EUROPEAID/120540/C/SV/MULTI

Freight Forwarders Training Courses

for Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

Module 3 Multimodal Transport

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3 MULTIMODAL TRANSPORT (ESP. MARITIME CONTAINERS)

Learning Objective:
The student should be able to explain the functioning and the rules of the different types of multimodal transport, especially that of the seaborne multimodal container transport. He/she should know different types of multimodal transport, especially that of the seaborne multimodal container transport. He/she should know different types of loading units, the necessary shipping documents and procedures in container trade. He/she should also have an idea of freight pricing in multimodal transport, especially for containers.

Multimodal Transport

The Multimodal Transport sector is very important for TRACECA countries for its development potential as it offers unique advantages (door-to-door, low transport cost, flexibility). Thus every actor in the freight forwarding business should know the international multimodal freight market well, the regulations and standards, the networks, the bottlenecks, the paperwork and the technicalities. Except maritime containers which have a great potential, nowhere in the world is there greater potential for the transportation of containers by rail than in the countries of the TRACECA corridor.

The absence of a modern container logistics system in some TRACECA countries is being addressed and now appearing on the scene are several intermodal operators with structures that will allow them to maintain much tighter control of their operations. For example an intermodal operator operates reefer block trains from Riga to Tashkent in Uzbekistan and Ashkabad in Turkmenistan, a 3000 mile journey across grassy plains, deserts, wide rivers and mountains. It experiences temperatures which range from well below zero to as high as +40°C, yet its cargoes of perishable food products are being delivered in perfect condition.

3.1 General Knowledge of Multimodal Transport

Learning Objective:
The student should understand the difference between multimodal transport, multimodal transport operator MTO and combined transport. He/she should be able to explain the benefits of multimodal transport and should have a basic understanding of technologies applied in multimodal transport. The distinction between a traditional freight forwarder and an MTO should be understood.

3.1.1 Terminology of Multimodal Transport

Learning Objective:
The student should understand the different definitions related to multimodal transport.

Definitions of multimodal transport

- **Multimodal transport** is transport by using two or more different means of transport through the use of transhipment (intermediate handling),
  organized by one carrier (Multimodal Transport Operator),
  under one contract,
  with one freight document,
  under one liability,
  and one price.

- **Intermodal transport** is the use of several means of transport (multimodality) while the goods remain in the same loading unit (e.g. container), without intermediate handling (road vehicle, trailer, container). It arises from the encounter between a commercial necessity and a fundamental technological innovation.

- **Combined transport** is intermodal transport, which is principally carried out by rail, inland waterways, or by sea, with the trips beginning and ending by road. This definition taken from the European conference of Transportation Ministers (in French: ECMT) encompasses the following techniques.
  - Piggyback systems (a blend of road and rail transport)
  - Roll-on Roll-off systems (a blend of road and water transport).

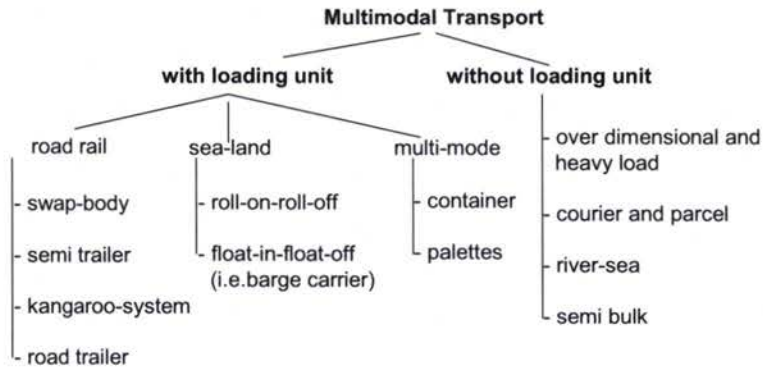
Test Questions (3.1.1):
Which explanations are correct? Please indicate which is Right / wrong

a. Combined Transport is a transport which combines land and sea transport. Wrong
b. Intermodal Transport does not mean necessarily that a single, through contract is concluded. Right
c. Intermodal Transport relates to the technical view and means that a loading unit is used. Right
d. Multimodal Transport relates to the commercial view and means that a through contract for several modes is concluded. Right
e. Combined Transport can also be a unimodal transport. wrong

3.1.2 Overview of multimodal transport systems

Learning objective:
The student should have a general understanding of the different types of multimodal transport.

There are several possibilities to structure multimodal transport. One of them is taking into consideration the technical aspect:



In brief some explanations:

Swap-body: inter-changeable body system where the truck body is lifted off the chassis, transported by rail and, at the point of destination, placed on another truck chassis for final delivery. This type of technology does not significantly differ from the container system.

Container: is basically a metal box of various construction types used in international transport. There are various types and standards.

Pallet: raised platform on which loads can be stacked and constructed for easy movement by a forklift or sling. Standard form in the EU is 800mm x 1200mm.

Roll-on/roll-off: the facility for road vehicles (trailers with or without tractors) to be driven on and off a ship, or as in the case of rolling road, a train.

Barge-carrier: a ship borne system in which the barges are loaded inland, linked together and pushed down an inland waterway to a point that can be reached by a ship, where the barges are lifted onto the mother ship with the use of gantry cranes or by lowering the mother ship. Two types of barges exist (lash-lighter-abroad-ship for use of up to 370 tonnes/Lykes and Seabee for use of up to 850 tonnes).

Piggyback: or trailer on flat car TOFC system, where semi-trailers are loaded on flat cars (usually by crane) and transported as a unit. At the terminal of destination the semi-trailer is picked up by a tractor for final delivery.

Kangaroo-system: where both trucks and trailers are transported by rail; this system is also referred to as the "rolling road". The trucks roll-on and roll-off horizontally onto / from the railcar.

Road-railer: bimodal service, where the bogies from the chassis for road transport are exchanged in the rail terminal by rail bogies, the road railers form a train and are transported like wagons to the rail terminal of destination from where they continue travelling as normal road trucks exchanging the bogies.

Courier and parcel systems: courier and parcel transport systems are part of the fast freight market. Fast freight includes the scheduled carriage of goods from door-to-door within a minimum of time. The fast freight market can be divided into four service segments with different products, structures and rules. The different operators on the market are:

- Courier service
- Express service

- Parcel service
- Integrators

Heavy lift transport: heavy lift transport requires a solid preparation of the whole transport chain in advance. Specific projects for each individual transport problem have to be worked out. From the technological aspects every heavy lift transport has to be planned and carried out as a door-to-door transport. In this sense the commercial terms of multimodal transport should obviously also be applied. In fact heavy lift operators tend to use more multimodal transport especially in the framework of industrial project deliveries. They also offer carrier conditions for the main leg and "as agent" conditions for the pre- and on-carriage.

River-sea shipping: river-sea shipping is a through shipping starting or ending at an inland port via inland waterways and ocean going traffic. River-sea ships are licensed for inland waterways and ocean going traffic. Main advantage is that there is no necessity for ocean port transhipment. River-sea ships have up to 4 metres draft and are able to load up to 5.000 tdw. At the moment about 2/3 of the European river-sea cargo is handled by 2.000 units and about 6-7 Mio. tdw by units under Russian or CIS flag.

Test Question (3.1.2.)
Link the relevant technologies to the pictures that depict them.

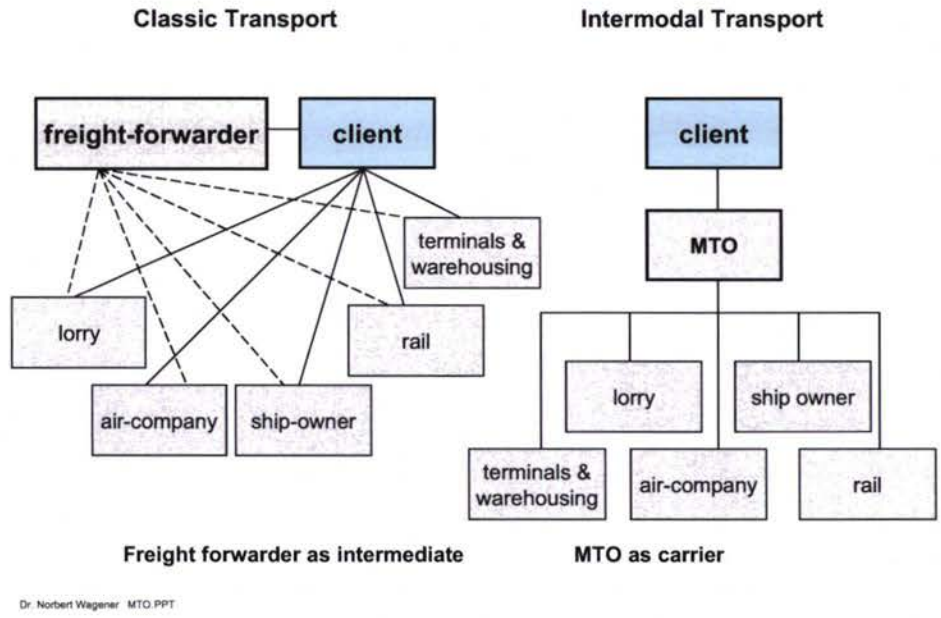
	**Kangaroo System**
	**Swap-body**

	**Container, Gantry Crane** **Both answers right**
	**Gantry Crane, Container** **Both answers right**

3.1.3 The Multimodal Transport Operator

Learning Objective:
The student should know possible types and relations of a Multimodal Transport Operator MTO.

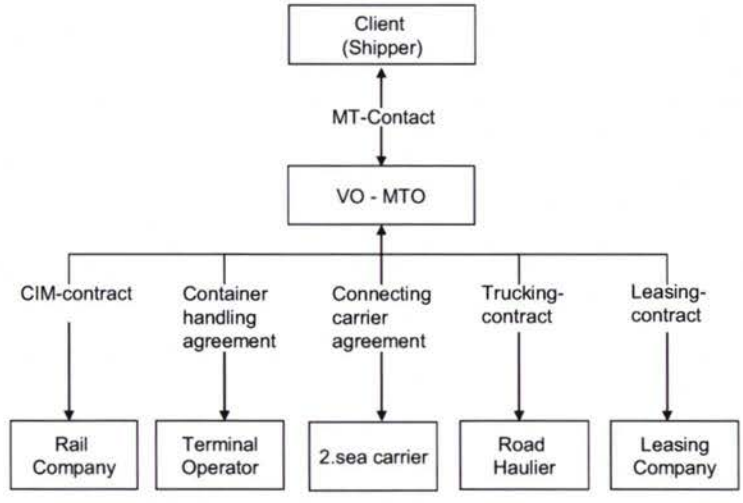
The Multimodal Transport Operator MTO offers and organizes multimodal transport. This MTO acts as a full responsible carrier and not as an intermediary. In his relation to the customer he offers one single contract, with one document, one liability (network or uniform liability system) and one price for the whole multimodal chain.
In his internal business relations he subcontracts different transportation, handling and ancillary services.



The traditional freight forwarder acts only as an intermediary, the MTO acts as a genuine carrier.

We distinguish between Carrier-MTO with vehicles of their own and Non-Carrier-MTO which do not possess their own vehicles. Carrier-MTO can be shipping lines (Vessel-Owning-MTO VO-MTO) or Forwarders and Non-Vessel-Owning-MTO (in USA according to US-Shipping Act 1984 NVOCC Non Vessel Operating Common Carrier).

Contractual Relations of a VO-MTO
(example: multimodal container transport)



Typical versions of MTO:

Possession of equipment	Possession of ships	Estimated market share (worldwide)	Main field of activities	Examples
Non-Carrier-MTO (NC-MTO) without own equipment Carrier-MTO (C-MTO) own equipment	Non-Vessel-Owning-MTO (NVO-MTO) or Non-Vessel-Operating-Common-Carrier (NVOCC)(without own ships) Vessel-Owning-MTO (VO-MTO)(own ships)	40% 60%	Forwarder Ship's Agency Trucking company Airlines Railways Port terminal Operator Conference-Carrier Non-Conference-Carrier Inland Navigation Carrier	Kuehne + Nagel (CH) PAN Liner Agencies (UK) Federal Express (USA) CSX (USA) Port of Seattle (USA) Hapag-Lloyd (D) Evergreen Lines

The commercial interests of an MTO differ according to its investment in infrastructure and vehicles.

The functions of an MTO include, but are not limited to:

To identify and to provide the proper means of carriage for the through transportation of shippers' goods
To schedule timetables to suit both the shipper and the receiver
To provide transportation traction for the entire journey.
To provide a standardised documentation set to ensure a minimum delay in transit through national borders
To provide for a simple billing structure to minimise the number of invoices
To provide tracking and tracing facilities
To provide as much detail on each transit move as shippers require
To provide cargo-handling advice for stowage of goods in containers and swap-bodies

Test Question (3.1.3):

What is the difference between a traditional forwarder and a Multimodal Transport Operator?

Cross the right answers:

a. An MTO transports containers while a traditional freight forwarder is responsible for general cargo.(wrong)
b. An MTO is a real carrier and combines different modes. (right)
c. A traditional forwarder is an intermediary who only organizes the transport chain and is not an actual carrier. (right)
d. The traditional forwarder only receives and delivers cargo. (wrong)
e. The traditional forwarder is only a road haulier. (wrong)

3.1.4 Benefits of Multimodal Transport

Learning objective:
The student should understand the economic benefits of multimodal transport.

Why have MTO's emerged? What are their benefits? What are the benefits for their customers?

The economic basis for multimodality is that transport modes can be integrated into a door-to-door transport chain in order to improve the overall efficiency of the transport system.

Benefits of multimodal transport are

- **Economics of unitization**

From individual cartons through pallets to containers, reduced handling gives savings in labour, packaging and damage costs. Risk of damage reduces when commodity is handled only two times, regardless of the number of mode changes. Packaging designed for specific mode, container, swap-body etcetera ensures less damage due to broken stowage. Cargo loss is eliminated or greatly reduced due to no pilferage or excessive movement in the transport module.

- **Economics of scale**

Road haulage – large modern trucks give increased load capacity, fuel economy and less environmental damage due to the increased number of axles, lower emissions and air suspension systems. Improved efficiency in engine, gearbox and axle designs gives faster highway speeds.

Rail transport – full train loads i.e. container trains on scheduled services operate at maximum payload and computerised signalling systems minimise

speed variations. Greater tractive effort from modern locomotives results in longer heavier trains with reduced manning.

Air transport – modern powerful engines give a huge increase in carrying capacity of large "jumbo" and wide body jet aircraft together with increased range. Smaller aircrew numbers with increased computer assistance reduce labour costs. Specially designed automated cargo terminals minimise human input and reduce cost.

River transport – larger vessels with lower crew numbers increases efficiency and computerised engine management systems reduce maintenance costs. Labour saving cargo-handling devices improves vessel turnaround time.

Deep sea vessels - huge savings are made through an increase in ship size. E.g. 6000 TEU post panamax vessels have a 21% cost advantage over 4000 TEU panamax vessels – but only at full slot utilisation. However, economy of scale with bigger ships may mean lower frequency – reduced service, port constraints, bigger ships means greater costs if breakdowns occur. Big ships can only be filled by using increased transhipment of boxes and this adds to the costs.

To achieve full benefit only big operators can provide, a) ships, b) terminals, c) IT infrastructure, d) combined transport systems. Results are big ships on "around the world" or "pendulum" services between "mega hubs" being supported or fed by local feeder vessels.

Hub & Spoke systems are a precondition to ensure both: the employment of bigger vehicles on the main leg and to offer a door-to-door-network. Additional costs through longer distances via the hub are compensated through less transport costs/units and through better service in time.

- **Environmental effects**

The increasing success of road transport is resulting in ever worsening conditions also due to the dominance of trucks in freight transport. Transport by truck is unavoidable over very short distances but in middle and long (international) transport distances other modes may be used. The switch from road to environmentally friendly modes may be achieved by raising structural costs and charges of the road freight sector as well as by the enhancement of intermodal / multimodal transport.

Example: Case Study North-South Routes

Comparison of unimodal and multimodal transport – pricing relevant results

The following are given cost estimates from the EU project RECORDIT for three Trans-European corridors:

- the freight freeway between Patras - Brindisi - Milano - Munich - Hamburg and Gothenburg;
- the tri-modal transport chain between Genova - Basel - Rotterdam and Manchester;
- the door-to-door intermodal chain along the corridor Barcelona - Lyon - Torino - Verona - Budapest and Warsaw.

In fact, while the primary objective of the project was to document the cost and price formation mechanisms, and therefore to estimate total real costs, the most interesting results for pricing purposes are those yielded by the comparison of intermodal costs with those of all-road transport on the corresponding routes.

More specifically:

- comparing total costs (internal + external) across the two options (intermodal Vs all-road) sheds light on their relative attractiveness, and should therefore contribute to explain their current market position
- comparing external cost with taxes and charges currently paid allows for identifying market inefficiencies, both within modes and across them.

Summary results from RECORDIT are provided below to this effect.
Total internal costs for the movement of containers (i.e. costs directly borne by the end-user, including taxes and charges) are summarised in the table below:

Table: Internal costs of Intermodal vs All-road transport

Corridor				Intermodal	All-road	
€/movement	Length (km)	€/km		€/movement	Length (km)	€/km
Genova-Manchester	2315	2134	1.08	2836	1912	1.48
Patras-Gothenburg	3970	4128	0.96	4894	3599	1.36
Barcelona-Warsaw	3350	3270	1.02	3448	2735	1.26

Source: RECORDIT

The intermodal option turns out to be consistently cheaper than the all-road alternative, despite being longer. Its competitiveness is however severely undermined by the poor performance of intermodal transport in terms of trip duration, which is between 70% (Patras-Gothenburg) and 400% (Genova-Manchester) longer than for all-road. It is also interesting to note (see figure below) that, whilst main haulage is the most important cost in all cases, the share of movement and transhipment at terminals can increase to over 20%. The shares will vary depending critically on the number of transhipments necessary along the intermodal route, and the length of the pre- and post-haul legs. On very short routes the pre and post haul costs can rise to nearly 50%.

Reasons for shipping lines to offer multimodal services

In many cases shipping lines regard multimodal transportation (i.e. carriers haulage) as an optional and supplementary service for their customers if they insist upon it.

But container shipping lines offer more and more door-to-door-container transport. They organize the whole chain and offer a single freight document and a single price.

At present in Western Europe about 70% of sea containers go inland under the responsibility of the shipping line.

There are very solid commercial reasons which promote the engagement of shipping lines in port and land operations. In brief these are:

- economics of scale at sea
  - concentration on hub ports
  - economic ship size
  - high service frequency
- influence on haulage costs
  - lower inland transportation costs
  - realization of necessary sea freight
  - scale effects in inland transportation
- efficient utilization of the carrier owned container park
  - compensation of higher depot and positioning costs by decreasing costs for storage and positioning of empty containers
  - improvement of the box/slot-ratio.

Test question (3.1.4):

What are the benefits of multimodal transport?

Indicate the right answers:

a. Economics of unitization (right)
b. More cargo (wrong)
c. Economics of scale (right)
d. Environmental effects (right)
e. Higher prices (wrong)
f. Shorter distances (wrong)

3.1.5 Conditions for multimodal transport

Learning Objective:
The student should understand some main preconditions for multimodal transport.

The implementation of the multimodal transport requires the synthesis of many elements:

Ideal practices for the transport modes involved
(low transport cost, high frequency, high connectivity, quality of service).
No regulation prohibits the incoming sea containers to continue their journey by train, but if customs require that all containers should fully deconsolidate, to allow for a thorough cargo check, then the concept of intermodality is violated.

Adequate terminal infrastructure
(sufficient capacity, fast handling, limited dwell time)

Efficient interfaces
(existence of interoperable sea/rail/road networks, prompt information flow, effective documentation processing and customs clearance)
Implementation of actions and measures for the promotion of intermodal transport. Among them, vehicles used exclusively for road haulage in feeder or final delivery carriage by combined transport may be exempted (completely or partially) from some national taxes, exempted potentially from traffic constraints (weekend bans), allowed for increased laden weights etc.

Integrated infrastructure and transport means
(intensify intermodal design of the trans-European transport networks, enhance design and functions of intermodal transfer points, harmonise standards for transport means)

- Multimodal and interconnected operations
  (integration of freight freeways in an intermodal context, development of common charging and pricing principles, harmonise competition rules and state-aided regimes on an intermodal basis)
- Mode-independent services and regulations
  (harmonisation and standardisation of procedures and EDI). Information systems used for the management of freight transport are currently closed but modal systems are often provided by the carriers themselves as a value added service to their customers. The increasing use of new technologies allows accurate real time information to be shared between actors (e.g. through EDIFACT messages) and has the potential to

integrate information from other systems (traffic management, supply chain management, emergency response etc).

- Establishing an appropriate multimodal liability regime.
  EC is working towards the promotion of a voluntary multimodal liability regime as part of a door-to-door intermodal service. In parallel, the discussion for the wide implementation of the United Nations Convention on International Multimodal Transport of Goods has been reopened.
- Increasing the awareness and understanding.
  Shippers are often unaware of the potential of intermodal transport and the information and skills to take advantage of intermodal transport alternatives. A new actor, the Freight Integrators, will attempt to arrange door-to-door transportation by selecting and combining without prejudice the most sustainable and efficient modes of transport
- Ensure that grants are not simply allocated to the transport mode organisations (e.g. railways) but are transferred to users or operators.

Test question (3.1.5)

1. Indicate whether the following are right or wrong

a. There is a UN convention on intermodal transport in force. Wrong
b. Multimodal systems require both, integration of technical systems as well as integration of liability and organisation. Right
c. Better understanding of multimodal transport by shippers would facilitate its expansion. Right

3.1.6 Components of the Intermodal Transport Chain

Learning objective:
The student should know components of the intermodal chain and the factors influencing the intermodal chain.

Modes of transport

Within the inter-modal system, shipments may move on one or any number of different means of transport. The shipper does not necessarily wish to know nor to understand the technicalities of the various means of transport. The shippers' concern is that the goods reach their destination on time, in undamaged condition and at a competitive cost.

Interfaces

- Each change of transportation mode requires an interface between one or more modes. Specialised equipment is required for each mode. Consequently, the more flexible the interchange is, the greater the capital investment is in plant and equipment.
- Air cargo interchanges require large numbers of small, very specialised units, often designed to only handle one specific class of aircraft.
- Deep-sea container terminals require huge gantry cranes to reach over increasing ship beams. Vessels with container securing guides above deck level demand increasing the lifting height to load the container clear of obstructions. Generally, two main interfaces cannot be combined - air and sea. However, it is possible to combine air, road and rail, or sea, road and rail. It is unusual to have a rail and air connection other than for passenger services.
- There are two separate industries, air and ocean, with few links to reduce cost for the shipper. The air industry has been more successful in minimising delay time for cargo waiting to be shipped. Except on very long haul routes, cargo shipped by sea spends 22% of its transit time waiting to be transported. Preparation of shipping documentation, customs clearance and general transportation delays need to be streamlined in order to reduce delays. Greater emphasis should be placed on paperless systems.
- International trade is growing on average 10% annually and requires new investments in interface terminals. This will necessitate more substantial land use causing environmental objections to be resolved. Also, automation enabling the 24 hour working shifts often results in objections by local residents.

Equipment

- Commodity, route and destination determine the type of loading unit required by shippers. Local door-to-door requirements are different to long haul deep-sea shipments.
- Availability of rail connection for long overland transport is essential to reducing costs.
- Type of commodity defines specialist transport modules, reefer, insulated, tank etc. One-way traffic requires leased equipment. Closed circuit internal company movements may benefit from purchased equipment.

Factors Influencing the Choice of the Transport Method

The choice of the type of transport service provider is no longer limited to the simple choice of the means of transport. The freight forwarders must decide upon a transport system among others, of which some are already a combination of several different means. It is a question for the freight forwarder to discourage their customers from contacting carriers directly, or in certain cases from carrying their products themselves (own-account). The factors influencing this choice are:

Reliability: being reliable is being present in the place and at the moment that a need exists. With the development of logistics (zero stock) this factor has taken on a greater importance.

Flexibility: this factor has grown in importance due to the developments in logistics. This characteristic can be defined as the agility of adaptation of the transport system when faced with daily collection schedule changes and amounts to be delivered. This adaptability can be defined by the skill of the service provider to react rapidly to changing situations and their ability to efficiently handle high traffic periods.

Time limits: without being decisive, the factor of transit-time is an important criterion of choice. For certain types of goods, such as fresh or frozen foodstuffs, flowers, etc. the rapidity of transit-time can be essential for their preservation. In general, high value goods and those necessitating a high capital investment tend to use the faster methods of transport.

Security: this concerns the various misfortunes that can happen to the goods in the course of a transport operation during the loading, transhipment, or unloading phases, while the goods stay at intermediate handling points (ports, airports, bonded warehouses, etc). These misadventures can include theft, breakage, shortages and other miscellaneous damage. The best insurance in the world cannot reimburse the freight forwarder for the loss of confidence and brand image that they will be subjected to in case of problems.

Cost: even if there is a difference of analysis between the value of the goods transported and the qualitative requirements of the service asked for, the cost of transport services is the primary criterion in the choice of what means of transport. In general, the price includes the following costs:

- Forwarding (relating to speed, distance, weight),
- Packing (relating to the intrinsic characteristics of the goods),
- Insurance (relating to the value of the goods and the probability of their being subjected to risks),

- Handling and warehousing (at intermediate handling points),
- Associated services (forwarding, Customs operations, etc).

Other criteria: let us mention, in no particular order: the absence of intermediate handling, the ease of handling, a well thought out range of materials (containers, swap-bodies, etc), the ease of tracking the goods and the rapidity of information transfer.

Test Question (3.1.6.)

1. Decide what is right or wrong!

Main factors for shippers to decide on the transport method are:

a. Price right
b. Direct connections wrong
c. Punctuality right
d. Long lasting business connections wrong
e. Security right
f. Flexibility right
g. Good conditions for sub-contractors wrong
h. On-Time Invoicing wrong

3.1.7 Multimodal Contracts and Liability

Learning question
The student should know different documents for multimodal transport. He/she should understand the principles of the MTO liability.

Multimodal Transport Operator MTO

The MTO is a freight forwarder who acts as a carrier and as a principal for sub-contractors and who sets up a single multimodal transport document on behalf of their customers which covers the entire transport operation from door-to-door.

Multimodal Standard Contracts:

Type	**Negotiable / Non-Negotiable**	More information (See Annex 2)
FBL FIATA Bill of Lading	Negotiable	FBL_Standard_Conditions.Doc FBL_Cover_Page.PDF
FCT Forwarders Certificate of Transport	Non.Negotiable	FCT_Cover_Page.PDF
FWB FIATA Multimodal Transport Waybill	Non-Negotiable	FWB_Cover_Page.pdf FWB-Second_Page.pdf
MULTIDOC 95	Negotiable	See also www.bimco.dk
MULTIWAYBILL 95	Non-Negotiable	Multiwaybill95.pdf See also www.bimco.dk
Company own Bill of Lading for Multimodal Transport	Negotiable	

A **Bill of Lading B/L** (also the FBL) is issued in a negotiable form unless it is marked as "non-negotiable". Negotiability means that it constitutes a title to the goods and the holder, by endorsement of the B/L, is entitled to receive or to transfer the goods mentioned.

At the place of receipt (port of loading) the consignor[1] (usually the forwarder) has the right - against delivery of the goods - to receive the Bill of Lading from the carrier respectively from the carriers agent.
At the point of delivery (port of unloading) the goods are then delivered by the carrier (resp. his agent) against the Bill of Lading.

A Bill of Lading serves three functions:

Proof of receipt	The B/L is a receipt issued by the carrier (usually filled in by the forwarder and signed by the carrier's agent or by the master of the ship) which contains information on condition, volume and kind of the goods shipped.

[1] Consignor = any person or organisation that sends goods to a consignee.

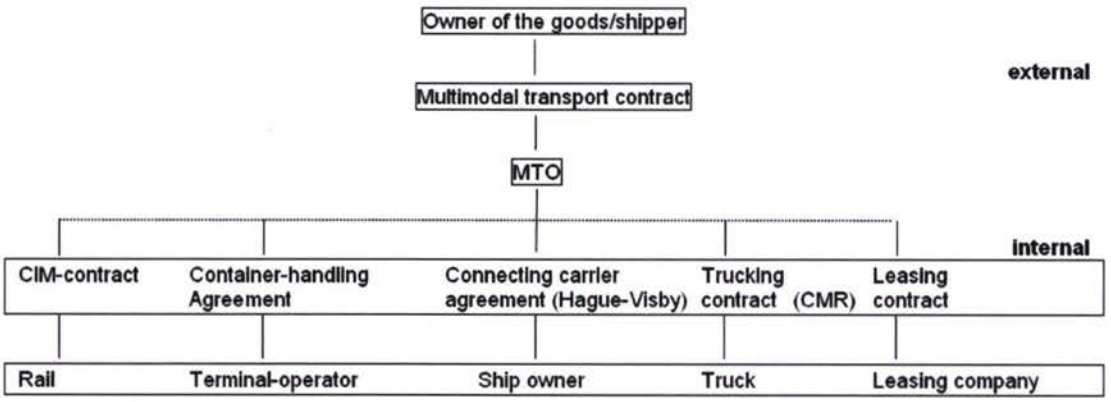
Proof of Ownership (Document of Title)	The person who is endorsed and holds the B/L is entitled to the goods and has the right to receive the goods from the carrier against B/L. The B/L represents the goods. The goods can be traded by trading the B/L.
Document for the transport contract	The B/L is a document which proves the contract of affreightments and its contents. It is not the contract itself, because the contract was concluded by the booking act already.

For more information on the B/L see 2.5.1

Legal Situation of the MTO

Regarding the legal and liability situation we must differentiate between an internal and external part. The internal part is the legal relationship of an MTO towards different transport operators (carriers), the external part is concerning the owner of the goods (shipper).

See the Chart for example:



Typical risks of transport, which are elements of insurance:

- damage
- loss
- delay

Liability – internal part:
The liability for these risks in international transport is mainly intra-modal and ruled by law:

- Warsaw convention - air traffic
- Hague and Hague -Visby rules- / Hamburg rules - sea traffic
- CMR - Road traffic
- COTIF /SMGS - Rail traffic

For ports, terminals and in warehouses there is no international law yet, so damages, losses and delays at these interfaces are regulated according to contractual law (e.g. standard warehousing conditions). Especially in developing countries this sometimes means a non-transparent and risky situation, because the legal situation is unclear for the MTO.

Liability – external part:
Two main streams of development
Uniform-solution: MTO as sui generis - the MTO contract is an own contract, independent from unimodal agreements. There is one uniform liability, independent from where the damage occurred.
Network-solution: Multimodal transport is the sum of unimodal transport, respecting the rules and laws already developed for them. The liability depends on the mode where the damage occurred.

The Freight Forwarder's liability in case of issuing an FBL
The liability of a Freight Forwarder according to the terms of the FBL is a mixture of the uniform and the network solutions.

Please read FBL_Standard_Conditions.Doc (8. Limitations of the Freight Forwarder's Liability) carefully! (See Annex 2)

Short Summary:
The liability is limited to 666.67 SDR[2] per package or unit or 2 SDR per kilogram of gross weight of the goods lost or damaged, whichever is higher. If an ad valorem freight rate has been paid then the value as stated in the FBL shall be the limit for compensation.
If the multimodal transport does not, according to the contract, include carriage of goods by sea or by inland waterways, the liability of the Freight Forwarder

[2] SDR = Special Drawing Right = artificial "basket" currency created by the International Monetary Fund (IMF) in 1969 to support the exchange rate system and to serve as an internal accounting currency. The currency basket consists of US$, Euros, Yen and British Pounds.
On April 07th 2006 1 SDR = 1.187 Euro
For actual rates see www.IMF.org

shall be limited to an amount not exceeding 8.33 SDR per kilogram of gross weight of the goods lost or damaged.
When the loss of or damage to the goods occurred during one particular stage of the multimodal transport, in respect to which an applicable international convention or mandatory national law would have provided another limit of liability if a separate contract of carriage had been made for that particular stage of transport, then the limit of the Freight Forwarder's liability for such loss or damage shall be determined by reference to the provisions of such a convention or mandatory national law.

Legal framework for International Multimodal Transport
The UN Conventions on the International Multimodal Transport of Goods (MT-convention) signed in 1980. The MT-Convention is not in force yet!
UNCATAD/ICC Rules for Multimodal Transport Documents

For further information on the development of the Multimodal Standard Contracts and documents according to UNCTAD/ICC rules see www.bimco.dk

For further information on multimodal transport contracts and liability see:
UNCTAD_MMT_RULES.en.PDF

Test questions (3.1.7):

1. *Which documents could be used by the MTO to issue a Negotiable Through-Transport-Document? Indicate whether the answer is right or wrong.*

Answer:

a. FBL (right),
b. FWB (wrong),
c. FCR (wrong),
d. Multidoc 95 (right),
e. CMR waybill (wrong)

2. *The Liability of a freight forwarder as MTO who issues an FBL is limited to*

Answers:

a. 2 SDR per kilogram when transport is only on land (wrong)
b. 2 SDR per kilogram when sea or inland shipping is included (right)
c. 2 SDR per kilogram when combined rail / road transport (wrong)
d. 1000 SDR per package (wrong)

3. *What does ad valorem mean?*

a. Freight is charged according to measurement
b. Freight is charged according to calories
c. Freight is charged according to weight
d. Freight is charged according to value right

3.1.8 Different Technologies for Multimodal Transport

Learning objective:
The student should know different intermodal technologies and their applications.

Types of loading units

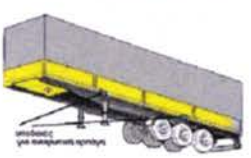
ISO Ocean Container
Top lift
Stackable
Standard for vessel cells

ISO standardised 20" 40"

Inland Container
Typically top lift
Stackable up to 3 units

Class A 12,2 – 13,6 m
Class B 7.8 – 12.2 m
Class C 7.15 – 7.8 m

Swap body
Bottom lift
Width 2,5m
Appropriate space utilisation for convenient pallets



Grapple-arm semi-trailer

Volumes and frequencies

High transport volumes are required

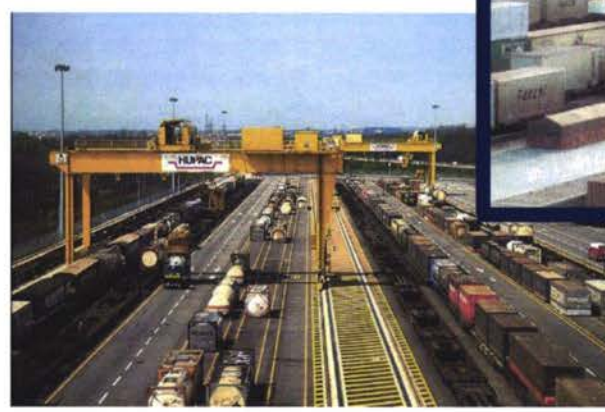
- Train 30 – 100 TEUs
- Containerships ships 1500 – 9000 TEUs

Low trip frequencies

Need for timetable synchronisation

Rail terminals & handling equipment

Reach Stackers
Relatively low initial capital
High maintenance cost
Moderate productivity
High flexibility



Gantry cranes
High initial capital is required
Relatively low maintenance cost
High productivity
Partial / full automatic operation
High Infrastructure requirements

Existing maritime systems

Ship-to-shore gantry cranes

Straddle carriers

Gantry cranes

Advanced systems

See also 3.1.2

Swap-Bodies:

This type of transport module was developed to take advantage of some of the road vehicle taxation laws in Germany, which were introduced to promote an inter-modal switch from road transport to rail. They are primarily used for road, rail and barge shipments within the European continental area. The concept originated from shippers' requirements for a range of units suitable for various commodities, unlike containers that were introduced by the sea transport industry to minimise cargo handling time in ports.

There are two general types in circulation, Class "A" and Class "C" and both types are produced in a range of sizes. The Class C unit is nominally 7.15 m in length and the Class A is either 12.192 m, 12.5 m or 13.6 m in length. Most are 2.55m wide and 2.67m high but some may be in excess of this height. Manufacturers are free to produce units to customer's requirements provided the positions of the bottom lifting and securing points comply with the CEN standard.

Generally they are lifted from strengthened brackets on the bottom although some have a top lift capability. Some Class A units can be stacked but no more than three units high. Swap-body units are not subject to ISO construction standards, although they follow broad guidelines established by DIN and CEN. The identification markings are by no means universal. Unlike ISO containers

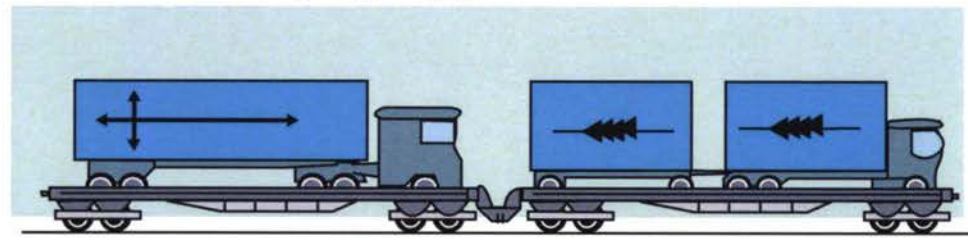
there is no standardised numbering system. Any unit in international combined rail transport must carry a rail approved dimension code and certification plates.

Road trailers:

Container and swap-body carrying trailers are either conventional flat bed or skeletal designs fitted with a combination of twist lock units to ensure that a wide range of units can be carried. Twist locks generally fitted at 10 foot intervals with a double set at half length on a 40 foot trailer to permit the carrying of two 20 foot units. Some modern trailers have a sliding and telescopic load bed to ensure that axle loads are not exceeded when carrying heavy containers of less than 40 foot in length. The majority of trucks carrying containers are either rigid vehicles fitted for one 20 foot container or articulated vehicles suitable for one 40 foot or two 20 foot units. Some rigid trucks will have a second trailer attached by drawbar to carry a second unit. Much attention is given to reducing the unladen weight of trucks in order to carry a heavier payload. To achieve this some modern trucks are fitted with aluminium wheels thus increasing their payload by as much as 1000 kg.

Rail Trailers:

There are a number of variants of railcars for carrying road vehicles such as the "Rollende Landstrasse" (**Kangaroo**) system.



This consists of a number of low level flat bed railcars that are connected together with fold over flaps at the connections to permit trucks from driving the full length of the train (normally 800m). This system is mainly used in Switzerland where foreign trucks exceeding the maximum permissible weight for road use, transit the country on board a train from north to south. Other versions of railcars have regular sized wheels but with a low level centre section on to which conventional road trailers may be loaded by means of a lifting crane or gantry. There are a number of other railcar designs in an experimental stage in an endeavour to produce a satisfactory and economical design.

Bimodal Trailers:

Bimodal trailers are specialist road trailers that can be converted into rail wagons by automatically lowering rail wheels to replace the road wheels. In road mode they run on conventional rubber tyred wheels. In rail mode, trailers are connected by the fifth wheel kingpin to rail wheel bogies and road wheels rest on plates on the next following bogie. This type of trailer is still in a development stage.

Piggyback Trailers:

Road-going semi-trailers suitable for lifting on to railcars in a manner similar to swap-bodies. They are fitted with bottom side rail brackets stiffened to accept crane grapplers. No ISO standards apply. Required special railcars to ensure overall heights and widths remain within rail outline gauges and are required to be fitted with folding side and rear run-under bars to enable stowage on board railcars. Variable air suspension is required. The system of piggyback road vehicles (also referred to as Huckepack) are carried by train. In most cases it involves the carriage of unaccompanied trailers and semi-trailers. The trailers and semi-trailers need a number of adaptations before they can be used in this scheme. The biggest advantage of this system lies in the fact that it reduces the use of congested roads by heavy lorries. Furthermore it enables a carrier to make maximum use of the loading capacity of a vehicle, as railways do not suffer from weight limitations. And last, but certainly not least, the rail rate for the transport of one vehicle may be less than the vehicle operating cost over the route. This form of intermodal transport is seen as the solution to the environmental problems.

Even though the advantages of both these systems are obvious, the expansion of services is very often inhibited by restricted rail gauge clearances through bridges and tunnels on key routes, which prevents the carriage of full-height road semi-trailers.

Tunnel

A very special form of the combination road-rail is the transport by Channel Tunnel from France to the United Kingdom. In this case, after completion of all custom procedures, a complete lorry drives on the train; there is no need for special loading equipment. The crossing takes about one hour, time in which the lorry driver can relax and have a cup of coffee, or even a complete tasty meal in a separate carriage. On arrival the lorry can enter the country of

destination without further inspection of customs.

RoRo:

The abbreviation RoRo comes from Roll-on, Roll-off transport. In this system road vehicles and sometimes even the train carriages are carried by ships. The road vehicles, accompanied or unaccompanied, make journeys abroad without their cargo having to be unloaded or the vehicle lifted aboard the ship. This system offers speed and efficiency in loading and unloading and minimises the risks of loss or damage to goods through transhipment. The difference between RoRo and a ferry is the fact that in RoRo vehicles cannot move themselves. Semi-trailers are driven onto the ship by specially designed terminal-tractors.

Shipping

Containers are carried by converted oil tankers on the East Coast USA coastal traffic. To reduce time in port, conventional ships quickly converted by fitting cell guides but at great loss of space. Later, purpose built cellular ships were built for service in the early 1960's. The container capacity of these ships was only in hundreds. Ships developed without cargo handling equipment were totally reliant on shore facilities. Manning levels were reduced to cut operating costs. By the late 1960's the 1st generation cellular container ships were in service in many parts of the world servicing many trade routes. Capacity had increased quickly and remarkably.

1st generation 1960 - 70's	capacity up to 1500 TEU
2nd generation 1970's	capacity 2500-3000 TEU
3rd generation 1980's Panamax	capacity 4000 TEU
4th generation 1990's Post Panamax	capacity 6000 TEU plus

The ship's speed increased from 15 knots in the 1960's to 25 knots in 1990. Steam turbines gave way to diesel as more fuel-efficient means of propulsion. Projects are in hand for ships of 18000 TEU but these have many constraints - port facilities, container handling equipment, water depth in port approaches, canals and main international waterways i.e. Malacca Strait. Modern deep-sea ships stow containers up to 9 containers high under the deck and up to six containers high on the deck. Transverse stow may be up to 17containers across. Coastal vessels may have up to three containers high stacked both above and below decks with up to five container units stowed transversely.

Typical Ship Sizes

Type	Container Capacity	Size Dwt	Length (m)	Draft (m)
Malaccamax	18,000	140,000	420.0	21.0
Post Panamax	8,428	104,715	340.0	14.0
Post Panamax	6,036	75,000	300.0	13.5
Panamax	4,229	57,904	294.0	12.6
Panamax	4,038	59,093	292.5	13.0
Handy Size	1,391	24,046	182.9	10.1
Handy size	1,038	17,445	152.1	12.7
Feeder	841	10,747	129.8	8.3
Feeder	333	5,344	118.0	6.0

Inland Waterway Transport: Container carrying barges developed from traditional self propelled river craft. New designs fitted with cell guides and hatch less openings. Ships' holds now box shaped. Wheelhouse on hydraulic elevating system facilitates forward vision and minimises air draft for passing under bridges. Pusher tugs can propel up to six barges ahead. Generally these craft will carry containers to a maximum of three high (no hatch tops) and two across. Flat top barges designed for containers or transporting trucks.

Intermodal Handling Facilities: Containers lifted by top corner castings only. Intrinsic strength of containers only in vertical line down corner posts, minimum lateral compression strength. Some older units fitted with fork pockets for forklift handling (20 foot full and empty, 40 foot empty only). Full containers are not to be lifted by wires without spreader - especially 40 foot. Swap-bodies normally lifted by grapplers from bottom, but some fitted with top lift castings or forklift pockets. Each node requires handling equipment specifically suited to that node.

Road transfer points or depots require:

- 30 tonne forklift trucks (top and bottom lift),
- 40 tonne reach stackers (top and grapple lift), and possibly
- rubber tyred gantries (lifting 1 over 3 by 3+1 lanes).

Rail transfer points require:

- Rail-mounted gantries (lifting 1 over 3 over a number of rail tracks), possibly reach stackers (40 tonne with both top and grapple lift).

Inland waterway transfer nodes require

- Reach stackers (40 tonne), barge loading rail mounted gantries (outreach of at least 4 wide, with top and grapple lift).

Deep-sea terminals require

- Rail mounted ship loading gantries (out reach up to 22 containers wide, 50 tonne capacity), combinations of rail mounted or rubber tyred gantries (up to 1 over 5 by 7+1 lanes).
- Forklift trucks and/or reach stackers for full containers, plus empty handlers to stack up to 8 containers high.
- Straddle carriers 40 tonne capacity stacking 4 high.
- Tractors and trailers

All gantries should be fitted with container spreaders, telescopic devices with swivel turntables and compensating devices for heavy ends. Some reach stackers should be similarly fitted. Fork trucks and reach stackers have very high axle loads of up to 120 tonnes requiring heavy-duty pavement.

Containers within terminals can be moved by gantries, straddle carriers, tractor-trailer combinations (including road trains). All movements are controlled from a central position either by computer or manual system. Some gantries are automated and rely on radio signals from central computers but there are no terminals yet that are fully unmanned. Straddle carriers use radio for transmitting locations to controlling systems, or they may be monitored by radar and transponder beacons. Differential GPS signals are used in some terminals, and in others buried wires or limit switches for positioning are used (mainly for gantry system). Containers are identified either by visual numbering systems, magnetic strips, or concealed microchips, depending on the level of terminal IT development.

Customer loading / discharging facilities may have some lifting equipment but unless they are a large operator this is unlikely. Delivery vehicles may have self-unloading capability – especially if the vehicle is a swap-body – but few vehicles are capable of handling containers. In normal procedures for units to remain on road vehicles they are positioned adjacent to the loading platform for either end or side loading. Swap-bodies designed for closed circuit operations may have landing legs to permit advance delivery and release of traction until collection is required.

Transport to inland terminals: Introduction of ISO containers produced demand for flat railcars to transport units from ports to **inland terminals**. Original railcars offered 20 foot capacity only, but soon developed 60 foot flat bed units capable of carrying 20 foot, 30 foot, 40 foot and 45 foot containers or swap-bodies. The maximum payload has increased to 90 tonnes. Some "well" or "pocket" units are in service to permit the carrying of containers that are over height. Spine wagons have been developed for carrying piggyback trailers. A range of specialist units is being developed for these trailers that are designed to swing open permitting trailers to be driven on to wagons.

Test Questions (3.1.8):

1. *Explain the different technologies of container transport, the kangaroo-system and the swap-body system!*

Answers: Indicate whether the answer is right / wrong or fill in!

a. Container transport are boxes which can only be transported by rail. (wrong)
b. Containers can be loaded and unloaded by gantry cranes and reach stackers. (right)
c. The kangaroo-system means the transport of empty containers by means of the forklift truck pockets at the bottom of a container. (wrong)
d. The kangaroo-system means the transport of semi trailers by rail wagons (right).
e. The swap-body system is widely used in sea transport (wrong).
- The swap-body system is a loading unit for road – rail-transport. (wrong)

2. *Which equipment is needed for sea-road-container transport?*

Cross the right answers:

- ISO-container (right)
- Any Sea-going-vessel (wrong)
- Roll-On-Roll-Off-Ship or container vessel (yes)
- Gantry cranes in the port (yes)
- Conveyor belts (wrong)
- Rail-wagon (wrong)
- Flat Container Trailer (yes)
- Closed Warehouse (wrong)
- Hooks (wrong)
- Rail Bogie (wrong)
- Berth (right)

3.2 Types and Specification for the Most Used Container

Leaning Objective:
The student should know the main types of containers and for which cargo they are designed for. He/she should have an understanding of the main parameters of a container and about its handling requirements.

3.2.1 Container Types, Dimensions and Payloads

Learning objective:
The student should know different container types, their loading capacities and their purpose.

ISO Standards:	Length	10, 20, 30, 40, 45 ft
	Width	8.5 ft
	Height	4, 8, 8.5, 9.5 ft
	Gross Weight	variable up to 35 tonnes

ISO = International Standard organization

ISO Standard containers:

Standard Box		BOX 20′ dimensions inside 590 x 234 x 239 cm payload ca. 22 to BOX 40′ dimensions inside 1203 x 234 x 239 cm payload ca. 26,5 to High Cube (40′) dimensions inside 1203 x 234 x 271 cm payload ca. 26,6 to For all kind of general cargo.
Open Top		Open Top Container 20′ dimensions inside 590 x 233 x 236 cm payload ca. 18,2 to Open Top Container 40′ dimensions inside 1202 x 232 x 233 cm payload 26,3 to Especially for over-height cargo.

Refrigerated Container		20´und 40´ also High Cube Electrically operated heating/cooling aggregate. Needs board or landside electric connection or "clip-on" diesel aggregate during land transport. For all temperature controlled cargo.
Platform		20' oder 40' For heavy lift or oversized cargo (not for land transport).
Flat Rack		Special open platform container, which is not closed on the top or eventually at the sides.
Open Side Container		Special container which is open at the sides Useful for cargo which should be loaded/unloaded from the side, e.g. paper rolls.
Tank Container		20' For the transport of liquid foodstuff cargo, e.g. • alcohol • fruit juice • sweet oil

Dimensions of ISO containers

Containers are always marked with their Tare and Gross weights on the doors. A 40-foot container will have an approximate weight of 3.5 tonnes and a maximum gross weight of approximately 28 tonnes. Road Haulage Vehicles carry 20-foot containers of up to 20 tonnes gross weight. In rail transport the maximum payload is increased to 90 tonnes.

The **most common sizes** in ft. are:

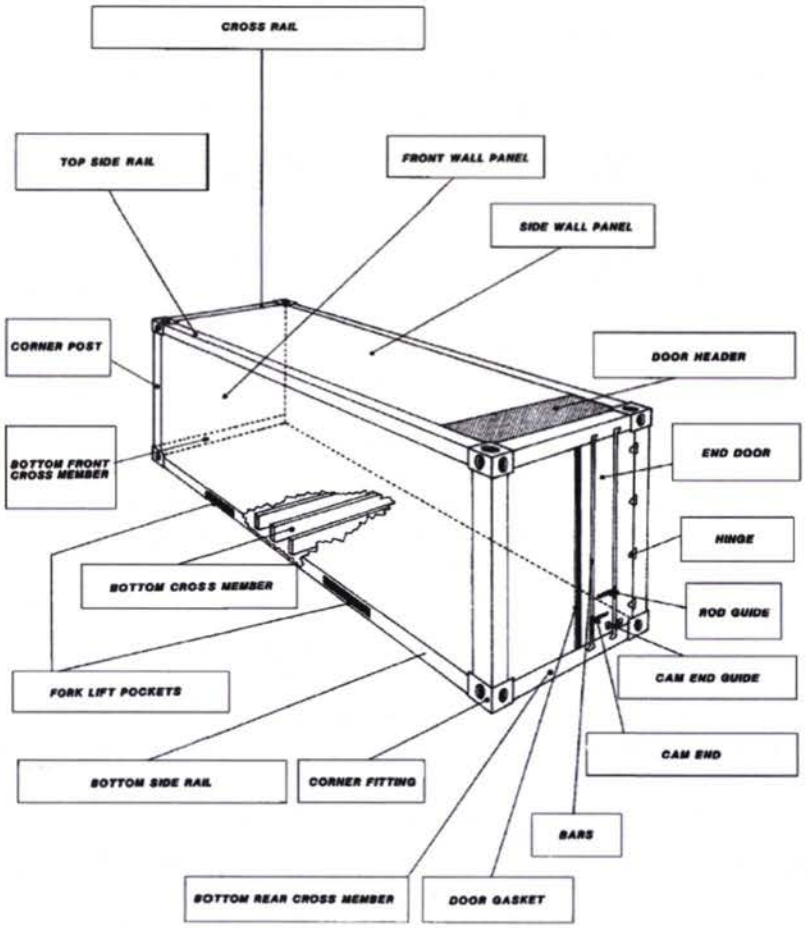
- in length: 20' (6,05 m) - 30' (9,12 m) - 40' (12,19 m) - 45' (13,71 m),
- in height: 8' (2,44 m) - 8' 6'' (2,60 m) - 9' 6'' (2,90 m), but the 8' type tends to make way for the other types, with all of them being 8' (2,44 m) in width.

These dimensions are bound to change: the 30' type accounts for only 1 % of the fleet, whereas the 45' type continues to develop.

Length	width	height			
	20'	8'	8'-8' 6''		= standard
	40'	8'	8' 6''-9' 6''	height of 9'6''	= high cube
	45'	8'	8' 6''-9' 6''	height of 9'6''	= super high cube

There are indications that in the USA, the number of 45 and 53-foot containers is increasing but there are difficulties with these units operating within European standards.

CONTAINER DISSECTION



Interactive Exercise

Indicate the following parts on the picture above:

- Corner Fitting
- Fork Lift Pockets
- End Door

Twenty Foot Equivalent Unit TEU

This is a measurement unit in container trade which is based on a 20' ISO standard container. So a 40' ISO Container is equivalent to two TEU.

Some cellular container vessels can carry several thousand Twenty Foot Equivalent Units (TEU). 4,000 TEU represents approximately 56,000 tonnes of deadweight capacity. A train can carry 30 - 60 TEUs while container ships carry 1500 - 4000/6600 TEUS

A container truck can carry 2 TEU, that is: 2x20'Container or 1x40' container.

Test Question (3.2.1)

1. Which container is suited for which cargo? Please indicate

20' Standard Box	Tank Container	Refrigerated Container	Bulk Container	Platform	Flat Rack	Open Side Container
Electronics	Palm Oil	Bananas	Sinter Magnesite	Building machine	Metal Coil	Paper Rolls

2. Indicate whether the answer is right / wrong or fill in!

What is the purpose of a temperature controlled container:

Answer:

- ☐ To transport heavy loads (wrong)
- ☐ To transport bulky goods (wrong)
- ☐ To transport cargo which must be cooled. (right)

3. What are the dimensions of a 40'-Container?

Answer:

- ☐ dimensions inside 590 x 234 x 239 cm (wrong)
- ☐ dimensions inside 1203 x 234 x 239 cm (right)
- ☐ dimensions inside 1203 x 234 x 271 cm (right)

4. What are corner fittings of the container used for?

- ☐ For handling with forklift trucks (wrong)
- ☐ For identification of containers (wrong)
- ☐ For handling with spreaders (right)
- ☐ For customs purposes (wrong)

5. What is the approximate payload of a 20' ISO container?

- ☐ 22 to (right)
- ☐ 20 to (wrong)
- ☐ 26 to (wrong)
- ☐ 18 to (wrong)

6. What does TEU mean?

- ☐ The European Union (wrong)
- ☐ Twenty Feet Equivalent Unit (right)
- ☐ Forty Feet Equivalent Unit (wrong)
- ☐ The Equivalent Unit (wrong)

3.2.2 Loading Gauge at Departure and at Destination

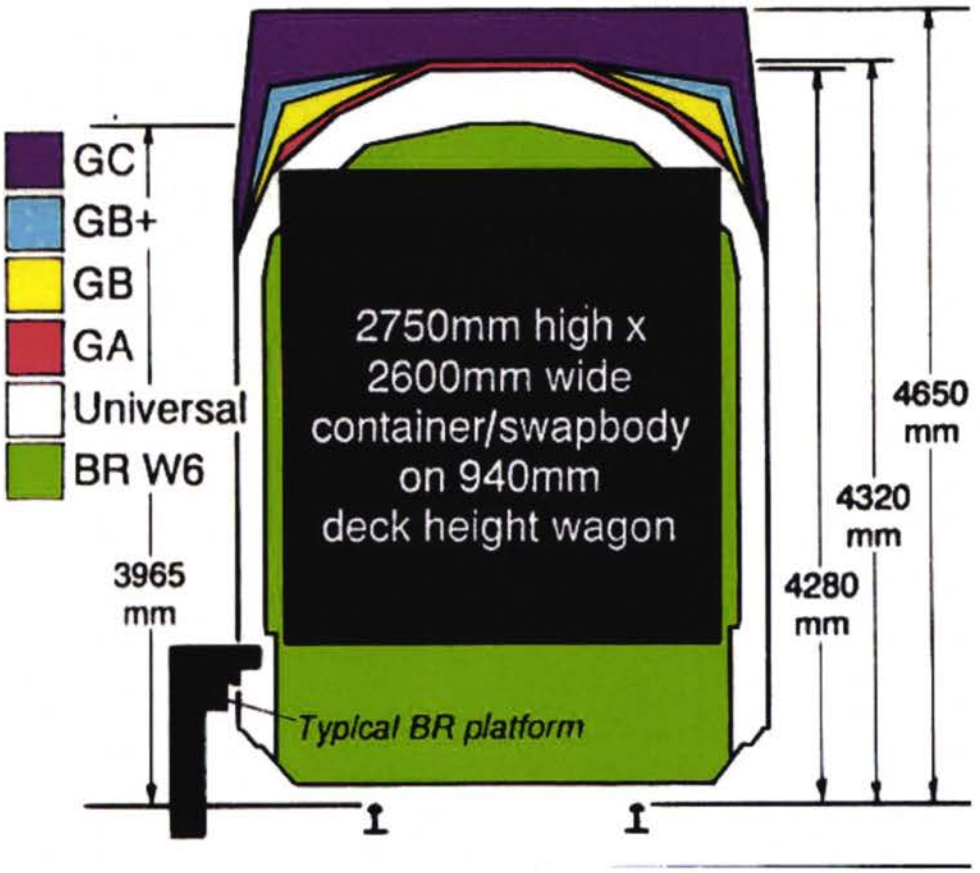
Learning Objective:
The student should understand what a loading gauge is. He/she should be aware that he/she must consider different gauges in international transport when transporting containers or oversized cargo.

The physical dimensions of a vehicle and its load are governed by a series of height and width profiles, known as loading gauges. These are applied to a given route, to ensure that a vehicle will not collide with a lineside or over line structure, such as station platforms, canopies, overhead power supplies, overpasses or tunnels.

Loading gauge profiles vary by route, reflecting the constraints on rail vehicle size caused by lineside and overline structures.

Historically, railways were constructed by separate companies, often to differing loading gauges. This is why it is very important to respect the different loading gauges alongside the route and to plan accordingly.

The picture below shows different West-European gauges.



This diagram shows how BR's obtruding platforms would present a problem in adopting the standard Continental width (line running through platform edge). Increasing the structure gauge to give extra height, for the GB+ loading gauge needed for unaccompanied piggyback or the GC gauge required for tractor-and-trailer piggyback, would be very expensive. The black box shows the SB1 loading gauge RfD has adopted for Channel Tunnel containers and swap-bodies. 'Universal' gauge is the West European standard for vehicles.

From Modern Railways, April 1992

Test Question (3.2.2.):

1. Indicate whether the following are right or wrong.

a. Loading gauge limits the weight of a rail cargo (wrong)
b. Loading gauge limits the height and width profile of a certain route (right)
c. There are only two gauges in Europe: the West-European and the Russian. (wrong)
d. Cargo exceeding the loading gauge can be transported with special permission and after careful planning of the route. (right)
e. You can get information about the different loading gauges from the different railroad companies. (right)

2. *Why is the loading gauge at the departure and the destination so important?*

a. Because it determines the physical dimensions of a vehicle and its load. (right)
b. Because it determines the wagons. (wrong)
c. Because it determines the maximum axle weight and the possible total weight of wagon and load. (wrong)

3.2.3 Identification Codes of Containers

Learning Objective:
The student should understand the contents and the objective of the identification code of a container.

ISO Numbering System
ISO standards require each container to have a series of identification marks and safety certification details.

The **CSC Plate** carries information showing amongst others, date of construction, load rating, and any repair information. In general, any container used for international transport must have a valid safety approval plate or "CSC plate". CSC is the abbreviation for Container Safety Convention.

For further details on Container safety see www.tis-gdv.de

The **Identification Marks** are fixed to the top and to each side of the container. These marks are;

(a) The owners code letters - a four letter code of which the last letter is "U" indicating that the marks comply with the ISO numbering code.
(b) The individual container identification number - a six-digit number followed by a check digit (sometimes outlined). This is a computer-generated number not sequential, which can be validated by a simple mathematical process. This ensures that the number has been correctly transcribed from document to document.
(c) A country code - a three letter code identifying the country of origin
(d) A size code - a two digit code indicating size
(combination of length + height)
(e) A type code - a two-digit code indicating the special characteristics of the unit.
(f) These latter two codes are *Examples*

OCLU 024263 0GBX 2000

OCLU	OCL	owners code for Overseas Container Line
	U	indicates ISO code in use
	GBX	GB - country of origin Great Britain (X is added to make up the three digit code)
	2000	20 - indicates a 20 foot long, 8 foot high container 00 - indicates a standard dry van container with opening(s) at one or both ends.

a) and b) are the so called **BIC-Code**, the international identification codes of container owners.

Other examples of the size type code are:

4332	40 foot long, 8.5 foot high, thermal container that can be heated or refrigerated
3277	30 foot long, 8.25-foot high, tank container for dangerous gasses maximum tested pressure 22 bar.

Additionally there are tare and maximum permissible gross weights for the individual unit marked on the door. There are many and varied internal dimensions depending on operator, with a wide range of special constructions for project cargo, bulk liquids, open top, open side, collapsible, refrigerated, insulated, and base flats.

More information can be found on www.bic-code.org

Test Questions (3.2.3)

1. What is a CSC-Plate?

a. a platform container
b. a plate for identification of container owner
c. a plate that shows the safety approval of a container according to CSC convention

(c)

2. *What does the BIC-Code consist of? Please indicate whether the answer is wrong or right.*

- ☐ owner's code (right)
- ☐ ISO code in use (right)
- ☐ 6-digit-identification-number (right)
- ☐ 10-digit-identification number (wrong)
- ☐ maximum weight (wrong)
- ☐ country of origin (right)
- ☐ container length (right)
- ☐ container type (right)
- ☐ container lessor (wrong)
- ☐ year of build (wrong)

3. *In how many countries is the BIC-code accepted?*

a. 120
b. 110
c. 65
(b)

4. *The BIC-Code guarantees that ……..*
Please indicate whether the following statements are right or wrong.

- ☐ the container number is unique (right)
- ☐ the owner can be identified (right)
- ☐ the freight charges can be calculated fairly (wrong)
- ☐ no further documents are necessary (wrong)
- ☐ container could be better controlled and monitored by customs. (right)

3.3 Loading Procedures in Container Traffic

Learning Objective:
The student should understand basic requirements for a safe loading of consignments into a container. He/she should be aware of possible damage arising from non-proper packing.

Loading Plan for Container

Shippers are very often unaware of the risk their goods or products can face in a container or swap-body when they are in transit between origin and destination. A manufacturing company that has little or no knowledge of the international shipping trade may believe that once their goods have been placed inside a container that they will be safe from damage. Unfortunately this is not the case,

as containers (or swap-bodies) can experience considerable violent acceleration and deceleration forces throughout their journey.

Not only are containers and their contents subjected to the normal motions experienced in normal road transport, but when used as a link in the inter-modal chain, they will experience rapid velocity changes in all three planes (sometimes simultaneously). The forces imposed on freight units during rail transport during shunting or switching operations can be violent and intense, but generally in only two planes, whereas those forces imposed by sea transport are generally less violent but of greater degree and in all three planes.

It is essential that goods packed inside containers are fully secured against movement, to avoid damage to the contents, and also to protect personnel when the unit is opened for discharge. Each different type of commodity (cartons, cases, loose items, heavy or hazardous goods) will require special stowage considerations and securing methods.

Container leasing companies may advise shippers how to stow their goods safely and securely in their containers, and some of the larger companies have a special department for this function, but the majority are amenable to lease containers or swap-bodies to a shipper without any information or stowage advice whatsoever. With the wide range of specialist containers in circulation, designed for different conditions and types of freight, it is essential that the container is packed properly.

You can find detailed advice for container packing in: Cont_pack.pdf

More advice can be found on www.imo.org

Case Studies: Stowage + Packaging of Goods in Containers

Incidents of Poorly Stowed Cargo in Containers:

a) A twenty-foot (6m) container with top loading hatches in addition to the rear doors had been filled with loose grain. With such a commodity a retaining fence and plastic membrane should have been positioned inside the doors to enable the doors to be opened safely without the contents moving. Unfortunately this had not been done as recommended and when a Customs Officer loosened the first door to check the contents, the weight of the cargo on the door forced it open and the majority of the contents was deposited on the ground, completely overwhelming the Customs Officer. Fortunately the truck driver was able to dig the Officer out before he drowned under the pile of grain.

(b) Before the general trend of constructing containers out of lightweight corrugated steel, the method of construction was that the corner posts were the main strength members of the unit, and the top, end and side panels were constructed from materials such as GRP, plywood or aluminium. One such container with aluminium end panels had been loaded with a large 1.8m diameter reel of electrical cable weighing 16 tons. The company that had loaded the cable reel had simply rolled it into the container, closed, locked and sealed the doors. The unfortunate truck driver (who had not been present when the container was loaded) soon became aware that there was something not quite right about his load. However, before he could take any action to stop and inspect the contents of the container, he was obliged to stop abruptly to avoid an accident. The result was that the cable reel burst through the front panel of the container almost crushing the cab of the truck.

(c) A Mercedes Benz "S" Class motorcar had been loaded into a 40-foot (12m) container, but instead of having the petrol tank drained for safety, the loading company had left the tank half full. Additionally the vehicle was only secured with short lengths of thin rope, instead of having the wheels chocked and also secured with ropes of the correct thickness and properly tensioned. In an incident in the container terminal when a straddle carrier was in collision with the container, the impact caused the car to break free of the securing lashings, and then as a result of the petrol leaking from the damaged tank, burst into flames. The Mercedes was damaged beyond repair.

(d) Containers are always marked with their Tare and Gross weights on the doors. A 40-foot container will have an approximate weight of 3.5 tonnes and a maximum gross weight of approximately 28 tonnes. (Although there are a limited number of containers with a gross weight of 35 tonnes in circulation with a Far East Company) A regular open top container had been loaded with small pieces of scrap metal in the USA for discharge in Europe.

The shipper had not understood that the commodity was a dense material and had therefore loaded the container until it was full to the top and could not hold any more scrap. The container was loaded safely in the USA but when the shore gantry had lifted the container clear of the ship's side the bottom fell out and all of the contents were dropped approximately 15 metres on to the wharf. Fortunately the port operated a strict safety policy and the access of all pedestrians - including dockworkers - on to the wharf when cargo was being worked was strictly forbidden. When all of the scrap was eventually cleared up it was weighed and the result was that the container with a payload of 24.5 tonnes had actually been loaded with 47.5 tonnes.

Two points for discussion:

(a) Did the shipper realise the danger of his actions and the possibility of injury or death by his actions, but did he not worry in his attempt to ship the maximum freight for the minimum cost?

(b) The container leasing company should have advised the shipper of the maximum payload permissible for that particular container and when they were advised that the cargo was to be scrap metal they should have taken steps to have it weighed as soon as possible after loading to ensure that the safe load was not exceeded.

Weight Limits (container and on transport modes)

When packing containers the weight limits of the container and the vehicles must be respected. Overloading can cause serious damage and accidents (e.g. falling out of the bottom when lifted).

Road Haulage Vehicles: Introduction of 20-foot containers of up to 20 tons gross weight put pressure on the haulage industry to develop trucks to carry such weights. Permissible axle loads have been increased to 8 tons per axle and gross vehicle weights have been increased to 40-44 tonnes. Different countries have varying regulations on truck construction requirements, but Europe is slowly harmonising. New designs of engines and transmissions for improving fuel consumption from 47 litre/100 km to 25 litre/100 km over 10 years are being developed.

Country	Max Vehicle Wt (t)	Max Axle Wt (t)	Max Vehicle Length (m)
Finland	48.0	8.0	25.25
France	40.0	10.0	16.75
Germany	40.0	10.0	18.75
Poland	42.0	8.0	18.75
Russia	36.0	10.0	20.0
Switzerland	28.0	10.0	18.75
UK	42.0	8.0	18.75

Rail Transport: Introduction of ISO containers produced the demand for flat railcars to transport units from ports to inland terminals. Original railcars offered 20 foot capacity only, but soon developed 60 foot flat bed units capable of carrying 20 foot, 30 foot, 40 foot and 45 foot containers or swap-bodies. Max payload increased to 90 tonnes. Some "well" or "pocket" units are in service to permit carrying of over height containers. Spine wagons have been developed for carrying piggyback trailers. A range of specialist units is being developed for these trailers designed to swing open, permitting the trailers to be driven onto wagons.

Test Questions (3.3):

1. *Which damages could occur during container transport and how should they be prevented?*

Consider the case and put the dangers and possible prevention measures which are relevant for each case into the right line!

Choose from the following possible dangers:
- danger of pressing contents out the door
- danger of over-loading, fall out of bottom
- danger of uncontrolled moving

Choose from the following prevention measures:
- proper lashing, chocking the wheels
- strict control of total weight allowed, e.g. by weighing
- retaining fence and plastic membrane at the front door

	Case	Danger	Prevention
1	Loose grain in 20'-container	danger of pressing contents out the door	retaining fence and plastic membrane at the front door
2	expensive car in a 40'container	danger of uncontrolled moving	proper lashing, chocking the wheels
3	high density metal cargo in a 40' container	danger of over-loading, fall out of bottom	strict control of total weight allowed, e.g. by weighing
→		→	
→		→	
		→	→

2. *You have to organize a road haulage of a 40' container (26 to payload) by truck from Italy to Germany via Switzerland. Consider limitations and choose options for multimodal transportation.*

What would be a correct solution?

Maximum vehicle load is 10 tonnes in Switzerland. Therefore I should use rail transport.

Maximum vehicle load is 28 tonnes in Switzerland. Therefore I should use combined transport. right

Maximum vehicle load is 28 tonnes in Switzerland. Therefore I should use inland navigation transport.

Maximum vehicle load is 32 tonnes in Switzerland. Therefore I should use road transport.

3.4 Geography of Container Traffic

Learning Objective:
The student should know main ports and main land and shipping routes for container transport. He/she should understand the concept of hub-and-spoke-systems in multimodal container transport, also in connection to feeder services. He/she should be able to give examples of hub-and-spoke-systems in the worldwide container trade.

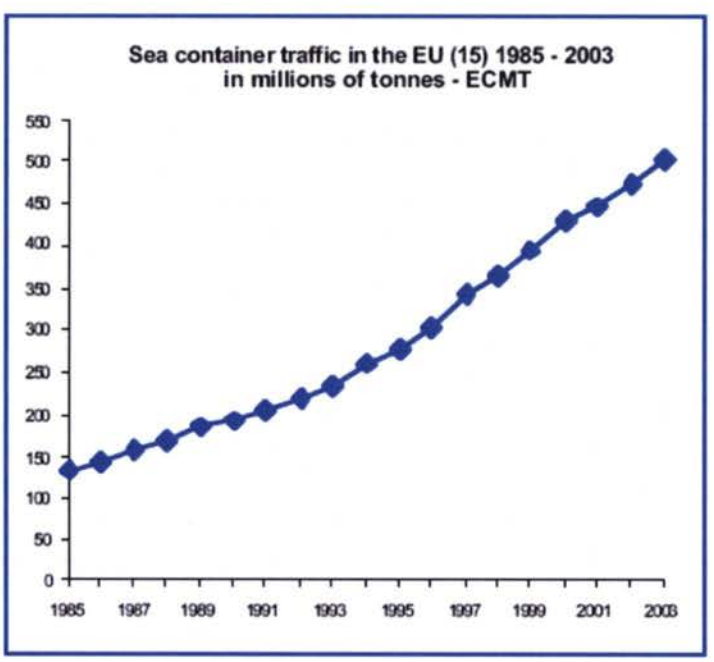
3.4.1 The Container Traffic in Europe and Worldwide by Sea

Learning objective:
The student should have an understanding of the development of container transport in Europe. He/she should know the most important container ports and shipping routes worldwide.

Container Traffic in Europe

Maritime container traffic is growing in Europe at a high level of up to 10% per year. This is a result of the globalization of the worldwide economies, especially of the Asian economies and their trades to Europe.

Less than 10% of the total maritime tonnage completes its journey with a land-based segment that uses a combined transport technique (as an alternative to road). The further growth of maritime container transport in Europe offers encouraging prospects for intermodal surface transport.



source: ECMT

Intermodal rail - road transport makes up about a quarter of the rail transport in Europe.

Intermodal transport that includes a waterborne section accounts for 5% of the river traffic (despite the current growth in waterborne container traffic).

For further statistical data on the development of combined transport see the websites of the International Union of Railways (**UIC**) www.uic.asso.fr/ and of the European Conference of the Ministers of Transport www.cemt.org.

For a more detailed study on intermodal transport in Europe see Annex 1 (RECORDIT project).

Intercontinental Container Traffic
The intercontinental container traffic is mainly seaborne container traffic. Since the beginning of container trade we have seen a steady increase in ship sizes and there is still no end. Container ships up to 12000 TEU are currently being discussed.

Growth in container ship size

Year	Average ship size (teu)	Largest ship in world fleet (teu)
1980	975	3.057
1990	1.355	4.409
2000	1.741	7.200
2004	1.999	8.100

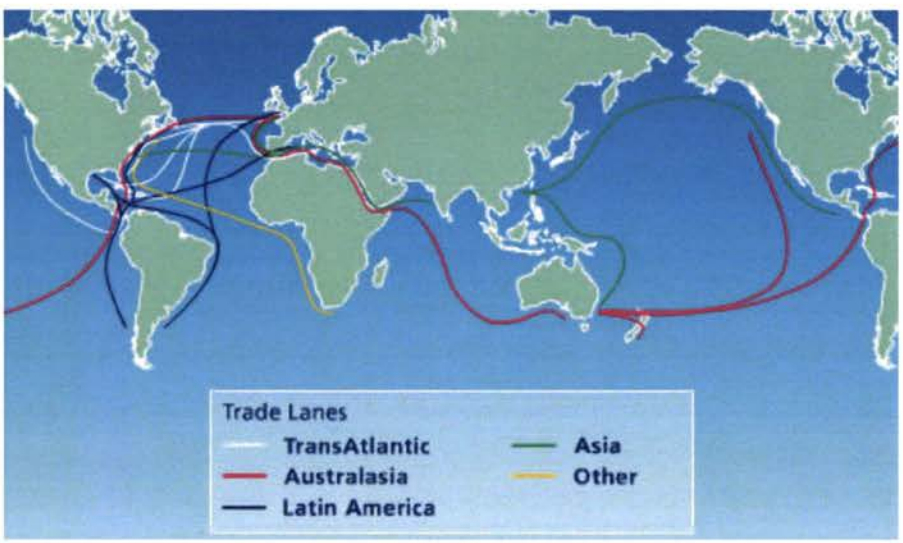
The Main container routes are:

Container growth (head-haul), 2004/05

	2003	2004	2005
Asia - N. America	9.9%	12.6%	7.9%
Asia - N. Europe	17.5%	16.5%	15.0%
N. Europe - N. America	1.0%	1.2%	1.0%

Source: Drewry container market quarterly

The chart below shows the main international ocean container shipping routes.



Source: www.cpships.com/

Shipping connections between Europe and the Traceca region can be found under www.hafen-hamburg.de in English and Russian.

The most Important Container Ports are:

Estimated transhipment volumes at important container hub ports, 2004

Hub ports	Region	Total Throughput (Teu)	Transhipment Estimate (Teu)	Estimated Transhipment Incidence
Singapore	SE Asia	21,340,000	17,314,636	81.1%
Hong Kong	Far East	22,021,000	6,661,463	30.3%
Shanghai	Far East	14,557,200	6,242,127	42.9%
Rotterdam	N. Europe	8,200,000	3,296,400	40.2%
Dubai	Mid-East	6,428,883	3,221,513	50.1%
Gioia Tauro	S. Europe	3,388,781	2,724,580	80.4%
Algeciras	S. Europe	2,937,381	2,487,609	84.7%
Hamburg	N. Europe	7,003,000	2,299,085	32.8%
Salalah	Mid-East	2,228,546	2,217292	99.5%
Antwerp	N. Europe	6,063,746	1,393,509	23.0%
Marsaxlokk	S. Europe	1,461,174	1,382,819	94.6%
Khor Fakkan	Mid-East	1,594,396	1,281,894	80.4%
Bremerhaven	N. Europe	3,469,107	1,056,394	30.5%
Piraeus	S. Europe	1,541,563	790,822	51.3%
Damietta	N. Africa	854,225	739,452	86.6%
Jeddah	Mid-East	2,425,930	531,188	21.9%

Source: Drewry Shipping Consultants Ltd

Test Questions (3.4.1.)

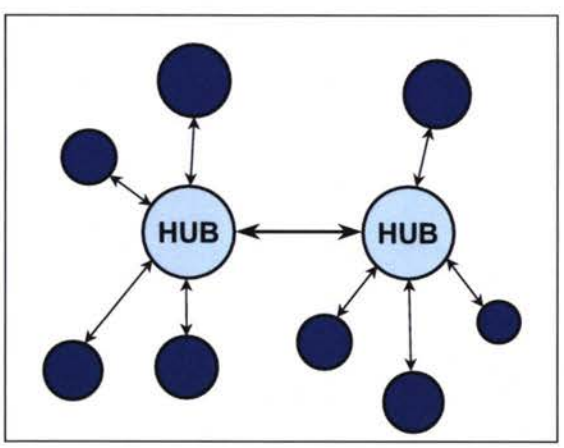
1. *Which main container hub ports do you know? Indicate whether the following are right / wrong.*
   a. Bremerhaven right
   b. Singapore right
   c. Kiel (wrong)
   d. Tallinn (wrong)
   e. Rotterdam right
   f. Port Said (wrong)
   g. Damietta right
   h. Salalah right
   i. Aden (wrong)
   j. Gibraltar (wrong)
   k. Marseille (wrong)
   l. Marsaxlokk right
   m. Shanghai right

2. *Which countries in the Traceca region could be called on by ships?)*
   a. Azerbaijan (right)
   b. Kazakhstan (right)
   c. Turkmenistan (right)
   d. Kyrgyzstan (wrong)

3.4.2 Hub-Spoke-System, Feeder and Landbridges

Learning objective:
The student should understand the principles of hub-spoke-systems, feeder services and land bridges. He/she should be able to explain the reasons for their development.

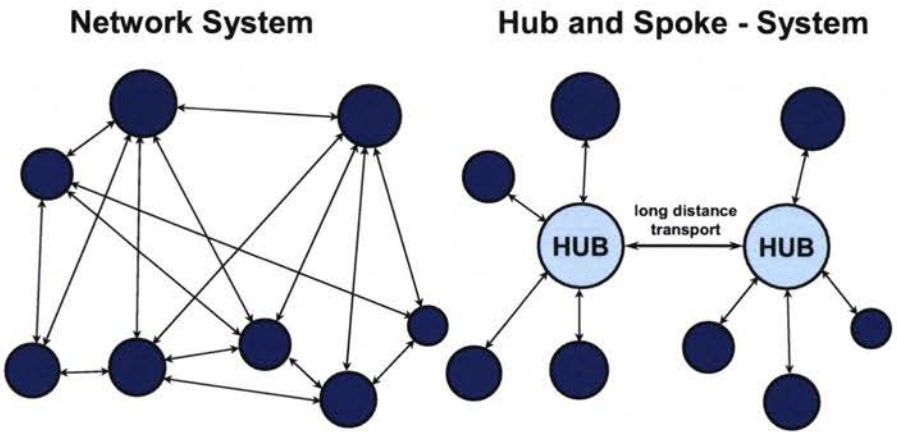
Hub and Spoke Systems: A special kind of network is the popular hub and spoke system. It consists of a central net-node, called "hub" and several small net-nodes. The hub is linked to all nodes of the network through "spokes".
The hub-spoke-system is applied in container shipping, parcel and express services, passenger and freight air services and also more and more in rail passenger and freight networks.



All transportation within the network is run over the hub. Therefore the haulage consists of two parts, [1) from spoke to hub (collection) 2) from hub to spoke (distribution)]. Integrators have built up global hub and spoke systems connecting between major first level hubs and from there to second and third level hubs. Cargo handling activities like sorting and re-delivery are carried out from hubs only.

The advantages of this system are:
3. less capacities to be provided than in other kinds of networks
4. (transport equipment and physical cargo handling facilities)
5. higher loading productivity by concentrating freight volumes

6. concentration of administrative- and communication facilities
7. minimised transaction costs and higher efficiency



Benefits of Hub & Spoke System

Economies of Density and Scale

The consolidation of freight flows on the spokes causes

- a better capacity utilisation,
- a better service through increasing of service frequency,
- less transit time,
- the possibility to use bigger, more economical freight vehicles,
- degression of the costs per unit.

Hub & Spoke means better service at less costs (up to 20%) !

Benefits of Hub & Spoke System

Additional service is possible

The Hub's can be used as freight centers and additional services can be offered:

- actual information about delivery status
- warehousing
- etc.

Increasing of service quality results in increasing trade and local demand!

Transshipment hubs have to have deep water, cranes that are able to load/unload the largest of vessels, and most importantly they must be located at a minimal deviation from the main east-west shipping route through the Mediterranean. CMA-CGM has summed up the "wish list" requirements for a transhipment hub as:

- Minimum deviation form the main trade lanes
- Good geographical location for weekly shuttle services
- A hinterland market
- Cheap port expenses for multiple calls
- Rail connections to inland Europe
- Immediate access to berth and cranes
- High productivity of at least 80 moves per hour for mother vessels

Deep-sea gateway ports handling origin / destination cargo must also have deep water and equipment for large ships, but in this case their proximity to the centres of population and industry is more significant.

Short-sea/intra-regional port (also handling origin / destination cargo) tends to have shallower water and in some cases have more basic handling facilities. Proximity to the centres of population and industry is again important, but these ports tend to serve either a smaller cargo market, or are located in more remote area's (e.g. within the Black Sea). These ports therefore see their traffic handled in smaller feeder vessels linking to transhipment hubs, or intra-regional traders linking with other short-sea ports.

Feeder Services:

Feeder services are transport services which connect a hub or main container port with other minor ports in one ocean range. These feeder services can be water based (ocean, river) or land based (rail, road). Feeder ship sizes vary from 300 to 2000 TEU while so called mother vessels on the main ocean leg can carry up to 9000 TEU.

In inter-modal operations well-defined and regular hub and spoke systems are in use. On some European rivers regular shuttle services operate between major industrial centres and coastal vessels are operating scheduled **feeder** services successfully between main hubs and out-ports. Such services will be increasingly important with the advent of still larger container vessels which will be restricting their calls to a very limited number of main ports.

Example: Hub ports in the Europe – US-Trade are Bremerhaven, Rotterdam; feeder connections to/from Baltic ports Petersburg, Kotka, Gothenburg, Gdynia

Deep-sea shipping: Deep-sea shipping is the most economical mode of transportation. Continuing increase in container ship size reduces operating costs substantially. Savings of USD 1000.00 per slot can be achieved on the Far East trade by utilising vessels with a capacity of 6000 TEU instead of 4000 TEU. The major cost element in long haul transportation is now contained in terminal charges at each end of the voyage. Increased use of transhipment at main-ports is raising the proportion of through-cost. The major savings are benefiting exclusively the main line carriers who can afford to invest the capital cost for ever larger container vessels. Most of these carriers are investing in private terminals to control the entire through-transport chain and for the same reasons are also absorbing **feeder** line operations.

Main line vessels are supported by **"feeder"** ships on coastal services with longer haul "handy-size" and "handymax" ships performing the majority of trade. Experiments are being carried out with vessels without hatches to minimise port turnaround time in both coastal and deep-sea trades. Other vessels have cell guides on deck to minimise container securing time and cost. Swap-bodies and demountables are only utilised in inland waterway modes. All deep-sea traffic is containerized.

Deep sea vessels- huge savings are made through the increase in ship size. E.g. 6000 TEU post panamax vessel has 21% cost advantage over 4000 TEU panamax – but only at full slot utilisation. However, economy of scale with bigger ships may mean lower frequency – reduced service, port constraints, bigger ships means greater costs if breakdowns occur. Big ships can only be filled by using increased transhipment of boxes – adds to cost.
To achieve full benefit only big operators can provide, a) ships, b) terminals, c) IT infrastructure, d) combined transport systems. The results are big ships on "round the world" or "pendulum" services between "mega hubs" being supported or fed by local **feeder** vessels. (**Hub & Spoke** operation)

Vessel Size	Frequency(Annual)	Volume (50 weeks)
5,000 teu	Weekly	250,000
10,000 teu	Fortnightly	250,000
10,000 teu	Weekly	500,000

Land Bridges
Land bridges are transport services between ocean ports at one coastline ("mini-bridges") or between two different coastlines ("land bridges"). Land bridges save transit time through less transport distance via sea. This is advantageous

for high value cargo, where less capital costs through less transit time compensates higher transportation costs.
Examples: Trans-Siberian land bridge, North American land bridge, Canadian land Bridge

Case Study "Dancing Clogs"

A company in Limerick in the Republic of Ireland received an order to supply 4000 pairs of traditional Irish dancing clogs to be delivered to the St Patrick's society in Odawara, near Tokyo in Japan. The weight of the consignment is 3,200kg and the cube is 22.0 cu. There is a requirement to speed the consignment through to the destination so the airfreight option was investigated, but as the receivers were an amateur dance team the cost was of great importance.

Option 1 – Airfreight Method (route A):

Day 1	*Transport from factory on shrink-wrapped euro-pallets to Dublin Airport by road truck.*
Day 2	*Pallets broken down at Air cargo Terminal and loaded into standard air freight containers (potential loss through pilferage, damage through mishandling, adverse weather as operation carried out on airport apron, minor damage not affecting contents but visual appearance of packaging).*
Day 3	*Air freight containers transported to London Air Cargo Centre for transfer to long haul cargo aircraft.*
Day 4	*Long haul transport by cargo aircraft*
Day 5	*Containers unloaded at Tokyo Cargo Centre and placed in warehouse. Containers unloaded and made available for collection (potential loss through pilferage, damage through mishandling, minor damage not affecting contents but appearance of packaging).*
Day 6	*Consignment collected in loose condition and delivered to consignees by road truck (potential loss through pilferage, damage through mishandling, adverse weather, minor damage not affecting contents, but appearance of packaging).*

Quotation from Airfreight Agent US $ 7225

Option 2 – Airfreight Method (route B)

Day 1	*Transport from factory on shrink-wrapped euro-pallets to Dublin Seaport by road truck. Truck loaded on to overnight RoRo ferry to Liverpool port in England.*
Day 2	*Truck departs Liverpool early morning and arrives London Air Cargo Centre early afternoon. Consignment unloaded and placed in warehouse. Goods remain shrink wrapped on pallets. Little likelihood of significant damage*
Day 3	*Pallets loaded on to long haul aircraft and transport commenced*
Day 4	*consignment arrives Tokyo Air Cargo Centre and unloaded in to warehouse.*
Day 5	*Consignment collected and delivered to consignees by road truck. Goods remain shrink wrapped on pallets. Minor damage to some packaging and 14 pairs of clogs missing. Insurance claim made against carrier.*

Quotation from Airfreight Agent US $ 6955

Option 3 – Sea freight Method (Route 1)

Day 1	*Shipping line 20 ft general purpose container delivered to factory for loading by shipper's employees. Damage risk – minimal. Road vehicle departs for Dublin and container shipped on overnight RoRo ferry to Liverpool.*
Day 2	*Container discharged from ferry and loaded to Rail freight train for shipment to Southampton Container Terminal. Unloaded overnight and placed in export shipment stack*
Days 3 – 5	*Container remains on quay awaiting arrival of next vessel for Tokyo.*
Days 6 – 42	*Vessel in transit via Rotterdam, Hamburg, Le Havre, Jeddah, Singapore, Manila, Hong Kong, and Kaohsiung.*
Days 43 – 46	*Container remains on quay awaiting customs clearance and collection.*
Day 47	*Container collected by road truck and delivered to consignees. Unloaded by volunteers from the St Patrick's Association. No damage to contents*

Quotation from Sea freight Agent US $ 1851

Option 4 – Sea freight Method (Route 2)

Day 1	*Shipping line 20 ft general purpose container delivered to factory for loading by shipper's employees. Damage risk – minimal. Road vehicle departs for Dublin.*
Days 2 - 7	*Container unloaded at seaport container terminal to await next feeder vessel for Southampton.*
Days 7 - 9	*in transit to Southampton via Liverpool.*
Days 9 - 12	*Container remains on quay awaiting arrival of next vessel for Tokyo.*
Days 12 – 48	*Vessel in transit via Rotterdam, Hamburg, Le Havre, Jeddah, Singapore, Manila, Hong Kong, and Kaohsiung.*
Days 43 – 46	*Container remains on quay awaiting customs clearance and collection.*
Day 47	*Container collected by road truck and delivered to consignees. Unloaded by volunteers from the St Patrick's Association. No damage to contents*

Quotation from Sea freight Agent US $ 1470

Source: Alan Duncan, Tacis Project: MBA in Intermodal Transport, Moscow 2000

Read the case study and discuss pros and cons of the different transport options. What would be your criterions to decide and which option would you have chosen?

Test questions (3.4.2):

1. *A hub-and spoke system is a (right / wrong)*
   a. network system which connects all lines via a central transhipment point (right)
   b. network system for distribution of bicycles
   c. container terminal layout concept
   d. special IT-network for order processing in parcel services

2. *The benefits of a hub-spoke-system are (right / wrong)*
   a. Less transport distance /km/
   b. Less transport costs /Euro/ton/ (right)
   c. Bigger main ship sizes possible (right)
   d. Less connections

3. *Why feeder services and hub ports gain more and more importance in container shipping?*
   a. Because larger container ships have higher fixed costs per day right
   b. Because larger container ships need to be utilized right
   c. Because the customer wants to use big hub ports
   d. Because outports can be connected to the main lines more easily right
   e. Because feeder ships can serve on direct lines between ports
   f. Because of economics of scale right

3.4.3 The Sea-Air-Transport

Learning objective (3.4.3.):
The student should understand that sea-air-transport is an alternative to pure air and pure sea intercontinental transport. He/she should understand the niche in which sea air creates benefit for the customer.

The MTO forwarding goods from Asia to Europe can choose the Air-Sea technique. This involves helping customers to take advantage of the best compromise between the factors of speed and cost:

- Time is saved during the air leg,
- Money is saved during the maritime leg.

This technique is situated therefore halfway between expensive all-air transport and slow all-maritime transport. So this technique helps by being faster and thus saving costs.

Example:
Linking Singapore and Antwerp with transhipment in Dubai. The Singapore to Dubai leg by ship and the Dubai to Antwerp leg by plane. The fact that the Dubai airport is located near the port facilitates this sea-air technique.
Sea Transit time from Singapore to Antwerp: Approximately 20 days
Sea Transit time from Singapore to Dubai: Approximately 10 days
Air Transit time from Dubai to Antwerp: 1 day
The time saved is approximately 10 days.

Test Questions (3.4):

Right or Wrong?

a. Sea Air transport is usually routed via Alaska and Russia. (wrong)
b. Sea-Air Transport means half the transit time via sea for half the price of air freight (right).
c. Dubai is a main sea-air-hub. (right)

3.5 Contracts and Pricing in Container Transport

Learning Objective:
The student should understand the components of a cost calculation for a multimodal transport chain. Different contractual options for seaborne multimodal container transport should be understood.
The student should be able to understand the basic concept of sea freight tariffs and should be able to make a basic calculation of sea freight.

3.5.1 Container Leasing

Learning Objective:
The student should understand the possibilities for hiring in containers from leasing companies.

Leasing of containers is an option for container operators and shipping lines in order to:

- increase the container park temporarily, especially for specialized containers (e.g. reefers etc.)
- save financial means (liquidity) for buying own containers
- avoid the transportation of empty containers and to adjust the container stock in certain relations according to imbalances.

In principle the following leasing arrangements are possible:

- one-way-lease
- round-trip-lease
- master lease arrangement
  = agreement with the leasing company with the possibility to give back a leased container at a destination where the shipping company faces an over-supply and to get new containers in case of under-supply

For more information on container leasing see http://www.iicl.org/

Test Question (3.5.1.)

Containers can be leased from (right / wrong).

a. Leasing companies (right)
b. Shipowners (wrong)
c. Banks (wrong)
d. Freight Forwarders (wrong)

3.5.2 General Contract Terms

Learning objective:
The student should know the meaning of the different commercial terms in container shipping. He/she should have an understanding of the different main types of contracts between intermodal carriers and merchants.

Different types of services and contracts

Whereas the shipping companies in the past where only concentrated on the transport of cargoes on the sea borne section, today's provider of maritime cargo transport services are offering a wide range of additional logistic services even in the inland transport. The following table shows some of the different service models

merchants haulage	Organisation of the pre- and post-carriage on the responsibility of the sender. The shipping company provides its own containers for an extra charge (equipment handover charge). The delivery and re-delivery of the container is not included. The sender has to conclude a contract of affreightment with the MTO.
carriers haulage	Organisation of the pre- and post-carriage on responsibility of the MTO. The sender is liable to provide the cargoes for loading within a defined time. The sender concludes only one multimodal transport contracts with an MTO.
mixed arrangements	All possible combinations of merchants and carriers haulage. For example: Organisation of the pre- and post-carriage on responsibility of the sender. The shipping company provides its own containers (for an equipment handover charge) on the point of loading.

FCL

Full Container Load

The full container is utilized and booked by the client.

Usually FAK or commodity box-rates apply (see 3.5.5)

LCL

Less than Container Load

Parcel Load which does not fill a whole container. Usually commodity rates apply according to W/M weight or measurement in carrier options. Forwarder-type-MTO consolidates high priced cargoes and books lower priced FCL.

Single vs. Service Contracts

To assure a constant amount of freight for the carrier/MTO and constant service levels and freight rates for the sender, it is common to conclude service contracts.

In these contracts the sender is liable to provide a minimum of cargo within an agreed period. On the other hand, the carrier/MTO guarantees constant freight rates and pre-defined service-levels for the agreed amount of freight.

Contents checklist for negotiating service contracts:

- name of the sender (handled confident)
- ports of shipment and destination
- destinations
- kind of freight or FAK (freight all kinds)
- contracts or scale of rate
- opening and final dates
- service liabilities for the shipping company/MTO
- additional agreements, sanction clauses

Minimum Bill of Lading

A **minimum bill of lading** - **minimum billing** or **minimum charge** - is often required in a freight service. In ocean freight, a minimum of usually 2 or 3 CBM (cubic meters) is required. The freight consolidator may specify the minimum requirement in a dollar amount, instead in CBM. In air freight, a minimum of usually 1 kilogram is required. If a consignment is light and small, it is more economical to ship by air rather than by sea considering the benefits of air freight. In road and rail freight, the minimum requirements vary widely among carriers.

Test Questions (3.5.2.)

1. *What does merchant haulage mean?*
   a. The shipper can use his own container.
   b. The carrier provides the container for the shipper. right
   c. The carrier organizes the inland haulage.
   d. The shipper organizes the inland haulage. right
   e. The ship owner organizes the inland haulage.

2. *What does LCL mean?*
   a. Loaded Container Lifted
   b. Less Container Loaded
   c. Less than Container Load right
   d. Parcel load which does not fill the whole container. right

3.5.3 Multimodal Container Transport Tariffs

Learning objective (3.5.3.)
The student should understand the cost structure of multimodal tariffs and the principles of pricing.

Cost Structures in Maritime Container Transport

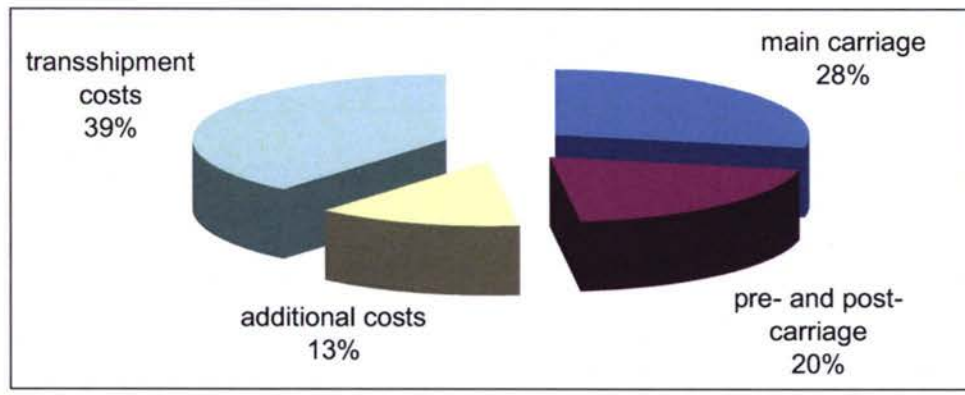
The cost structures in maritime container transport cannot be claimed to be transparent. In traditional liner shipping it was common to consider only the sea haulage as a cost factor.

Due to the expanding services provided by modern shipping companies/MTO´s this viewpoint has changed and today the entire container haulage from origin to final destination is defined as a cost factor. The following are different cost types:

costs of pre- and post carriage	• equipment handling costs • costs for rail- or road haulage or inland shipping on the pre- and post- carriage • costs for transport means in general
costs of transhipment	• loading costs • landing charges • terminal costs • warehouse-costs

costs of sea transport	• fuel costs • port charges • crew costs • insurance • depreciation • repair & maintenance costs
additional costs	• administration • sales and marketing • costs for IT and communication infrastructure

Figure 1: Costs Structure per TEU of an MTO (Trans Pacific Transport)



Source: Biebig, Althof, Wagener (2004)

Multimodal Container Tariffs
Multimodal Tariffs can be divided into segmented and integrated tariffs.

Segmented tariffs split the prices of the transport into five parts:

- pre-carriage,
- storage/transhipment in the loading port,
- sea transport,
- storage/transhipment in the unloading port, post-carriage.

Integrated tariffs declare the rates between two defined inland-points only without showing the costs for part performances.

Pre- and post-haulage
Charges for the inland haulage to the loading port and from unloading port to the final destination.

The rates for the inland haulage can either be published separately or integrated within the sea freight. Separate inland tariffs can be calculated on the basis of:

- chosen cities
- tariff zones (e.g. as European zone charge)
- postal-code lists (e.g. as ZIP-code)

THC (Terminal Handling Charge)

Terminal charges for the transhipment of the containers.
The calculation is made without any rebates and surcharges.

Surcharges and Rebates

The following table sums up common surcharges/rebates in maritime container transport:

surcharges	•	transhipment / feeder additional
	•	equipment additional, special container additional
	•	LCL-surcharge (LCL = less than container load)
	•	terminal handling charge, container handling charge
	•	surcharges for transport of non conference-owned containers
rebates	•	container allowances FCL/FCL-traffic up to 10% (FCL = full container load) FCL/LCL or LCL/FCL-traffic up to 6%
	•	rebates for using certain container terminals
	•	consolidation allowances
	•	volume rebates
	•	time-volume-rates
	examples:	up to 2,5 Mio. t freight/a = 5% rebate 2,5 up to 5 Mio. t freight/a = 7,5% rebate more than 5 Mio. t freight/a = 10% rebate
	•	service contracts

Case Study[3]

This case study will sum up the statements made before. To show the cost structure and rating systems, some member-companies of the TACA (Transatlantic Conference Agreement) where requested to carry a 20' container with 14 tonnes of books from Kiel (Germany) to Chicago (USA). The received calculation is shown in the following table:

cost component	amount
sea freight	USD 920
CAF (20% of USD 920)	USD 184
pre-haulage	DEM 445
THC (Germany)	DEM 333
THC (USA)	USD 420
post-haulage	USD 825
TOTAL (USD 1 = 1,75 DEM)	DEM 4.888

Test Question (3.5.3.)

1. Which main cost components should be calculated in a multimodal transport chain?

a. Fees for border crossing
b. Costs of pre- and post carriage right
c. Customs
d. Costs of transhipment right
e. Harbour fees
f. Costs of sea transport right
g. Additional costs (e.g. administration) right

3.5.4 Haulage Rates (inland charges)

Learning Objective:
The student should have a general understanding of inland charges on seaborne container transport.

Typical Inland charges

Source: Mediterranean Container Ports and Shipping, Drewry Shipping Consultants Ltd).

[3] Pawlik (1999), S. 66.

The following charges are discussed:

- Loading / discharge of transhipment containers (per 20ft and 40ft units)
- Loading / discharge of origin/destination containers (per 20ft and 40ft units)
- Other moves (including restows via quay and ship; special gear; hatch cover moves)
- Lashing charges
- Storage/warehousing activities (including free storage periods; reefer charges)
- Stuffing/unstuffing activities
- Overtime

Table Typical Mediterranean container handling charges (US$)*

	Charge per Move		
	Least expensive	Average	Most Expensive
Transshipment Containers (Load or Discharge)**			
20ft Full	20	55	107
20ft Empty	15	50	107
40ft Full	33	55	133
40ft Empty	21	50	133
Origin/Destination Containers (Exports)***			
Loading 20ft Full	57	110	187
Loading 20ft Empty	30	69	147
Loading 40ft Full	57	110	367
Loading 40ft Empty	30	69	187
Origin/Destination Containers (Imports)***			
Discharging 20ft Full	90	135	187
Discharging 20ft Empty	30	69	147
Discharging 40ft Full	90	135	367
Discharging 40ft Empty	30	69	187

* Based on port or terminal tariffs, not including storage charges

** Covers vessel to yard stack (or vice versa)

*** Covers vessel to yard stack to vehicle (or vice versa)

Table: Typical container storage charges (US$ per teu per day)*

	Least expensive	Average	Most Expensive
Free storage period	20 days	5-10 days	No free days
Origin / destination cargo	$7	$10	$12
Transshipment cargo	$8	$16	$39.5

* After free storage period

Table: Typical miscellaneous handling charges

Service Type	Charge per Move		
	Least expensive	Average	Most Expensive
Restow via quay	USD $ 27	$57	$95
Restow on board	$22	$52	$85
Special gear*	+55%	+50%	+200%
Hatch cover moves	$27	$52	$367

- Special gear charges are a surcharge on the relevant size of the unit handled (for example 20ft or 40ft)

Table: Typical container stuffing / unstuffing charges (US$)

	Least expensive	Average	Most Expensive
20ft container	50	70	130
40ft container	85	140	234

Table: Typical reefer box charges (US$)

	Least expensive	Average	Most Expensive
Charge per reefer unit	25	31	70

Table: Typical lashing charges (US$)

	Least expensive	Average	Most Expensive
Charge per unit	8	10	15

Overtime charges: Overtime is paid whenever a service is carried out outside the terminal's normal working hours (for example) public holidays or weekends. The rates vary from 50% to 100% uplift on all the vessel and landside operation charges.

Inland Transport Links: Good quality, competitively priced road and rail access is clearly very important for gateway ports.

Typical inland distribution costs, Iberian ports to/from Madrid (US$)

	By road		By Rail	
	20ft	40ft	20ft	40ft
Bilbao	640	640	250	385
Algeciras	1085	1085	360	495

Source: Drewry Shipping Consultants Ltd.

Test Questions (3.5.4)

1. Typical inland charges are. Please indicate whether the statements are correct or incorrect.

a. Storage/warehousing activities (including free storage periods; reefer charges) (right)
b. Sea freight
c. Loading / discharge of transhipment containers (per 20ft and 40ft units) (right)
d. Airfreight
e. Loading / discharge of origin/destination containers (per 20ft and 40ft units) (right)
f. Paper and Stamps
g. Overtime (right)
h. Communication charges

3.5.5 Ocean Freight

Learning Objective (3.5.5.):
The main rating concepts and most important surcharges in ocean freight should be understood.

Rating Concepts

Basically the calculation of a sea freight rate can be executed in two different ways, as FAK-rate (freight all kinds) and as commodity-based rate.

FAK-rates

To calculate an FAK-rate, the total costs for running a container line (including pre- and post-carriage) are divided through the planned amount of transported TEU´s. The result is the Break-Even per TEU. The freight rate per TEU results if a profit mark-up and possibly a risk mark-up is added.

The problem of FAK-rates results from the equal transportation-charge for low- and high-valued cargoes in the selling-price calculation. But the senders must

be assured, that the money they pay will not drive the price of their goods above the competitive level of the markets where they trade. So for certain commodities a transport to actual costs of transportation is not possible.

Commodity-based rates

Facing this problem, the shipping companies have no choice but to set rates that permit the movement of low-valued commodities even if this means that the carriage is performed at a financial loss to the company. To offset this difficulty, the only solution is to set rates for items of high value which will absorb the loss incurred on the low value commodities, which means a cross-subsidisation.

The ongoing containerisation has lead to a decrease in shares for commodity-class based price differentiation systems. Distance-, time-volume- and zone-based rates are of increasing importance.

The employed rating concept depends on:

- the level of homogeneity of the freight volume
- the level of containerisation
- concentration ratio of supply and demand (i.e. impact of shipping conferences)
- pricing policy of alternative carriers (rail-, road- haulage, inland shipping).

Comparative container rates for average products (in US$)		
	20'	**40'**
To North-European sea port		
• Indian subcontinent (average East/West)	3700	5200
• Pakistan	3650	4800
• *Central America*	2700	5200
• Southern Africa	3000	5800
• Eastern Africa	3000	6300
• Western Africa	3200	5000
To US port		
• Indian subcontinent (average East/West)	4300	8000
• Pakistan	3900	7400
To Middle East (Dubai)		
• Indian subcontinent (average East/West)	2800	3900
• Pakistan	2650	3750
To Far East		
• Indian subcontinent (average East/West)	2200	4300
• Pakistan	2075	4150

(source: Regional Transport and Transit Facilitation Workshop, Bangkok 19-21 April 1999: Containerisation, Logistic Cost and Facilitation (less documented aspects of an old theme), Carlos F. de Castro, March 1999 - United Nations - ESCAP, World Bank

Surcharges on the basis of ocean freight are (the most important):

Currency Adjustment Factor (CAF)

In times of unstable currency, the freight rate is often quoted with a **currency adjustment factor** (CAF) to cover an additional charge for currency appreciation. The CAF, if any, is indicated on the bill of lading. The tariff of most international carriers uses the U.S. dollar as the basis of the freight cost calculation. The CAF allows for fluctuations in the value of the dollar against the currency in which the carrier earns its revenues.

Bunker Adjustment Factor (BAF)

The term **bunker** refers to oil. It may also refer to a compartment on a ship for storing fuel, that is, oil in modern ships and coal in old-time steamships. In times of unstable oil prices, the freight is often quoted with a **bunker adjustment factor** (BAF) to cover an oil price hike. The BAF, if any, is indicated on the bill of lading. The BAF allows for fluctuations in the cost of oil.

Test question (3.5.5.)

1. *Sea freight includes. Please indicate which are correct.*
   a. terminal handling
   b. depreciation of the ship right
   c. customs duties
   d. crew costs ship right
   e. loading and discharging of the cargo ship right

2. *What is the difference between FAK rates and commodity box rates?*
   a. FAK is a uniform rate per container right
   b. FAK means freight as known
   c. commodity box rates are class rates, e.g. for certain articles USD / kg
   d. commodity box rates are rates per container and per commodity class right
   e. FAK means freight all kind right

3. *Put the right explanation to the relevant surcharges! Indicate the correct answer.*

BAF	Additional for oil costs
CAF	Additional for exchange rates
THC	Additional for landside handling costs
LCL-Surcharge	Additional for less than full container loads

3.5.6 Way - Bills and Accompanying Documents

Learning objective:
The student should know waybills as a transport document and he/she should know the difference between a waybill and a Bill of Lading.

Air Waybill: Loading and unloading are not considered to have finished until the carrier has received the waybill on board, either with or without reservations, and having been duly signed by the shipper, the consignee, or a person designated by them. The airline (#1) – the carrier – is the principal contact that the freight forwarder has, since it is through the airline that the freight forwarder is going to "negotiate" their prices according to the importance of the traffic that they can offer, in terms of volume and of weight, while at the same time respecting the constraints and time limits of their customers. In this way the freight forwarder organises the transport operation with the airline by choosing the best possible routes both in terms of speed and security. They must give the airlines all the necessary information concerning the goods to be transported, their packing and their destination. As soon as they have chosen a carrier this latter will give them the information necessary for the shipment, that is to say the AWB (Air Waybill) number, the document which represents prima facie evidence of the air transport contract, as well as the flight number. They will then prepare the drawing up of the AWB while at the same time informing their customer of the dates and times of departure and arrival at the destination airport. The airline will the be able to confirm that the goods were in fact loaded on board and that they flew, or did not fly, on the booked flight.

Sea waybill: It is a simplified document set up by the shipping lines in the early 80's. As on the one hand ship movements are getting faster, while on the other hand document transmission (typical for traditional Negotiable Bill of Lading) has remained slow, the goods very often arrive before the documents required for delivery at the destination. This hindrance can be avoided by means of a sea waybill, which actually enables the goods to be delivered to the consignee named in the document. The latter then may – by proving his identity - take delivery of the goods without producing any title. This document is not a title to the goods and thus may not be negotiated.
The information on it is used to identify the goods loaded as well as the name of the person to whom they will be delivered. A significant gain of time is recorded upon the goods arrival; the consignee can collect them as soon as they arrive, thus saving demurrage or warehousing costs.

EDI (Electronic Data Interchange) transmission: Faced with the need for fast document transmission, the shipping lines have computerised the completion of sea waybills. The sea waybill is transmitted to their agent at destination by means of EDI; when the computer receives it, the document printed is used as a notification of arrival. One single copy used as a receipt for the shipper is then completed; it is the non negotiable "Data Freight Receipt", a.k.a. computerised bill of lading.

Test Questions:

1. *What is a sea waybill? Please indicate which is correct.*
   a. Document for sea transport right
   b. Full negotiable
   c. Bankable
   d. Simplified in comparison to bill of lading right
   e. Can be transmitted electronically right

3.6 Multimodal Road-/Rail-Transport

Learning Objectives:
The student should know possible technologies for multimodal road/rail-transport. He/she should know main stakeholders in this field of transport and should be able to explain basic organizational and contractual conditions.

3.6.1 Technologies: piggyback, swap-body, roadrailer, terminals

Learning objective:
The student should know the main technologies of multimodal road/rail-transport and their benefits.

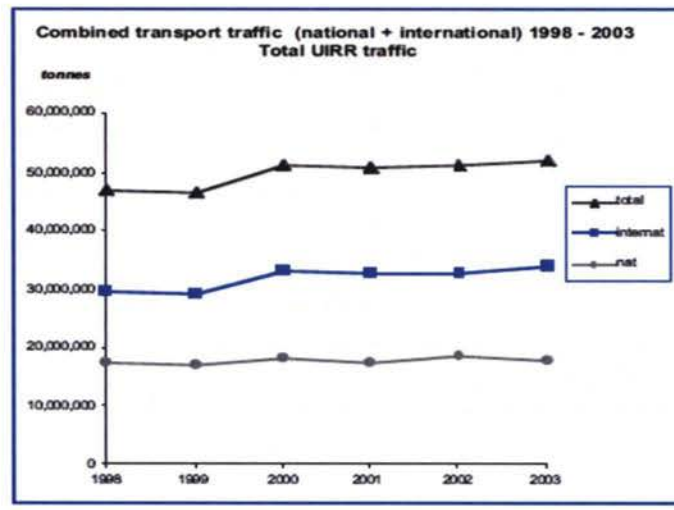
(source: CNT Transport / Europe: Bulletin of the Observatory on Transport Policies and Strategies in Europe: Intermodal Transport in Europe, Double issue Nos.13-14, April 2005)

Types of transport

Within the generic group of combined transport operators, the family of operators composing the members of the UIRR (Union international rail - route or International Union of Combined Road - Rail Transport Companies, whose businesses mostly came from the road transport world, see www.uirr.com) is the largest: it transports about 4.5 million TEU[4], that is, about 50 million tonnes.

[4] Traffic volume is calculated by translating all types of traffic units (containers, swap-bodies, trailers) into the equivalent number of twenty-foot ISO containers, the TEUs (Twenty-Foot Equivalent Units).

Two-thirds of this traffic is international transport (serving especially the hinterland of maritime ports), and one third is national transport, whose proportion is tending to decline because the distance at which intermodal transport is competitive in relation to road transport is becoming longer.



Source: UIRR

The technique of the rail motorway (sometimes called the 'rolling road' method), which consists of putting the whole road vehicle (including trailer) on a train, together with its driver, contributes to about 20% of the land-based intermodal traffic, and concerns only the Channel crossing and Alpine passes. Among the remaining 80%, that is, "unaccompanied" intermodal transport, four-fifths consists of "boxes" (containers and swap-bodies) and only a fifth by special trailers, a technique in decline today (as it is too in the United States).
Road-Rail combination/combined transport possibilities:

- Swap body
- Semi-trailer
- Kangaroo-system
- Road-railer

The possible road-rail combination can be divided into two groups dependant on the engine. When the engine and loading unit are divided we speak of non-accompanied combined transport. When the engine and loading unit stay together it is considered accompanied combined transport.

Non-accompanied transport / about 81% of road-rail transport in Germany

- Swap-body
- Semi-trailer
- Road-railer

Accompanied transport / about 19% of road rail-transport in Germany

- Kangaroo-system

Reason for using road-rail transport. There are several reasons which must be considered as advantages for road-rail transport.

Economic reasons

- More effective use of equipment; instead of truck engines which are producing costs, loading units which are earning money are moving.
- More transport capacity, as lorries going to or coming from a combined-terminal are outside legal restrictions (rolling at night, holiday and week-end). Furthermore permitted transport capacities are higher (44 tonnes instead of 40 tonnes)
- Low personal costs as no truck driver is necessary / for accompanied transport, train time is not considered as driving time
- Partly tax reductions and franchises
- Fixed time-tables do turn transport time into a known variable/reliable system
- Plan exits for liberation of vignettes

Security reasons

- High security standards, low damage rate of loading
- Tracking and tracing systems locate loading

Ecological reasons/road traffic reduction

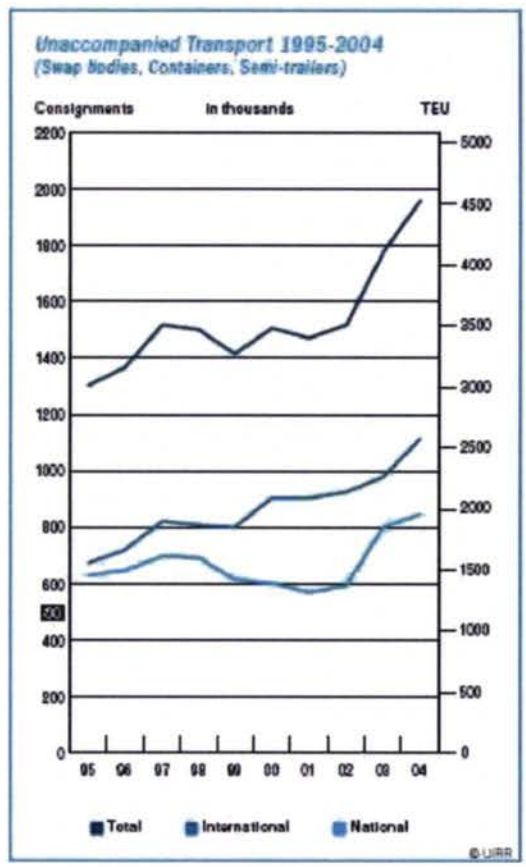
- Reducing noise and air pollution
- Bringing traffic from road to rail (making space on the road for other road traffic)

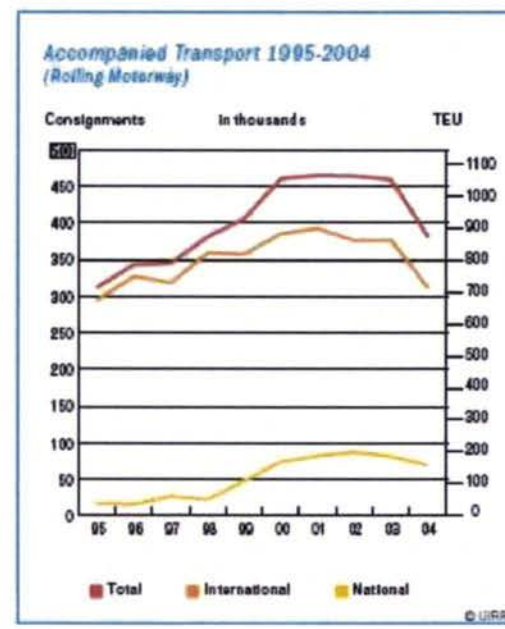
Developments: Looking at the load development of different road-rail systems (except road-railer), swap body/containers on the UIRR level are maintaining a leading position with 69%. The kangaroo-system has increased up to 22% during the past few years.

Chart 1: Combi Modes in 2004 International Traffic (UIRR 2004)

Techniques	Total UIRR	
Semi-trailers	126 954	9%
Swap bodies and containers	987 410	69%
Rolling Motorway	312 329	22%
SUM in consignments	**1 426 693**	**100%**
SUM TEU	**3 281 394**	**100%**

Chart 2: UIRR Traffic Development (UIRR 2004)





Terminals and train connections

Terminals are connecting points which must have a high efficiency for making road-rail transport of interest. In Germany either private companies or the German Rail is running terminals. Efficiency depends mainly on location, organisational matters and transhipment equipment. Basically two kinds of transhipment equipment is used.

There are a variety of train operating systems throughout Europe. The most common ones are:

- **Shuttle trains**: direct trains with a fixed composition (number and type) of rail cars operated in a loop between terminal A and terminal B.
- **Y-shuttle trains**: part trains with a fixed composition of rail cars starting at terminal A and continuing, after separation into two rail car sets, like a fork towards two different terminals B and C.
- **Block trains**: direct trains between terminal A and terminal B. The composition of the train or the rail cars is not fixed.
- **Part trains**: train composed of sets of rail cars with two or more destinations: the composition of the train is not fixed.
- **Linertrains**: travelling like passenger stop trains, the boxes are loaded and unloaded in a sequence of terminals.
- **Short lines**: trains travelling over short distances and serving as feeders for major train links; widespread system in the USA
- **Circle train**: specific kind of short line train discussed in Germany but not yet implemented; feeder train serving a number of small terminals running, in some cases, in a circle.
- **Single rail car train**: the intermodal rail car is annexed to a conventional freight train.

Test Questions (3.6.1.)

1. *Which technologies for combined road/rail-transport do you know? Please indicate which are correct.*
   a. Swap-body right
   b. Mafi-Trailer
   c. Fork Lift Trucks
   d. Semi-trailer right
   e. Rolling Motorway right

2. *Compare the kangaroo-system with the swap-body system in economic terms. Which system is suited best under which conditions? Link to the correct answer.*

System	Conditions
Swap-body	Existing network of forwarders which cooperate in combined transport
	Terminal handling equipment needed
	Loading unit can be used for storage
Kangaroo	No partner for trucking on the delivery side available
	No special terminal handling equipment

3. *What are the benefits of combined road/rail-transport? Please indicate which are correct.*
   a. More effective use of equipment right
   b. More transport capacity right
   c. Less transit time
   d. Low personal costs as no truck driver is necessary right
   e. Partly tax reductions and franchises right
   f. High Flexibility
   g. Just-In-Time-Service better than by road
   h. Liberation of vignettes right

3.6.2 Combined Transport Operators and Services

Learning Objective:
The student should understand that in Europe combined rail-road transport operators are privately organized companies. He/she should be able to name some of the reasons and measures for promotion of combined transport.

(source: CNT Transport / Europe: Bulletin of the Observatory on Transport Policies and Strategies in Europe: Intermodal Transport in Europe, Double issue Nos.13-14, April 2005)

Operators

Throughout Western Europe privately organised companies are acting on national and international levels offering services in combined transport road-rail. In Germany the company is called KOMBIVERKEHR. These companies are organised on an international level in the "Union Internationale des sociétés de transport combiné (UIRR)". See www.uirr.com

Following please find an overview of members.

Adria Kombi	Slovenia	Kombiverkehr	Germany
Bohemiakombi	Czech Rep.	Novotrans	France
Cermat	Italy	Ökombi	Austria
Combiberia	Spain	Polkombi	Poland
Crokombi	Croatia	Portif	Portugal
C.S. Eurotrans	Slovakia	SWE-Kombi	Sweden
CTL	Great Britain	T.R.W.	Belgium
Hungarokombi	Hungary	Trailstar	Netherlands
Hupac	Switzerland	Associated member Nouvelle de Conteneurs (France)	CNC Compagnie
Kombi Dan	Denmark		

The entry onto the market of new operators has not had the dynamic effect for which many had hoped. Traditional operators (Kombiverkehr, Hupac, Cemat, Ökombi) are still playing the main role, while the volume shipped by the international cooperative organisation ICF is in decline.

The international traffic of the UIRR operators

TEU	**1999**	**2000**	**2001**	**2002**	**2003**
CNC, Vincennes	156 794	146 584	131 491	117 429	103 436
Cemat, Milano	304 187	343 607	366 743	405 927	504 566
Combiberia, Madrid	25 207	30 227	26 839	29 391	31 542
Hupac, Chiasso	424 099	531 438	514 089	497 794	562 219
Hupac, Rotterdam	56 448	60 663	73 048	78 465	84 930
Kombi Dan, Padborg	8 938	12 475	14 288	14 902	12 749
Kombiverkehr, Frankfurt	818 770	862 121	857 424	869 682	947 591
Novatrans, Paris	174 426	177 730	167 360	171 716	154 207
Okombi, Wien	307 295	342 169	381 779	416 562	389 839
Polkombi, Varsovie	26 034	26 098	10 512	854	0
Rocombi, Bukaresti		725	501	232	9
Swe-Kombi, Helsingborg	16 555	17 234	18 547	8 646	0
TRW Brussels	126 660	132 818	139 794	148 582	144 234
TOTAL TEU	**2 445 412**	**2 683 888**	**2 702 415**	**2 760 181**	**2 935 321**

Source: UIRR

The trends in international intermodal traffic are diverging between French operators (a drop of 22% in 4 years) and the other operators as a whole (an increase of 27%; CEMAT alone + 66%).

Difficulties and trends

Intermodal transport faces some real problems. Operators are generally under-capitalised or in deficit, therefore unable to invest in and develop an activity of low profitability. The cost structure is often poorly understood; the division of business receipts and public subsidies between the various elements of the total costs, i.e. between infrastructure, traction, provision of wagons and traction units, multimodal railheads, handling, purchase of materials, etc, is not clear.

The justification for intermodal transport is more often made in socioeconomic terms (referring to external costs) than in financial terms (the profitability of the operators); the 'rail motorway' for example cannot survive without a considerable level of subsidy. The regulations on using the rail network, whether concerning the tariff structure or the allocation of track paths between the different types of traffic and operators, pose an additional problem. The succession of European directives since 1991 shows the difficulty there is in reforming the system and making it work better. Finally, shippers complain that the punctuality of both rail and rail-road transport is poor. In commercial terms, it is evident that customers who have been disappointed with the failings in the system will not return willingly. However, the success of intermodal solutions in certain countries and on certain rail lines shows that the right conditions for it can exist in Europe.

Measures to Promote Combined Transport

In **combined transport**, the rail companies' main customers are the **operators**[5], who currently handle some 90% of such transport. Over the years, they have perfected the technical and organisational aspects of combined transport in collaboration with the rail companies, and have caused significant transport volumes to pass from road to rail. This has enabled the rail companies to handle dispatches in a much more economical fashion, with full trains. The UIRR

[5] In combined transport, the operators constitute the link between the forwarder and the rail companies. They organise transport and transhipment capacities for the road-rail transport chain between the forwarding and reception terminals, or in door-to-door transport. Comparable to wholesalers, they buy from the rail companies complete trains or the means of traction for their own wagons, and sell the various transport capacities/wagons to their own customers. They thus fulfil the basic conditions of combined transport, accumulating different individual road transport dispatches into transport volumes that can economically justify rail transport

member companies alone hold a market share of about 65%, routing loading units equivalent to about 5 million standard units (TEUs), or to the daily transhipment onto the railway network of 9,000 long-distance road transports.
In this connection, a series of targeted **promotional measures** have been put into application, to good effect. These have enabled transport policy to support the development of combined transport at the national and European levels, while broadly complying with the rule of cost neutrality. Support for CT is based mainly on Directives **92/106** and **96/53** and includes derogations for road vehicles used for the positioning legs before and after rail transport.
The following is a brief survey of the principal promotional measures:

- **Exemption from road tax:** In accordance with the European Directive, road vehicles primarily engaged in the first and last legs of combined transport operations must be completely or partially exempt from road tax. This solution prevents the over-burdening of transport with infrastructure taxes, since a rail infrastructure utilisation fee already has to be paid in connection with combined transport. Additionally, these vehicles generally only cover very short distances.
- **Exemption from traffic prohibitions:** Transport by rail may also be carried out without restriction at weekends and on public holidays, whereas road vehicles are subject to traffic prohibitions during these periods. To make the most of this advantage of rail transport, road vehicles used in the relatively short positioning legs are exempt from traffic prohibitions at weekends and on public holidays.
- **Increase in maximum gross weights:** This measure aims to compensate for an inherent disadvantage of combined transport. Because of the use of intermodal swap-bodies, road vehicles involved in combined transport are generally heavier than fixed-structure trucks. The logistics companies whose job it is to route heavy goods will only opt for combined transport if they can have the same payload available as they do with pure road transport. As regards to the demands made on transport to the hinterland of seaports, it is already possible today to transport **40-foot containers** with a vehicle gross weight of **44 tonnes** by road upstream and downstream by rail transport, even in countries where the maximum authorised weight is generally 40 tonnes. An extension of this weight compensation measure to all loading units used in unaccompanied combined transport (20-foot containers, swap-bodies and cranable semi-trailers[6]) would be logical, and would contribute to the development of combined transport.

[6] Unaccompanied combined transport: the transport of containers, swap-bodies and semi-trailers transshipped in a terminal between a road vehicle and a wagon. By way of comparison, in accompanied combined transport – known as the "rolling road or motorway" –, the entire vehicle is loaded onto the wagon and accompanied by the driver

- **Extension of promotional measures:** The European Commission has drawn up proposals to modify the above-mentioned Directives, under which it wishes to extend and unify certain promotional measures which have already proved highly useful in some States. These modifications would be warmly welcomed by the combined transport sector. Unfortunately, a proposal to modify Directive 92/106, which would stipulate a maximum road transport segment of 20% of the total distance for combined transport operations to be eligible for support, is far too rigid. It would have the effect of excluding certain combined transport chains from the promotional measures. This is because the decision to opt for combined transport does not depend exclusively on the geographical proximity of a transhipment terminal, but also on the possibility of opting for the terminal via which rail transport services may best meet with the overall logistical requirements. The current rule, which requires use of the "closest suitable terminal" for transhipment onto the railways is clearly closer to reality, and should therefore be retained. Turning to subsidies for operational improvements or investments, currently governed by Directive 1107/70, care should be taken to ensure that these are not granted in their entirety to the rail companies, but, in the spirit of liberalisation, directly to users or operators. This would also enable a closer check to be kept on results. The subsidisation of investments in transport units such as swap-bodies and cranable semi-trailers would also help haulage and logistics companies to acquire the appropriate equipment for intermodal transport.
- **The Switzerland-EU Transit Agreement:** One of the most effective measures in support of international combined transport has proved to be the 28-tonne limit imposed on HGV's in Switzerland. The significant difference from the permissible gross vehicle weight in the neighbouring countries to the north and south has had the effect over the last few decades of encouraging the use of combined transport to route a large proportion of all freight crossing the Alps. Environmental considerations led the Swiss to maintain this limit for a long time. Nonetheless, under pressure from the European Union, Switzerland has had to accept a gradual raising of the limit up to 40 tonnes. But unless this liberalisation of transalpine road transport is accompanied by a similar liberalisation of rail transport and an allocation of external costs to each transport mode, even with the current level of transit costs, there are fears of a serious decline in transalpine rail transport, which represents the largest flow of combined transport in Europe, with all the accompanying consequences for the environment.

This example shows that:
The goal of liberalising road transport and of managing it using uniform conditions throughout Europe is a good one. The liberalisation of rail should be regarded as equally important and environmental protection is vital. If these goals are pursued according to differing degrees of priority, undesirable consequences may be expected.

- **State subsidization of investments into the infrastructure of combined transport:** There are subsidizations into new buildings and reconstructions of combined road-rail terminals and into equipment (reach stacker etc.) within some EU countries (e.g. Germany). So the state wants to lower the entry barriers for new combined traffic.

Test Questions (3.6.2.):

1. *Who operates this combined road/rail-transport? Please indicate which answers are correct.*
   a. The freight forwarder for the whole transport chain. right
   b. The Combined Rail Transport Operator (e.g. Kombiverkehr) for the whole transport chain.
   c. The Combined Rail Transport Operator (e.g. Kombiverkehr) for the rail transport only.
   d. The Combined Rail Transport Operator (e.g. Kombiverkehr) for the rail transport and for the loading and unloading of rail cars only. Right

2. *What are measures to promote combined road-rail transport? Please indicate which answers are correct.*
   a. Exemption from road tax right
   b. State subsidization for prices
   c. Determination of prices by state authorities
   d. Exemption from traffic prohibition right
   e. Increase in maximum gross weight right

3.6.3 Pricing and Tariffs

Learning objective:
The student should understand principles of the commercial procedure and pricing in combined road-rail transport.

Commercial procedure

The forwarder concludes with the sender a common road transport contract (e.g. CMR waybill). In its relation to the Combined Transport Operator (e.g.

Kombiverkehr in Germany) he books the consignment and receives a booking order for combined rail transport. Electronic booking is also possible (see example form at www.kombiverkehr.de)

Pricing

The tariff price of the Combined Transport Operator (e.g. Kombiverkehr) differs between

- Relation (national / international)
- Mode (accompanied, unaccompanied)
- Volume of the traffic of one customer
- Type, size and weight of the loading unit.

Price calculation

By looking at an example of price components for a 20' Container transport from Offenbach (Germany) to Alma Ata price calculations can be clarified:

Clients order:

- Pick-up at the shippers location in Offenbach and delivering it free to terminal Alma Ata

(including availability of a rental container)

Cost elements:

- Positioning empty containers on shipper's premises
- Pick up loaded container on shipper's premises
- Transhipment to terminal at Frankfurt/Main - Ost
- Terminal fee at Frankfurt/Main - Ost
- Train transportation Frankfurt/Main - Ost to Berlin
- Train composition for appropriate destinations and quality control in Berlin
- Train transport Berlin to Malaszewicze/Brest
- Border fee and re-forwarding at Brest
- Transhipment in Brest
- Train transportation to Alma Ata
- Verification and Tracing of container run in GUS

Test Question (3.6.3):

1. What does the price in combined road/rail-transport depend on? Please indicate which answers are correct.

The tariff price differs between

a. Relation (national / international) right
b. Commodity (class)
c. Mode (accompanied, unaccompanied) right
d. Volume of the traffic of one customer right
e. Contract Terms
f. Type, size and weight of the loading unit. right

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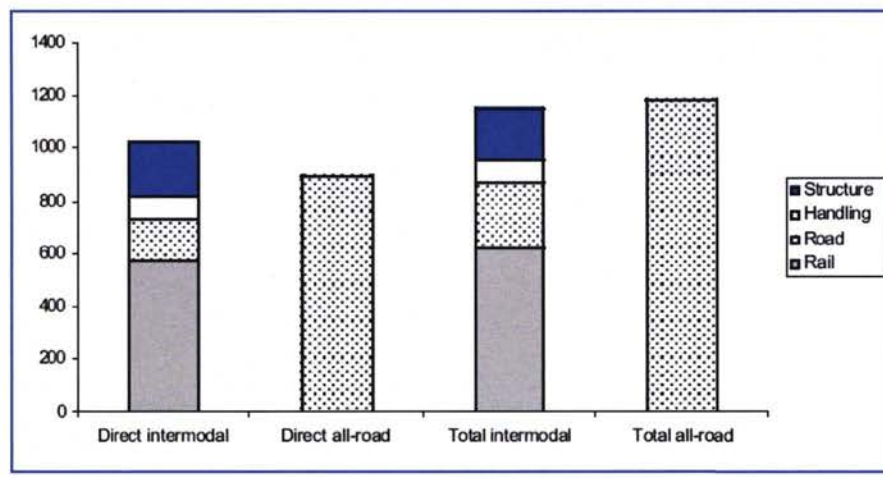
Annex 1: Recordit Project

(source: CNT Transport / Europe: Bulletin of the Observatory on Transport Policies and Strategies in Europe: Intermodal Transport in Europe, Double issue Nos.13-14, April 2005)

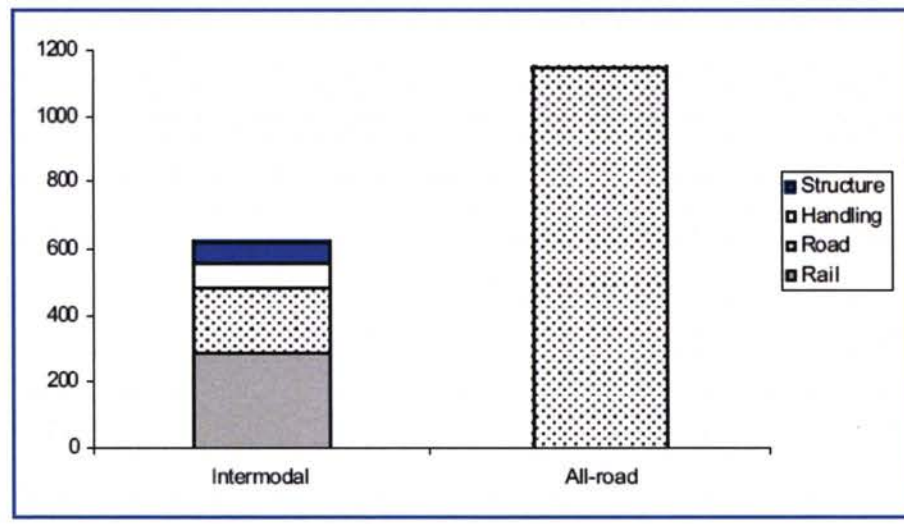
The European research project RECORDIT, based on a detailed study of three intermodal corridors in Europe, showed that the direct costs of all-road transport (those met by the shipper through the price system) are lower than those of intermodal transport. The addition of indirect costs (social costs resulting from accidents, noise and other nuisances) gives intermodal transport only a small advantage on total costs. Internalisation of external costs, though often suggested, would not only pose political problems but also not suffice to make intermodal transport really competitive.

Direct cost and total cost of intermodal transport and road transport in Europe: current situation (in Euros/TEU for an average journey of 1000 km)



In contrast, a thorough reform of intermodal transport, treating all its components, and inspired by the model of dedicated freight routes on American railways, could make its direct costs drop dramatically, allowing it to play a full part in the market.

Direct cost of intermodal transport and road transport in Europe,
The long- term situation in a reformed system



The enlargement of Europe (the Union has gone from 15 to 25 members and ECMT from 19 to 43) relaunched the debate on intermodal transport. Everywhere, it is road goods transport that is growing and people everywhere are suggesting that other solutions will have to be sought. The railroad option, old -style, will not be adequate, and people are also thinking about the waterborne mode, and sea cabotage (motorways of the sea).

The European Union is developing its own support policy for intermodal transport, even if no directive is specifically devoted to it. The Marco Polo programme has only limited resources however, while the network junctions and intermodal loading infrastructure do not figure explicitly in the Trans-European Transport Networks (TENs) promoted by the Union. Finally, rail interoperability is still very imperfect and is an obstacle to the development of rail transport, and therefore even more to that of rail - road transport.

This overall analysis is supported but also modified by the analysis of national situations, which provide examples of failures and successes from which all the countries can draw lessons.

Analysis by country

In **Germany** an Act of 2000 has reformed the statistics relating to the transport of containers and swap-bodies. The results of a new survey should be available in 2005. Much double counting has been noticed in the earlier figures.

The trends are as follows:

- intermodal traffic that includes a railway element increased by 8.4% between 1996 and 2002, its percentage of 12% of railway tonnage remaining stable;
- the rail motorway (rolling road) remains an alternative solution to the road for Alpine crossings but has not been used for domestic transport within Germany since 1994;
- river-borne intermodal transport, measured by the number of containers carried, doubled between 1995 and 2002, and is used in particular for serving maritime ports, but its share of total rail transport is still no more than 6%. This traffic consists mainly of containers, with few swap-bodies, transported on the Rhine but also on other rivers that flow into the North Sea; as to maritime container transport, a distinction is going to have to be made in the statistics between despatches and receptions at terminals and transfers between one mode and another which produce a double operation;
- finally, there are few figures available for maritime cabotage, though it is the subject of great expectations at European level

The principal axes of German intermodal transport are North - South, from Italy to Scandinavia. There is also East-West traffic, with services to the Czech Republic and Hungary from the ports of Hamburg and Bremerhaven, but the traffic with Poland has declined since 1999 because of the influence of road competition.

The major rail - road transport operators are Kombiverkehr and Transfracht (Stinnes has a 50% share in both these operators). Kombiverkehr, a member of the UIRR family, has restructured its network with "Kombinetz 2000+", and transports 23 million tonnes annually, that is, the equivalent of 960,000 lorries. Transfracht, in which DB has a large share interest, mainly transport containers, their load equivalent to 260,000 lorries in 2003. This company too has restructured its network and renovated its commercial product, by differentiating between one service for stable, loyal traffic, a "stand-by" service for unexpected despatches that matches the flexibility of goods traffic, and a "last minute" service for reservations made 24 hours before departure. Intermodal loading sites are the property of the ports and the DB. A debate is taking place about their development into logistics platforms.

The **costs of rail - road transport** are divided, in Germany as elsewhere, in equal proportions between the road section (pre- and post- rail carriage and transfer) and the rail section.

As to trends, **Kombinetz is expanding**. The operator buys the traction of complete train-loads from DB Cargo and commercializes them. The traffic amounts to about 150 trains a night. The quality of service with, in prime places, punctuality, has made real progress. On the other hand, the question of terminals is controversial. The political project is to provide coverage of the whole country. But the traffic flow is not sufficient in certain zones and, moreover, because terminals are often located near towns and are noisy, local authorities are not always in favour of their extension. The result is that traffic is concentrated into certain dense axes, which is creating a service that is very different from the initial plan, especially in geographic terms.

Public policies for subsidising intermodal transport include the funding of terminals, whether they belong to the DB or private firms; the "advantage" given to intermodal transport by fixing the maximum weight of intermodal road haulage units at 44 tonnes (40 tonnes for conventional road transport), exemptions from restrictions on weekend working, and lower taxation on vehicles.

The total aid thus allocated, over the period since 1998, amounts to 219 million euros. The Ministry of Transport is not satisfied with the results that have been achieved. It wants the level of the aids to be linked more closely to their effectiveness, by tying them to the volume of goods transferred from road to rail and by asking operators to reimburse subsidies if they do not fulfil the objectives they had promised. Some aids will also go to private branch lines, if these shippers have a substantial volume of traffic, and if they do actually use this infrastructure.

Finally, new operators are entering the intermodal market, for example Box Express, created by port and maritime groups which have their own means of traction using leased equipment and which transports 100,000 boxes a year. There is also the case of operators created by industrial firms, such as the chemicals firm BASF in the Rhineland. Cooperation between Kombiverkehr and Polzug is starting to appear, but this situation has not yet stabilised.

Overall, the reliability of combined transport is satisfactory, because 92% of trains arrive less than a quarter of an hour late. But the reduction in quality seen in 2003 compared with 2002 is evidence that the network is being used intensively and would not easily cope with a growth in traffic

The case of **Belgium** shows that it is not helpful to constrain the field of intermodal transport within strict technical and legal definitions. Waterways and railways as a whole are, most often and necessarily, multi- or inter-modal.

The **cost of transport remains the determining factor** in the choice of mode for most shippers (even though experts specialising in transport tend to insist on the influence of the transit time). Recent research showed that, more than speed, it is **reliability** that is important to shippers, in accordance with the needs of more rigorous logistics.

As to infrastructure, what is needed is not so much major construction but ensuring the **interoperability of existing networks**. It is a technical problem, but also one of personnel (why could not a pan- European programme of training engine-drivers be introduced?) To facilitate cross-border traffic, the Commission could subsidise, in a very precise fashion, multi-current locomotives.

Obstacles to the development of intermodal transport that have been identified in Belgium can be identified and listed by component, interchangeable with systems in other countries.

Obstacles relative to rail transport:

- in managing the network, priority is traditionally given to passengers, which has a strong impact on the quality of the freight service. In Belgium this difficulty should be reduced with the entry into service of the new Namur-Athus line, dedicated to freight and serving the port of Antwerp;
- rail freight does not possess its own set of locomotives or team of drivers: any problem with the transport of passengers produces a problem with freight;
- strikes on one side of the border or the other are numerous and have repercussions on neighbouring networks as well;
- technical standards are not homogeneous between one country and another and necessitate a change of locomotive and driver at each border crossing; this problem constitutes a particularly serious obstacle;
- the change-over of train drivers does not relate just to technical questions, but also to rules on the use of labour (these are directly linked to geographic zones, which do not match commercial traffic zones);
- tunnel clearances and the height of catenaries (too low in Europe for the "double stacking" used so efficiently in the United States) are inadequate and impose their own constraints;
- wagons are often poorly adapted to the containers and swap-bodies;
- triage operations in freight sidings are slow and expensive;

- freight services do not have sufficient autonomous within the management of rail companies;
- telematics tracking of despatched items is less well developed than in other modes;
- rail transport is poorly integrated into logistics supply chains;
- the current cultural behaviour of rail managers leads them to try to satisfy resource conditions and not outputs. They lack a commercial spirit and do not find it easy to cooperate with operators of other modes.

Concerning waterborne transport:

- barge owners are poorly organised and reluctant to work in cooperative groups;
- it does not provide telematics tracking;
- it is poorly integrated into logistics chains;
- it does not have enough regular routes and timetables;
- the operating times of the infrastructure are inadequate (canal locks close during the night and on Sundays);
- loading and unloading times at the port are long, in particular for transfers between river and maritime modes (at Antwerp the relevant jetties are separated from one another). Where maritime ports are concerned, river transport is seen as a poor relation in comparison with the surge in maritime container traffic;

For maritime cabotage ("short sea shipping"):

- the image of this mode among shippers is that of an old-fashioned technique, and not really dynamic;
- administrative and documentary procedures are particularly complex, by comparison with land-based modes;
- telematics communication is poor;
- small ports are not very efficient.

The result is that intermodal transport that includes a maritime component cannot generally be competitive in relation to road transport except at a minimum distance of 1000 km. Despite all these problems, there are cases where intermodal transport works well! This observation gives room for optimism and suggests that there should be a search for solutions based on practical analyses, case by case.

In **Spain** the new government has repealed the law on railway reform prepared by the preceding government. It is not yet known whether the priority will be given to rail, and within that mode whether it will be just the TGV, or include

renewal of the classic network and freight. The liberalization plan, which should allow new operators to enter the market, will be re-examined in the coming months.

Intermodal transport receives practically no public subsidy in Spain; it is hardly mentioned in political discourse, apart from the Petra plan for supporting road transport, which makes a minor mention of intermodal transport. To a certain extent, **it benefits from the aids provided by neighbouring countries**.

Rail intermodal transport concerns mainly containers and a limited number of swap-bodies, but not accompanied lorries of the "rolling road" type. The business unit in charge of freight within the rail company RENFE has recently fused with the unit in charge of intermodal transport. Within a total of 26 million tones of traffic, intermodal transport represents about 30%. A third of this traffic is domestic, entirely within Spain; a third is international European, and a third relates to maritime ports. The network connects the main towns and maritime ports. Apart from the historic operator, there is Combiberia (with participation by Novatrans and Kombiverkehr) and Transfesa (which brings together RENFE, SNCF and private capital). Traffic development is limited by the pinch points outside terminals in the major cities.

A recent study by CETMO analysed intermodal transport within a 'strengths, weaknesses, opportunities and threats' framework.

The weaknesses are not negligible:

- operations are too segmented;
- tariffs have increased more than inflation, unlike road transport;
- investment decisions are inflexible;
- the average commercial speed is lower than that of road, and even of sea transport;
- the main terminals are saturated;
- the French network, which gives access to the rest of Europe, has no spare freight paths;
- there are many strikes on the French network;
- the responsibility for this traffic is divided between national networks;
- the length and weight of rail convoys in Spain are less than the European average (respectively 400m and 800 tonnes, against 750m and 1200 tonnes in France). Changing to these norms would reduce costs by 30%.

Among the threats can be listed:

- price competition from door-to-door road transport;
- priority given by the rail network to passenger transport (notably in the suburbs);
- the scarcity of land at affordable prices for constructing new terminals, and the distance
- from city centres which stems from that;
- the large number of actors, which complicates any new initiative.

The strengths of the system cannot be ignored:

- a possible increase in the share of the market for intermodal transport;
- the service quality plan that has been introduced, which could bear fruit.

Finally, the opportunities are as follows:

- intermodal transport has less impact on the environment than its main competitor, roads;
- rail transport is growing by 1% to 2% faster than Spanish GDP;
- road transport costs would increase significantly if the internationalisation of external costs, promoted by European documents, comes into effect;
- the costs and prices of road transport are likely to increase under the influence of a rise in salaries;
- road is subject to a growing pressure to take more account of the environment;
- European policy is seeking alternatives to road;
- the liberalisation and interoperability of railways are likely to strengthen its competitiveness;
- the Sines-Madrid-Paris line might be reserved for freight and is TENs - listed.

Though the operation of the terminals must be improved by creating new ones, and the characteristics of convoys must be harmonised with the rest of the European network, the problem of the larger Spanish gauge will constitute a supplementary and long-lasting obstacle.

In **France** intermodal rail-road transport has experienced a return to the conditions that were in affect at the end of the 1990s. After a period of definite growth (a doubling from 1985 to 2000), its traffic is currently in decline despite statements of principle by those with political responsibility that are systematically favourable to intermodal rail freight. For its part, waterborne freight is expanding noticeably. The share of intermodal transport in national surface transport has always been modest (of the order of 3% of the current

total, expressed in tonne/km, having reached 4.5% in 1997), and will probably decline further, because of the reforms currently under way, to about 2%.

The **problems of rail intermodal transport** stem first from the structure of the traffic it carries (with a high proportion of national traffic, over distances too close to the minimum level for competitiveness with door-to-door road transport), an absence of rolling road or piggyback systems (except to cross the Channel), and the inadequate services to sea ports for the land-based sections of container traffic. As a consequence, transit traffic has undoubtedly not been sufficiently taken into account in the management of intermodal transport and its projects. The requirements of the market also favour transfers towards road (for example, small parcels services hardly use rail anymore because of the time it takes, while the motorway network now covers the whole of the national territory).

To these special problems can be added the generic problems of rail transport: sensitivity to the economic situation and a vicious circle of deficits in an industry which has increasing returns; structural blockages; and the inertia of the organisation of production by the railway company. Intermodal transport seems to have been used, up to the end of the 1990s, as an adjustment variable for the freight market in a period of strong economic growth. The subsidies awarded at the time had perhaps the air of a godsend. Then the strikes of 2001 undermined the confidence of shippers, and the reduction in State aid, the increase in track access charges by the infrastructure manager, RFF, and the increase in the price of energy, have set off a circle of decline.

The **market is segmented into axes**. The success of certain routes (Paris-Bayonne) shows that the potential exists for some expansion. The efforts that have been made to improve rail punctuality are now recognised by shippers. The under-equipment of handling infrastructure has been reduced with the construction of the sites of Dourges, Bordeaux and Dijon, while Marseille and Le Havre are making an effort to invest. The North-South backbone is emerging as the central traffic route (traffic between the Provence-Alpes-Cote d'Azur region and the Ile-de-France represents 50% of the French domestic market), though it is a route whose pinchpoints need to be removed. As to international traffic, that to and from Italy is the most important. The reliability of rolling stock is improving with the entry into service progressively of a stock of locomotives dedicated to freight, interoperable and travelling fairly fast so that they fit more easily on the tracks used by passenger trains. The question now is how to identify a team of locomotive drivers specialising in freight. Service quality is now the subject of increased effort, the proportion of trains arriving

on time having reached 87% (it must be said too that the operators tend to pass the blame for their own delays to the rail company.

However, the number and quality of available freight paths are insufficient, the gauge clearances being too small on a large part of the network. The infrastructure operator, RFF, has announced a forthcoming reform that will give better treatment to freight. A debate has started on whether the network is being used correctly and whether additional capacity could be identified by modifying the way the SNCF uses the network.

More generally, French intermodal transport is a **complex system of interlinked actors**, who were reluctant for a very long time to consider innovation and the entry of new actors. For all that, a recomposition of the landscape is emerging. The CNC, a subsidiary of the SNCF, is part of the renovation plan for rail freight recently launched by the company, faced with a chronic deficit in this market. It is selecting its markets more strictly and closing the least busy terminals, reducing the number of its agencies (14 closures in 6 months) to the point where it is now keeping only a "skeleton" network of the most heavily-used routes. The plan for a hub-style network, focused around the "nodal point" of Ile-de-France, at Villeneuve-Saint Georges, has been abandoned in favour of a scheme of direct point-to-point lines (as the company Novatrans has done), in particular for serving ports. Shippers seem ready to accept this modification, providing the service offered is at the level of quality they expect.

Public grants for intermodal transport have been reallocated and their volume severely reduced: 95 million euros in 2001, 20 million euros in 2004 and 16 million euros in 2005. They are no longer awarded to the rail companies providing the traction (to compensate it for the deficit related to intermodal traffic), but to the specialised operators. The State, in its ambiguous role of regulator and shareholder, has not set out a clear strategy (between the desire to develop intermodal transport, to liberalise the market, and to stabilise SNCF's balance sheet). It is possible that, in some cases, local authorities will involve themselves more in this traffic (in the way that the Nord-Pas de Calais region did on the Dourges terminal).

Will the SNCF deconcentrate its management, or on the contrary try to become an operator of international standing and open up to logistics (as the DB has already done with its subsidiary Schenker and Railion)? Will changes come from Europe, with the entry of new operators, and the opening up of the networks?

In **Greece** as in the rest of Europe, information about intermodal transport encounters a basic problem: **transport statistics are conceived according to a modal logic**. Thus, one can follow traffic flows right to the rail terminals, but knowledge of what happens to road flows before and after the rail journey is poor.

In Greece, the dimensions of the country do not lend themselves very well to intermodal domestic transport: distances are too short along the principal economic axis, Athens-Salonika. The only road-rail service is between Salonika and Sopron (in Hungary), provided by ICF.

Greek intermodal transport is thus mainly maritime transport. Greek ship owners possess 18% of the world fleet but domestic traffic. Serving the islands by Ro-Ro, is only a very small proportion of their activity. In any case, the use of the sea does not constitute an alternative to road in Greece; it is simply imposed by geography.

The principal intermodal axis is the **international Adriatic axis**, with some 350,000 lorries transported annually. Grants will be maintained until 2008 to strengthen intermodal terminals.

As to the **measures that could be taken**, increased attention could be given to road transport, in order to harmonise regulations on maximum weights in Europe. Also the pertinent markets for intermodal transport should be identified in order to concentrate resources on those markets. Finally, shuttle trains seem to be confirmed as the only way of ensuring the reliability demanded by shippers.

Italy has an important place in the organization of rail-road transport in Europe. **Transalpine international traffic makes up two-thirds of the total traffic** - though it hardly exists outside the Northern part of the country.

The principal rail operator is Trenitalia, a product of the reform of FS, but private companies have also appeared in the market: Ambroggio, Rail Traction Italy (bought by the German Railion) and ERS for the transport of containers (from Rotterdam).

For the Alpine crossing, Luino is the most-used pass (more than the Brenner), Domodossola is in rapid expansion, Chiasso is stagnant, while Modana is in decline because of the commercial failure of the Eurotunnel and the reduction in traffic between France and Italy. Overall, there are three times as many swap-bodies as maritime containers. The principal terminals are Padova, Verona,

Busto (the private terminal of Hupac), Novara (linked to the Lotschberg) and Milan. In Milan there are five terminals, all too small, fragmented and enclosed within the built-up urban area.

The technical efficiency of combined transport is known to depend on a series of structures: intermodal handling equipment, railway goods sidings, and a railhead terminal providing the connection to the main rail network. In addition account must be taken of disparities between gauges and often their inadequate size.

The rail motorway (rolling road) with Austria has been suppressed following the abolition, imposed by the European Union, of the "ecopoints" system. Furthermore, the largest European intermodal operator, ICF, is in the process of fragmenting because of the strategic error of a choice of a hub and spokes type of organisation in preference to the shuttle system, which is more productive.

On the whole, intermodal transport is in a fairly healthy state in Italy (thanks largely to the policy of the Swiss government!), and could expand even further. The **principle of giving public aid** to help this growth has been agreed but the budgetary decisions have not been made, and will not be easy.

The transport system in **Poland** is characterized by an expansion in road freight transport at the expense of rail, including over long distances. Rail transport is orientating itself rather towards international traffic. However, after the liberalization of the market, in conformity with Community legislation, and with the entry of new operators (especially on "short lines"), it can be seen that after years of decline rail transport is again on the increase, the historic operator, PKP, carrying only two-thirds of the total traffic.

Within this context, **intermodal transport plays only a limited role**. Concerning mainly containers (for 90% of the total, the rest divided between swap-bodies and trailers), it accounts for example for no more than 4.5% of traffic from the port of Gdynia and 2% of national traffic. Nevertheless, a certain growth can be seen in connections to other parts of the European Union, because of the disappearance of barriers at the German border.

In addition to the **obstacles to intermodality** that are found in many countries, can be seen some characteristics specific to Poland: the change of rail gauge at the Eastern border of the country; the availability of a labour force which sustains road transport and strengthens its competitiveness: the persistence of a sizeable 'own account' road freight transport sector, less likely to turn to rail.

The result is that the majority of maritime containers are not treated in an intermodal manner on their land-based section, but move entirely by road or by rail: the container acts rather as a packing box (it leads to a significant drop in the theft of goods) than an intermodal tool.

The German port of Bremerhaven is competing with that of Gdynia, with a land-based service carried out by Polzug (subsidiary of PKP and the DB). The PKP is having trouble accommodating to the reform separating infrastructure, freight transport (profitable!), inter-city passenger transport and regional transport.

For all that, the medium-term prospects are good. The production of manufactured goods is increasing, and international traffic is expanding. Undoubtedly, Polish transport firms are subject to a period of transition that is longer than for other member countries, delaying their capacity to provide a cabotage transport in the Union, but a phenomenon of convergence seems already to have been triggered.

Of the 350 million tonnes transported in **Portugal**, 85% moves by road, 12% through the ports and **only 3% by rail**. Road transport is 96% national, two-thirds of the rest is traffic with Spain. Rail freight is 90% national, the rest is with Spain. In Spain the public authorities have supported the creation of 25 logistics platforms, while in Portugal governments have not become involved in this activity beyond making exploratory studies. The existing platforms have been set up for their own use by the large distributors and the railway company.

A recent event could change this state of affairs. The port of Sines has started operations, with the presence of the international warehousing and handling firm PSA (Singapore). Conceived as a port of transhipment between inter-Continental routes and feeder routes, it could nevertheless take traffic from other ports. An agreement has been made for a rail service five days a week in the direction of Lisbon and Porto. The way the whole Portuguese port system is run could therefore see thorough change.

Rail transport is evolving too. Goods are likely to be concentrated towards five points in the country, with direct connections between each of them twice a day. But it is not really known how much demand there is for such a service. Furthermore, a project associating road transport firms, the railways and freight forwarders to create an intermodal company has waited four years for the necessary authorisations from the rail enterprise.

Finally, there has been **an effort to create a highway on the sea** with Great Britain and Northern Europe. Its price (0.8 euros per kilometre) remains higher than that for road transport (0.7 euros per kilometre), while European governments do not want to subsidise this system. It is true that road transport works on unusually low margins (Portugese enterprises declare themselves to be in deficit), while respect for working time regulations is not rigorous and the road tolls for heavy vehicles are low.

Research on intermodal transport in the **United Kingdom**, as noted in the recent report by the French Plan Commissariat, is handicapped by a lack of data, which is not collected in detail by the administration, although national-level statistics for the road sections of intermodal journeys are available and there are new proposals for collecting maritime data.

Great Britain is an island and much of the freight that arrives is in containers, which should encourage intermodal transport. The Channel Tunnel also enables this technique to be used for transport links with the Continent. But rail-road transport in Britain makes up only a quarter of rail traffic, which itself only accounts for 8% of British freight traffic: Only **2% of British surface freight transport is intermodal**. Since 1998 transport of goods through the Tunnel has fallen by half. The agreement between Eurotunnel and the operators did not encourage its development and traffic was disturbed for a long time by the problem of illegal immigrants, to the extent that road transport remains competitive for serving France, Germany and Italy. Nevertheless there has been some improvement in the situation.

The goods transported are forestry products, chemicals and food. An increasing use of this technique is being made by supermarket chains, which have increased their intermodal traffic by 20% in the last year with the goal of making the logistics organisation more efficient. It should be noted that operators advertise their intermodal transport services by drawing attention not to their prices, but to road congestion, which intermodally allows traffic to escape!

A strategic rail freight network linking 40 major industrial towns has been published. The intermodal freight offer is fragmented at the moment, 20 terminals being linked by just one train a day in each direction. There is a lack of the associated logistic installations (warehousing, storage depots) in proximity to intermodal sites in some regions, especially around London, in Wales, and in northeast England, which puts a brake on the use of this technique.

The plan for a new line, "Central Railway", linking the Channel Tunnel to Liverpool in the north of England by using an old route which is currently mostly disused, and which would have been financed by participation from the banks, was not supported by the ministry, either because it was sceptical about the relevance of the dossier or because it was concerned that its possible success would rebound on passenger transport, already weakened by network congestion.

The principal operators are Freightliner, created from the historic BR, and Intermodal Express (a subsidiary of EWS which specialises in bulk transport). They offer a terminal-to-terminal service, while other operators, which are smaller, offer a door-to-door service accompanied by additional logistics operations. Freightliner and Intermodal Express own their own terminals but also use those of other operators. Various intermediary companies also intervene in the services: companies leasing intermodal units, and railhead terminal owners and operators. The logistics company Tibbett & Britten manages two platforms and the Associated British Ports Group three.

The government has announced a programme of modernisation of the freight network, including terminals, especially on the routes between ports and the big metropolitan centres. It is necessary both to widen the gauge clearances and to remove the pinch points on East-West routes: this project is advancing. The recent widening of clearances on the North-South route immediately bore fruit, with the launching of several supplementary trains daily.

The Rail Regulator decided to subsidise freight traffic by reducing its track costs. The SRA (Strategic Rail Authority) can allocate a "freight facilities grant" (subsidy for intermodal equipment) in which a grant is given to operators according to the equivalent road vehicle-km avoided. The "track access grant" subsidises freight train operators' network charges. Finally, the "company neutral revenue scheme" is a subsidy for container traffic which is paid to the partner in the transport chain which takes the highest commercial risk. The criteria taken into account includes the impact on the environment, the additional financial costs and the points served.

For the regulatory authorities, the prospects for the development of intermodal transport depend on the improvement of reliability (for a journey from Day A to Day B) and the reduction of prices.

A recent study for the Rail Regulator predicted a doubling of domestic intermodal traffic over 10 years. The argument was based on the overall transport context, in which the prospects for growth of road freight transport are

disquieting, because of the possible extension of road pricing (today in London and perhaps one day on interurban routes), the lack of recruits to drive lorries, and the European Working Time Directive, etc.

Intermodal transport in **Sweden** is seen as an alternative to road transport. Already **the Swedish modal pattern is fairly atypical in Europe**, because its 90 billion tonnes-kilometres are divided between 22% for rail, 36% for sea and 42% for road.

Intermodal transport is both maritime (with numerous ferries) and rail, and lends itself to serving ports, land-based long-distance links (the country measures 2000 kilometres from North to South) and to crossing sea inlets. It carries 6% by value of the country's exports and 10% by value of imports. Apart from intermodal transport, there are also rail services carrying swap-bodies, introduced by manufacturers such as Ikea and Volvo. The products transported by intermodal techniques are those principally of high-density value, apart from steel and paper which are handled in specialized boxes.

The principal ports are Gothenburg, which handles 70% of Swedish containers and is also a ferry terminal, and Stockholm, whose traffic is mainly in the Baltic Sea.

Intermodal transport involving the railway mode is, in this case, divided as follows:

- 27% lorries;
- 22% 20 foot containers;
- 18% 40 foot containers;
- 17% trailers;
- and 16% specialised containers

and it is largely international.

In terms of railway reform, **the State is responsible for the infrastructure**, including terminals; the operators are responsible for services. These are divided, as in other countries in Europe, between:

- a member of the UIRR family, Rail Kombi, which is a subsidiary of the Norwegian Cargo Net with a minority participation of the Swedish Green Cargo, and which sells a transport service to road freight transport firms from railhead to railhead. Its annual traffic is some 45,000 TEU and has increased by 60% during the last ten years;
- a subsidiary of the historic rail enterprise, Green Cargo, which sells door-to-door transport to shippers;

- finally, other firms intervene in intermodal transport: ICE, Maersk and new entrants.

The State is trying to fund technological research and supports discussion forums and study groups. An innovative attempt to use small containers has been a commercial failure.

A commission has been asked to draw up policy objectives for freight transport, according to the formula "an efficient transport and a competitive industry within the framework of sustainable development". It has recently submitted its proposals, notably a variable toll on infrastructure use to encourage intermodal transport, but without formulating its objectives in numerical terms. In effect, there must be action on Intermodal Transport Units (whose tare weight is too heavy; their use is too rigid; while ISO containers do not fit well with road transport use); on terminals (in which the State does not intervene directly but for which it envisages supporting services with a budget of 100 million euros, on condition they are open to all operators); on the clearance gauge ("double stacking" on the line between Finland and Poland would increase capacity by 25%); and on the expansion of research; improving logistics organisation, improving technical performance of engines, and promoting research on fuels.

The commission is also examining the obstacles to the development of intermodal transport, whether of a technical, organizational or legal order. Information systems must provide better links between the railways and the other modes; and a special plan aims in this way to make movement through the ports more fluid.

The outlook for changes in intermodal transport seems positive, with an increase of 8% a year for ferries, in which shippers are showing a sustained interest. But the forwarders do not want to take a risk by putting their own system in place. In Finland intermodal transport provides a domestic service to the ferries that connect with Lóbeck. Containers transit the country towards Russia, but they go by road to preserve control over it!

Intermodal transport in **Switzerland** is composed, as far as 80% of it is concerned, of international traffic in transit and especially of transit along the North- South axis (85% of the total). Intermodal transport in transit is divided in the following way:

- 34% rail-road transport (of which 4% for the rail motorway, or 'rolling road' or 'piggy back', which therefore has only a marginal role);
- 30% traditional rail traffic;
- 36% road transport.

The share of intermodal traffic in rail traffic has doubled since 1985, going **from 20% to 40%**.

The Swiss model of support to intermodal transport, which is intense, can be separated along the different time scales:

- in the short term, aid is going to transport operations via the rail operators: one special aid to the 'piggy back' railway and another to reduce the price of freight paths. In ten years, some 2.8 billion Swiss francs (1.8 billion euros) will have been spent in this way;
- the tax on heavy lorries has made road freight transport more expensive and is expected to rise further in 2005. But the RPLP ("charge proportional to the distance covered") has not had the effects that were expected on the modal division of freight: the size of lorries has increased and their number has decreased, thereby absorbing this increase in the tariff
- for using road infrastructure;
- In the medium term, aid is being given to the construction of terminals (including those abroad, as at Busto in Italy) and to interest-free loans for the purchase of rolling stock;
- in the long term, the new rail lines currently under construction will modify strongly the transport system as a whole. The Lφtschberg line will enter into service in 2007, that of the Gothard in 2014, with a capital expenditure of 10 billion francs by that date. In addition, the traffic through the Simplon is rising because of the improvement to its gauge configuration.

Among the actors of rail-road transport, CFF Cargo represents 90% of the market but BLS, allied to Railion, will now use its own locomotives. The strategy of CFF is to strengthen the Italy-Germany route by creating ad hoc companies in cooperation with other partners and by buying multi-current traction units. For domestic traffic, the use of swap-bodies that are handled horizontally is developing (400 units are already in use). The company Hupac (associating majority private shareholders with CFF) is developing its volume of traffic intensively (+ 11% in 2003) and has 80 trains running on the European North-South axis daily. In particular it sends 30 shuttles daily towards its Italian hub in Busto.

The entry of new operators onto the market has been noted, but on a reduced scale. Finally, ICF is in difficulty, in Switzerland as elsewhere. Generally, there is a certain reluctance to provide information, which does not help analysis.

Among the challenges for the future, the **reliability of the service must be improved** (more than half the trains are more than half-an-hour late). There are multiple causes: the limited capacity of many rail interchanges, a lack of locomotives (orders have been placed), saturation of Italian terminals (new ones are being constructed). **As for costs**, they are not well known!

So far, the energetic policy of the Swiss authorities has had effects that are far from negligible. Nevertheless i**ntermodal transport has only experienced a growth in parallel to that of road transport, without taking a larger share of the market**.

Forecasts dating up to 2030 that were calculated recently envisage a much stronger growth on rail than on roads (the rail share would go from 40% to 46%) but do not give any precise figures for intermodal transport. This outcome would be the result of a vigorous policy which is likely to go in the following direction:

- concentration on the major routes (use of long and fully-loaded trains, avoiding road pinch points and satisfying the environmental expectations of people living nearby);
- reductions in the price of freight paths by subsidising the operator, or the construction and maintenance of infrastructure by the railway management;
- exempt heavy lorries from the RPLP charge when they are serving as intermodal;
- guarantee loans for constructing terminals;
- restrict night-time road freight traffic (currently forbidden between 10 p.m. and 5 a..m)
- persuade the public authorities to join in the strategy (30% of receipts from the RPLP are assigned to the cantons). Note that road tolls will in this way have contributed to transport options that are alternatives to road.

The situation and dynamics of intermodal transport in Europe both have rather contradictory characteristics. Countries and operators experiencing a growth in traffic live side by side with those where it is falling away. Governments who invest in infrastructure projects and new capacity are neighbours of those which, while proclaiming their desire to see a different balance between the modes, are reducing their financial support and seeing a decrease in intermodal traffic.

These comments also apply to the European Commission, whose resources are not always at the level of its ambition. But its role is not only financial, and the promotion of standardisation as well as interoperability shows the **importance of technical and organisational factors**, at the same time as **budgetary and regulatory factors.** The comparative method ("benchmarking") and the diffusion of **good practice** can have a beneficial effect, and this panorama drawn up by the OPSTE hopefully contributes to that process.

From this picture of contrasts, the conclusion might be that intermodal transport is only **one particular answer** among very many others to the questions that public authorities and economic actors ask themselves about the future of transport. Intermodal transport, whether it marries road freight to the maritime mode, rail freight or waterborne transport, cannot be introduced under any conditions or in any place. On the contrary, efforts to encourage it must concentrate on those cases where it has the best chance of demonstrating its technical and commercial effectiveness and its benefits, socio-economic if not financial.

Intermodal solutions are more efficient on **axes** with heavy traffic, over long distances. Though intellectually seductive, the various "hub and spokes" formulate the aim to massify low-volume traffic flows by making them transit a single central sorting point, have been abandoned. It is through "industrialised" shuttles which associate productivity with service quality (providing that they own suitable rail freight paths) that rail-road transport can develop today.

Can the development of intermodal transport manage without **political support** from the public authorities? Public support in launching new services is usually necessary during the inevitable period of apprenticeship. However, not all public aid takes the form of money, **nor does it all have a budgetary impact.** For example, the prohibition of heavy lorries at night costs the budget of the Federal State and cantons nothing, and yet it has an effect on the modal distribution of freight. The same could be said of the former Austrian system of "ecopoints". Conversely, some measures without budgetary cost have been disadvantageous to intermodal solutions: with the enlargement of the Union to ten new members. If the liberalisation of the road freight transport market is allowed to operate without a simultaneous harmonisation of competition conditions, it will bear down on road prices (worrying the French professional road haulage organisations), and will thereby restrict the area in which intermodal transport is competitive.

Construction, access and infrastructure tariff regime, fiscal policy, labour regulation, technical standardisation and interoperability, the regulation of emissions and noise and other nuisances: the public authorities have to operate **a vast range of instruments** in order to contribute, with the private actors, in the development of an intermodal solution which associates the special characteristics of each one of the various transport techniques.

ANNEX 2: Multimodal Standard Contracts

Standard Conditions (1992) governing the FIATA MULTIMODAL TRANSPORT BILL OF LADING

Definitions

"Freight Forwarder" means the Multimodal Transport Operator who issues this FBL and is named on the face of it and assumes liability for the performance of the multimodal transport contract as a carrier.

"Merchant" means and includes the Shipper, the Consignor, the Consignee, the Holder of this FBL, the Receiver and the Owner of the Goods.

"Consignor" means the person who concludes the multimodal transport contract with the Freight Forwarder.

"Consignee" means the person entitled to receive the goods from the Freight Forwarder. - "Taken in charge" means that the goods have been handed over to and accepted for carriage by the Freight Forwarder at the place of receipt evidenced in this FBL.

"Goods" means any property including live animals as well as containers, pallets or similar articles of transport or packaging not supplied by the Freight Forwarder, irrespective of whether such property is to be or is carried on or under deck.

Applicability

Notwithstanding the heading "FIATA Multimodal Transport Bill of Lading (FBL)" these conditions shall also apply if only one mode of transport is used.

Issuance of this FBL

By issuance of this FBL the Freight Forwarder

undertakes to perform and/or in his own name to procure the performance of the entire transport, from the place at which the goods are taken in charge (place of receipt evidenced in this FBL) to the place of delivery designated in this FBL;

assumes liability as set out in these conditions.

Subject to the conditions of this FBL the Freight Forwarder shall be responsible for the acts and omissions of his servants or agents acting within the scope of their employment, or any other person of whose services he makes use for the performance of the contract evidenced by this FBL, as if such acts and omissions were his own.

Negotiability and title to the goods

This FBL is issued in a negotiable form unless it is marked "non negotiable". It shall constitute title to the goods and the holder, by endorsement of this FBL, shall be entitled to receive or to transfer the goods herein mentioned.

The information in this FBL shall be prima facie evidence of the taking in charge by the Freight Forwarder of the goods as described by such information unless a contrary indication, such as "shipper's weight, load and count", "shipper-packed container" or similar expressions, has been made in the printed text or superimposed on this FBL. However, proof to the contrary shall not be admissible when the FBL has been transferred to the consignee for valuable consideration who in good faith has relied and acted thereon.

Dangerous Goods and Indemnity

The Merchant shall comply with rules which are mandatory according to the national law or by reason of International Convention, relating to the carriage of goods of a dangerous nature, and shall in any case inform the Freight Forwarder in writing of the exact nature of the danger, before goods of a dangerous nature are taken in charge by the Freight Forwarder and indicate to him, if need be, the precautions to be taken.

If the Merchant fails to provide such information and the Freight Forwarder is unaware of the dangerous nature of the goods and the necessary precautions to be taken and if, at any time, they are deemed to be a hazard to life or property, they may at any place be unloaded, destroyed or rendered harmless, as circumstances may require, without compensation. The Merchant shall indemnify the Freight Forwarder against all loss, damage, liability, or expense arising out of their being taken in charge, or their carriage, or of any service incidental thereto.

The burden of proving that the Freight Forwarder knew the exact nature of the danger constituted by the carriage of the said goods shall rest on the Merchant.

If any goods shall become a danger to life or property, they may in like manner be unloaded or landed at any place or destroyed or rendered harmless. If such danger was not caused by the fault and neglect of the Freight Forwarder he shall have no liability and the Merchant

shall indemnify him against all loss, damage, liability and expense arising therefrom.

Description of Goods and Merchant's Packing and Inspection

The Consignor shall be deemed to have guaranteed to the Freight Forwarder the accuracy, at the time the goods were taken in charge by the Freight Forwarder, of all particulars relating to the general nature of the goods, their marks, number, weight, volume and quantity and, if applicable, to the dangerous character of the goods, as furnished by him or on his behalf for insertion on the FBL.
The Consignor shall indemnify the Freight Forwarder against all loss, damage and expense resulting from any inaccuracy or inadequacy of such particulars.
The Consignor shall remain liable even if the FBL has been transferred by him.
The right of the Freight Forwarder to such an indemnity shall in no way limit this liability under this FBL to any person other than the Consignor.

The Freight Forwarder shall not be liable for any loss, damage or expense caused by defective or insufficient packing of goods or by inadequate loading or packing within containers or other transport units when such loading or packing has been performed by the Merchant or on his behalf by a person other than the Freight Forwarder, or by the defect or unsuitability of the containers or other transport units supplied by the Merchant, or if supplied by the Freight Forwarder if a defect or unsuitability of the container or other transport unit would have been apparent upon reasonable inspection by the Merchant. The Merchant shall indemnify the Freight Forwarder against all loss, damage, liability and expense so caused.

Freight Forwarder's Liability

The responsibility of the Freight Forwarder for the goods under these conditions covers the period from the time the Freight Forwarder has taken the goods in his charge to the time of their delivery.

The Freight Forwarder shall be liable for loss of or damage to the goods as well as for delay in delivery if the occurrence which caused the loss, damage or delay in delivery took place while the goods were in his charge as defined in Clause 2.1.a, unless the Freight Forwarder proves that no fault or neglect of his own, his servants or agents or any other person referred to in Clause 2.2., has caused or contributed

to such loss, damage or delay. However, the Freight Forwarder shall only be liable for loss following from delay in delivery if the Consignor has made a declaration of interest in timely delivery which has been accepted by the Freight Forwarder and stated in this FBL.

Arrival times are not guaranteed by the Freight Forwarder. However, delay in delivery occurs when the goods have not been delivered within the time expressly agreed upon or, in the absence of such agreement, within the time which would be reasonable to require of a diligent Freight Forwarder, having regard to the circumstances of the case.

If the goods have not been delivered within ninety consecutive days following such date of delivery as determined in Clause 6.3., the claimant may, in the absence of evidence to the contrary, treat the goods as lost.

When the Freight Forwarder establishes that, in the circumstances of the case, the loss or damage could be attributed to one or more causes or events, specified in a-e of the present clause, it shall be presumed that it was so caused, always provided, however, that the claimant shall be entitled to prove that the loss or damage was not, in fact, caused wholly or partly by one or more of such causes or events:

an act or omission of the Merchant, or person other than the Freight Forwarder acting on behalf of the Merchant or from whom the Freight Forwarder took the goods in charge;

insufficiency or defective condition of the packaging or marks and/or numbers;

handling, loading, stowage or unloading of the goods by the Merchant or any person acting on behalf of the Merchant;

inherent vice of the goods;

strike, lockout, stoppage or restraint of labour

Defences for carriage by sea or inland waterways

Notwithstanding Clauses 6.2., 6.3. and 6.4. the Freight Forwarder shall not be liable for loss, damage or delay in delivery with respect to goods carried by sea or inland waterways when such loss, damage or delay during such carriage has been caused by:

act, neglect, or default of the master, mariner, pilot or the servants of the carrier in the navigation or in the management of the ship,

fire, unless caused by the actual fault or privity of the carrier, however, always provided that whenever loss or damage has resulted from unseaworthiness of the ship, the Freight Forwarder can prove that due diligence has been exercised to make the ship seaworthy at the commencement of the voyage.

Paramount Clauses

These conditions shall only take effect to the extent that they are not contrary to the mandatory provisions of International Conventions or national law applicable to the contract evidence by this FBL.

The Hague Rules contained in the International Convention for the unification of certain rules relating to Bills of Lading, dated Brussels 25th August 1924, or in those countries where they are already in force the Hague-Visby Rules contained in the Protocol of Brussels, dated 23rd February 1968, as enacted in the Country of Shipment, shall apply to all carriage of goods by sea and also to the carriage of goods by inland waterways, and such provisions shall apply to all goods whether carried on deck or under deck.

The Carriage of Goods by Sea Act of the United States of America (COGSA) shall apply to the carriage of goods by sea, whether on deck or under deck, if compulsorily applicable to this FBL or would be applicable but for the goods being carried on deck in accordance with a statement on this FBL.

Limitation of Freight Forwarder's Liability

Assessment of compensation for loss of or damage to the goods shall be made by reference to the value of such goods at the place and time they are delivered to the consignee or at the place and time when, in accordance with this FBL, they should have been so delivered.

The value of the goods shall be determined according to the current commodity exchange price or, if there is no such price, according to the current market price or, if there are no such prices, by reference to the normal value of goods of the same name and quality.

Subject to the provisions of subclauses 8.4. to 8.9. inclusive, the Freight Forwarder shall in no event be or become liable for any loss of or damage to the goods in an amount exceeding the equivalent of 666.67

SDR per package or unit or 2 SDR per kilogramme of gross weight of the goods lost or damaged, whichever is the higher, unless the nature and value of the goods shall have been declared by the Consignor and accepted by the Freight Forwarder before the goods have been taken in his charge, or the ad valorem freight rate paid, and such value is stated in the FBL by him, then such declared value shall be the limit.

Where a container, pallet or similar article of transport is loaded with more than one package or unit, the packages or other shipping units enumerated in the FBL as packed in such article of transport are deemed packages or shipping units. Except as aforesaid, such article of transport shall be considered the package or unit.

Notwithstanding the above mentioned provisions, if the multimodal transport does not, according to the contract, include carriage of goods by sea or by inland waterways, the liability of the Freight Forwarder shall be limited to an amount not exceeding 8.33 SDR per kilogramme of gross weight of the goods lost or damaged.

When the loss of or damage to the goods occurred during one particular stage of the multimodal transport, in respect of which an applicable international convention or mandatory national law would have provided another limit of liability if a separate contract of carriage had been made for that particular stage of transport, then the limit of the Freight Forwarder's liability for such loss or damage shall be determined by reference to the provisions of such convention or mandatory national law.

Unless the nature and value of the goods shall have been declared by the Merchant and inserted in this FBL, and the ad valorem freight rate paid, the liability of the Freight Forwarder under COGSA, where applicable, shall not exceed USD 500 per package or, in the case of goods not shipped in packages, per customary freight unit.

If the Freight Forwarder is liable in respect of loss following from delay in delivery, or consequential loss or damage other than loss of or damage to the goods, the liability of the Freight Forwarder shall be limited to an amount not exceeding the equivalent of twice the freight under the multimodal contract for the multimodal transport under this FBL.

The aggregate liability of Freight Forwarder shall not exceed the limits of liability for total loss of the goods.

The Freight Forwarder is not entitled to the benefit of the limitation of liability if it is proved that the loss, damage or delay in delivery resulted from a personal act or omission of the Freight Forwarder done with the intent to cause such loss, damage or delay, or recklessly and with knowledge that such loss, damage or delay would probably result.

Applicability to Actions in Tort

These conditions apply to all claims against the Freight Forwarder relating to the performance of the contract evidenced by this FBL, whether the claim be founded in contract or in tort.

Liability of Servants and other Persons

These conditions apply whenever claims relating to the performance of the contract evidenced by this FBL are made against any servant, agent or other person (including any independent contractor) whose services have been used in order to perform the contract, whether such claims are founded in contract or in tort, and the aggregate liability of the Freight Forwarder and of such servants, agents or other persons shall not exceed the limits in clause 8.

In entering into this contract as evidenced by this FBL, the Freight Forwarder, to the extend of these provisions, does not only act on his own behalf, but also as agent or trustee for such persons, and such persons shall to this extent be or be deemed to be parties to this contract.

However, if it is proved that the loss of or such loss or damage to the goods resulted from a personal act or omission of such a person referred to in Clause 10.1., done with intent to cause damage, or recklessly and with knowledge that damage would probably result, such person shall not be entitled to benefit of limitation of liability provided for in Clause 8.

The aggregate of the amounts recoverable from the Freight Forwarder and the persons referred to in Clause 2.2. and 10.1., shall not exceed the limits provided for in these conditions.

Method and Route of Transportation

Without notice to the Merchant, the Freight Forwarder has the liberty to carry the goods on or under deck and to choose or substitute the means, route and procedure to be followed in the handling, stowage, storage and transportation of the goods.

Delivery

Goods shall be deemed to be delivered when they have been handed over or placed at the disposal of the Consignee or his agent in accordance with this FBL, or when the goods have been handed over to any authority or other party to whom, pursuant to the law or regulation applicable at the place of delivery, the goods must be handed over, or such other place at which the Freight Forwarder is entitled to call upon the Merchant to take delivery.

The Freight Forwarder shall also be entitled to store the goods at the sole risk of the Merchant, and the Freight Forwarder's liability shall cease, and the cost of such storage shall be paid, upon demand, by the Merchant to the Freight Forwarder.

If at any time the carriage under this FBL is or is likely to be affected by any hindrance or risk of any kind (including the condition of the goods) not arising from any fault or neglect of the Freight Forwarder or a person referred to in Clause 2.2. and which cannot be avoided by the exercise of reasonable endeavours the Freight Forwarder may:
Abandon the carriage of the goods under this FBL and, where reasonably
possible, place the goods or any part of them at the Merchant's disposal at any
place which the Freight Forwarder may deem safe and convenient, whereupon
delivery shall be deemed to have been made, and the responsibility of the Freight
Forwarder in respect of such goods shall cease.
In any event, the Freight Forwarder shall be entitled to full freight under this FBL and the Merchant shall pay any additional costs resulting from the above mentioned circumstances.

Freight and Charges

Freight shall be paid in cash, without any reduction or deferment on account of any claim, counterclaim or set-off, whether prepaid or payable at destination. Freight shall be considered as earned by the Freight Forwarder at the moment when the goods have been taken in his charge, and not to be returned in any event.

Freight and all other amounts mentioned in this FBL are to be paid in the currency named in this FBL or, at the Freight Forwarder's option, in the currency of the country of dispatch or destination at the highest

rate of exchange for bankers sight bills current for prepaid freight on the day of dispatch and for freight payable at destination on the day when the Merchant is notified on arrival of the goods there or on the date of withdrawal of the delivery order, whichever rate is the higher, or at the option of the Freight Forwarder on the date of this FBL.

All dues, taxes and charges or other expenses in connection with the goods shall be paid by the Merchant. Where equipment is supplied by the Freight Forwarder, the Merchant shall pay all demurrage and charges which are not due to a fault or neglect of the Freight Forwarder.

The Merchant shall reimburse the Freight Forwarder in proportion to the amount of freight for any costs for deviation or delay or any other increase of costs of whatever nature caused by war, warlike operations, epidemics, strikes, government directions or force majeure.

The Merchant warrants the correctness of the declaration of contents, insurance, weight, measurements or value of the goods but the Freight Forwarder has the liberty to have the contents inspected and the weight, measurements or value verified. If on such inspection it is found that the declaration is not correct it is agreed that a sum equal either to five times the difference between the correct figure and the freight charged, or to double the correct freight less the freight charged, whichever sum is the smaller, shall be payable as liquidated damages to the Freight Forwarder for his inspection costs and losses of freight on other goods notwithstanding any other sum having been stated on this FBL as freight payable.

Despite the acceptance by the Freight Forwarder of instructions to collect freight, charges or other expenses from any other person in respect of the transport under this FBL, the Merchant shall remain responsible for such monies on receipt of evidence of demand and the absence of payment for whatever reason.

Lien

The Freight Forwarder shall have a lien on the goods and any documents relating thereto for any amount due at any time to the Freight Forwarder from the Merchant including storage fees and the cost of recovering same, and may enforce such lien in any reasonable manner which he may think fit.

General Average

The Merchant shall indemnify the Freight Forwarder in respect of any claims of a General Average nature which may be made on him and shall provide such security as may be required by the Freight Forwarder in this connection.

Notice

Unless notice of loss or damage to the goods, specifying the general nature of such loss or damage, is given in writing by the consignee to the Freight Forwarder when the goods are delivered to the consignee in accordance with clause 12, such handing over is prima facie evidence of the delivery by the Freight Forwarder of the goods as described in this FBL.

Where the loss or damage is not apparent, the same prima facie effect shall apply if notice in writing is not given within 6 consecutive days after the day when the goods were delivered to the consignee in accordance with clause 12.

Time bar

The Freight Forwarder shall, unless otherwise expressly agreed, be discharged of all liability under these conditions unless suit is brought within 9 months after the delivery of the goods, or the date when the goods should have been delivered, or the date when in accordance with clause 6.4. failure to deliver the goods would give the consignee the right to treat the goods as lost.

Partial Invalidity

If any clause or a part thereof is held to be invalid, the validity of this FBL and the remaining clauses or a part thereof shall not be affected.

Jurisdiction and applicable law

Actions against the Freight Forwarder may be instituted only in the place where the Freight Forwarder has his place of business as stated on the reverse of this FBL and shall be decided according to the law of the country in which that place of business is situated.

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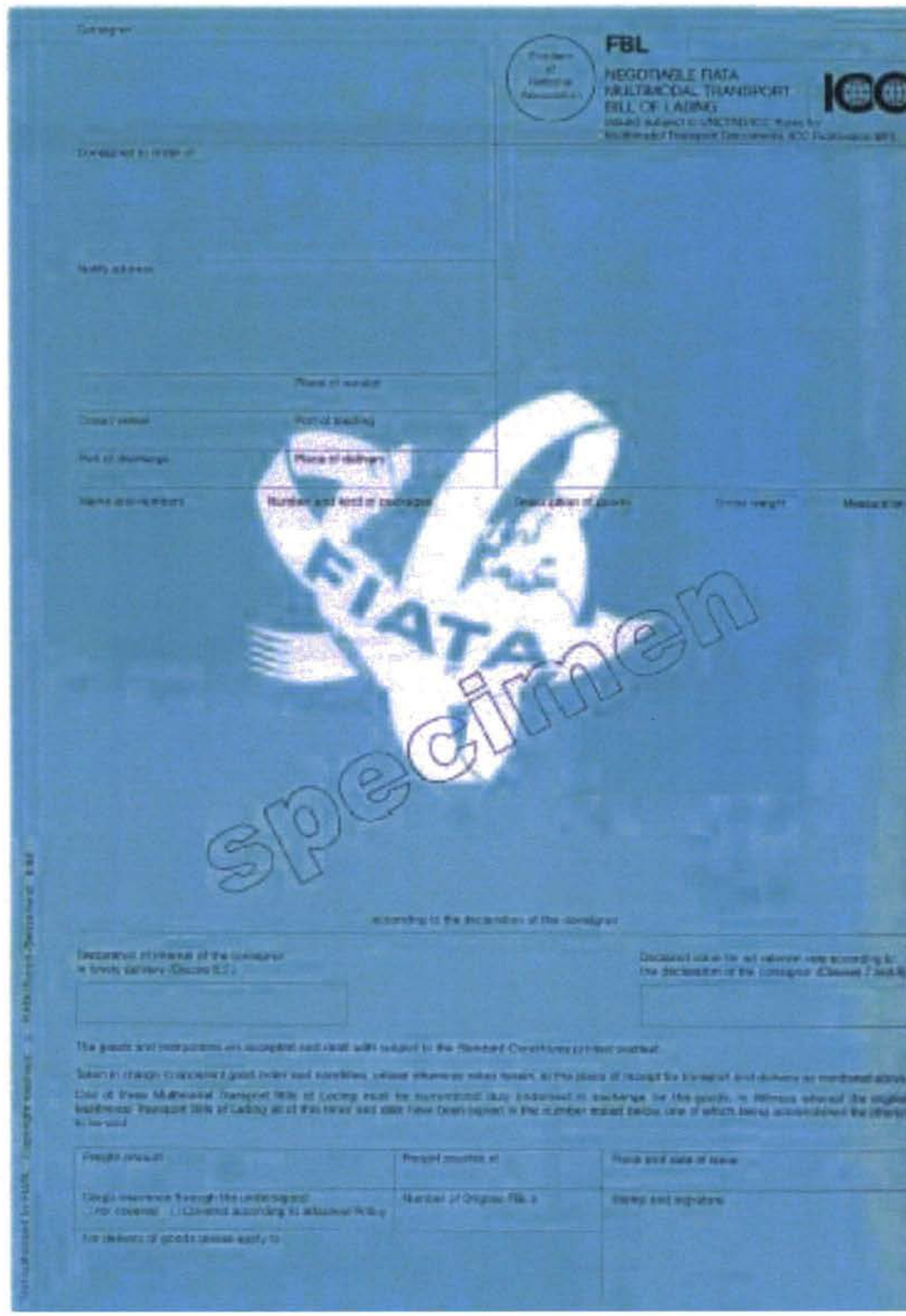
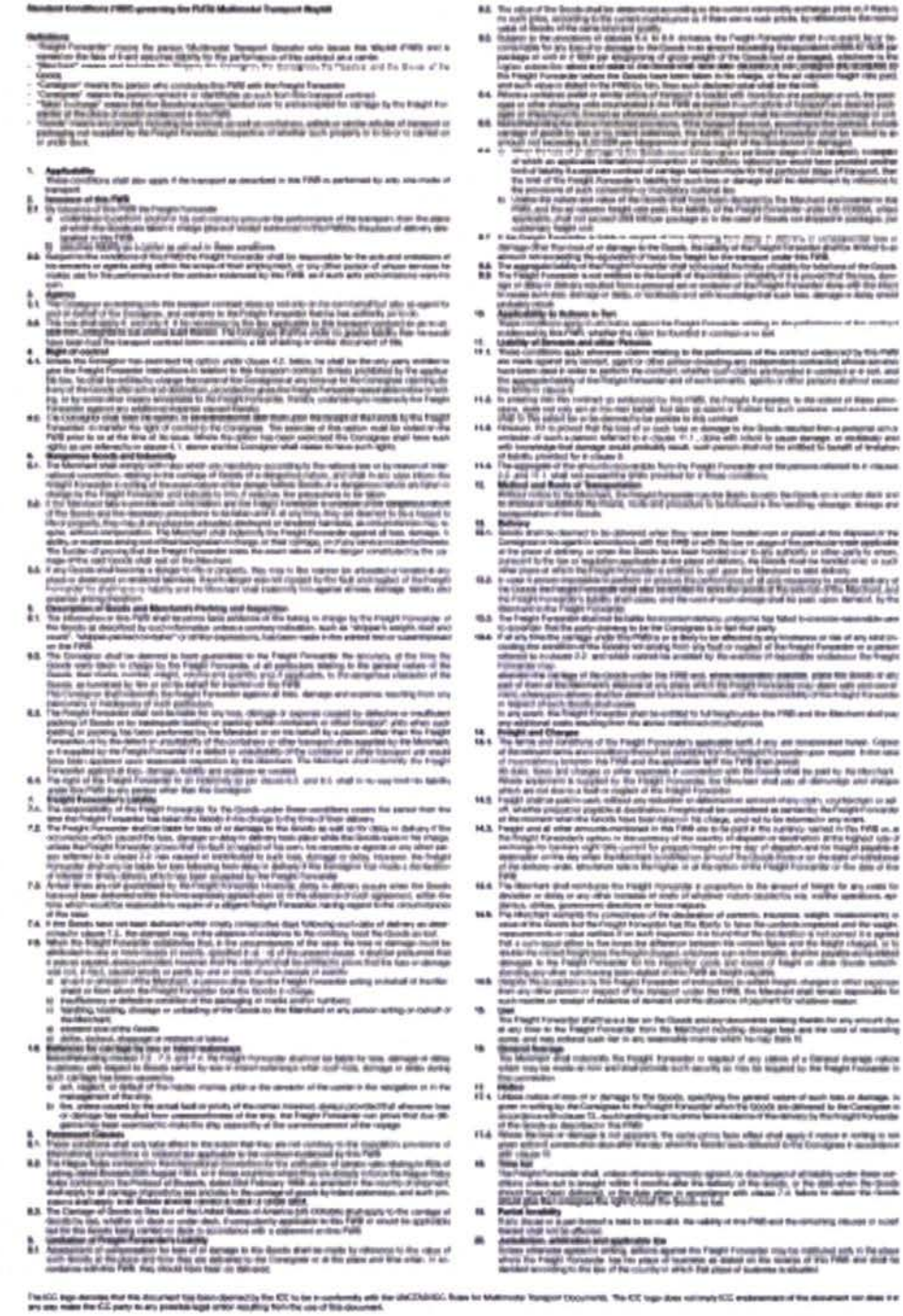
FBL Cover Page



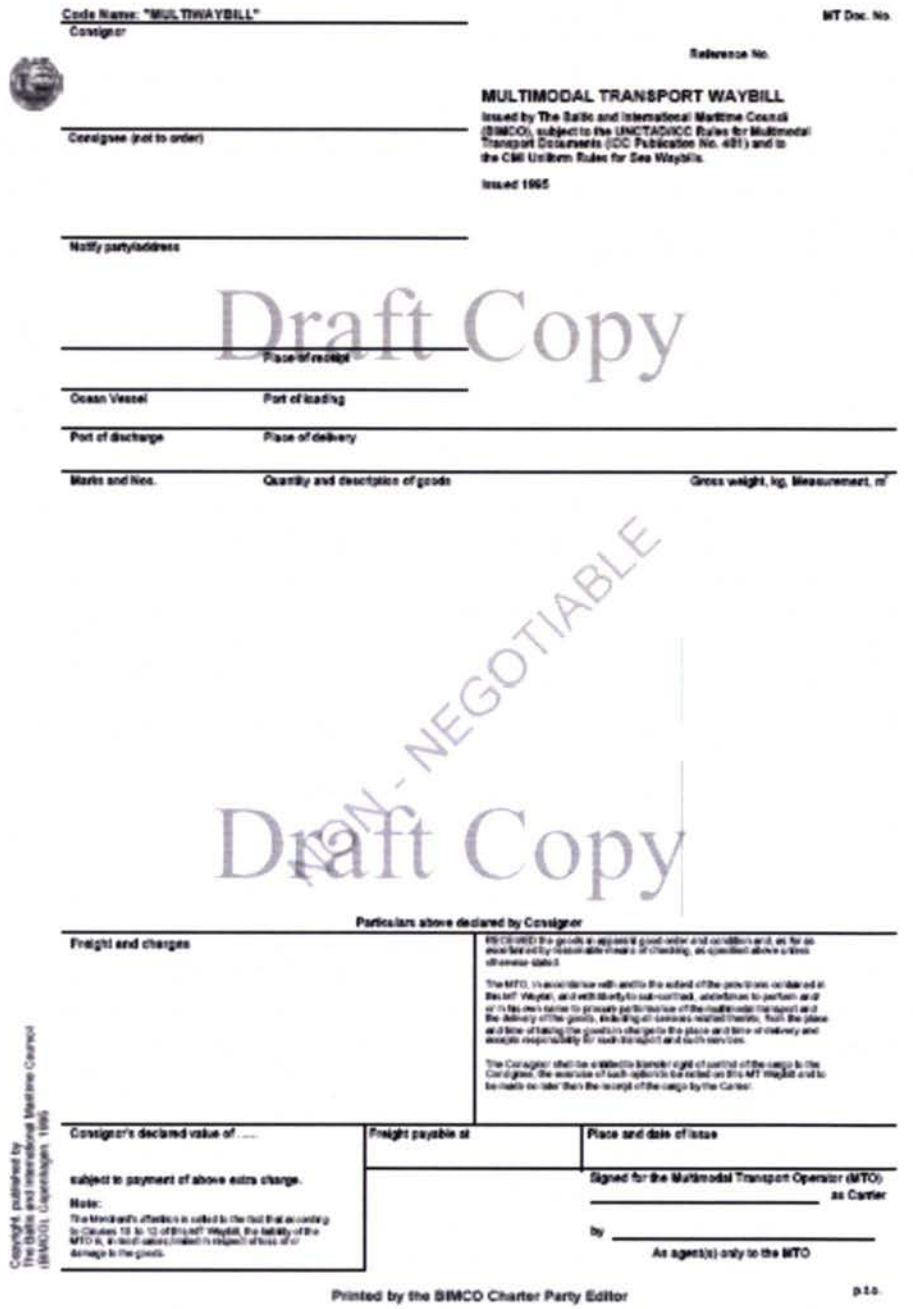
FCT Cover Page

FWB Cover Page

FWB Second Page



Multiwaybill 95



Code Name: "MULTIWAYBILL"
Consignor

MT Doc. No.

Reference No.

MULTIMODAL TRANSPORT WAYBILL

Issued by The Baltic and International Maritime Council (BIMCO), subject to the UNCTAD/ICC Rules for Multimodal Transport Documents (ICC Publication No. 481) and to the CMI Uniform Rules for Sea Waybills.

Issued 1995

Consignee (not to order)

Notify party/address

Draft Copy

Place of receipt

Ocean Vessel | Port of loading

Port of discharge | Place of delivery

Marks and Nos. | Quantity and description of goods | Gross weight, kg, Measurement, m³

NON - NEGOTIABLE

Draft Copy

Particulars above declared by Consignor

Freight and charges

RECEIVED the goods in apparent good order and condition and, as far as ascertained by reasonable means of checking, as specified above unless otherwise stated.

The MTO, in accordance with and to the extent of the provisions contained in this MT Waybill, and with liberty to sub-contract, undertakes to perform and/or in his own name to procure performance of the multimodal transport and the delivery of the goods, including all services related thereto, from the place and time of taking the goods in charge to the place and time of delivery and accepts responsibility for such transport and such services.

The Consignor shall be entitled to transfer rights of control of the cargo to the Consignee. The exercise of such rights is to be noted on this MT Waybill and to be made no later than the receipt of the cargo by the Carrier.

Consignor's declared value of .....

subject to payment of above extra charge.

Note:
The Merchant's attention is called to the fact that according to Clauses 10 to 12 of this MT Waybill, the liability of the MTO is, in most cases, limited in respect of loss of or damage to the goods.

Freight payable at

Place and date of issue

Signed for the Multimodal Transport Operator (MTO)
as Carrier

by

As agent(s) only to the MTO

Printed by the BIMCO Charter Party Editor

p.t.o.