transport service-providing companies are unable to offer such services as they are small in size and have a capacity constraint. A healthy and competitive transport market needs big, medium and small companies to avoid monopoly. Thus, on the one hand, the local carriers need capacity development; on the other hand, bigger capacity foreign companies should come forward to meet the demand in the form of joint ventures or partnerships with local companies who have skills and expertise in this field. Effective co-operation, than taking over, between local companies and international shipping lines would be very important to provide quality multimodal services. Freight transport market should welcome the direct taking-over (FDI) of local company, although Delphi Panel was against it.

11.2.2.3 *Commercial Operators*

Road-rail-maritime is the best available option for a multimodal transport system in Bangladesh. But the present ownership and operational status of rail freight services is an important barrier to developing such services. Thus rail freight services need privatisation for commercial services., because a private operator with a commercial attitude can offer better rail freight services than a government operator does. It is also important that all transport services including public should be run at a reasonable profit because, as without profit the services will not improve or last long. However, to encourage a multimodal transport system it is also important that the rail freight multimodal option be cheaper or reasonable. An independent regulatory body or commission can ensure such commercial environment.

11.2.3 Change in Inland Transport System

11.2.3.1 *Suitability of Transport Network*

Effective containerisation includes an inland transport infrastructure suitable for faster door-to-door movement of containers. But the inland transport infrastructure, for example road, inland terminals including river ports, in Bangladesh is yet not suitable for origin-to-destination containerised cargo movement resulting in a conventional transport system requiring higher transit time. However, the inland transport system is not such a barrier to multimodal transport system as the customs law and formalities are. The requirement of transshipment at border crossings is hindering the development of multimodal transport services for trade with neighbouring countries.

11.2.3.2 *Extension of Services*

With the development of containerisation and a multimodal transport system, shipping lines worldwide now offer point-to-point, instead of port-to-port, transport and logistics services. However, international shipping lines are only offering port-to-port or port-to-point transport services in Bangladesh. The freight transport multimodal development must include the extension of transport and logistics services beyond seaport to and/ or from destination and/ or origin. For this development joint venture, partnership or merger between the international shipping lines and local carriers would be better options in Bangladesh, because there are already some local carriers who have become partners of the international transport haul in the shape of feeder services, and they also know every segment of local business requirements. The formation of joint ventures or partnerships will also help the local carriers to upgrade their skills and knowledge in the field.

11.2.4 Technology and Methodology Change

11.2.4.1 *Port Operations*

Containerisation has changed the cargo handling methodology and technology in ports and terminals of all countries. But Bangladeshi ports have not yet been containerised to the full extent. As a result port operations are not time-effective. Even a lower level of containerisation could not be introduced due to the weak port system such as lack of direct multimodal accessibility of hinterlands to port terminals. This has resulted in higher transit time, transport cost and uncertainty. Thus the port system has become a barrier to a multimodal transport system.

11.2.4.2 Inland Clearance Depots

Technology and methodology change for multimodal transport system development must include the establishment and operation of a sufficient number of ICDs including logistics centres and inland river terminals with container handling equipment and other necessary facilities. But an effective and sufficient number of ICDs is not available in Bangladesh. This has resulted in multiple handling of cargo at modal transfer points and has restricted the door-to-door cargo movement. So, more terminals and ICDs must be established with adequate facilities, in particular in the main load centre, Dhaka.

11.2.5 Standardisation

A multimodal transport system development requires standardisation such as flow of information using a standard format such as EDI. Shippers or consignees are unable to get sufficient information about their consignments due to tracking and tracing incapability of carriers, and also freight forwarders. Recent information (in April 2005) suggests that the ports and customs have not yet established EDI system, although efforts are ongoing (ADB, 2005). Also a well-equipped or established company with standard information on freight rates or transit times is very crucial to develop such services. But the transport and logistics services providers are unable to publish multimodal freight rates or transit times due to, among others, the uncertainty of cost and time. News about shipping is not published regularly, sufficiently and is not up-to-date in Bangladesh. As standardisation has not yet been achieved in Bangladesh, to avoid spurious operators, multimodal transport operators should be registered or licensed. To develop competitive door-to-door services

bookings must route through freight forwarders without direct bookings to shipping lines, as in the airline industry.

11.2.6 Logistics Concepts and Practices

11.2.6.1 *Knowledge and Skills*

There is a change in the concept and applications of modern logistics management for example supply chain management, all over the world. Such change has not yet taken place in Bangladesh. Because the executives and management are not aware what benefits can be achieved through such changes. They do not know that adoption of a multimodal transport system would improve the international trade and investment environment. So, the shippers are reluctant to use door-to-door services, as they see no advantage in it. Although some shippers are interested in using door-to-door multimodal transport services, such services have not yet developed in Bangladesh. So, there should be institutions for learning for new generation and training for managers with updated programmes.

11.2.6.2 *Use of International Commercial Terms*

Traditional international commercial terms (INCOTERMS) such as f.o.b. or c.i.f. are often unsuitable for multimodal transport, as they tend to split shipment responsibility, usually at ports. However, Bangladeshi stakeholders do not see any problem in using old INCOTERMS, which indicates the limited knowledge of the managers. They think that government procedures, dishonesty, lack of awareness and infrastructure limitations are much greater deterrents to multimodal transport system than INCOTERMS. However, they

recognise that the adoption of internationally accepted INCOTERMS suitable for multimodal transport systems enhances widespread acceptance of freight forwarders and carriers. In fact, Bangladeshi stakeholders should adopt modern INCOTERMS to gain control of supply chain.

11.3 CONCLUSIONS AND RECOMMENDATIONS FOR DEVELOPING COUNTRIES

As part of the triangulation technique a factor analysis identified the seventeen factors of freight transport multimodal development in developing countries. A conventional freight transport system of these countries can be transformed into an integrated multimodal freight transport system by addressing these factors. Also the different methods of ranking (details in section 10.4) can help to identify country specific complementary issues as in the case of Bangladesh discussed above.

The top (number one) factor for developing countries is procedural barriers consisting of issues of *outdated attitude, under-the-counter payment, customs procedures and use of traditional INCOTERMS*. Banomyong and Beresford (2001) contend that the adoption of modern *INCOTERMs* such as 'delivered' instead of 'FOB' will assist the exporters to have control over the supply chain route and thus choose the most suitable one. The freight transport multimodal development is restricted by the weak presence of modal transfer points due to *unreliable port and terminal services, lack of port and terminal competition, longer ship turnaround time in port, and lack of sufficient number of inland terminals*. There are some preconditions to standard system development including *publication of freight rate, development of standard customs clearance system, and shorter inland transit*

time. Moreover, the standard system developments should include issues of *simplification of customs procedures, automated customs clearance systems and registration or licensing of transport operators*. Also there has to be a competitive freight market meaning *no subsidy to commercial freight services, competitive inland freight market and sufficient volume of containerised cargo*. Also the multimodal transport operator will require *commercial rail freight services, joint venture or partnership, with local skill and expertise and freight forwarders*. On the other hand the understanding and recognition (knowledge) of modern transport and logistics system is vital to success. They need to be *aware of the benefits* of a multimodal transport system and be *capable of distinguishing freight forwarder and shipping line*. Academic and training institutions; industry leaders; and foreign partners and operators can play an important role in improving the users' knowledge (Daly and Cui, 2003).

Another important factor of freight transport multimodal development is the suitability of the inland transport network, which includes issues of *availability of transport modes option, capable road infrastructure* for containerised cargo movement, *adequate communication technology*, an appropriate *attitude towards foreign direct investment* and *presence of international shipping lines* in the local market. The government mainly, as well as private parties, should invest to provide suitable infrastructure including transport, telephone and information technology infrastructure (UNCTAD, 2002a). UNCTAD (2002b) set five quantifiable goals for the improvement of infrastructure in LDCs: improved road network, rail connections, telecommunications (and postal services), computer literacy and telephone density. In particular the greater use of communication technology improves the quality of services while reducing the trade transaction costs, which thus benefits the international trade (UNCTAD, 2002b).

The progress towards achieving multimodal transport system can be understood from the issues of *local carrier's skill, knowledge and capacity*, the environment of *taking-over (FDI) of local company* by international company and *complete commercial freight market*. Another factor is the availability of information, which includes regular *publication of shipping news, availability of freight rates, and availability of multimodal transport operators including for cross border trade*. The freight market has to be regulated (*system of freight booking through forwarders*) and deregulated allowing the *private or commercial operation of rail freight and co-operation* among the parties in the supply chain. The reform, which includes managerial improvement measures, deregulation to encourage competitiveness, commercialisation and privatisation, in the transport sector is a lengthy and complex process but improves the trade efficiency and competitiveness by reducing transport costs (UNCTAD, 2002a). Ultimately market force and national political determination are likely to play an important role in the industry (Huang and Kadar, 2004)

The important factors of freight transport multimodal development are the inland transport systems of a country consisting of capacity, which includes issues of *seaport containerisation*, addressing *deterrent issues* such as dishonesty, bureaucracy and *railway capacity* and that of *navigable inland waters and inland river terminals* and of *presence of local carriers in international transport haul and inland transit time and cost*. The last but not least factor of the freight transport multimodal development is the public-private partnership in the form of uniform policy adoption and investment in inland terminals.

11.4 LIMITATIONS OF THE RESEARCH

The research aimed to identify the issues, problems, dimensions and factors of freight transport multimodal development in developing countries with a particular eye on Bangladesh. The scope and findings of the research were limited in the following ways:

- The study mainly focussed on identifying the issues and concepts of multimodal transport for overseas international trade. Thus the issues of cross border trade, domestic trade, and air transport have not been explored in depth.
- Containerised cargo, as unitisation is a precondition for multimodal transport system, was the focus. Thus the issues of break-bulk and other types of cargo have not been considered.
- The quantitative study was conducted among graduates of the World Maritime University, which trains mainly the personnel of transport sector of emerging, developing, and least developed countries and thus the participants were selected only from Asia, Africa and South America.
- The three rounds of survey were conducted using email, which is still a relatively new survey approach, particularly for Bangladesh.
- In general the publications and research activities in the field under study are not abundant.
- Last but not least the study did not include legal aspects of a multimodal transport systems. In the context of an increasingly complex and fragmented legal framework at the international level a separate study may address the issue. UNCTAD (2003e) conducted a study titled '*Multimodal transport: the feasibility of an international legal instrument*', which can be consulted in this regard.

Despite these limitations the empirical findings of this research are conclusive and reliable to Bangladesh and other developing countries' situations due to the fact that the panel members are industry leaders and experts in the field of supply chain, logistics and transport. Their knowledge spans not only the situation in their countries under review but also other countries. Also the methodology applied for the research appears to be a valid option for further research in the context in countries where survey and research has particular problem of access not found in developed countries.

11.5 FUTURE RESEARCH

Future research may extend the scope of the research in the following directions:

- Develop a general freight transport multimodal development model (for all countries);
- Develop a general multimodalism ranking index (for all countries);
- Identify country- and cargo- specific multimodal transport options and preferences with time and cost taken in account;
- Identify the issues of the multimodal transport system for countries specific cross-border trade;
- Investigate the under-the-counter payment in developing countries and then measure its effect on the competitiveness of the supply chain; and
- Identify the effect of using traditional INCOTERMS on the cost- and time-effectiveness of multimodal transport system.

FIRST ROUND SURVEY QUESTIONNAIRE

Dear Sir/ Madam

I am doing research (PhD) at the University of Plymouth, United Kingdom on 'The Role of Multimodal Freight Transport in the Removal of Trade Barriers in Bangladesh'. Multimodal transport refers to the movement of containerised goods from shipper's door to consignee's door by at least two different modes of transport by a single operator under a single contract. Manufacturers, shippers, maritime and inland transport operators, freight forwarding organisations, port/ terminal operators, and inland clearance depots all are being consulted in this research.

As part of the research I am conducting a survey using the Delphi Technique. The questionnaire used in the survey is shown below in this email. The Delphi Technique consists of two rounds of questionnaires. In each round you are asked to make a judgement about a specific subject, by marking (X) at the left of one of the three options for each statement, labelled as 'Agree', 'Disagree' and 'Unable to Comment'. In the case of 'Disagree' you are requested to give further comments. Such comments form the second round survey.

Your reply will be treated in strict confidence, and names of individual respondents or organisations will not be used in published material or given to third parties. The general findings of the survey will, however, be published. If you participate in the survey, a copy of the general findings will be emailed to you.

I look forward to hearing from you **within two weeks**. If you require any further details please do not hesitate to contact me at the address below.

Dewan Md. Zahurul Islam
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 Plymouth, Devon PL 4 8AA
 United Kingdom
 Telephone: + 44 1752 232467
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ALL ANSWERS SHOULD REFER TO THE SITUATION IN BANGLADESH

- 1 The present transport system is a barrier to multimodal transport as the inland transit time is too high.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-

- 2 The inland transport infrastructure is suitable for origin-to-destination containerised cargo movement.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-

- 3 There are sufficient inland clearance terminals for efficient door-to-door cargo movement.
 Agree? Disagree? Unable to comment

In case of disagreement please mention why-

- 4 Bangladesh government should not invest any more for the development of inland terminal or inland clearance depots.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 5 The main ports are sufficiently developed to act as container terminals.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 6 The port system is a barrier to multimodal transport as the average ship turnaround time at port is too long.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 7 There is insufficient port competition to make port services efficient.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 8 Shippers or consignees are unable to get sufficient information about their consignments because of inadequate modern communication technology e. g. Electronic Data Interchange (EDI).
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 9 Inland transport operators are too restricted by government regulation and this prevents effective competition.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 10 Customs procedures do not restrict the operation of door-to-door transport of containerised cargo.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 11 Sufficient information about multimodal freight rates or transit time is generally available to shippers.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 12 The structure of government transport ministries (or departments) is already suitable for multimodal transport development.
Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

- 13 A uniform policy and regulation for the development of multimodal transport is better developed by private parties (e.g. shippers association, freight forwarders association) than by a government.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 14 A smaller number of trucking companies with bigger capacity carriers (i.e. tractor-trailer) could create a healthy competitive market in Bangladesh suitable for origin-to-destination international transport haul.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 15 The road-rail-maritime multimodal service is better than road-maritime or road-inland water-maritime multimodal option for an international overseas trade.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 16 A privatised rail freight service is better than a state-owned one for multimodal development.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 17 There is sufficient volume of cargo on the Dhaka-Chittagong route for running a commercial multimodal rail freight service at a profit.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 18 To encourage multimodal transport it is not necessary for a rail freight service to operate at a profit.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 19 The sea shipping lines, calling at Bangladeshi ports, do not encourages the local carriers to be the part of international origin-to-destination transport haul.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 20 An effective multimodal system requires that international sea shipping lines have joint ventures or partnerships with local carriers or freight forwarders.
 Agree? Disagree? Unable to comment?
 In case of disagreement please mention why-
- 21 An effective multimodal system requires that international sea shipping lines take ownership of local carriers or freight forwarders.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

22 Freight forwarders should not be multimodal transport operators if they do not own vehicles or vessels.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

23 Most letters of credit use INCOTERMS f.o.b. or c.i.f. for international shipments and this prevents the development of multimodal transport.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

24 The problem with developing multimodal freight transport is that nobody knows it can improve the international trade and investment environment.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

25 Shippers are reluctant to call for door-to-door (origin-to-destination) transport as they see no advantage in it.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

26 Cross-border trade with neighbouring countries will increase if there is a multimodal transport service without transshipment at the border.

Agree? Disagree? Unable to comment?
In case of disagreement please mention why-

THANK YOU FOR YOUR HELP

If you would like a copy of the general findings please enter your name and address including fax/ email below. The findings will not describe the names of individuals or organisations.

Name:

Designation-

Office Address:

email address:

Fax number:

Details result of the first round Delphi study

No.	Statements in the First Round Delphi Survey	A	DA	UC	Total	Per Cent
1	The present transport system is a barrier to multimodal transport as the inland transit time is too high.	9	3	1	13	69.23 A
2	The inland transport infrastructure is suitable for origin-to-destination containerised cargo movement.	5	6	2	13	46.15 DA 38.61 A
3	There are sufficient inland clearance terminals for efficient door-to-door cargo movement.	3	10	-	13	76.92 DA
4	Bangladesh government should not invest any more for the development of inland terminal or inland clearance depots.	4	8	1	13	61.53 DA
5	The main ports are sufficiently developed to act as container terminals.	3	10	-	13	76.92 DA
6	The port system is a barrier to multimodal transport as the average ship turnaround time at port is too long.	11	2	-	13	84.61 A
7	There is insufficient port competition to make port services efficient.	12	1	-	13	92.31 A
8	Shippers or consignees are unable to get sufficient information about their consignments because of inadequate modern communication technology e. g. Electronic Data Interchange (EDI).	12	1	-	13	92.31 A
9	Inland transport operators are too restricted by government regulation and this prevents effective competition.	8	4	1	13	61.53 A
10	Customs procedures do not restrict the operation of door-to-door transport of containerised cargo.	3	9	1	13	69.23 DA
11	Sufficient information about multimodal freight rates or transit time is generally available to shippers.	5	7	1	13	53.85 DA
12	The structure of government transport ministries (or departments) is already suitable for multimodal transport development.	1	9	3	13	69.23 DA
13	A uniform policy and regulation for the development of multimodal transport is better developed by private parties (e.g. shippers association, freight forwarders association) than by a government.	11	2	-	13	84.61 A
14	A smaller number of trucking companies with bigger capacity carriers (i.e. tractor-trailer) could create a healthy competitive market in Bangladesh suitable for origin-to-destination international transport haul.	7	4	2	13	53.85 A

15	The road-rail-maritime multimodal service is better than road-maritime or road-inland water-maritime multimodal option for an international overseas trade.	9	1	2	12	75 A
16	A privatised rail freight service is better than a state-owned one for multimodal development.	12	1	-	13	92.31 A
17	There is sufficient volume of cargo on the Dhaka-Chittagong route for running a commercial multimodal rail freight service at a profit.	13	-	-	13	100 A
18	To encourage multimodal transport it is not necessary for a rail freight service to operate at a profit.	4	8	1	13	61.53 DA
19	The sea shipping lines, calling at Bangladeshi ports, do not encourages the local carriers to be the part of international origin-to-destination transport haul.	8	4	1	13	61.53 A
20	An effective multimodal system requires that international sea shipping lines have joint ventures or partnerships with local carriers or freight forwarders	11	2	-	13	84.61 A
21	An effective multimodal system requires that international sea shipping lines take ownership of local carriers or freight forwarders.	4	8	1	13	61.53 DA
22	Freight forwarders should not be multimodal transport operators if they do not own vehicles or vessels.	3	10	-	13	76.92 DA
23	Most letters of credit use INCOTERMS f.o.b. or c.i.f. for international shipments and this prevents the development of multimodal transport.	4	5	3	12	41.67 DA 33.33 A
24	The problem with developing multimodal freight transport is that nobody knows it can improve the international trade and investment environment.	11	1	1	13	84.61 A
25	Shippers are reluctant to call for door-to-door (origin-to-destination) transport as they see no advantage in it.	3	9	1	13	69.23 DA
26	Cross-border trade with neighbouring countries will increase if there is a multimodal transport service without transshipment at the border.	10	-	2	12	83.33 A
	Total Opinion expressed (% of total opinions)	186 55.5	125 37.3	24 7.16	335 100	

Note: A - Agree, DA - Disagree and UC - Unable to Comment

SECOND ROUND SURVEY QUESTIONNAIRE

To (Name of the person and company)

Dear Sir/ Madam

Thanks a lot for taking part in the first round survey of the study on 'The Role of Multimodal Freight Transport in the Removal of Trade Barriers in Bangladesh'. I am very grateful to you for giving time, effort and expert opinion, in your busy schedule, to reply. For your kind information I would like to mention that there were twenty-six (26) statements in the first round survey questionnaire and 13 panellists including you participated in this round. The panellists have supplied valuable comments, which have enriched this research, along with agreements or disagreements with the statements. There was general consensus on thirteen (13) statements. The remaining thirteen (13) did not achieve consensus and are used in this second round survey questionnaire. The second round survey questionnaire is formed from the comments of the panellists along with the original thirteen statements of first round.

As I indicated in the first round that the Delphi Technique used for this research consists of two rounds of questionnaires. Now may I ask you to consider the original statement and the comments of the panellists and then please make a judgement by marking (X) at the left of one of the three options for each statement, labelled as 'Agree', 'Disagree' and 'Unable to Comment'. In the case of 'Disagree' you are requested to give further comments. The questionnaire used in this round is shown below in this email.

As I promised in first round that your reply would be treated in strict confidence and names of individual respondents or organisations will not be used in published material or given to third parties. The general findings of the survey will, however, be published.

I would like to emphasis the importance of reading all statements before making your judgement.

It is stressed again if you participate in this survey; a copy of the general findings will be emailed to you.

I look forward to hearing from you within one week. If you require any further details please do not hesitate to contact me at the address below.

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ALL ANSWERS SHOULD REFER TO THE SITUATION IN BANGLADESH

1. Original statement: The present transport system is a barrier to multimodal transport as the inland transit time is too high.

The panellists have expressed the following opinions disagreeing with the above statement.

1.1 Customs law and formalities are a greater barrier to a multimodal transport system than the inland transport time.

Agree Disagree Unable to Comment

Please comment if you disagree---

1.2 The inland transport system is not a barrier to multimodal transport although it is not time-effective.

Agree Disagree Unable to Comment

Please comment, if you disagree---

1.3 Port operations are not a barrier to multimodal transport although they are not time-effective.

Agree Disagree Unable to Comment

Please comment, if you disagree---

2 Original statement: The inland transport infrastructure is suitable for origin-to-destination containerised cargo movement.

The panellists have expressed the following opinions disagreeing with the above statement.

2.1 Road transport is not adequate and railway is not capable to meet the need of inland-containerised cargo movement.

Agree Disagree Unable to Comment

Please comment, if you disagree---

2.2 Inland transportation of containerised cargo is possible only by road and railway not by inland waterway.

Agree Disagree Unable to Comment

Please comment, if you disagree---

2.3 More inland terminals/ inland clearance depots/container freight stations should be established.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

3 Original statement: Bangladesh government should not invest any more for the development of inland terminal or inland clearance depots.

The panellists have expressed the following opinions disagreeing with the above statement.

3.1 Government and also private sector should invest side by side to establish more inland terminals/ inland clearance depots.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

3.2 Government should establish more inland terminals / inland clearance depots but private management operators should operate them.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

3.3 Important inland water terminals must be developed with such facilities as container handling equipment and container freight stations.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

4 Original statement: Inland transport operators are too restricted by government regulation and this prevents effective competition.

The panellists have expressed the following opinions disagreeing with the above statement.

4.1 The inland transport market is enjoying an effective competitive regime and free from government restrictive regulation.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

4.2 There is overriding trade unionism in the freight transport market.

Agree Disagree Unable to Comment

Please comment, if you disagree---

4.3 Competition is hampered by lack of discipline in the freight transport sector.

Agree Disagree Unable to Comment

Please comment, if you disagree---

5 Original statement: Customs procedures do not restrict the operation of door-to-door transport of containerised cargo.

The panellists have expressed the following opinions disagreeing with the above statement.

5.1 Customs procedures such as arrangement of escorts, bonded warehouse system etc have restricted effective door-to-door delivery.

Agree Disagree Unable to Comment

Please comment, if you disagree---

5.2 Customs have not developed a system or procedure for door to door transportation of containers.

Agree Disagree Unable to Comment

Please comment, if you disagree---

5.3 Final price of product is high because of 'under-the-counter' payment to get customs and port clearance.

Agree Disagree Unable to Comment

Please comment, if you disagree---

5.4 The 'outdated' attitude of trust-distrust in the customs-clients relationship prevents effective door-to-door service.

Agree Disagree Unable to Comment

Please comment, if you disagree---

5.5 Recently introduced ASYCUDA is improving the customs clearance system.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

5.6 The customs procedures should be more simplified to facilitate faster clearance of consignments.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

6 Original statement: Sufficient information about multimodal freight rates or transit time is generally available to shippers.

The panellists have expressed the following opinions disagreeing with the above statement.

6.1 Transport and logistics service providers are unable to publish multimodal freight rates or transit times, as there is uncertainty of cost and time.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

6.2 Unlike in North America and Europe freight forwarders and other trade bodies have not yet accepted multimodal transport system.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

6.3 Unlike developed countries, news about shipping is not published sufficiently and is not up-to-date in Bangladesh.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

6.4 Bangladeshi shippers are not aware what benefits multimodal freight transport can offer.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

6.5 Bangladeshi shippers do not know where to get sufficient information about multimodal freight rates.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

7 Original statement: The structure of government transport ministries (or departments) is already suitable for multimodal transport development.

The panellists have expressed the following opinions disagreeing with the above statement.

7.1 The structure of government transport ministries or departments needs to be changed to enable a more aggressive approach to multimodal transport development by government.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

7.2 People with knowledge and experience in transport and logistics should be employed by transport ministries and departments.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

7.3 To avoid spurious operators, multimodal transport operators should be registered or licensed.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

8 Original statement: A smaller number of trucking companies with bigger capacity carriers (i.e. tractor-trailer) could create a healthy competitive market in Bangladesh suitable for origin-to-destination international transport haul.

The panellists have expressed the following opinions disagreeing with the above statement.

8.1 A healthy and competitive transport market needs big, medium and small companies to avoid monopoly.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

8.2 There is nothing wrong with the existing structure of the trucking industry

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

9 Original statement: To encourage multimodal transport it is not necessary for a rail freight service to operate at a profit.

The panellists have expressed the following opinions disagreeing with the above statement.

9.1 To encourage multimodal transport government can subsidise rail but must be run on a breakeven (i.e. no-loss-no-profit) basis.

Agree Disagree Unable to Comment

Please comment, if you disagree---

9.2 Without profit the rail freight service will not improve or last long.

Agree Disagree Unable to Comment

Please comment, if you disagree---

9.3 All transportation either in private or public sector should run at a reasonable profit.

Agree Disagree Unable to Comment

Please comment, if you disagree---

9.4 The rail freight service should be cheaper but reasonably profitable.

Agree Disagree Unable to Comment

Please comment, if you disagree---

10 Original statement: The sea shipping lines, calling at Bangladeshi ports, do not encourages the local carriers to be the part of international origin-to-destination transport haul.

The panellists have expressed the following opinions disagreeing with the above statement.

10.1 The local carriers in the shape of feeder services have already become part of the international transport haul.

Agree Disagree Unable to Comment

Please comment, if you disagree---

10.2 Although sea shipping lines encourage local carriers to be part of the international transport haul, it is not possible for sea shipping lines to enter every segment of the business.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

10.3 The local carriers need to upgrade their skills and knowledge.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

11 Original statement: An effective multimodal system requires that international sea shipping lines take ownership of local carriers or freight forwarders.

The panellists have expressed the following opinions disagreeing with the above statement.

11.1 There is enough skill and expertise in Bangladesh to operate multimodal transport systems in joint venture or as agents of international shipping lines.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

11.2 A local company can meet local challenges better than an international company. So, joint venture or partnership is the best option for effective multimodal services.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

11.3 Local carriers have no capacity to become owners of international shipping lines.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

11.4 Effective co-operation between local and international shipping lines is more important than taking over of a local carrier or forwarding company.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

12 Original statement: Most letters of credit use INCOTERMS f.o.b. or c.i.f. for international shipments and this prevents the development of multimodal transport.

The panellists have expressed the following opinions disagreeing with the above statement.

12.1 Presently used INCOTERMS (f.o.b., c.i.f. or c.f.r. / c.o.f.) do not affect the use of multimodal transport

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

12.2 Government procedures, dishonesty, lack of awareness and infrastructure limitations are much greater deterrents to multimodal transport system than INCOTERMS.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

12.3 Internationally accepted INCOTERMS suitable for multimodal transport systems enhance widespread acceptance of freight forwarders.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

13 Original statement: Shippers are reluctant to call for door-to-door (origin-to-destination) transport, as they see no advantage in it.

The panellists have expressed the following opinions disagreeing with the above statement.

13.1 Shippers are not aware what a freight forwarder can do and what a shipping line should do to assist door-to-door transport services.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

13.2 Like airlines, bookings must route through freight forwarders with no direct bookings to shipping lines to enable competitive door-to-door service

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

13.3 Shippers are interested in efficient multimodal freight but such services have not yet developed here.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

13.4 With the development of modern information technology and reliability of services, shippers nowadays feel rather relaxed about using door-to-door services.

Agree

Disagree

Unable to Comment

Please comment, if you disagree---

THANK YOU FOR YOUR HELP

Please enter your name and address including designation fax/ email below for future correspondence (e.g. to send general findings to you).

Name:

Designation-

Office Address:

Email address:

Fax number:

Details result of the second round Delphi study

No.	Statements in 2 nd Round Delphi Survey	A	DA	UC	Per Cent
1.1	Customs law and formalities are a greater barrier to a multimodal transport system than the inland transport time.	10	2	-	83.33 A
1.2	The inland transport system is not a barrier to multimodal transport although it is not time-effective.	10	2	-	83.33 A
1.3	Port operations are not a barrier to multimodal transport although they are not time-effective.	10	2	-	83.33 A
2.1	Road transport is not adequate and railway is not capable to meet the need of inland-containerised cargo movement.	10	2	-	83.33 A
2.2	Inland transportation of containerised cargo is possible only by road and railway not by inland waterway.	8	4	-	66.67 A
2.3	More inland terminals/ inland clearance depots/container freight stations should be established.	11	1	-	91.67 A
3.1	Government and also private sector should invest side by side to establish more inland terminals/ inland clearance depots.	12	-	-	100
3.2	Government should establish more inland terminals / inland clearance depots but private management operators should operate them.	8	3	1	66.67 A
3.3	Important inland water terminals must be developed with such facilities as container handling equipment and container freight stations.	12	-	-	100 A
4.1	The inland transport market is enjoying an effective competitive regime and free from government restrictive regulation.	9	1	2	75 A
4.2	There is overriding trade unionism in the freight transport market.	8	2	2	66.67 A
4.3	Competition is hampered by lack of discipline in the freight transport sector.	8	4	-	66.67 A
5.1	Customs procedures such as arrangement of escorts, bonded warehouse system etc have restricted effective door-to-door delivery.	11	1	-	91.67 A
5.2	Customs have not developed a system or procedure for door to door transportation of containers.	9	2	1	75 A
5.3	Final price of product is high because of 'under-the-counter' payment to get customs and port clearance.	9	2	1	75 A
5.4	The 'outdated' attitude of trust-distrust in the customs-clients relationship prevents effective door-to-door service.	11	1	-	91.67 A
5.5	Recently introduced ASYCUDA is improving the customs clearance system.	10	-	2	83.33 A

5.6	The customs procedures should be more simplified to facilitate faster clearance of consignments.	10	1	1	83.33 A
6.1	Transport and logistics service providers are unable to publish multimodal freight rates or transit times, as there is uncertainty of cost and time.	9	2	1	75 A
6.2	Unlike in North America and Europe freight forwarders and other trade bodies have not yet accepted multimodal transport system.	6	2	4	50 A
6.3	Unlike developed countries, news about shipping is not published sufficiently and is not up-to-date in Bangladesh.	12	-	-	100 A
6.4	Bangladeshi shippers are not aware what benefits multimodal freight transport can offer.	11	1	-	91.67 A
6.5	Bangladeshi shippers do not know where to get sufficient information about multimodal freight rates.	11	1	-	91.67 A
7.1	The structure of government transport ministries or departments needs to be changed to enable a more aggressive approach to multimodal transport development by government.	12	-	-	100 A
7.2	People with knowledge and experience in transport and logistics should be employed by transport ministries and departments.	11	1	-	91.67 A
7.3	To avoid spurious operators, multimodal transport operators should be registered or licensed.	12	-	-	100 A
8.1	A healthy and competitive transport market needs big, medium and small companies to avoid monopoly.	12	-	-	100 A
8.2	There is nothing wrong with the existing structure of the trucking industry	7	3	2	58.33 A
9.1	To encourage multimodal transport government can subsidise rail but must be run on a breakeven (i.e. no-loss-no-profit) basis.	6	6	-	50- 50- DA
9.2	Without profit the rail freight service will not improve or last long.	12	-	-	100 A
9.3	All transportation either in private or public sector should run at a reasonable profit.	12	-	-	100 A
9.4	The rail freight service should be cheaper but reasonably profitable.	12	-	-	100 A
10.1	The local carriers in the shape of feeder services have already become part of the international transport haul.	12	-	-	100 A
10.2	Although sea shipping lines encourage local carriers to be part of the international transport haul, it is not possible for sea shipping lines to enter every segment of the business.	9	2	1	75 A
10.3	The local carriers need to upgrade their skills and knowledge.	11	1	-	91.67 A

11.1	There is enough skill and expertise in Bangladesh to operate multimodal transport systems in joint venture or as agents of international shipping lines.	11	1	-	91.67 A
11.2	A local company can meet local challenges better than an international company. So, joint venture or partnership is the best option for effective multimodal services.	11	1	-	91.67 A
11.3	Local carriers have no capacity to become owners of international shipping lines.	7	5	-	58.33 A
11.4	Effective co-operation between local and international shipping lines is more important than taking over of a local carrier or forwarding company.	11	1	-	91.67 A
12.1	Presently used INCOTERMS (f.o.b., c.i.f. or c.f.r. / c.o.f.) do not affect the use of multimodal transport	11	1	-	91.67 A
12.2	Government procedures, dishonesty, lack of awareness and infrastructure limitations are much greater deterrents to multimodal transport system than INCOTERMS.	11	-	1	91.67
12.3	Internationally accepted INCOTERMS suitable for multimodal transport systems enhance widespread acceptance of freight forwarders.	12	-	-	100 A
13.1	Shippers are not aware what a freight forwarder can do and what a shipping line should do to assist door-to-door transport services.	11	1	-	91.67 A
13.2	Like airlines, bookings must route through freight forwarders with no direct bookings to shipping lines to enable competitive door-to-door service.	10	2	-	83.33 A
13.3	Shippers are interested in efficient multimodal freight but such services have not yet developed here.	9	3	-	75 A
13.4	With the development of modern information technology and reliability of services, shippers nowadays feel rather relaxed about using door-to-door services.	7	5	-	58.33 A
46	Total 46 statements in 2 nd Round Delphi Survey	464	69	19	

Note: A - Agree, DA - Disagree and UC - Unable to Comment

SURVEY OF FREIGHT TRANSPORT MULTIMODAL DEVELOPMENT

Dear Mr/ Ms

I am a former World Maritime University student (Port Management '95) and I take the privilege to request you to participate in this research for my PhD at the University of Plymouth, United Kingdom. As part of the research I am conducting a survey to compare freight transport multimodal development in a range of countries. The survey is below in this email. It should take about 30 minutes of your busy time, but your expert response will make the survey successful.

In order to gain a good understanding of freight transport multimodal development, it is most important that I receive opinions from a wide range of countries, and from different professions. Please answer the questionnaire, even if you are not directly involved in multimodal transport, or even you feel you cannot give an opinion to all the questions. Your views are valued as an informed professional in your country.

Your reply will be treated in strict confidence, and names of individual respondents or organisations will not be used in published material or given to third parties. The general findings of the survey will, however, be published, and should be of value to many countries, including your own. If you participate in the survey, a copy of the general findings will be emailed to you.

I look forward to hearing from you as soon as possible. If you require any further details please do not hesitate to contact me at the address below.

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ALL ANSWERS SHOULD REFER TO THE SITUATION IN YOUR COUNTRY

(Please enter the country referred to in your answers -----)

The questionnaire is easy to complete. Please make a judgement about a specific issue/ statement in your country's context, which will be measured on a scale, by marking (X) on the left of one of the six options. 5 = Strongly Agree, 4= Agree, 3= neither agree nor disagree, 2= Disagree, 1= Strongly disagree, and 0= don't know/ not applicable.

1 There is sufficient volume of containerised cargo on the main route(s) for running a commercial multimodal freight service at a profit.

5 4 3 2 1 0

2 A multimodal service based on rail for longer distance inland transport (rather than road or inland waterways) is better for international movements.

5 4 3 2 1 0

- 3 The road network is not adequately developed in terms of width, load bearing capacity, curvature, and road-bridge to meet the need of inland-containerised cargo movement.
5 4 3 2 1 0
- 4 The railway is capacity constraint in terms of multiple tracks, locomotive and container carrying wagon to meet the need of inland-containerised cargo movement.
5 4 3 2 1 0
- 5 There are navigable waterways for containerised barge operation between main production and consumption centres.
5 4 3 2 1 0
- 6 The main seaports are not sufficiently developed to act as efficient container terminals.
5 4 3 2 1 0
- 7 The port system is a barrier to multimodal transport system as the average ship turnaround time at port is too long.
5 4 3 2 1 0
- 8 The inland transport system is a barrier to multimodal transport due to uncertainty and unreliability of port and terminal service.
5 4 3 2 1 0
- 9 Overall the inland transport system has become a barrier to multimodal transport due to higher transit time & transport cost.
5 4 3 2 1 0
- 10 Important inland water terminals are not developed with such facilities as container handling equipment and container freight station.
5 4 3 2 1 0
- 11 There are insufficient number of inland terminals/ inland clearance depots for efficient door-to-door cargo movement.
5 4 3 2 1 0
- 12 Both government and private parties should invest to establish such infrastructure as inland terminals / inland clearance depots.
5 4 3 2 1 0
- 13 There is insufficient port and terminal competition to make port services efficient.
5 4 3 2 1 0
- 14 The inland transport operators are enjoying an effective competitive regime and free from government restrictive regulation.
5 4 3 2 1 0
- 15 A healthy and competitive transport market needs big, medium and small companies to avoid monopoly.
5 4 3 2 1 0

- 16 Effective co-operation between local freighting companies and international shipping lines is more important than the international shipping lines taking over a freighting company.
- 5 4 3 2 1 0
- 17 Although sea shipping lines encourage local carriers to be part of the international transport haul, it is not possible for sea shipping lines to enter every segment of the door-to-door business.
- 5 4 3 2 1 0
- 18 There is enough skill and expertise in the country to operate multimodal transport systems in a joint venture or partnership or as agents of international shipping lines.
- 5 4 3 2 1 0
- 19 The local carriers in the shape of feeder services have already become part of the international transport haul.
- 5 4 3 2 1 0
- 20 The local carriers need to upgrade their skills, knowledge and capacity to be competitive in the global market.
- 5 4 3 2 1 0
- 21 An effective multimodal system requires that international sea shipping lines take-over local carriers or freight forwarders or establish own branches.
- 5 4 3 2 1 0
- 22 International shipping lines are welcome to come up with foreign direct investment in the form of taking-over or establish a local company for effective multimodal services.
- 5 4 3 2 1 0
- 23 An effective multimodal system requires that international sea shipping lines have joint ventures or partnerships with local carriers or freight forwarders.
- 5 4 3 2 1 0
- 24 All freight transportation either in private or public sector should run at a reasonable profit.
- 5 4 3 2 1 0
- 25 Without profit the rail freight service will not improve or last long.
- 5 4 3 2 1 0
- 26 There should not be any subsidy for a commercial freight service.
- 5 4 3 2 1 0
- 27 A privatised rail freight service is better than a state-owned one for multimodal development.
- 5 4 3 2 1 0
- 28 The final price of a product is high because of 'under-the-counter' payment to get customs and port clearance.
- 5 4 3 2 1 0
- 29 Customs procedures such as arrangement of escorts, bonded warehouse systems etc have restricted effective door-to-door delivery of consignments.

	5	4	3	2	1	0
30 The 'outdated' attitude of trust-distrust in the customs-clients relationship prevents effective door-to-door service.	5	4	3	2	1	0
31 The introduction of an automated system will improve the customs clearance system.	5	4	3	2	1	0
32 The customs procedures should be more simplified to facilitate faster clearance of consignments.	5	4	3	2	1	0
33 The customs authority has not yet developed an adequate system or procedure for the door to door transportation of containers.	5	4	3	2	1	0
34 A uniform policy and regulation for the development of multimodal transport is better developed by private parties (e.g. shippers association, freight forwarders association) than by a government	5	4	3	2	1	0
35 The structure of government transport ministries or departments needs to be changed to enable a more aggressive approach to multimodal transport development by government.	5	4	3	2	1	0
36 People with knowledge and experience in transport and logistics should be employed by transport ministries and departments.	5	4	3	2	1	0
37 Customs law and formalities are a greater barrier to a multimodal transport system than a long inland transport time.	5	4	3	2	1	0
38 Cross border trade with neighbouring countries will increase if there is a multimodal transport service without transshipment at the border.	5	4	3	2	1	0
39 Shippers or consignees are unable to get sufficient information about their consignments because of inadequate modern communication technology e.g. Electronic Data Interchange (EDI).	5	4	3	2	1	0
40 Unlike developed countries, news about shipping is not published regularly and sufficiently and is not up-to-date.	5	4	3	2	1	0
41 Shippers do not know where to get sufficient information about multimodal freight rates.	5	4	3	2	1	0

42 Transport and logistics service providers are unable to publish multimodal freight rates or transit times, as there is uncertainty of cost and time.

5 4 3 2 1 0

43 To avoid spurious operators, multimodal transport operators should be registered or licensed.

5 4 3 2 1 0

44 Traditional international commercial terms of sale - INCOTERMS (e.g. f.o.b., c.i.f., which stipulate a named port of destination) do not affect the use of multimodal transport.

5 4 3 2 1 0

45 Government procedures, dishonesty, lack of awareness and infrastructure limitations are much greater deterrents to multimodal transport system than INCOTERMS

5 4 3 2 1 0

46 Shippers are not aware what a freight forwarder can do and what a shipping line should do to assist door-to-door transport services.

5 4 3 2 1 0

47 Shippers are not aware what benefits a multimodal freight transport can offer.

5 4 3 2 1 0

48 Shippers are interested in efficient multimodal freight services but such services have not yet developed here.

5 4 3 2 1 0

49 Freight bookings must route through freight forwarders with no direct bookings to shipping lines to enable competitive door-to-door service.

5 4 3 2 1 0

50 Freight forwarders should not be multimodal transport operators if they do not own vehicles or vessels

5 4 3 2 1 0

51 If the above issues/ factors have not covered all aspects of your country's freight transport multimodal development then, please make your comments here -----

Please also describe (mark X at the left of the category)

52 What your organisation is:

Manufacturer/ exporter/ importer

Government department

Agent of shipping line

Freight forwarder

Terminal operator

Agent of shipping line and freight forwarder – combined

Other (please mention here -----)

53 Your experience in transport and logistics related field is

Less than 5 years

More than 5 years but less than 10 years

More than 10 years but less than 20 years

More than 20 years

THANK YOU FOR YOUR HELP

If you would like a copy of the general findings please enter your name and fax/ email below. If it is difficult to contact you by these means, please enter your full address. The findings will not describe the names of individuals or organisations.

Name:

Job title:

Office Address:

Email address:

Telephone & Fax number:

Details on the factor analysis technique

1 Introduction to Factor Analysis

A factor analysis is defined as a method for simplifying complex sets of data (Kline, 1994). A factor analysis addresses the structure of the interrelationship or correlation of a factor among a large number of variables by defining a set of common underlying dimensions (Hair et al., 1995). A factor analysis technique helps achieving a number of objectives. First, it can be used to assess or to identify the structure and degree of relationships among a set of variables, which are tapping one concept. It examines the correlation between the variables. Second, a factor analysis may be applied to a correlation matrix of an individual respondent based on their characteristics. Third, a study may have a large number of variables and issues and a factor analysis is applied to determine the degree to which they can be condensed to a much smaller set of variables. The fourth use of factor analysis is related to the previous one, but is more ambitious with an aim of trying to condense to a more limited number of factors (Bryman and Cramer, 2001). Fifth, a factor analysis also shows the reliability of data. Sixth, a factor analysis can be employed to create an entirely new set of variables, smaller in number, to replace the original set of variables for inclusion in a subsequent technique. In chapter six we hypothesised that there are six dimensions or categories of freight transport multimodal development but we have found fifty issues or variables through Delphi study. Thus the research applies factor analysis to examine whether the issues could be condensed to a smaller number of dimensions or not.

The two most widely used forms of factor analysis are *principal-component analysis* and *principal-factor analysis* (in SPSS named as *principal-axis factoring*). A factor analysis is mainly concerned with describing the variation (or variance), which is shared by the scores of respondents on the variables. This is called *common variance*. A variable may have *specific variance*, which is unique and not shared with other variables and thus obviously is distinguished from the common variance. There may be another type of variance, *error variance*, which is the variation due to fluctuation or error in measuring something. But a factor analysis cannot distinguish error and specific variance. Thus these two variations combine to form *unique variance*. So, total variance = common variance + unique variance. In a principal-component analysis all (both common and unique) variance of a score or variable are analysed whereas in a principal-axis analysed only a common variance is analysed. Thus a principal component analysis is considered perfect, reliable and without error. The variation of an analysis in SPSS is termed as commonalities (Bryman and Cramer, 2001). George and Mallery (2001) suggested four basic steps for conducting a factor analysis

- 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

A factor analysis on the freight transport multimodal development in developing countries is performed in chapter 9.

2 Correlation Matrix

Producing a correlation matrix of all variables is the starting point for factor analysis. The matrix provides some initial clues as to how factor analysis works. The matrix also shows that factor analysis is derived from some combination of inter-correlations among descriptor variables (George and Mallery, 2001). A correlation matrix between the variables of this research was produced by SPSS version 11.5.1.

3 Extract of factors

The prime objective of factor extraction is to make an initial decision about the number of factors underlying a set of measured variables. The first stage involves extracting factors from a correlation matrix to make an initial decision about the number of factors underlying a set of measures. Principal component analysis is used to make these decisions (Green et al., 1997). The first step of factor analysis for the computer (by SPSS) is to select the combinations of variables whose shared correlation explains the greatest amount of total variance. The first extracted factor of a principal components analysis (unrotated solution) is termed Factor 1. Then factor 2 that is the combination of variables that explains the greatest amount of the variance remained (after factor 1 extraction). This process continues until as many factors have been extracted as there are variables (George and Mallery, 2001). There are main two criteria to decide which factor to include and which to exclude. The first criterion, known as Kaiser's criterion, is to select those factors having eigenvalue, the variability of a factor, greater than one. The underlying reason of setting this criterion is that the total variance of any variable has been set (standardised) at one. In other words the factors having eigenvalue less than one (which explains less variance) are excluded (Green et al., 1997 p. 352; Bryman and Cramer, 2001). But in large matrices this greatly overestimates the number of factors. So Cattell's Scree test, the second criterion, has been accepted as best solution to select the correct number of factors (Kline, 1994). The graphical Scree plot, in figure 1, is produced of eigenvalues and principal components. The term 'scree' describes the debris found at the bottom of a rocky slope and here implies that the scree test finds out the factors that are not very important. The cut-off point, in the scree plot, is where the line changes slope i.e. the factors to be retained are those which lie before the cut-off point at which the eigenvalues seem to level off (Bryman and Cramer, 2001; Kline, 1994). In addition to these two criteria two more criteria can be considered. The relative magnitude of eigenvalues has to be considered and the researcher should have an initial decision about the number of factors based on the priori conceptual beliefs (hypotheses) about the number of underlying dimensions. The reason for this is that the researcher does not necessarily need to choose a single value for the number of factors such as 8, rather it could be a range of values such as 6-8 (Green et al., 1997).

4 Rotation of Factors

So far the factors extracted using the extraction of factor method (discussed in previous section) are not easy to interpret, as they are unrotated. The goal of factor rotation is twofold: a) to statistically manipulate (i.e. to rotate factors) the results to make the factors more interpretable and meaningful and b) to make final decisions about the number of underlying factors (Green et al., 1997). To meet the main objective of factor analysis, reducing the ranks of a matrix, on rare occasions it might be useful to demonstrate that a given number of factors would explain the variance, regardless of what these were. The ultimate objective of factor analysis is to explain and account for the observed correlations and thus the factors must be interpreted and identified. For this reason unrotated solution is not enough. Rotated factors change the factor loadings and meaning of the factors. But the different factor analytic solutions are mathematically equivalent in that they explain the same amount of variance in each variable and thus in the matrix as a whole. Moreover, the rotated factors reproduce the original correlations precisely as well as the unrotated solution (Kline, 1994). A factor is interpreted or named by examining the largest values of the measured variables in the rotated factor matrix. Thus the final decision about the number of factors to choose is the number of factors for the rotated solution that is most interpretable (Green et al., 1997).

Scree Plot

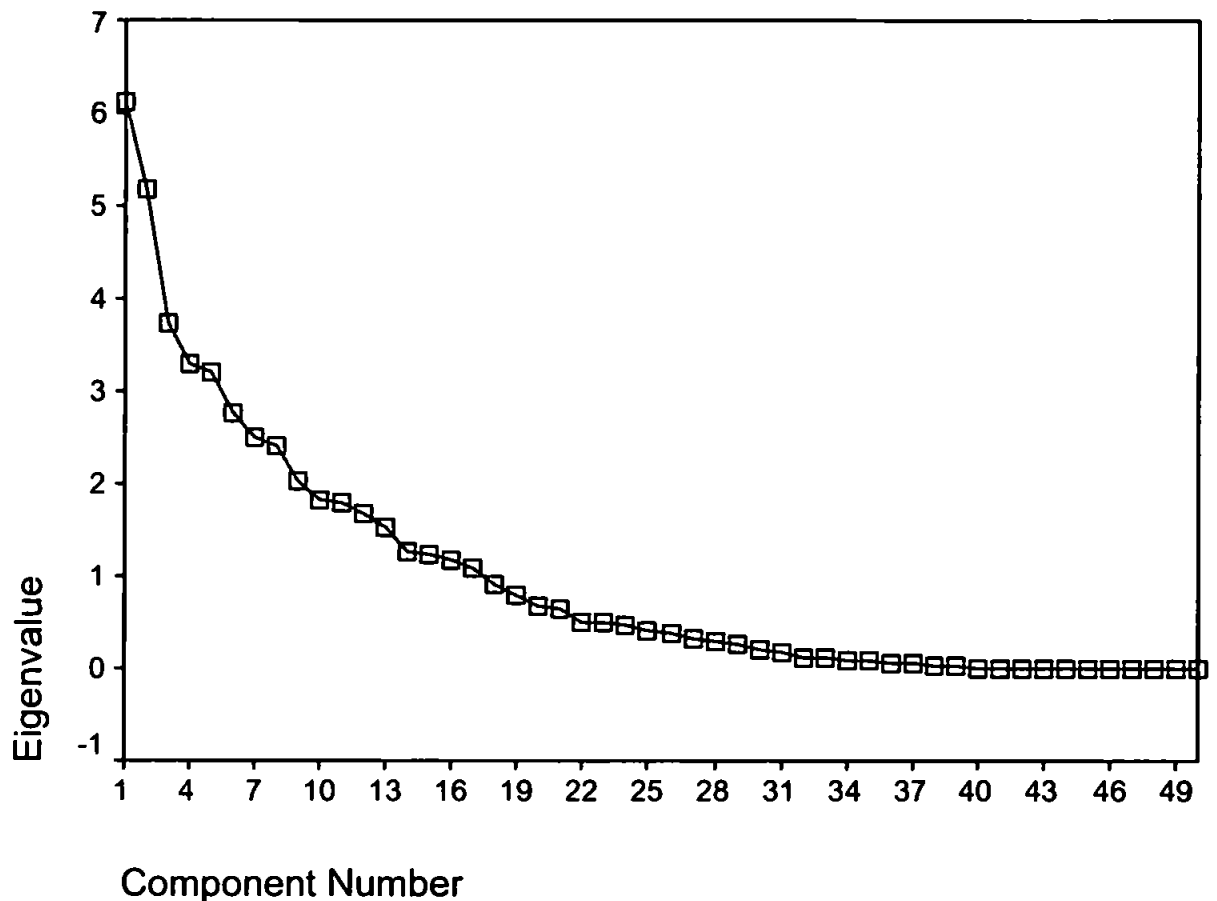


Figure 1: Scree plot of factor analysis.

In summary four criteria determine the number of factors to include in a factor analysis: 1) a priori conceptual beliefs about the number of factors based on the past research, theory, study and literature review, 2) the absolute values of the eigenvalues computed in the extraction of factor step, 3) the relative values of the eigenvalues computed in extraction of factor step, and 4) the relative interpretability of rotated solutions computed in this stage (i.e. rotation of factor). There are two options or methods of rotation: Orthogonal (Varimax) rotation and Oblique rotation. There is controversy as to which one is more appropriate. But the most popular rotational method is the *varimax* and in SPSS *varimax* rotation is the default procedure (although there are other options). Oblique rotations are less frequently used, probably its results are more difficult to interpret or summarise.

5 Orthogonal (*Varimax*) rotation:

The criterion or assumption in orthogonal rotation is that the factors are rotated in such a way that they are always at right angles (90 degree) to each other. This means factors are uncorrelated (unrelated) or independent of each other. In contrast in oblique rotation the factors are correlated. Thus the disadvantage of orthogonal rotation is that the factors may have been forced to be unrelated, whereas in real life they may be related (Bryman and Cramer, 2001; Kline, 1994). The issues or items that load most strongly on the factor 1 are grouped together first and ordered in terms of their correlations (loadings). Then the items that load most strongly on the factor 2 are grouped together second. Similarly third, fourth and so on are grouped together. The items that correlate less than 0.3 (ignoring + or - sign) with a factor are omitted from consideration as they account for less than 9 per cent of the

variance and so are not very important. Another criterion is to use the correlation or loadings above which no item correlates highly with more than one factor. The advantage of this criterion is that factors are interpreted in terms of items unique to them. This criterion results in less ambiguous meaning or interpretation of the factor. However, many researchers ignore the second criterion and emphasise all loadings in excess of 0.3 regardless of whether any variables are thereby implicated in more than one factor (Bryman and Cramer, 2001).

6 Technical details of Factors Analysis:

In SPSS11.5.1 the following steps were undertaken for factor analysis

Analysis → Data Reduction → Factor → Careful selection of 50 variables → √ Descriptives → √ Univariate descriptives → √ Coefficients → √ KMO & Bartlett's test of sphericity → Continue → Extraction → √ Scree plot → √ Maximum Iteration for convergence 150 → Continue → Rotation → √ Varimax → √ Loading plots → Maximum Iteration for convergence 50 → Continue → Options √ Sorted by size → Continue → OK

The above four steps (Descriptive, Extraction, Rotation and Option) produced the factor analysis ingredients. The above steps were taken following the directions of (George and Mallery, 2001 p.241) with a change. Number of 'Maximum iterations for convergence' was changed from default 25 to 50. However, rotation converged in 31 rotations. A number of rotation efforts revealed that rotation failed with 25 number of iterations. The following result appeared in the output navigator 'Rotated Component Matrix Rotation: failed to converge in 25 iterations. (Convergence = .002)'. But every time, Scree plot (shown above) along with the Component matrix and Total variance explained table indicated that the number of factor to be extracted is 17. The final rotation step with 'Maximum Iteration for convergence 50' also extracted 17 components (factors) based on the Kaiser's criterion (1960) Eigenvalues more than 1. The larger the Eigenvalue the more variance is explained by the factor (Kline, 1994 p. 30). The 17 factors accounted for 85.56% of all the total variance in the data set. Existing literature did not restrict the maximum number of iterations although they mention that 25 iterations should be sufficient. Probably the higher number of variables compared to lower number of cases can explain the requirement of such changes with fewer cases. Most literature suggests that the ratio of number of cases versus variables should be at least 2:1 (such as Kline, 1994). But the present research has an even lower number of cases (41) than the number of variables (50). However, with this final selections a rotated component matrix was produced which made the analysis more interpretable and meaningful.

The selection of variables under a factor has been discussed in the previous section. A preliminary result, using the condition of loading more than 0.3, showed ambiguous factors with variables. It became difficult to interpret and thus meaningless. Another alternative, using a higher loading condition such as more than 0.4 or 0.5, was also considered. Some researchers (such as Motear, 1991 and Mason, 1995) used such criterion. The use of higher loadings gives the research more reliability. Thus the criterion was changed to the alternative but probably less frequently used criterion. The criterion is to use the correlation or loading above which no item correlates highly with more than one factor. It makes interpretation meaningful and easy. With so many factors one can argue that the main objective of factor analysis, reduction of data or issues, has not been achieved. The higher number of factors was really a big concern to the researcher as well and he took some efforts, such as the aforesaid higher loading, to reduce the number of factor. But the number of factors remained unchanged. The higher number of factors may be explained by the fact that the principal component analysis is performed in such a way that there may be as many principal components as there are original variables.

Country	Area sq. km	Population	Road in km	Rail in km	Waterway in km	Telephone in thousands	GDP in US\$ million	Literacy in %	TEUs	Foreign com US\$ million	Transservice US\$ million
Bangladesh	144,000	138,448	201,182	2706	8,046	500	238	43.1	456,007	13	1,104
Benin	112,620	7,041	6,787	578	-	51	7.3	40.9	-	10	-
Brazil	8511,965	182,032	1980,000	31543	50,000	17,039	1,340	86.6	2413,098	8,050	5,896
Cambodia	181,040	13,124	35,769	602	3,700	22	20.42	69.9	-	598	211
Cameron	475,440	15,746	34,300	1008	2,090	95	26.8	79	-	58	-
Chile	756,950	15,665	79,800	6585	725	2,603	151	96.2	1253,131	3,173	4,086
China	9596,960	1286,975	1400,000	71600	110,000	135,000	5,700	86	19330,000	363,885	14,067
Colombia	1138,910	41,662	110,000	3304	18,140	5,433	268	92.5	791,588	2,220	1,866
Costa Rica	51,100	3,896	37,273	950	730	450	32.3	96	573,502	137	-
Egypt	1001,450	74,718	64,000	5105	3,500	3,971	289.9	57.7	1625,601	99	4,857
Eritrea	121,320	4,362	3,850	306	-	30	3.3	58.6	-	-	-
Ghana	239,460	20,467	38,940	953	1,293	240	42.5	74.8	-	67	381
India	3287,590	1049,700	3319,644	63518	16,180	27,400	2,660	59.5	2450,656	1,416	9,929
Indonesia	1919,440	234,893	342,700	6458	21,579	5,588	663	88.5	3797,948	2,241	4,016
Iran	1648,000	68,279	140,200	7201	904	6,313	456	79.4	415,382	29	1,813
Jordan	923,000	5,460	8,000	505	-	403	22.8	91.3	-	14	-
Kenya	582,650	31,639	63,300	2778	-	310	32	85.1	-	114	752
Malaysia	329,750	23,093	64,672	2418	7,296	4,600	210	88.9	4642,428	15,567	8,839
Morocco	446,550	31,689	57,847	1907	-	1,391	115	51.7	328,808	206	1,105
Mozambique	801,590	17,479	30,400	3123	3,750	90	19.2	47.8	91,345	22	263
Nigeria	923,768	133,881	193,200	3557	8,575	500	113.5	68	-	69	-
Pakistan	803,940	150,694	247,811	8163	-	2,861	311	45.7	159,919	644	2,357
Philippines	300,000	84,620	199,950	897	3,219	6,980	356	95.9	3031,548	14,802	3,567
Senegal	196,190	10,580	14,576	906	897	234	16.2	40.2	133,325	88	-
Singapore	6,92.7	4,608	3,150	38.6	-	1,950	105	93.2	17040,000	24,114	13,341
Tanzania	94,5087	35,922	85,000	3690	-	127	22.5	78.2	133,660	34	282
Uruguay	17,6220	3,413	8,764	2073	1,600	929	265	98	287,298	-	800
Vietnam	32,9560	81,624	93,300	3142	17,702	2,600	183	94	-	1,544	-

Country	rwarea	rwpoplation	rroad	rwrail	rwaterway	rwtelephone	rwgdp	rwliterac y	rwteus	rwforeignco mpany	rwtransservic e	Totalrw
Bangladesh	0.1786	0.8214	0.8214	0.5	0.4643	0.4464	0.6429	0.1071	0.2857	0.0714	0.25	4.48
Benin	0.1071	0.2143	0.1071	0.1429	0.6607	0.1071	0.0714	0.0714	0.7143	0.0357	0.5893	2.75
Brazil	0.9643	0.8929	0.9643	0.9286	0.9643	0.9286	0.9286	0.6429	0.4643	0.75	0.8571	8.64
Cambodia	0.25	0.2857	0.3214	0.1786	0.3571	0.0357	0.1786	0.3929	0.7143	0.5	0.0357	2.86
Cameron	0.5	0.3571	0.2857	0.3571	0.25	0.1786	0.2857	0.5	0.7143	0.25	0.5893	3.77
Chile	0.5714	0.3214	0.5714	0.8214	0.0357	0.6429	0.5357	0.9643	0.3929	0.7143	0.7857	5.39
China	1	1	0.9286	1	1	1	1	0.6071	1	1	1	9.93
Colombia	0.8214	0.6071	0.6786	0.6429	0.8929	0.7857	0.7143	0.7857	0.3571	0.6429	0.3571	6.5
Costa Rica	0.0714	0.0714	0.3571	0.2857	0.0714	0.3929	0.3571	0.9286	0.3214	0.4286	0.5893	2.95
Egypt	0.7857	0.6786	0.5	0.75	0.3214	0.7143	0.75	0.25	0.4286	0.8929	0.8214	6.64
Eritrea	0.1429	0.1071	0.0714	0.0714	0.6607	0.0714	0.0357	0.2857	0.7143	0.8929	0.5893	3.36
Ghana	0.3214	0.4286	0.3929	0.3214	0.1786	0.2857	0.3929	0.4286	0.7143	0.2857	0.1429	3.46
India	0.9286	0.9643	1	0.9643	0.8214	0.9643	0.9643	0.3214	0.5	0.5714	0.9286	8.61
Indonesia	0.8929	0.9286	0.8929	0.7857	0.9286	0.8214	0.8929	0.6786	0.8929	0.6786	0.75	8.46
Iran	0.8571	0.6429	0.7143	0.8571	0.1429	0.8571	0.8571	0.5357	0.25	0.1786	0.3214	5.68
Jordan	0.6786	0.1786	0.1429	0.1071	0.6607	0.3571	0.25	0.75	0.7143	0.1071	0.5893	3.79
Kenya	0.5357	0.5	0.4643	0.5357	0.6607	0.3214	0.3214	0.5714	0.7143	0.3929	0.1786	4.63
Malaysia	0.4286	0.4643	0.5357	0.4643	0.4286	0.75	0.6071	0.7143	0.9286	0.8214	0.8929	6.32
Morocco	0.4643	0.5357	0.4286	0.3929	0.6607	0.5357	0.5	0.2143	0.2143	0.4643	0.2857	4.48
Mozambique	0.6071	0.3929	0.25	0.5714	0.3929	0.1429	0.1429	0.1786	0.0357	0.1429	0.0714	2.75
Nigeria	0.7143	0.7857	0.75	0.6786	0.5	0.4464	0.4643	0.3571	0.7143	0.3214	0.5893	5.96
Pakistan	0.6429	0.8571	0.8571	0.8929	0.6607	0.6786	0.7857	0.1429	0.1429	0.5357	0.3929	6.45
Philippines	0.3571	0.75	0.7857	0.2143	0.2857	0.8929	0.8214	0.8929	0.5357	0.7857	0.4286	5.86
Senegal	0.2857	0.25	0.2143	0.25	0.1071	0.25	0.1071	0.0357	0.0714	0.3571	0.5893	2.48
Singapore	0.0357	0.1429	0.0357	0.0357	0.6607	0.5714	0.4286	0.8214	0.9643	0.9643	0.9643	4.8
Tanzania	0.75	0.5714	0.6071	0.7143	0.6607	0.2143	0.2143	0.4643	0.1071	0.2143	0.1071	4.16
Uruguay	0.2143	0.0357	0.1786	0.4286	0.2143	0.5	0.6786	1	0.1786	0.8929	0.2143	5.54
Vietnam	0.3929	0.7143	0.6429	0.6071	0.8571	0.6071	0.5714	0.8571	0.7143	0.6071	0.5893	6.3

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