

"Conflict and Co-operation -  
The implications of Contemporary European Transformations for Social Theory"  
Workshop "The role of transport for Europe's future"  
Nicosia, Cyprus, March 19-23, 1997 University of Cyprus

## **The changing face of the European operational environment in the freight transport**

Dr A. Ballis, Dr G. Yannis and Prof. D. Tsamboulas  
*National Technical University of Athens*  
*Department of Transportation Planning and Engineering*  
*5, Iroon Polytechniou str. Zografou, Athens, GR-15773, GREECE*

### **Abstract**

The severe environmental and safety problems that the continuous increase of the road traffic creates in the European network, require the shift of the transport patterns to the environmental friendly modes. For the freight transport this means a shift from road to combined transport. In the macro-scale, regulatory initiatives should provide the framework for the efficient competition environment, making transport system fairer and more efficient, whereas transport chain actors should adjust their transport behaviour and redefine their strategies inside this new environment. The associated decisions must be based on a multi-criteria approach since strong lobby interests and severe social reactions are conflicting in this -very sensitive for the whole economy- sector. Significant decisions must also be taken in micro-scale. The reorganisation of the traditional transport companies requires new market strategies and imposes personnel restructuring and new working environment that are opposing the today's organisational structures. In the long run, the application of new technologies in the intra- and inter-organisation of the transport companies has the potential to transform radically the sector structure, even redefine the transport concept.

### **1. Introduction**

Transport is an essential service in any society, a precondition for the industrial development and a driving force behind international trade and tourism. Transport cost as a percentage of total sales value, varies significantly. Highest cost percentages -in the range of 20%- are found when products with low value are traded over long distances (e.g. cast iron in intercontinental trade) while the lowest cost percentages can account less than 1%. On average, the transport costs in the European Union account for only 2.8% of final product prices. On the contrary, the effects of the transportation externalities (in terms of congestion, accidents, air pollution and noise) seem to count much higher for the society. This difference arises from the fact that the transport choices are influenced mainly by transport prices and that for many journeys there is a

mismatch between transport prices paid by the users and the underlying costs. Society pays large parts of costs caused by certain transport users. Bridging this gap is called the internalisation of external costs which means that someone making a journey should pay the real cost of that journey.

The present infrastructure (and congestion) charging system is a mix of taxes based on the nationality principle (e.g. annual vehicle taxes) which holds that taxes are paid in the country of origin and the territoriality principle which implies that charges are paid where the costs are caused (e.g. tolls, road user charges and, to a lesser extent fuel excise duties). However, the need to link charges as closely as possible to costs, is a trend with growing importance that has strong political support at European level (European Parliament opinion for the "Eurovignette" Directive 93/89/EC).<sup>1</sup>

The "interpretation" of the above pricing policy promotes the shift of the transport patterns to the environmental friendly modes. For the freight transport this means a shift from road to combined transport, rail transport, short-sea shipping and inland waterways. Transport chain actors should adjust their transport behaviour and redefine their strategies inside this new environment.

Combined transport (CT) can be defined as the combination of at least two modes of transport in a single transport chain, without a change of loading unit, with most of the route travelled by rail, inland waterway or short-sea shipping, and with the shortest possible initial and final journeys by road. Combined transport can be distinguished in two basic types: accompanied and unaccompanied combined transport. In accompanied transport, the complete lorry drives over a ramp under its own power onto a special low loader wagon. During the journey, the driver remains on the train, accompanying his lorry in a separate, comfortably equipped wagon. The most obvious drawback of the system is its especially heavy "dead weight", as the weight of the full lorry also has to be transported by rail. In the unaccompanied combined transport only the loading units (containers, swap-bodies, and semi-trailers) are transported. The vast majority of the combined transport market uses the unaccompanied transport by rail.<sup>2</sup>

This work aims to present the changing face of the European operational environment in the freight transport sector, reflecting the current trends of a more environment-friendly transport activity. The international combined transport is presented as the alternative for a more environment-compatible approach in European transport activities. Moreover, the need for transport operators re-engineering by the use of new techniques is identified and analysed.

## **2. Macro-scale initiatives**

The importance of ensuring that prices reflect underlying costs has also been emphasised in the White Paper on the Future of the Common Transport Policy.<sup>3</sup> It has grown with the completion of the internal transport market. Transport operators based in different Member States and using different modes of transport, have been given the opportunity to offer their services across the Union in competition with one another.

Despite the significant advantages that combined transport has to offer, the present percentage that the CT possesses in the transport market indicates the need for additional investments and measures.<sup>4</sup> The Community of European Railways claims that the general market conditions are so bad that profitability in combined transport ranges from low to negative for the rail companies. In many cases, the profit margin for combined transport is not enough to ensure that the networks can finance their own infrastructure. From a strictly business viewpoint, they probably would have been well advised to drop out of the market if they didn't have the backing of the EEC, the Member States and local authorities to help them pay for infrastructure.<sup>5</sup>

During the past few years a number of technical and fiscal measures have been introduced.<sup>6</sup> The permissible total weight for road vehicles used in the initial and final journeys of the combined transport chain can be as much as 44 tons (normally permitted only 40 tons) because of the greater tare of the containers used in CT. Transport operators who are engaged in CT operations can save on motor vehicle taxes in most countries, while there should be opportunities for certain types of investment in CT to be subsidised with government funds. Moreover, other measures will have a negative influence to the "pure" road

transportation. Due to the -rightly- strict labour laws, one driver alone is no longer able to deliver a shipment by road over a distance of more than 700 km in one day - unless, of course, the driver intentionally infringes the regulations.

Complexity of transport sector in Europe makes every political decision and its implementation a very difficult task. Regulations favouring combined transport can easily be converted to road promotion measures when their implementation is not sufficiently monitored. For example, subsidies (through loans and/or tax reduction, etc.) for special lorries transporting swap-bodies, intend to favour combined transport, whereas carriers can benefit from these subsidies and then make exclusive use of the new lorries on the roads.

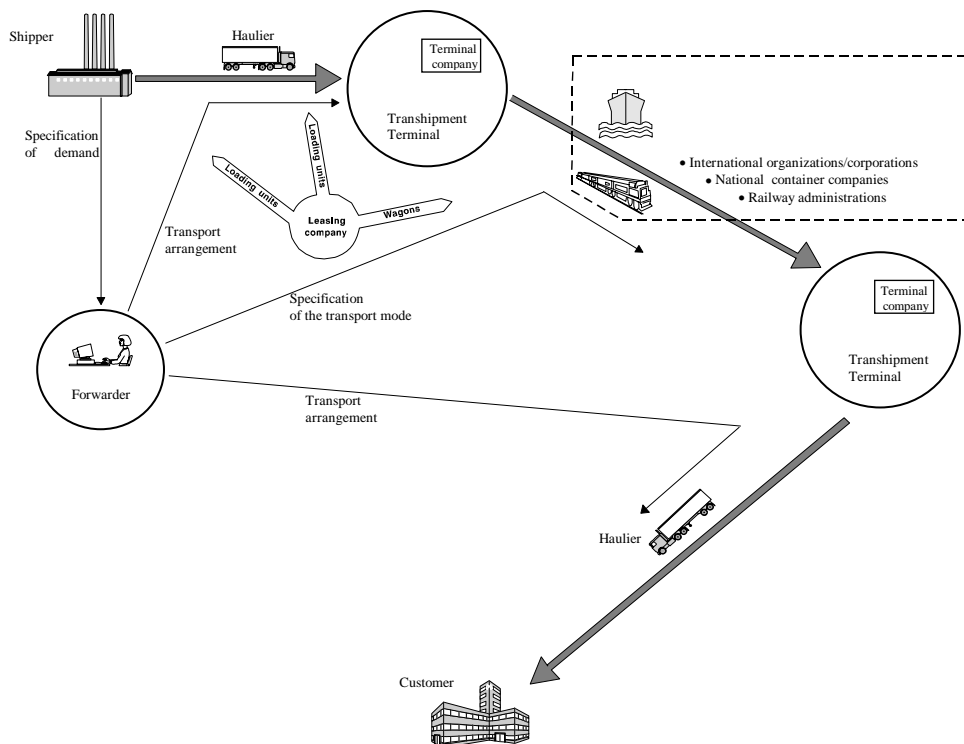
Decisions concerning the promotion of combined transport in Europe must be based on multi-criteria approaches since strong lobby interests and severe social reactions are conflicting in this -very sensitive for the whole economy-sector. If only all parameters are taken into consideration with their weighted importance, the related decisions can provide the optimum solution for all economic and social conflicting interests in Europe. Multi-criteria techniques is the most appropriate method as it allows for a priorities hierarchisation based not only on simple cost-benefit approaches but also on the generalised benefit, using an integrated approach for the transport sector evolution.

### **3. Re-engineering of transport operators**

The regulatory initiatives in the macro-scale arise the need for significant decisions in micro-scale. However, the reorganisation of the traditional transport companies (in order to cope with the new transport attitudes) requires new market strategies and imposes personnel restructuring as well as new working environment that are opposing the today's organisational structures.

The understanding of the complex combined transport structural organisation is a prerequisite. The normal scenario is that the shipper contacts a forwarder when a transport is needed. The Figure 1 presents the physical flow of the cargo as well as the actors involved and their role in a typical combined transport chain. The shipper specifies a demand for transported volume, transport times and frequencies, price level, etc. This demand governs the

output of transport services. Even though the forwarder is the buyer of the core CT services, it is the demand of the shipper that the forwarder has to fulfil by choosing among different transport operators. Only a few shippers specify the mode of transport, especially those with production that pollutes the environment. Certain large shippers operate their own terminal equipment, used at private sidings.



**Figure 1.** Actors involved and their role in a typical transport chain

The role of the forwarder is to act as an intermediary in the transaction of transport services between transport buyers and operators supplying physical transport services. The forwarders have focused on different types of transport. One basis for segmentation is specialization on certain unit load types. Three different roles can be distinguished: (1) traditional forwarders, (2) semi-trailer operators and (3) swap body operators.<sup>7</sup>

The traditional forwarder has closely established connections to road transport. Their transport services are mainly carried out by articulated lorries; they use CT as complement and as reserve capacity.

Forwarders with a core business of using semi-trailers for CT are usually owners of semi-trailers and buy the haulage services from small hauliers. In addition, they have terminals for grouping shipments, but on a smaller scale than the traditional forwarders.

Forwarders with a core business of using swap bodies sell exclusively transport services. Their business orientation is to transport goods in fixed transport links where the swap bodies rotate. Since the road haul cost of swap bodies is higher (than the one for semi-trailers), while the rail haul cost is lower, these forwarders are connected most closely to CT.

The size and the role of the hauliers vary widely between European countries. The resources of the hauliers vary according to their size. Some hauliers specialize in hauling semi-trailers or swap bodies while other larger companies possess vehicles for all types of transport. Another activity performed is the supply of unit loads. When shifting from pure road transport to CT, hauliers face vastly different conditions. The decision to choose the swap body based transport system during the initial phase of combined transport operations is very difficult, because this system has the lowest degree of economic convertibility to the road.

The use of loading units requires from the company good managerial and operative re-organisation skills, able to modify the mix of the company's personnel, to reduce manual workers and to increase the office staff, in order to handle the additional operations' workload. The easy convertibility to all-road transport makes the "grapple arm" semi-trailer the classic first choice loading unit in combined transport, at the initial phases of operations, even if it is not the most productive. For a transport company, purchasing a "grapple arm" semi-trailer, especially when replacing the old semi-trailer, this does not represent a major change. If it were to buy swap bodies, it would be obliged to dramatically convert its fleet and way of conducting its operations.<sup>8</sup>

This greater peace of mind for operators, who are working with combined transport for the first time, downplays the higher value of the cost to loading capacity ratio of the semi-trailer compared to the swap body. The company feels more comfortable when it has a period of maturity towards combined transport

operations, during which it uses the semi-trailer. However, the newcomer operators of combined transport have to compete in an already highly evolved combined transport market, that has adopted the swap body in a generalised manner. Therefore, they must evaluate whether it is more economically beneficial to skip the initial phases involving the semi-trailer (although they feel more comfortable) and start competing immediately with the use of swap bodies.

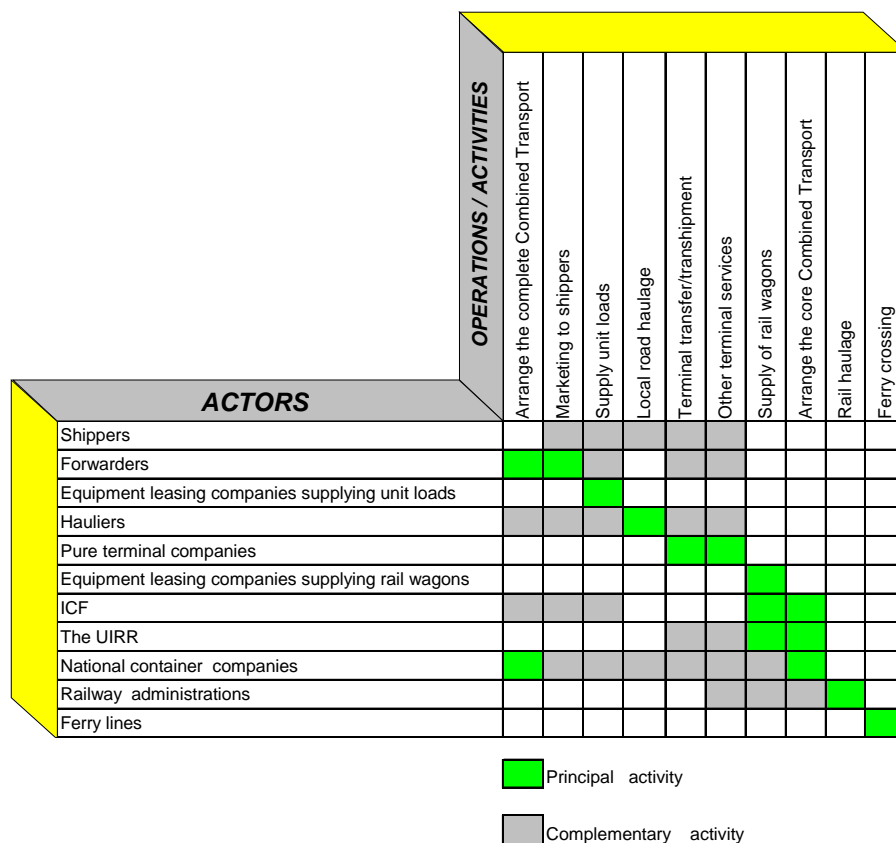
In addition, the haulier (acting as forwarder) must ensure that the loading unit is collected at the destination terminal and is delivered to the final destination. Many hauliers, including medium-sized firms have extended their operations at the “other end” either by setting up their own offices or by finding reliable partners who assume responsibility for local delivery by lorry.<sup>9</sup>

In parallel with the individual actors, a number of international organisations/corporations participate in the market. The railway companies and their subsidiaries originally concentrated their efforts on the maritime container business. The European railway companies jointly formed the Intercontainer, to which they gave the task of organising and marketing the international container rail transport. Intercontainer was merged in 1993 with the railway subsidiary for temperature-controlled freight transport, to Intercontainer-Interfrigo (ICF). In parallel to the ICF, the UIRR (Union Internationale des sociétés de transport combine Rail-Route) has the monopoly on European border-crossing CT involving semi-trailers and rolling highway. UIRR has 17 joint owners distributed over the same number of countries (even though the geographical business areas do not exactly follow national borders).

All these international operators dispose very often an international organisational structure as well as privileges (often monopoly privileges) in special market segments giving them a significant competitive advantage vis-à-vis the individual transport operators. Only very few (not more than 10) large individual operators with established European networks can compete the above international organisations/corporations. On the other hand, the international organisations/corporations are obliged to cooperate and very often make strategic alliances with the individual combined transport operators in

order to benefit stronger market access of the latter. Therefore, they are in the process of adapting their interfaces (terminals, information systems, etc.) with the other combined transport operators, and thus a smoother flow of the shipments inside the combined transport chain is gradually realised.

Domestic transport operators play a significant role in the international combined transport sector as they dispose a heavy local infrastructure (generally domestic transport turnover is multiple of the international one of the same country) and very often are used for the last part of the international combined transport chain: the local distribution of the shipment. However, the domestic operators are more reluctant in necessary changes and present today an important bottle-neck in the international combined transport chain.



**Figure 2.** Co-operation and conflicts among the actors involved in the combined transport chain (Based on information from source (8))

In general, domestic terminal companies, railway administrations, ferry lines, equipment leasing companies and other transport sector actors play an important role in the operation of the international combined transport chain, as



they dispose the necessary domestic infrastructure and take advantage of their traditional dominant position in the domestic transport market.<sup>10</sup> Figure 2 shows the above presented combined transport actors as well as their operations/activities. This figure reveals that both co-operation and conflicts exist among the actors involved in the combined transport chain. The actors which perform according to their principal operations/activities are working in a complimentary environment. All relations are based on mutual dependency. However, since this mutual dependency is not always symmetric, some actors can be dominant. Taking into account that the dominance leads to imbalance, all actors try to improve their position by invading into complimentary operations/activities. “Dominant” actors try to improve their positions (and profits) in the market while the “weakened” actors try to defend their market using offensive tactics. The actors that are expanding their activities form an antagonistic environment, not only against the conventional “masters” of the sector but also against each other.

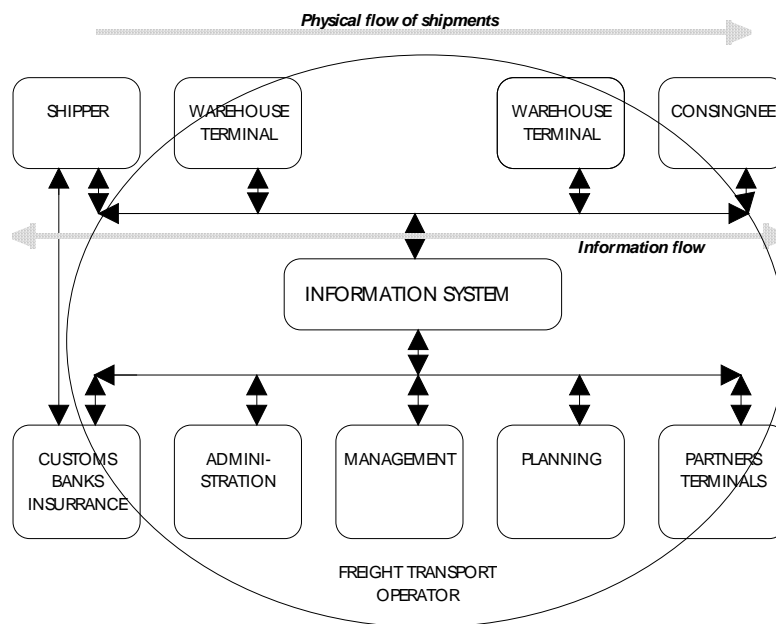
#### **4. The use of new techniques**

In order to make full use of the combined transport efficiency, the actors involved in the international transport chains must take advantage of the advanced operational schemes<sup>11</sup> and the available technological innovations.<sup>12, 13</sup> These new organisational and technological schemes can provide to the transport operator a significant competitive advantage towards its competitors. In the long run, this fact imposes the use of these new and efficient schemes to all transport operators who do not want to progressively lose their customers.

The introduction of a number of operational innovations<sup>14</sup> such as hub-and-spoke systems (central gathering of all shipments), freight villages (large warehouses for handling and conditioning of the shipments), overnight delivery (goods processing during the night), block trains (non-stop line trains), standardisation of shipments (handled by special standardised equipment) and automatic identification of the shipment (by the use of various types of tags) support the effectiveness of the combined transport production chain. Transport operators not opting to use these new techniques limit their growth and lose progressively their market share as they can not respond properly to

the increasing needs of their customers. Small and medium size operators who cannot develop their own infrastructure to benefit from these new techniques, can use third party services or participate in cooperations splitting thus the fixed cost.

In a fast changing world, the shippers are becoming more and more demanding vis-à-vis the transport operators. Today, just-in-time techniques, stock reduction, together with efficient information flow, consist standard requirement of the shippers, imposing thus a new way of work to the transport operators. Today, the shippers prefer the transport operator offering integrated services instead of the traditional carrier who executes only the carriage of goods. The provision of integrated services comprises not only the door-to-door carriage of the shipment but also the integrated logistics' services (inventory, warehousing, conditioning, etc.) and completes support of related information. The activities of the transport operator are incorporated in the integrated production chain of the customer in order to guarantee continuous flow from raw materials to the end-customer.



**Figure 3.** Shipment and information flow

All these new structures of transport operations impose a powerful coordination of all elements of the transport chain (operators, vehicles, nodal centers, etc.) which is only possible by the use of advanced information systems.<sup>15</sup> Transport operators focus today on the efficient implementation of

real-time tracking and tracing of every shipment/container/vehicle. In addition, they focus on automatic dissemination of information to and from the customer, the carriers, the terminal authorities, the customs, the banks and every other party involved, by the use of integrated information systems. A schematic presentation of the physical flow of goods and the information flow in the international combined transport chain is presented in the Figure 3.

It is noted that the realisation of these new organisational schemes can only be feasible by the use of advanced telematics technologies. More precisely, technological advances in automatic identification (bar-codes, radio-labelling, optical character recognition, voice recognition, etc.), computers (powerful computers, local networks, portable terminals, on-board computers, etc.), software (relational data bases, distributed architectures, multi-windows interfaces, etc.) and communications (telecommunication networks, radio and satellite communication, electronic data interchange, etc.) are those making possible the development of powerful information systems, supporting efficiently the integrated door-to-door international combined transport services.

Technical innovations based on advanced hardware equipment and computer controlled systems as well as operational innovations using new organisational structures and integrated information systems, have a significant impact to the productivity, the differentiation of services offered and to the efficient quality control of the combined transport operations.<sup>16</sup> The progressive implementation of these innovations in every level of combined transport operations has already started to transform the transport activity profile in Europe. It is due to the use of these innovations that combined transport operations have the potential to offer a higher-than-today level of service and be more competitive towards road transport. Further research and feedback from pilot implementation will lead these new systems to their maturity and their full exploitation for the benefit of the transport sector.

## **5. Conclusions**

Freight transport sector in Europe has been transformed radically over the last decades due to the changing competition environment as well as to the introduction of a number of technical and operational innovations. The increasing importance of environmental issues arises the need for more "green" transport modes, making combined transport a good solution despite its complexity. The combined transport regulatory framework, evolves under the influence of conflicting interests of the European freight transport actors, imposing them to re-orientate their activities. Furthermore, the increasing shippers demand for high quality transport services, obliges European transport operators to re-organise their traditional way of work and seek for new and innovative techniques in order to cope with vivid competition.

In this fast changing European operational environment in the freight transport sector, freight operators are obliged to take significant decisions on their operations structure, if they want to maintain their presence in the European market. The reorganisation of the traditional transport companies (in order to cope with the new transport attitudes) requires new market strategies through new alliances and services differentiation and imposes cost reduction through personnel restructuring and new working environment that are opposing the today's organisational structures. In the long run, the application of new technologies in the intra- and inter-organisation of the transport companies seems to have a great potential to transform radically the sector structure, even redefine the transport concept.

## **6. References**

- <sup>1</sup> Kinnock Neil "Towards Fair and Efficient Pricing in Transport" European Commission DG VII Com (95) 691.
- <sup>2</sup> UIRR. Focus on Combined Transport". International Union of Rail-Road Transport Companies, Brussels, December 1995.
- <sup>3</sup> Commission of the European Communities (1993), " White Paper : The future development of the common transport policy. A global approach to the construction of a Community framework for sustainable mobility", COM(92) 494 final, Office for Official Publications of the European Communities, Luxembourg.
- <sup>4</sup> United Nations / Economic Commission for Europe (1991), "European Agreement on important international combined transport lines and related installations (AGTC)", United Nations, Geneva.
- <sup>5</sup> Club de Bruxelles "Transport In Europe - The future of Inland Transport" Study written by the Club de Bruxelles under the direction of Genevieve Renaux, 1991.
- <sup>6</sup> Commission of the European Communities (1992), "Communication from the Commission concerning the creation of a European combined transport network and its

- operating conditions", COM(92) 230 final, Office for Official Publications of the European Communities, Luxembourg.
- <sup>7</sup> COST 310. "Freight transport logistics". Final report of the Pan-European research action COST310, Commission of the European Communities, Luxembourg, 1993.
  - <sup>8</sup> Woxenius J. "Modelling European combined transport as an industrial system" Chalmers University of Technology, Goteborg, 1994.
  - <sup>9</sup> Tsamboulas A., Ballis A. and Ercolani F. "Appraisal of a new international combined transport service corridor in Europe". Accepted for publication in the winter 1997 issue of Transportation Quarterly.
  - <sup>10</sup> Department of Transportation Planning and Engineering - NTUA. "Investigation of Greek transport demand for the combined transport corridor Greece - Italy - Northern Europe". NTUA, Athens, June 1994.
  - <sup>11</sup> OECD "Integrated advanced logistics for freight transport". Report prepared by an OECD scientific expert group, OECD, Paris, 1996.
  - <sup>12</sup> Ballis A. and Tsamboulas D. "Space requirements, environmental impacts, social restrictions and innovative technological solutions for the unitised cargo terminals". Euroconference on Environment and Innovation, Workshop on Transport and Innovation, Vienna, October 23-26 1996.
  - <sup>13</sup> Bollo D., Frybourg M. and Stumm M. "Suivi des flux physiques et nouvelles technologies de l'information". Etude CIIBA (Premier Ministre), Paris, mars 1994.
  - <sup>14</sup> Yannis G. "Système d'information et stratégie dans les transports. Le cas du transport express". Thèse de doctorat de l'Ecole Nationale des Ponts et Chaussées, ENPC, Paris, 4 Mars 1993.
  - <sup>15</sup> Yannis G. "Information systems and competition in freight transport sector". Congress on Information society, Technical Chamber of Greece, Athens, 4-6 December 1995.
  - <sup>16</sup> Porter M., Miller V. "How information gives you competitive advantage" Harvard Business review, July-August 1985.