CHAPTER 2: MULTIMODAL TRANSPORT: ITS EVOLUTION & APPLICATION

2.1 BACKGROUND

Multimodal transport is essentially an international through-transport combination with various modes of transport such as ship, rail, truck, aeroplane, etc., primarily through the use of containers. Containers will ensure the transport of unitised cargo from its origin to its final destination, with efficiency and least possible risk (UNCTAD, 1993).

According to Woxenius (1998), the concept of using freight containers dates from Roman times but container transport by rail was introduced by the Liverpool & Manchester Railway that used Roll-on/Roll-off containers for the hauling of coal back in 1830. The Birmingham & Derby Railway introduced an early form of multimodal transport with the transfer of containers between rail wagons and horse carriage in 1839. New York Central Railway developed and inaugurated the first dedicated container service from Cleveland and Chicago on March 19, 1921. Containerisation grew further as a means of 'door-to-door' transport, spurred on by the development of the Piggy Back System where trailers themselves were carried aboard specialised 'Flat cars' (ESCAP, 1983).

Containers for sea transport appeared during the 1960s and should be attributed to the innovativeness and the sea/land strategy of Mr. M McLean, the founder of Sea-Land Inc. (UNCTAD, 1993). He was originally an executive of a trucking company who took over a shipping company. As he was familiar with road/rail combination operations for land transport, he decided to apply the concept with sea transport to enable sea/land through transport with the help of standardised dimensions for containers. It followed that containers had to be fitted with special devices for the ease of switch between different modes of transport and that ships had to be equipped with rail structures known as cell-guides for vertical sliding and stowing into the ship's hold.

Containers ultimately enabled multimodal transport to be applied to most types of general cargo by means of an international standardised transport unit. Only particularly large (out-of-gauge) and particularly heavy cargoes cannot be containerised. Containerisation is basically the largest form of unitisation. Containers are loaded with products at the shipper's premises and sealed, and then they are carried over to the consignee's premises intact, without the content being taken out or re-packed en route. This is the essence of container transport as well as multimodal transport, but containerisation is not synonymous with multimodal transport. Containerisation contributes to a higher efficiency in the development of multimodal transport operations (see Table 2.1). The focus, now, is more on the organisation of the transport industry and the synchronisation of the integrated logistical system (Hayuth, 1987). In order to achieve multimodal transport, intensive co-operation and co-ordination among transport modes are essential.

Table 2.1: Keys elements in containerisation and multimodal transport

Containerisation	*Multimodal Transport*
1. Unitisation	1. System concept
2. Standardisation	2. Management and Co-ordination
3. Cellular ships	3. Control over cargo
4. RoRo vessels	4. Mergers
5. Gantry cranes	5. Multimodal Transport Operators
6. Straddle carriers	6. Modal Integration
7. Specialised terminals	7. Through rates and billing
8. Ship-to-shore productivity	8. Information system
9. Terminal back-up land	9. Logistics channels
10. Multi-rate structure	10. Deregulation

Source: Derived from Hayuth (1987)

2.2 DEFINITIONS

The terms 'Through Transport[1]', 'Combined Transport', Intermodal Transport' and 'Multimodal Transport' are all used in the context of cargo movement, from origin to destination. These four terms have very similar meanings, i.e. the transportation of goods by more than one mode of transport and a through freight rate. However, the United Nations made a distinction between each term and introduced definitions of transportation terminology in their Multimodal Transport Handbook (1995):

- ***Modes of Transport***: The method of transport used for the movement of goods, e.g. by rail, road, sea or air.
- ***Means of Transport***: The vehicle used for transport, e.g. ship, truck, or aircraft.
- ***Types of Means of Transport***: The type of vehicle used in the transport process, e.g. wide-body, tank truck, passenger vessel, etc.
- ***Unimodal Transport***[2]: The transport by one mode of transport only, where each carrier issues his own transport document (B/L[3], airwaybill, consignment note, etc.).
- ***Combined Transport***[4]: The transportation of goods in one and the same loading unit or vehicle by a combination of road, rail, and inland waterway modes.
- ***Intermodal Transport:*** The transportation of goods by several modes of transport where one carrier organises the whole transport from one point or port of origin via one or more interface points to a final port or point. Depending on how responsibility for the entire transport is shared, different types of documents are

[1] The HMSO (1966) publication *Through Transport to Europe* has defined through transport as: "The methods of distribution and transport which give through flow of traffic, from the point of origin to the final point of destination, with minimum transhipment delay."

[2] Traditionally a "through bill of lading" is issued to cover the move from the port of loading via the port of transhipment to the port of discharge. Depending on the back clauses, the first carrier might be responsible for the entire transport, or maybe only for that part which took place on board his vessel. For the sake of clarity, it is best to restrict the use of the expression "THROUGH BILL OF LADING" or "through transport" to *one mode of transport* but covering several *means of transport.*

[3] Bill of Lading

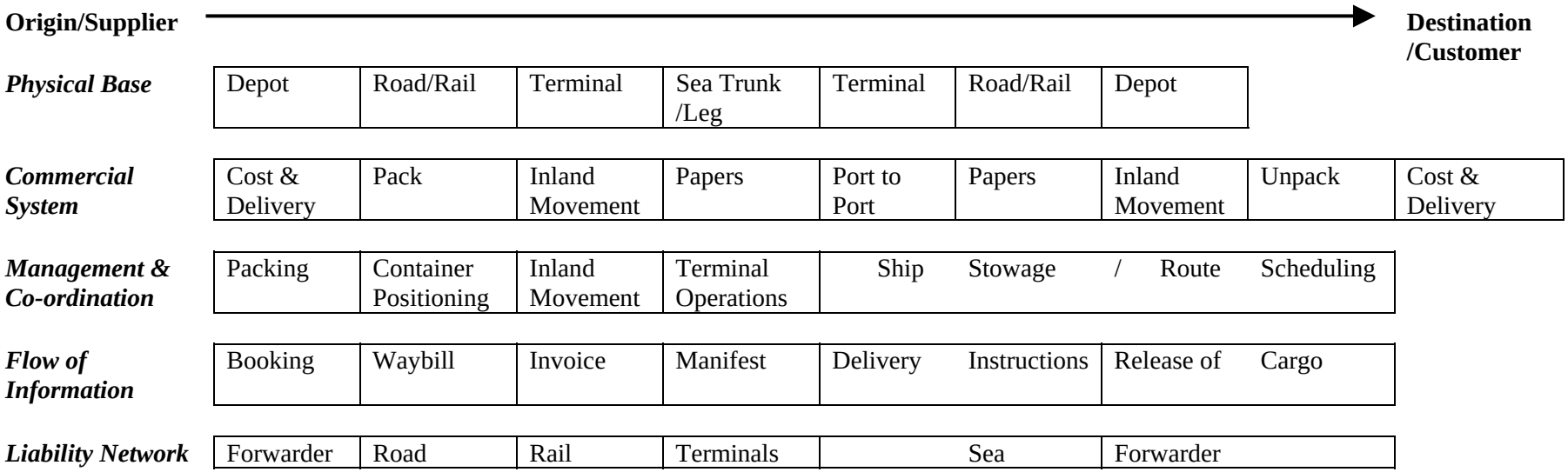
[4] The International Chamber of Commerce Rules for Combined Transport has defined *Combined Transport* as "the carriage of goods by at least two different modes of transport, from a place at which the goods are taken in charge situated in one country to a place designated for delivery situated in a different country."

used. There are also different definitions for intermodal transport. The ECMT (European Conference of Ministers of Transport) and the European Committee for standardisation (CEN) use the following definition for intermodal transport: "*the movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing mode"*. The EC definition goes beyond the ECMT/CEN definition, and corresponds with the ECMT/CEN definition of multimodal transport: "*the movement of goods whereby at least two different modes are used in a door-to-door transport chain"*. For Mahoney (1986), "*Intermodality"* means the movement of freight via two or more dissimilar means of modes of transportation while for Hayuth (1987), "*Intermodality"* means the movement of cargo from shipper to consignee by at least two different modes of transport under a single rate, through-billing, and through liability. The term "*intermodality*" has been widely adopted by European Union policy-makers.

- ***Multimodal Transport***: Where the carrier organising the transport takes responsibility for the entire door-to-door transport and issues a multimodal transport document.

Multimodal transport is therefore a concept (see Figure 2.1) which places the responsibility for transport activities under one operator, who then manages and co-ordinates the total task from the shipper's door to the consignee's door (see Table 2.2), ensuring the continuous movement of the goods along the best route, by the most efficient and, cost-effective means, to meet the shippers requirements of delivery. This means simplified documentation, and increasingly by electronic means such as electronic data interchange (EDI).

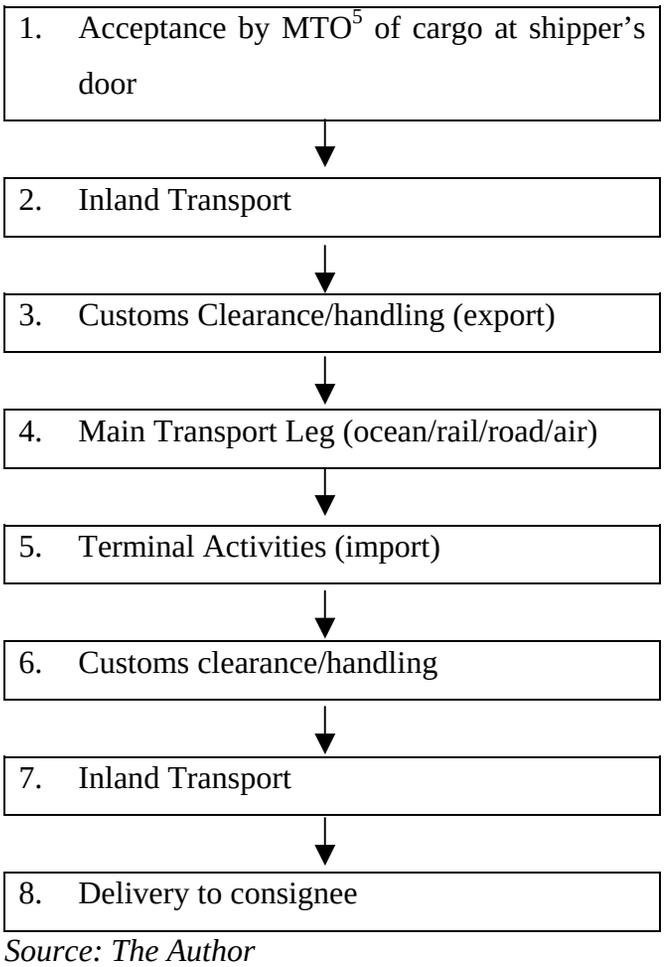
Figure 2.1: Components of a multimodal transport system



Source: Adapted from D'Este (1996)

A multimodal transport operator (MTO) acts as a principal and therefore as a "carrier", because the MTO contracts with the shipper to carry goods by one or more modes of transport as may be necessary. The MTO has accepted total responsibility and liability to perform the transport contract; he has become the sole interface point for the shipper's transport function.

Table 2.2: Typical steps in the transport chain



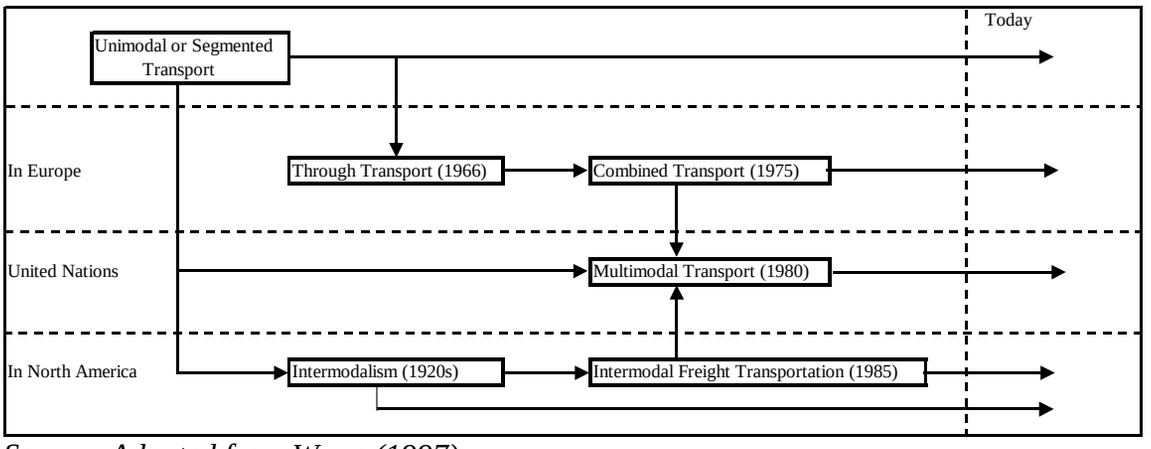
Source: The Author

[5] Multimodal Transport Operator

It should be stressed that the expression “Combined Transport” is based on the now obsolete 1975 ICC Rules for Combined Transport. These have now been replaced by the 1992 UNCTAD/ICC Rules for Multimodal Transport. Therefore, the expression “Multimodal Transport” should be used when referring to a type of transport where the carrier is liable for the door-to-door transport, while the expression “Combined Transport” should be reserved for road/rail combinations in the context of European or American intermodal transport.

The concept of multimodal transport is not new, the first efforts to establish a suitable legal regime for multimodal transport was made by the International Institute for the Unification of Private Law (UNIDROIT) in the 1930s. At that time, these efforts were considered more theoretical than practical in commercial circles (UNCTAD, 1994a). Figure 2.2, illustrates the evolution of transport terminology related to multimodal transport. Even though the term multimodal transport was officially introduced in 1980 with the United Nations sponsored Multimodal Transport Convention; the term attained legal recognition on 1 January 1992 with the introduction of the 1992 UNCTAD/ICC Rules for Multimodal Transport.

Figure 2.2: Evolution of transport terminology



Source: Adapted from Wong (1997)

The advent of the marine container provided the impetus for the development of multimodal transport which enabled transport service providers to extend their services to provide door-to-door services using a combination of carriers' notes, consignment notes, waybills, bills of lading, etc., each with their own terms and conditions of service and limit of liability.

It is interesting to note that transport terminology relating to intermodal/multimodal transport continues to evolve. The term "*multimodalism*" is now used in some of the literature (Tai, 1999). It seems that since the 1920s with the introduction of the term "*intermodalism*", many authors have tried to attribute different names to what is basically the movement of goods by at least two modes of transport. For the sake of clarity in this thesis, "*multimodal transport*" will refer to all types of goods movement by at least two modes of transport and "*intermodal transfer*" will refer to the change of transport mode.

2.3 MULTIMODAL TRANSPORT SERVICES

When a multimodal transport service is provided, the multimodal transport operator (MTO) will be liable from the point of origin to the point of destination (UNCTAD, 1995a). He will issue one transport document that will include invoice for freight charges, and also a guarantee for the transit time. From that point onwards, the MTO concludes a number of sub-contracts with individual carriers, road, rail, shipping lines, port authorities, terminal operators, stevedores, etc., on the MTO's own name, not that of the shipper or the consignee. Only the MTO is entitled to take delivery of the goods from each actual sub-carrier and pass them to the next sub-carrier. The MTO, in acting as a principal, is therefore responsible for the whole transport chain.

It is fundamental for the MTO to have the ability to design and provide effective transport arrangements. When goods are moving from the shipper to the consignee, it may take up to ten or twelve distinct transport links. At each transfer point, goods will then be unloaded and loaded, waiting or stored, weighted, checked or recorded,

packed/reconsolidated. All of these intermodal transfers cost time and money, thus affecting the competitiveness of particular routes (Beresford & Savides, 1997; Beresford, 1999a).

The MTO will have to rely on transport system analysis for the design and planning of the multimodal transport operation. According to Manheim (1979), the field of transportation system analysis has the following characteristics:

- It is ***multimodal***, covering all mode of transport.
- It is ***multi-sectoral***, encompassing the problems and viewpoints of government, private industry, and the public.
- It is ***multi-problem,*** ranging from rules, regulations, and policies to customer service levels and financial and economic feasibility.
- It is ***multi-disciplinary***, drawing on the theories and methods of engineering, economics, operations research, political science, psychology, other natural and social sciences, management and law.

This means that in the analysis of a transportation system, the total transportation system of a region must be viewed as a single multimodal system. The consideration of the transportation system cannot also be separated from consideration of the social, economic, and political system of a region.

Through transport systems analysis, the MTO will be able to use an integrated approach in operation, management and control of traffic, so that shorter delivery from origin to destination is made possible. The shorter delivery, and often more reliable delivery, will lower transit time of transport from origin to destination and will enable a greater control of costs, schedules and cargo safety. It is often due to the lack of co-ordination at the various intermodal transfers point that delay occurs. An UNCTAD (1995a) training module has described that the cost of the main transport leg, usually the sea leg, in the transport chain is not as high as it is generally believed to be (see Table 2.3). The module focused on multimodal transport in developing countries. It is an aim of this thesis to verify these figures against field data.

Table 2.3: Average costs involved in the movements of goods

(1) Feeder trucking cost	14%
(2) Truck turn around time	8%
(3) Container handling cost from/ to truck at port	5%
(4) Stacking/unstacking costs	10%
(5) Dwell time costs at inland and port terminals	8%
(6) Ship transport costs	34%
(7) Ship turn around time/costs	6%
(8) Container ship loading/unloading costs	15%
TOTAL	100%

Note: These percentages will vary according to the distance involved, especially in the case of sea leg[6].

Source: Derived from UNCTAD (1995a)

Massive savings on the transport chain are therefore possible, by improving overall efficiency through proactive management techniques and better control over cargo flow. To be able to improve overall efficiency, the MTO must be able to plan a high level of utilisation of transport links in conjunction with a continuity of cargo flow. Intralink storage must also be minimised (MacLeod, 1998).

The MTO is the only responsible party that is able to co-ordinate all modes of transport and organise multimodal transport. Shippers and consignees are not capable, nor do they have the time to determine the best route or the best price, as they do not have the MTO's expertise in transport management. They also do not have the capability to determine, forecast and even to solve problems that might occur to their cargo during transit (see Table 2.4).

[6] Developing countries generally import goods by sea over long distances and may consequently be using relatively more expensive liner services since, owing to the limited demand on certain routes, transport services cannot be available on the basis of appropriate economy of scale operations, resulting in higher costs to the users (UNCTAD, 1990).

Table 2.4: List of typical transport considerations

a) Shippers

1) Inland Transport complications
2) Transit time to terminal
3) Transit costs to terminal
4) Terminal charges
5) Frequency of service of main transport leg
6) Transit time of main transport leg
7) Costs of main transport leg

b) Consignees

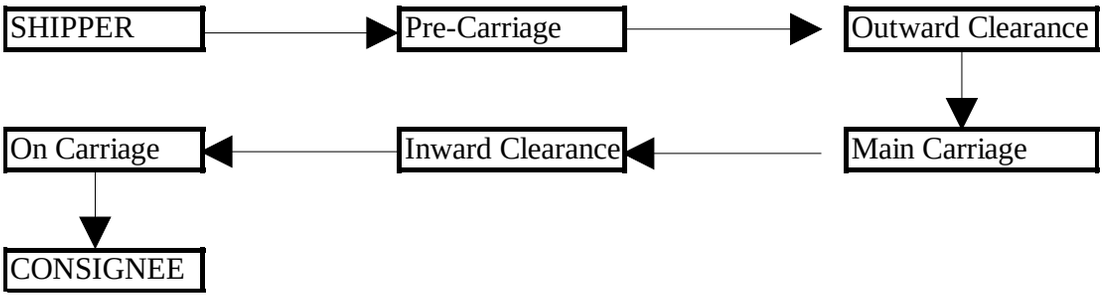
1) Terminal charges
2) Delay in obtaining inward clearance
3) Costs of bonds, etc. at inward clearance point
4) Transit costs from terminal to destination
5) Transit time from terminal to final destination
6) Border delays

Source: The Author

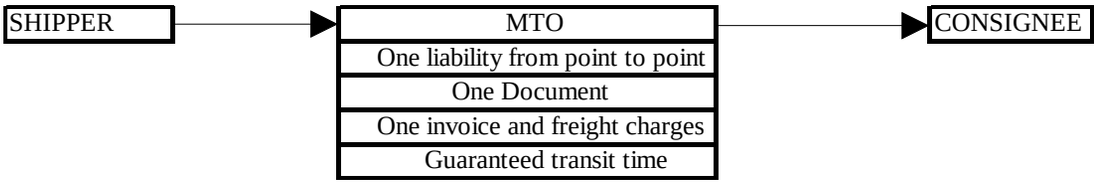
These two tables actually represent the minimum considerations that must be taken into account by both shippers and consignees, when exporting or importing. By using a MTO, shippers and/or consignees do not have to worry about their cargo as that burden has shifted to the service provider. As the MTO offers a one-stop service, the MTO will consider what is the best alternative for its client and propose a tailor-made solution (see Figure 2.3).

Figure 2.3: Segmented Transport vs. Multimodal Transport

Segmented Transport



Multimodal Transport



Source: Derived from Hayuth (1987)

2.4 MULTIMODAL TRANSPORT REQUIREMENTS

The use of multimodal transport implies overall structural changes covering new trade and transport practices. Various measures are needed to implement multimodal transport, from the streamlining of commercial regulations to the development of transport infrastructure. The upgrade of three main elements is necessary for an efficient multimodal transport system. These elements are commercial practices, administrative requirements and transport infrastructure.

2.4.1 Commercial Practices

2.4.1.1 Merchants

There are no international conventions in force governing contracts for the international sale of goods, so disputes and misunderstanding have often arisen between buyers and sellers, mainly because of different interpretations about the terms used in the contracts. In order to avoid such situations which hinder the smooth flow of international trade, the International Chamber of Commerce (ICC) has introduce standardised trade terms known as INCOTERMS[7] (ESCAP, 1992). The INCOTERMS were first published in 1936. Amendments and addition were later made in 1953, 1967, 1976, 1980, and 1990, and again in 2000 in order to bring the rules in line with current international practices.

These terms deal with delivery conditions between the buyer and the seller, and their main purpose is to divide the costs and risks of the transport movement and related operations between the two parties[8]. In other words, these terms determine at what point the seller has fulfilled his obligations so that the goods could be said to have been delivered to the buyer. Merchant who uses INCOTERMS in their contract of carriage must remember that the INCOTERMS only refers to the relationship between the buyer and the seller and how their responsibilities and liabilities are assigned.

There are 13 INCOTERMS[9] containing standard definitions (see Table 2.5). The texts of these terms spelling out in detail the obligation of the buyer and the seller are contained in the INCOTERMS 2000 edition published by the ICC[10].

Table 2.5: The 13 INCOTERMS

[7] International rules for the interpretation of trade terms
[8] ICC Publication No. 460
[9] Based on the INCOTERMS, some northern European countries such as Sweden have introduced what is known as "Combiterms", which seek to define more precisely the responsibility for certain types of expenses which has been left rather vague in the INCOTERMS. The "Combiterms", however, do not seem to have been used in countries outside Northern Europe (Woxenius, 1998).

Family	Abbrev.	Use	Mode of transport
The "E"	EXW	Ex works	All modes
The "F"	FCA	Free carrier at	All modes
	FAS	Free alongside ship	Maritime
	FOB	Free on board	Maritime
The "C"	CFR	Cost and Freight	Maritime
	CIF	Cost insurance & freight	Maritime
	CPT	Carriage paid to	All modes
	CIP	Carriage insurance paid to	All modes
The "D"	DAF	Delivered at frontier	Land
	DES	Delivered ex ship	Maritime
	DEQ	Delivered ex quay	Maritime
	DDU	Delivered duty unpaid	All modes
	DDP	Delivered duty paid	All modes

Source: UNCTAD (1995b)

The most often used INCOTERMS are EXW[11], FOB and CIF. The majority of exports, especially in developing countries, are done under the term FOB[12]. While the majority of imports are done under the term CIF. The problem with these two terms is that they both use the ship's rail as the "cut off" point but the ship's rail is not essential with containerised cargo as the goods are now, usually, being delivered by the shipper to the carrier before the main transport leg takes place.

In 1990, The INCOTERMS were amended to reflect new technology and practices, especially the increasing importance of containerisation and multimodal transport. Five new terms were added to suit the practices of containerised traffic. These terms are FCA, CPT, CIP, DDU, and DDP. When the goods are actually delivered to an ICD[13] or a

[10] INCOTERMS 2000, ICC publication No. 560
[11] Ex-Works, used to be known as Ex-factory or Ex-warehouse
[12] Even though the term FOB Airport has been dropped since the 1990 INCOTERMs, it is still widely used.
[13] Inland Clearance Depot

CFS[14] in a unitised or containerised form for subsequent loading onboard a ship, or to an airport terminal, the terms FCA, CPT or CIP should be used as the seller fulfils his liability towards the goods when he has handed over the goods, cleared for export, into the custody of the carrier. The risks towards the goods belong to the buyer when the goods are in the charge of the carrier. These terms do not need the "ship's rail" as the cut-off point. These INCOTERMS can be used and are recommended for all forms of carriage, whether by rail, road, sea, air or inland waterways, or by a combination of these modes.

The INCOTERMS 2000 when compared with INCOTERMS 1990 may appear to have few differences. The substantive changes have only been made in two areas: (1a & 1b) the customs clearance and payment of duty obligation under FAS and DEQ, and (2) the loading and unloading obligations under FCA.

(1a) "Free Alongside Ship" or FAS means that the seller fulfils his obligations when the goods are placed alongside the vessel at the named port of shipment. The FAS terms requires the seller to clear goods for export, which is a reversal from the previous INCOTERM 1990 that required the buyer to arrange for export clearance.

(1b) "Delivered Ex-Quay" or DEQ means that the sellers fulfils his obligations when the goods are placed at the disposal of the buyer, not cleared for import, on the quay at the named port of destination. This is a reversal from INCOTERM 1990 that required the seller to arrange for import clearance.

(2) "Free Carrier at" or FCA means that the seller fulfils his obligations when the goods are cleared for export to the carrier nominated by the buyer at the named place. If no specific point has been agreed within the named place, and if there are several points available, the seller may select the point at the place of delivery which best suits his purpose.

[14] Container Freight Station

2.4.1.2 Banking practices and documentation system

In the transport of goods in break bulk form, the critical point at which the carrier accepted responsibility for the goods and the risk of the goods often passed from the seller to the buyer was the ship's rail. In the financing of such sales[15], the banks were accustomed to receiving a bill of lading issued once the goods were on board the ship (Brooke & Buckley, 1985). With containerisation and the carrier accepting to transport the goods by more than one mode of transport this critical point moved inland, with the carrier accepting the goods for shipment before the ships rails, initially at the container yard, CFS or even ICD. The carrier thus reflected this change in the documents issued to the shipper by revising the conventional bill of lading to be a combined transport bill of lading and amending the statement in the combined transport bill of lading to read "Received for shipment, in apparent good order..." (Murr, 1979).

To banks accustomed to the traditional "on-board" bill of lading[16], this change in documentation meant a venture into unfamiliar territory, and the new bill of lading was looked upon with considerable suspicion. Banks thus insisted that the only acceptable bill of lading where those issued by the carriers confirming that the goods had passed the ship's rail by stamping the word "shipped on board" (Edward, 1980).

Nonetheless, after a certain period of time, banking practice made provision to accommodate the developments that were taking place in containerisation and multimodal transport through the revision of the ICC's Uniform Customs and Practices for Documentary Credit (UCP). In the 1983 revision of the rules (UCP 400) banks would accept any transport document, which has been issued by a carrier accepting liability for the entire transport, unless the parties had agreed otherwise in the letter of credit. The 1983 revision also allowed for "received for shipment" bill of lading to be accepted.

[15] See United Nations Manual on Freight Forwarding (1992), Module 10: Documentary Credits
[16] Walker A.G. (1987*) Export Practice and Documentation*, Butterworths, London, chap.6, pp.89-137.

An update of the rules released at the end of 1993 (UCP 500) clarified the situation with regards to the banking procedure by indicating that unless the letter of credit stated the contrary; the following types of transport documents are to be recognised by banks:

- Article 23: Marine/Ocean bill of lading
- Article 24: Non negotiable seaway bill
- Article 25: Charter bill of lading
- Article 26: Multimodal transport document
- Article 27: Air transport document
- Article 28: Road, rail or inland transport document
- Article 29: Courier and post receipts
- Article 30: Transport documents issued by freight forwarders

In some countries, however, banks have not kept abreast of the new developments in multimodal transport or the current rules governing documentary credit sales. As a result, banks are reluctant to allow the shipper to negotiate the transport document issued by MTOs and insist on an ocean bill of lading as proof of shipment (del Busto, 1994). The lack of support for MTO from the banking sector is at times justified, where there is no official or legal recognition of the MTO by the government or no regulation of the industry; the banks would be reluctant to accept MTO's transport document as evidence of shipment of goods. Although there may be no legal obligation on the banks to go beyond the letter of the rules in the UCP 500, banks are unwilling to expose the exporters and importers to the risk of being swindled by an unscrupulous MTO who disappears with the goods and the freight.

2.4.2 Administrative Requirements

2.4.2.1 Trade facilitation

One of the main problem that occurs in international trade is that each country has its own rules and procedures concerning the import and export of goods, and also that the cargo velocity today has outpaced the document velocity, in other words, the goods in many cases and on certain routes may arrive before the transport documents. This is one of the reason for the success of courier services[17] but courier services are however not the ideal solution to the problem of getting the various documents to their destination fast enough. For this reason, FALPRO[18] is standardising and simplifying documentation and trade procedures through regional or national facilitation organisations.

According to FALPRO, trade facilitation is done through the streamlining of the information flow mainly on three levels:

(i) ***Simplification***: The reduction of the amount of information required by the various authorities to an absolute minimum. This has already been done in a number of developed countries and some developing countries. Simplification must be carried out, both of the procedures required and of the documents.

(ii) ***Normalisation***: The reduction of variants of formalities, procedures and documents both at the national and at the international levels (i.e., they must be identical in all ports of a country and must be aligned to similar procedures and documents in other countries). This mainly concerns, transport documents, INCOTERMS, payment conditions and trade documents.

(iii) ***Harmonisation***: The harmonisation of statistics of streamlining of the transmission of data using EDI. Such change from paper documents to electronically transmitted

[17] "Value chain approach part of DHL revamp", in: *Bangkok Post Business Section*, 17 April 1999, p. 8.
[18] United Nations Trade Facilitation Programme

information is difficult to carry out but will greatly facilitate trade. However, because of the many different systems in use, harmonisation of such systems is required.

2.4.2.2 Customs

Customs is an important agency of every government. In many countries, Customs is a principal source of revenue for the government. In all countries Customs play a major role in enforcing laws at the nation's borders. As world trade has grown, so too has the complexity and workload of Customs. According to Lane (1999), the mission of Customs is as follows:

- To ensure all goods entering and exiting the country do so in compliance with all laws including revenue.
- To facilitate the entry of all legitimate merchandise into the country.

The globalisation of the world economy has placed increased pressure on the world's Customs administrations. Merchants have demanded faster, more standardised and uniform service while governments require more revenues. At the same time Customs must produce trade statistics and enforce other agency laws (i.e., health, intellectual property, etc.) at the nation's border. Customs are faced with the prospect of balancing the requirement of facilitation with enforcement. Using a traditional approach to Customs practices and procedures is not suitable for trade facilitation. In the European Union and in other regional grouping (e.g. NAFTA), Customs have reduced their day-to-day work and the number of officers to concentrate mainly on intelligence gathering rather than high profile policing. Table 2.6 is a review of the traditional Customs operation still in service today contrasted with the more modern approach being put in place in many countries.

Table 2.6: Customs procedures

Customs Procedure or Practice	**Traditional Customs**	**Modern Customs**
International Standards of the WCO[19] and WTO[20]	Non conformance or only partial conformance	Full conformance with all international Customs standards for classification, value, and procedure
Customs Automation	No or only partial	Full automation
Measures of Performance	Limited output measures and process measures & frequently the wrong measures	Full measures of compliance & facilitation leading to improved performance
Tariff System	Complex & high duty rates	Simplified & reduced duties
Revenue Collection	Prior to entry of goods	Entry & collection separate. Duties paid after entry
Enforcement and compliance approach	Characterised by manual inspections nearing 100% & paper reviews	Minimal inspections & paper documentation
Information	Provided at time of entry	Advance & historical information prior to arrival of goods & conveyance
Personnel	Poorly trained and low skilled	Highly trained & professional
Appeals of Customs decisions and transparency	Limited & unknown appeal process, limited publication notice of rules & practices	Fully defined appeals process within & beyond Customs, full transparency and co-operation with trade
RESULTS:	**Low & unknown compliance, high cost for government & industry & poor facilitation**	**High & measured compliance, lower costs for government & industry, vastly improved facilitation & framework for continued improvement**

Source: Compiled from http://www.wcoomd.org

To implement multimodal transport, Customs are required to facilitate the container flows, through minimisation of import/export documents and to permit the movement of

[19] World Customs Organisation
[20] World Trade Organisation

cargo to and from ports under bond or in a sealed container. Customs procedures can be eased through the adherence to various Customs Conventions (see Table 2.7).

Table 2.7: Conventions on Simplification and Harmonisation of International Trade Procedures (in chronological order)

1944	The Convention on International Civil Aviation
1948	The General Agreement on Tariffs and Trade (revised)
1954 & 1956	Customs Conventions on the Temporary Importation of Private and Commercial Road Vehicles
1956	The Customs Convention on Containers
1965	The Convention on the Facilitation of International Maritime Traffic
1971	The International Transit of Goods Convention (ITI)
1972	The Customs Convention on Containers
1973	The Kyoto Convention on Simplification and Harmonisation of Customs Procedures
1975	Customs Convention on the International Transport of Goods under cover of TIR Carnets (TIR Convention)
1980	The Multimodal Transport Convention
1982	The International Convention on the Harmonisation of Frontier Control of Goods
1994	Container Pool Customs Convention

Source: Compiled from http://www.unicc.org

These conventions are aimed at the facilitation of international trade and transport. Customs Conventions are designed to abolish unnecessary procedures at border crossings or to harmonise indispensable procedures. The following is an explanation of selected Customs Facilitation Conventions:

- *Customs Conventions on the Temporary Importation of Private and Commercial Road vehicle of 1954* established the principle of temporary importation of such vehicles under the cover of the "carnet de passage en douane".
- *TIR Convention of 1975* permits the international carriage of goods by road from one Customs office of departure to a Customs office of arrival, through as many countries as necessary, without any intermediate frontier check of goods carried.
- *International Convention on the Harmonisation of Frontier Control of Goods of 1982* aims at reducing the requirements for completing formalities.
- *Container Pool Convention of 1994* aims at the duty and tax-free admission of containers belonging to a Pool. Each contracting party's assigns a certain number of its container into a Pool and allows an equal number of such Pool containers to travel within its territory without any restriction.

2.4.3 Transport Infrastructure

Where transport infrastructure is poor, the development of multimodal transport may not be easy. In order to be able to gain maximum benefit from multimodal transport, infrastructure that is capable of handling containers must be in place (see Table 2.8).

Table 2.8: Infrastructure required to handle containers

PORTS	*Cranes-Ship to Shore *Stacking Areas-Container Yards *Container Handling Equipment *Communications Systems

INLAND TRANSPORT

ROADS	*Axle Loading *Bridges & Tunnels
RAIL	*Rolling Stock *Motive Power *Bridges & Tunnels *Cranes & Stacking Areas
INLAND WATERWAYS	*Lake/River craft (barges, etc.)

INLAND DESTINATION[21]

INLAND CLEARANCE DEPOT (ICD)	*Container Handling Equipment *Stacking Areas *Road, Rail & Inland Waterway access

Source: Derived from UNCTAD (1990)

This minimum level of transport infrastructure must be in place, in order to benefit fully from multimodal transport. The exporter will benefit by being more competitive in reaching the foreign buyer at minimum costs, minimum time with goods delivered in good conditions. The importer will also benefit from multimodal transport, as goods he has ordered, will be delivered to his premises at minimum cost and in good conditions.

United Nations Agencies, such as the Economic Commission for Europe (ECE[22]) has also provided a framework for inter-governmental co-operation and agreement aimed at

[21] Note that ICDs are commonly referred to as "destinations" and are often the point to which goods are consigned under a multimodal transport document, though in practice they are usually a collection point before the final movement to actual customers' premises.
[22] All European countries are member of the ECE

trade facilitation and integrated transport. These agreements are at the core of a simplified, normalised and harmonised European transport system. The following are a few examples:

- ***Framework for a coherent European infrastructure***

1. *European Agreement on Main International Traffic Arteries (AGR) of 1975* provides all member countries with the international legal framework for the construction and development of a harmonised international road network.
2. *European Agreement on Main International Railway Lines (AGC) of 1985* provides an international legal framework for the development of a coherent international rail network with a view to facilitate and develop international rail traffic.
3. *European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) of 1991*, provides the legal framework for the development of international combined transport infrastructure and services, particularly combined road/rail transport infrastructure and services, and for the improvement of their efficiency. The idea behind the AGTC is that door-to-door transport is only as strong as its weakest link therefore the AGTC sets minimum standards for rail lines and terminals as well as for inland waterways and terminals.
4. *European Agreement on Main Inland Waterways of International Importance (AGN) of 1996*, provides a legal framework for the establishment of an internationally agreed European network of inland waterways and ports, as well as the uniform infrastructure and operational parameters to which they should conform.

- ***Road traffic safety***

1. *Convention on Road Traffic, of 1968*
2. *Convention on Road Signs and Signals, of 1968*
3. *Protocol on Road markings, of 1973*
4. *Agreement on Minimum Requirements for the Issue and Validity of Driving Permits (APC), of 1975*

These international agreements provide a set of uniform traffic regulations, commonly agreed road signs, signals and markings, uniform safety requirements for motor vehicles and other acceptable regulations aimed at the improvement of safety in international road traffic.

- ***Transport Operations***

1. *European Agreement Concerning the Work of Crews of Vehicle Engaged in International Road Transport (AETR), of 1970*. This agreement establishes uniform-working conditions of drivers of commercial vehicle engaged in international road transport in accordance with the principles of the International Labour Organisation.
2. *Convention on the Contract for International Carriage of Goods by Road (CMR) of 1956 and 1978*. This agreement establishes the uniform conditions to which the Contract for the international carriage of goods by road, including the documents used for such carriage and the liability of the carrier, should conform.

To remain competitive, exporters and/or importers must be able to reduce transportation costs that are included in the goods' delivered price. In order to improve or eliminate such hidden costs, it is essential to improve the quality of a region's or a country's international transport and logistics capabilities. The adaptation of commercial practices to international standards is a prerequisite as well as removing any unnecessary trade barriers.

Efficient operations of transport modes and intermodal facilities, resulting from reduced physical barriers and institutional interference, and from simplified legal regimes, is the necessary precondition for effective improvement of international trade and transport. These improvements will lead to the existence of a mature multimodal transport system in that region or country.

2.5 LOGISTICS AND SUPPLY CHAIN MANAGEMENT

In recent years, the changes in production patterns within commerce and industry have called for new transport services regarding material supply and physical distribution with mass production becoming increasingly globalised. Transportation has for years been recognised, among its other roles, as a sub-function of logistics.

According to Hayuth (1987), the inter-relationship between logistics and transportation has been so strengthened that many regards logistics as being synonymous with physical distribution, both involving pre-production and post-production control of material flows.

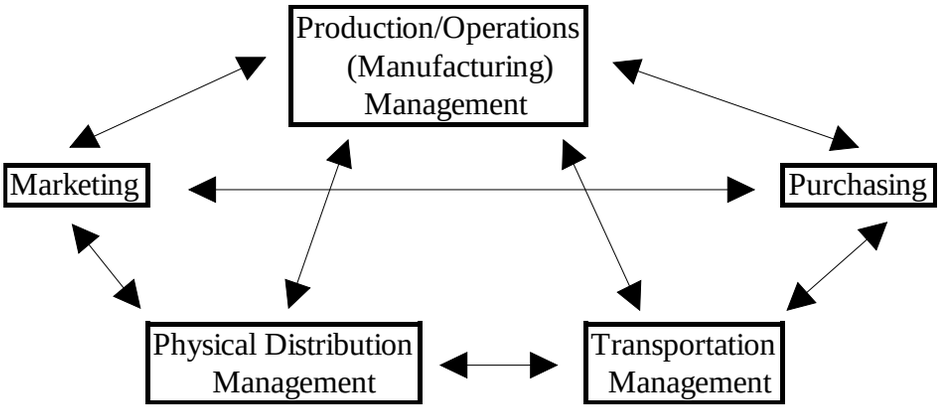
Multimodal transport is a service by which the MTO assumes contractual responsibility to move goods from a point of origin (in one country) to a destination (in another country) under a transport contract, for an agreed upon time and price. This multimodal transport service will ensure that the goods will move to their destination as fast and as securely as possible, at a known cost in advance.

The MTO's competitiveness in offering his services will depend on how he can take advantage of all possible management techniques available to make better use of the existing capacity and operating conditions of each specific link of the transport chain. ***The MTO is thus providing logistical services***.

Logistics is a management technique that controls the physical and information flows on a synchronised basis. Transport operators must therefore comply with the specification laid down in the logistics system. This system's approach to the individual activities (supply, production, and distribution) in the manufacturing process eliminates the separation of such activities and links them in new and more powerful combinations to achieve increased levels of efficiency, enhance quality and reduce costs of finished goods (UNCTAD, 1994a).

Logistics management also plays a strategic role in the decision-making process as well as in the organisation's structure. Novack *et al.* (1992) presented five group of activities in their logistics management concept and emphasised that some linkages and common processes must be established between them (see Figure 2.4)

Figure 2.4: Activity integration of logistics management



Source: Novack et al. (1992)

Chiu (1996) described that "*These five groups of activities can be classified into two dimensions. The first dimension includes the physical activities that are required to create the form, time, place, and quantity utilities. They are manufacturing/operations and transportation, which create the product/service and movement, as well as physical distribution that stores the product/service. The second logistics dimension includes the*

transaction activities (behaviour and information flows) that follow or initiate the physical activities discussed previously."

Williamson *et al.* (1990) proposed 23 specific activities associated with the logistics process and classified them into five groups (see Table 2.9). They further commented that transportation management, inventory management, and facility structure management are traditionally regarded as the core of the logistics function.

Table 2.9 Functional grouping of logistics activities

Activities	**Functional Groups**
• Inbound traffic • Outbound traffic • International traffic • Carrier selection • Mode selection • Public vs. private carriage	Transportation
• Warehouse management • Warehouse planning • Distribution centre management • Distribution centre planning • Plant site selection	Facility Structure
• Purchasing • Raw material inventory • Work-in-process inventory • Finished goods inventory • Parts/Service support • Return goods handling	Inventory
• Salvage/Scrap disposal • Material handling • Packaging • Order processing • Demand Forecasting • Production scheduling	Communication & Information

Source: Williamson et al. (1990)

Kent and Flint (1997), studied logistics "thought" and discovered that logistics has evolved from a transportation focus based primarily on agricultural economics to the view that it is a diverse and key component of business strategy, differentiation, and link

to customers. They also discussed that logistics "thought" can be structured into six distinct eras, starting from the turn of the last century and ending as a projection into the future. The six eras, based on their findings, are (1) farm to market, (2) segmented functions, (3) integrated functions, (4) customer focus, (5) logistics as a differentiator, and (6) behaviour and boundary spanning.

Table 2.10 presents six definitions for logistics that have evolved during the twentieth century. This move from a focus on physical distribution within the marketing domain in the early 1900s to the contemporary process orientation focused on conforming to customer requirements.

Table 2.10: Evolution of logistics definitions

Year	Definition
1927	"There are two uses of the word distribution which must be clearly differentiated...first, the use of the word to describe physical distribution such as transportation and storage; second, the use of the word distribution to describe what is better termed marketing."[23]
1967	"A term employed in manufacturing and commerce to describe a broad range of activities concerned with efficient movement of finished products from the end of the production line to the consumer, and in some cases includes the movement of raw materials from the source of supply to the beginning of the production line."[24]
1976	"The integration of two or more activities for the purpose of planning, implementing, and controlling the efficient flow of raw materials, in-process inventory and finished goods from point of origin to point of consumption."[25]
1985	"The process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirements."[26]
1992	"The process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirement."[27]
1998	"Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow of storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements."[28]

Source: Derived from Kent & Flint (1997)

The 1998 definition of logistics acknowledges that, today, logistics is a part of the supply chain process[29]. The supply chain in, say, consumer goods production starts with raw materials, their sourcing and delivery, through manufacturing to distribution of the finished goods to the consumer. One single company is unlikely to own mine, forge, factory, wholesaler and retailer but it is vital for those involved that the management of

[23] Ralph Borsodi, *The Distribution Age* (New York, NY: D.Appleton, 1927), p.19.
[24] National Council of Physical Distribution Management, Chicago IL, 1967
[25] National Council of Physical Distribution Management, NCPDM Comment 9, Number 6, November-December, 1976,pp.4-5.
[26] Council of Logistics Management, Oak Brook, IL, 1985.
[27] *What It's All About* (Oak Brook: Council of Logistics Management, 1992).
[28] Council of Logistics Management, Oak Brook, IL, 1998.

the supply chain is the best it can be. Along the supply chain, transport and inventory are intermediate links where cost can be reduced, performance raised, and value added[30]. Mentzer (2000) defined "supply chain" on four levels (see Figure 2.5):

(1) Definition of a 'basic' supply chain

"A supply chain is a set of 3 or more companies directly linked by one or more of the upstream and downstream flows of products, services, finances, and information from a source to a customer."

(2) Definition of an 'extended' supply chain

"An 'extended' supply chain includes suppliers of the immediate supplier and customers of the immediate customer, all linked by one or more of the upstream and downstream flows of product, services, finance, and information."

(3) Definition of an 'Ultimate' supply chain

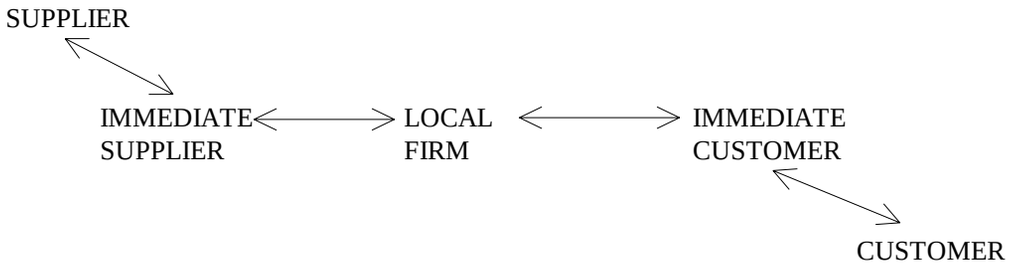
"An 'ultimate' supply chain includes all the companies involved in the upstream and downstream flows of products, services, finances and information flow from the initial supplier to the ultimate customer."

[29] "Supply chain management-it's the discipline of the 1990s", in: *Freight Management International*, January/February 1998, pp. 13-14.
[30] "Explained Logistics", in: *Seatrade Review*, March 1999, pp. 31.

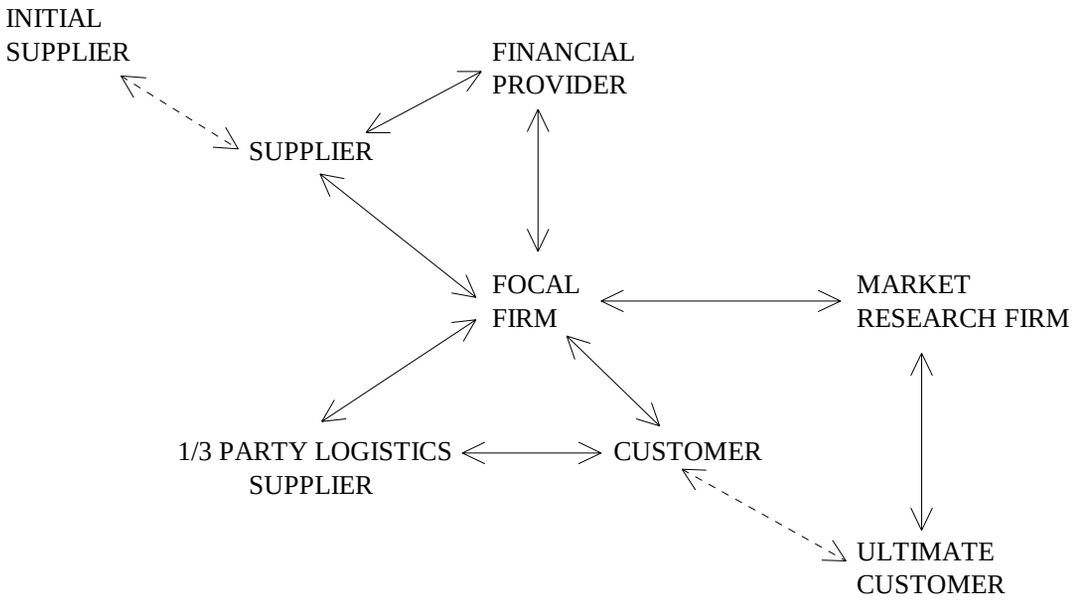
Figure 2.5: Evolution of supply chain

(1) 'Basic' supply chain

(2) 'Extended' supply chain



(3) 'Ultimate' supply chain



Source: Mentzer (2000)

(4) Definition of supply chain management

Mentzer (2000) defined "supply chain management" (SCM) as*: "the systematic, strategic co-ordination of the traditional business functions within a particular company and across companies within the supply chain, for the purposes of improving the long term performance of the individual companies and the supply chain as a whole."*

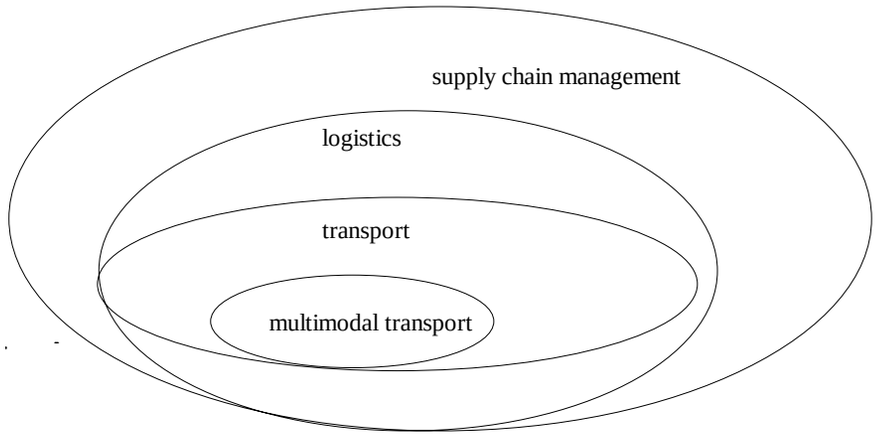
Other authors such as Taylor (1997) have considered logistics management and supply chain management as essentially synonymous terms. Logistics management is a systematic and holistic approach to managing the flow of materials and information across the whole supply chain from raw materials sources to end user consumption. Supply chain management is seen as the extension of logistics management principles to customers and suppliers, crossing geographical and organisational boundaries.

The term 'advanced logistics' has also been used in two OECD reports (OECD, 1992; 1996) to signify: *"...the concept of synchronising the activities of multiple organisations in the logistics chain and feeding back necessary information to organisations in production and/or physical distribution sectors on a real time basis, by fully utilising information technology and digital communication networks."* The OECD acknowledges that this definition also fits the term 'supply chain management' (OECD, 1996).

It can be derived from the above that transport, and multimodal transport in particular, is only one of the aspects playing a role in logistics and supply chain management. Multimodal transport possibilities are part of the framework within which different supply chain strategies are made feasible. Transport-related decisions are dependent upon a set of transport service requirements, such as lead-time, reliability, etc. This means that the shippers generally do not specifically demand a special transportation mode, but rather a transport performance (Henstra & Woxenius, 1999). Shippers expect to receive a reliable door-to-door service from transport/logistics service providers.

Figure 2.6 describes a typical shipper's perception of multimodal transport within the supply chain framework.

Figure 2.6: Shipper's perspective on multimodal transport



Source: Derived from Henstra & Woxenius (1999)

2.6 SUMMARY

The container revolution has facilitated the development of multimodal transport as an international through-transport means with various modes of transport. Containers will ensure the transport of unitised cargo from door-to-door with efficiency and least possible risk.

Confusion on transport terminology relating to multimodal transport is an area where standardisation may be necessary. Terms such as 'through transport', 'combined transport', 'intermodal transport', 'intermodality', 'multimodalism' and 'multimodal transport' have very similar meanings, i.e. the transportation of goods by more than one mode of transport from door-to-door with a through freight rate.

In order to benefit from multimodal transport, shippers must acquire the services of multimodal transport operators as only they have the know how to design efficient transportation systems suited to shippers requirements. Multimodal transport operators play a very important part in physically transporting the goods but other requirements are

also needed for efficient multimodal transport systems. Commercial practices such as the selection of suitable INCOTERMS, banking procedures and documentation can help or hinder the development of multimodal transport. Shippers and consignees are dependent upon trade facilitation measures and Customs practices for the development of multimodal transport systems and seamless trade. Infrastructure that is capable of handling containers must also be in place in order to fully benefit from multimodal transport.

Today, transport and multimodal transport in particular, is acknowledged as a sub-function of logistics, which itself is part of supply chain management. Multimodal transport decisions have an impact on the feasibility and reliability of supply chains. Shippers and consignees are more interested in supply chain performance than on the actual multimodal transport operations. They require efficient and reliable door-to-door service offered by transport/logistics service providers, who may be multimodal transport operators.