

MEASURES PROMOTING INTERMODAL TRANSPORT AS AN ALTERNATIVE TO PURE ROAD TRANSPORT

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Abstract

This paper is based on a report that has been prepared by a subgroup under PIARC's technical committee TC 2.4 – Freight Transport and Intermodality. Based on key developments in freight haulage and the need for action, the aim of this study was to review collaborative measures between road and other modes of transport and governmental measures aimed at promoting intermodal transport. Answering the suggestion about turning the issue into a catalogue of governmental measures, numerous measures to be taken by governments to support intermodal transport are recommended. Because of the increasing problems in road freight transport, it is important to consider intermodal alternatives that will make freight transport more sustainable and to use suitable combinations of the different modes productively. It is the role of public authorities to support intermodal transport and to provide the suitable framework conditions taking into account the public interest and the requirements of the industry.

Keywords: Intermodal transport, Intermodality, Freight transport, Governmental measures, Best practice

Résumé

Ce papier est basé sur ce rapport préparé par un sous-groupe du comité technique 2.4 de l'Association mondiale de la Route (AIPCR) – Transport de Marchandises et Intermodalité. Basé sur les développements clés des marchandises et le besoin d'action, le but de cette étude a été de présenter les mesures pour faire collaborer le transport routier avec les autres modes ainsi que les mesures gouvernementales pour promouvoir le transport intermodal. Pour répondre à la suggestion d'en faire un catalogue de mesures gouvernementales, le sous-groupe recommande un ensemble de mesures aux gouvernements pour encourager le transport intermodal. En raison de l'accroissement des problèmes dans le transport routier de marchandises, il est important d'envisager des alternatives intermodales pour rendre le transport de marchandises plus durable en combinant de la façon la plus appropriée les différents modes. C'est le rôle des pouvoirs publics d'aider le transport intermodal et d'en définir le cadre pertinent en prenant en compte l'intérêt public et les contraintes de l'industrie.

Mots-clés: Transport intermodal, intermodalité, transport de marchandises, mesures gouvernementales, les meilleures pratiques

1. Increasing Freight Transport, especially on Roads

Since the early 1990s in most developed countries, growth in freight transport has been higher than in passenger transport, and often higher than economic growth. The main reasons of the rapid growth of freight transport are globalisation, the spatial division of labour and the individualization of demand.

During the past 30 years, road freight has been steadily capturing market share from rail and inland waterway transport in Western European countries as well as most other countries throughout the world. The longer term trend shows that total tonne-kilometres in the road freight sector increased by a factor of more than 3.4 during the period 1970-2004. In 2004, rail freight stood at less than 50 percent of its modal share in 1970 (European Commission, 2006). Forecasts indicate that road transport will continue to grow faster than other modes of transport in the future.

2. Need for an alternative to pure Road Transport

The productivity of road transport is declining as a result of congestion, improved enforcement of regulation and social standards (training, driving times) and is leading to higher costs and loss of competitiveness of road transport. Road transport capacity will not increase in tact with growth because of the costs of new infrastructure and local objections to new roads and road extensions. New capacity is in any event taken by the massive growth in private passenger transport.

Environmental problems (noise, pollution, area space use, etc.) are increasing, especially in sensitive mountainous regions, coastal regions and urban areas. Concerns about climate change are increasing. Road truck transport is heavily dependent on fossil fuel and high fuel prices and price instabilities have to be faced.

Economic growth involves increased traffic flows, and to cope with this the different transport modes need to combine their services to create an efficient and sustainable transport system. Intermodality is seen as one possible approach with a high potential to make freight transport more sustainable and ensure economic development. Intermodality is needed so that better use can be made of alternative modes that have accessible spare capacity. Making better use of available resources is not an expensive solution and reduces stress on over-used road networks.

3. Development of Intermodal Transport and Key Problems

The first question to answer is: What is intermodal transport? This paper uses the broad and well-accepted definitions of the Terminology on Combined Transport prepared by the United Nations Economic Committee for Europe (UNECE), the European Conference of Ministers of Transport (ECMT) and the European Commission. Intermodality or intermodal transport is defined as “The movement of goods in one and the same loading unit or vehicle which uses successively two or more modes of transport without handling of the goods themselves in changing modes” (UNECE, 2001). A terminal is defined as: “A place equipped for the transshipment and storage of Intermodal Transport Units” (UNECE, 2001). When speaking of intermodal terminals, transfer points are included as part of the definition of intermodal terminals.

3.1 Trends in Intermodal Transport

The data and statistics situation in intermodal transport is not as good as in pure rail, road or river/sea/waterway transport because today's data collection is mode-related and not consignment related. It is therefore difficult to find significant and comparable data. This has to be considered when assessing the following developments in intermodal transport.

In 2004 freight transport within EU-25 was estimated at about 4 billion tonne kilometres. The share of road transport is about 44%, maritime transport 39%, inland waterways 3%, rail 10% and air and pipelines 4%. (European Commission, 2006a). Sea transport and road transport are expected to continue to increase more than other modes in the future. Intermodal transport has a remarkable share in short sea shipping, inland waterway and rail transport. The growth rate in combined road-rail transport in Europe is around 8% to 10% per year and therefore the same dimension as that of global container shipping (International Union of Combined Rail-Road Companies – UIRR). The growth is higher in international transport than in domestic. International traffic flows are concentrated on north-south corridors, especially transalpine corridors. The trends in domestic intermodal transport differ greatly from one country to the next, with decline today in France and Switzerland, stagnation in Austria, Spain and Belgium and growth in Germany and Italy.

In Russia and Ukraine rail transport has a high share. Economic growth lies behind the increasing freight volumes in these and other countries in Eastern Europe. Because of increasing world trade and increasing containerisation, the freight volumes in intermodal loading units will continue to increase. Therefore an increasing share of intermodal transport can be expected.

In freight transport, rail has a much more important position in the US than in Western Europe, with over 40% of the intercity market. In South America, the share of intermodal transport is not as high as in Europe or the United States because of the weak intermodal services and capacity mode. Share varies considerably from one country to another. The main mode is road with a share margin of between 63% and 92%. The rail share varies between 1% and 30%, while the inland waterway share varies between 0% and 13%.

Rail has an important role in Australia and China, but in other Asian countries road transport generally is much more important. In India and Bangladesh, 70% of freight transport today is by road (in Pakistan the figure is as high as 90%). In countries with sea access, short sea shipping is important. Landlocked countries are dependent on efficient and high quality rail or inland waterway connections to sea ports. In many countries, intermodal services (except short sea) are limited.

African rivers and lakes have always been the main means of transport, exchange, trade and development within the continent. The best known are the Nile (and the associated lakes, the largest one being Lake Victoria), the Congo, the Zambezi, the Niger, the Senegal and the Gambia. The Congo-Oubangui-Shanga basin is used for carrying a large share of goods towards landlocked countries such as the Central African Republic and Chad. Ferries on Lake Tanganyika carry a large share of imports-exports to Burundi in a multimodal chain with rail and road transport. Currently, the combination sea/road is used for between 75% and 90% of the freight. However, river and lake transport is virtually non-existent in the southern part of Africa as well as large parts of North and West Africa.

3.2 Key Problems in Intermodal Transport

Although intermodal transport is growing, its share is still relatively low and the big breakthrough of intermodal transport has still to come. The main reason for this development is the inability of intermodal transport to adequately meet customer requirements in the new logistics environment that emerged during the 1990s. Road transport is often considered to be more flexible, cost effective, transparent and efficient, and to provide a higher quality service.

The main barriers and key problems that hinder a breakthrough of intermodal transport are the following

- **Organisational barriers**, i.e. too many partners involved, a lack of cooperation between involved role-players, unclear responsibilities and liabilities, etc.
- **Technical barriers**, i.e. missing information technologies, no door-to-door tracking and tracing, friction at transfer points, lack of standardisation (semi-trailers, certain loading units), etc.
- **Infrastructural barriers**, i.e. unsuitable infrastructure at terminals, different rail gauges, capacity restraints at terminals and their access roads, different rail track equipment, lack of standardisation at terminals, etc.
- **Operational, logistical and service-related barriers**, i.e. a lack of transparency in the transport chain, limited flexibility for short-term orders, priority for rail passenger transport, limited intermodal services, a lack of information about available services, a lack of awareness of possibilities of intermodal transport, problems integrating intermodal transport in logistics chains of companies, etc.
- **Financial and economic barriers**, i.e. high investment costs for intermodal equipment, intermodal terminals, high pre- and end-haulage costs, cost-intensive storing capacity, etc.
- **Political barriers**, i.e. no harmonised framework conditions for pre- and end-haulage, terminal funding, etc.

4. Role of public Sector and Policies for Intermodal Transport

Economic growth means increased traffic flows, and to cope with this the different transport modes have to be combined for an efficient and sustainable transport system to be created. In this intermodal transport, using railways, inland waterways and shipping will all take on a greater role. It is therefore important for the public sector and road authorities to promote intermodal transport. If goods can be moved from road to rail, inland waterway and sea transport, there will be improved accessibility for traffic that has no alternative but to use the road.

Freight transport is necessary to make the world “go around”, but it also has a negative impact on society. Society therefore has to establish the framework conditions needed to create a properly functioning market and reduce transport’s negative effects.

Investment in transport infrastructure is traditionally the task of public authorities, while society has to encourage the efficient and sustainable use of public infrastructure. High quality of service and reasonable costs are in the interests of the economy and society. It is therefore a public responsibility to create transparent rules and equal conditions for all players in the market. Public authorities have to encourage fair competition and reduce and internalise the external costs of transport.

Presently, a large share of the transport market was under public control. This situation has changed in many parts of the world. Liberation of the transport sector goes hand in hand with globalisation, internationalisation and harmonisation in order to avoid distortions in competition. In Europe, liberalisation reform has been more radical in the railway sector. The first step was the separation of infrastructure from transport operations. However, in some countries there are still ties between the infrastructure manager and the railway operator. Within road transport and short sea shipping, national markets have been opened up, including cabotage. National differences in pricing, however, distort competition on the international transport market. Further harmonisation is necessary to create level playing fields between countries and between different modes of transport.

In 2006, the European Commission presented a mid-term review of the 2001 Transport White Paper: *Keep Europe moving – Sustainable mobility for our continent* (European Commission, 2006a). This mid-term review argues for a comprehensive, holistic approach to transport policy. A European sustainable mobility policy needs to build on a broader range of policy tools achieving shifts to more environmentally friendly modes where appropriate, especially on long distance, in urban areas and in congested corridors. At the same time, optimal use of each transport mode is paramount. All modes must become more environmentally friendly, safe and energy-efficient. Finally, co-modality, i.e. the efficient use of different modes on their own and in combination will result in optimal and sustainable utilisation of resources. This approach offers the best guarantee for simultaneously achieving a high level of mobility and of environmental protection. The EU will continue to support intermodal or multimodal transport, but the goal of the same modal split in 2010 as in 1998 is no longer viable. The tool-box for support includes action to remove regulatory obstacles to co-modality, to stimulate learning and the exchange of best practice throughout the EU, to promote standardisation and interoperability across modes and to invest in transshipment hubs. Adapting dimensions of containers and vehicles to meet the needs of intelligent logistics will be part of these considerations (European Commission, 2006b).

At the African continent level, the United Nations Economic Commission for Africa (UNECA) supports intermodal transport policies. UNECA's common objectives concerning intermodal and multimodal transport are to develop an integrated approach of transport taking into account all modes of transport, enhance harmonisation and coordination of transport to avoid duplication and contradiction, approve and implement the conventions, agreements, decisions on intermodal transport approved by African states, reinforce institutional and human resources for intermodal transport, develop the use of new Information and Communication Technologies (ICT) in transport, implement regulations allowing greater participation of the private sector, and participate to improvement and extension of transport networks by construction of the missing links as well as improvement of services in transit transportation corridors in countries without coasts.

5. Governmental Measures strengthening an Intermodal Transport System

There are numerous possibilities for government authorities to support intermodal transport. Some of these measures are presented in this section.

5.1 Intermodal Transport Networks and Transport Plans

An important measure strengthening intermodal transport is when intermodal networks and infrastructure are included in national transport plans, action programmes and state budgets -- plans that cover the entire transport chain and not just isolated parts of the common network.

Development within business logistics and supply chain management ought to be considered when national transport plans are being drawn up. Based on political goals and on the needs of the logistics and transport industry, the necessary intermodal transport network and infrastructure have to be secured within a national transport plan. Containing the macro locations of existing and planned intermodal terminals, as well as the connections with important seaports and other terminals, the plan can form the basis for funding requests, i.e. only terminals or intermodal connections (start-up funds at the beginning of the service) that are integrated within the transport plan can be funded.

5.2 Construction, Maintenance and Operation to achieve improved Accessibility to the Infrastructure

A precondition for the provision of effective and high quality intermodal services is an adequate transport infrastructure. Barriers to the development of intermodal transport are bottlenecks in the intermodal transport infrastructure. Efficient transport networks and terminals are needed if these barriers are to be overcome, and therefore a focus on construction, operation and maintenance of infrastructure leading to the elimination, or at least reduction, of these bottlenecks is paramount.

Strategies and measures designed to improve the intermodal transport infrastructure and operation should include:

- Identification of current and future bottlenecks in intermodal transport networks, including the identification of capacity needs and requirements.
- Intermodal terminal location planning considering the most important macro and micro criteria.
- Improving terminal layout and design based on common requirements and standards.
- Improving road access to inland and seaport terminals.
- Adaptation of priority rules in railway transport in favour of intermodal freight.
- Management of intermodal transport on terminals and on the transport networks.
- Benchmarking of the operation of intermodal transport chains including terminals.
- Further standardisation of infrastructure, equipment and services.

A joint effort by administrations, industry and other interested organisations to identify and solve the bottlenecks in intermodal freight transport logistics is recommended.

5.3 Financial Support for Intermodal Solutions

Financial support for intermodal transport is given in different forms throughout the world. In this section, examples from the European Union are presented and, in section 6, best practice in government measures on a national level.

Funding the TEN-T network in the European Union

The trans-European transport network comprises infrastructure (roads, railways, waterways, ports, airports, navigation aids, intermodal freight terminals and product pipelines) and the services necessary for its operation. The priority measures are:

- Completion of the connections needed to facilitate transport;
- Optimal efficiency of the existing infrastructure;
- Achievement of the interoperability of network components;
- Integration of the environmental dimension in the network.

To finance projects it will be essential to obtain the best mix of the three existing sources of funding, i.e. national budgets, the Community budget and resources generated by direct contributions from users. Co-funding with the private sector is also important (e.g. PPP).

The Marco Polo programme

The general objective of the Marco Polo programme is to reduce road congestion, enhance traffic safety and improve the environmental performance of the freight transport system within the Union, thereby contributing to an efficient and sustainable transport system. The first stage of the Marco Polo programme ran from 2003 to 2006, with a budget of 100 million Euros for the EU25. The specific objective of the Marco Polo II programme is to shift at least the expected increase in international freight transport during the period 2007-2013 off the road. It has a budget of 740 million Euros and has been extended to countries bordering the European Union. Marco Polo II is aimed at providing assistance in the form of risk-reducing subsidies to bottom-up logistic services. Infrastructure funding can be part of the assistance in cases where this infrastructure supports the logistic services.

5.4 Security Issues in Intermodal Transport

Transport security has become a vital issue worldwide. The sustained threat of terrorist action has rendered transport both a target and an instrument of terrorism. Following the events of 11 September 2001, many control regimes have been implemented in aviation and maritime transport. Security rules may be extended to land transport and intermodal logistic chains. The introduction of security measures by the United States for certain imports has already had an impact on the supply chains of all continents. Careful consideration needs to be given to international cooperation in order to improve worldwide standards and prevent unnecessary and costly duplication of controls.

5.5 Research and Development

To help overcome reluctance to invest in new and more flexible transport technologies, the European Union – as part of its R&D framework programmes, which cover a wide range of scientific fields – has supported many projects seeking to give operators the tools they need to run intermodal services effectively and improve the framework conditions for intermodal transport. The Commission allocates millions of Euros each year to support research teams across Europe and develop effective and efficient technologies for intermodal transport services. By bringing together researchers from different Members States, this support encourages the development of technologies with wide application. European Union research funding is targeted closely towards policy aims.

5.6 Standardisation

Against the background of internationalisation and globalisation of markets and the growing increase and interdependency of goods flows, standardisation in the field of freight transport is an important issue. In relation to freight and intermodal transport, standardisation is done at international (ISO), European (CEN) and national levels (national standardisation organisations). Intermodal transport is mostly international or European, seldom national transport alone. It is therefore obvious that standardisation should be established at international (ISO) and continent level (European level: CEN) and only exceptionally at national level.

The current state of standardisation in intermodal transport can be assessed as shown in Table 1.

Table 1 – Intensity of standardisation activities in the field of freight transport (Rapp Trans AG, 2005)

Standardisation fields in freight transport	ISO	CEN	UIC	National standards
Logistics, transport services				
Transport systems				
Tariffs, accounting				
Infrastructure				
Vehicles, rolling stock				
Load units				
Packaging				
Trans-shipment technology				
Security				
Transport telematics				

	low		medium		high
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Further standardisation needs in intermodal transport cover IT solutions, security, loading units, equipment, services and the planning and design of infrastructure.

6. Best Practice in supporting Intermodal Transport

In Europe, there are numerous examples of good practice in government measures supporting intermodal transport. Austria, Germany, Italy and Switzerland are all co-funding intermodal terminals based on national regulations that are part of a strategy to support intermodal transport. The funding rules are very different because of national framework conditions. These countries are subsidising infrastructure and equipment for intermodal transport, and sometimes also operations in a starting phase. In the later case, funding is (especially for new transport services) aimed at supporting the project at the start-up phase, after which the project should be self-sustainable. In particular Italy has many different aid schemes which are approved by the European Union such as subsidies to intermodal operators, subsidies for equipment to intermodal transport, vehicles, new technology, information systems, training etc. There are also some subsidies for operation costs for loading and reloading and for rolling motorways. Also other countries than Italy have these kinds of aid schemes, but not to the same extent. The extent of the modal shift has to be quantified and is generally a component of the agreement supporting the aid scheme.

Austria, Germany and Switzerland also use accompanying measures of importance, such as the introduction of a heavy goods vehicle fee (including reimbursement for trucks used in pre- and end-haulage), heavy truck management for freight trucks on Alpine crossings, enforcement of road freight transport regulations (driving hours, weight etc.) and an increased total weight for truck transport in intermodal services. These kinds of measures have been important as a part of a policy to move freight transport from road to railway and increase intermodal transport. Other kinds of road freight transport management system have also been tried out, for instance slot management and reservation systems in Alp tunnels.

Development projects of river and waterways transport in Africa show that alternative freight transport modes can also be in use in developing countries. Best practice from Japan shows that new intermodal solutions can have a significant impact on increasing intermodal transport and the reduction of truck transport.

Best practice in Latin America concerns primarily an original concept of a road-rail motorway, the generalisation of dry ports and intermodal terminals and the development of multimodal corridors. Rail-road intermodal transport is fairly underdeveloped in Latin America, mainly because of height limits in tunnels. Successful experiences of rail-road transport concern mainly ore transport in Brazil or raw produce (soy/cotton). Several multimodal corridors converging on the United States are a reality in Mexico. In Bolivia, eight multimodal corridors (rail-road-river-sea) have been developed since 2003.

Best practice varies considerably between countries all over the world, but also within continents. Intermodal transport is primarily international. Therefore there is clearly a need for harmonisation and coordination of national supporting and funding systems.

7. Benefits of Strategies and Measures promoting Intermodal Transport

There are very few ex post evaluations of measures in intermodal transport, and especially of governmental support measures, and therefore it is difficult to say much about the costs/benefits of measures of this kind. However, there are some smaller ex post evaluations in the European Union, Switzerland and Japan. The following benefits can be expected from measures and framework conditions supporting intermodal transport.

Benefits due to support of intermodal transport itself:

- Improvement in efficiency and quality of intermodal transport (best practice from Austria achieved significant improvement in the quality of intermodal services for shippers)
- Increasing awareness of intermodal options (e.g. by the Marco Polo programme and European research projects)
- Improvement of road access to seaport and inland terminals
- Improvement of cooperation in the intermodal transport chain
- Reduction of terminal costs and thereby overall intermodal transport costs
- Improvement of security in intermodal chains.

These improvements have led to a better position of intermodal freight transport in the freight market and therefore also to a modal shift.

Best practice from Germany, Switzerland, Austria and Italy shows a broad package of governmental measures promoting intermodal transport. These countries have had a significantly more positive development of intermodal transport than other countries in Europe. There seems to be a connection between governmental support schemes and growth in intermodal transport. This development has probably resulted in benefits for the society and the environment, as well as for the private sector.

Benefits due to modal shift:

- Better utilization of the capacity of the whole transport system
- Relief from road freight transport on motorways and highways (e.g. with intermodal transport measures, Switzerland significantly reduced road transit transport and thus environmental and social costs).
- Reduction of environmental burdens such as pollution and noise (e.g. best practice from Japan shows that new intermodal solutions can result in a significant reduction of CO₂ emission).
- Improvement of safety.

These benefits are important for road authorities. Roads can be relieved from unnecessary freight transport and designated to freight that has no other alternatives than road transport.

8. Conclusions and Recommendations

Governmental measures promoting intermodal transport can lead to a better balance between the freight transport modes, where advantages will be taken of sea and rail transport on longer distances. The following measures are recommended:

- Consider intermodal transport in international, national and regional transport policies.
- Integrate locations of intermodal terminals in national transport plans.
- Introduce infrastructural and operational measures to guarantee sufficient access to terminals.
- Encourage co-funding of intermodal terminals by national authorities.
- Grant subsidies for intermodal operations in the starting phase.
- Develop international standards.
- Harmonise framework conditions.
- Improve the communication situation in intermodal transport.
- Co-fund research and development.
- Create intermodal development centres.
- Improve intermodal transport statistics.
- Monitor and control effects of measures.
- Provide sufficient access to seaports for landlocked countries.
- Introduce heavy vehicle fees.
- Enforce road freight transport regulations (driving hours, weight, etc.).
- Manage road freight transport (slot management, reservation systems, information systems, etc.).

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