FREIGHT TRANSPORT AND INTERMODALITY

20 September 2007 (pm)

TECHNICAL COMMITTEE 2.4
FREIGHT TRANSPORT AND INTERMODALITY

INTRODUCTORY REPORT

CONTENTS

EXECUTIVE SUMMARY

The research work by Committee 2.4 focused on the current status of freight transport in member countries and how the variety of challenges relating to freight transport and logistics should be tackled. These include, but are not limited to, the efficiency of logistics, the environment, and safety, as well as the differing objectives of the stakeholders in freight transport such as shippers, freight carriers, administrators and residents.

Our main areas of work and findings can be summarized as follows:

- Promoting intermodality in freight transportation
- Mitigating the negative impacts of freight transport growth
- How developing countries can build a sustainable transport system

1) Measures Promoting Intermodal Terminals and Alternatives to Road Transport

Promoting intermodality as an alternative to the use of roads in transporting freight can have a variety of benefits. The freight transportation sector is growing, causing a number of environmental and societal problems, not to mention increasing the congestion on the road network. More collaboration between road and other transportation administrators, as well as government measures that supported intermodality would not only improve the efficiency and safety of the roads, but would have positive benefits on the environment and all freight transportation.

2) Mitigation of Negative Impacts Caused by the Increase in Freight Transport

Due to their size, behaviour and routes taken, freight vehicles can have a negative impact on the environment, the society and the economy, and as the amount of freight increases, so do these negative impacts. Therefore strategies must be developed to mitigate these deleterious effects. Technology can play a contributory mitigation role, as can improving the overall transport infrastructure and implementing measures that regulate freight access away from certain roads and areas.

3) Guidance for Developing Countries in Building a Sustainable Freight Transport System

Each country has a unique history and pattern of economic growth to which the transport system makes a distinct contribution. When an individual transport system is developed, necessary aspects of sustainable development must be considered; and yet it is also imperative to pay due attention to the individual characteristics and overall growth of the given economy and society. Developing countries, such as those in Africa and Asia, often face the problem of inefficient freight transport systems that lack good infrastructure and freight management systems. The committee makes recommendations on how these problems can be tackled, as well as raising the issue of how international cooperation and support can be organised to promote sustainable freight transport systems in developing countries.

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1. THE SESSION

Technical Committee 2.4's session on "Freight transport and intermodality" will provide a good opportunity to obtain advanced knowledge and experience in the area of freight transport and intermodality. TC2.4's subgroups will present reports on: (a) Promoting intermodality in freight transportation, (b) Mitigating the negative impacts of freight transport growth, (c) How developing countries can build a sustainable transport system. There will also be some additional presentations about freight transport in different countries.

The subgroup reports and the individual presentations will focus on the current status of freight transport in member countries and how the complicated problems relating to freight transport and logistics can be tackled. From the business point of view, these problems include the efficiency and service level of logistics; from the social point of view they include congestion, the environment, energy consumption, and safety and security. In addition, since the different stakeholders in freight transport - shippers, freight carriers, administrators and residents – have different, and often conflicting, objectives and evaluation criteria, potential solutions for building efficient and sustainable freight transport systems should incorporate the complexity of economic and social issues as well as the variety of consciousness of stakeholders.

One of the most important topics in this session will be the intermodal freight transport system. We propose that greater intermodality and the conversion of freight road transport to rail or shipping can be part of the solution to reduce CO_2 emissions of goods vehicles as well as improving the safety and efficiency of the entire transport system. Examples of the best practices from member countries in the promotion of intermodal freight transport can highlight areas where this has currently been achieved. Following the report on intermodality, the discussion will focus on effective measures for improving the intermodal terminals and access routes, as well as on information systems that use ICT and ITS (Information and Communication Technology and Intelligent Transport Systems).

Although developing countries are keen to achieve social and economic development, African and Asian areas often face the problem of inefficient freight transport systems due to a lack of good infrastructure, insufficient freight management systems and, in particular, the border crossings of adjacent countries. This session will present guidance for overcoming the specific freight transport problems faced by developing countries and we will discuss how we can organize international cooperation and support to promote sustainable freight transport systems in developing countries.

2. THE REPORT

The main areas of work and findings by Committee 2.4 can be summarized as follows:

1) Promoting intermodality in freight transportation
2) Mitigating the negative impacts of freight transport growth
3) How developing countries can build a sustainable transport system

2.1 Measures Promoting Intermodal Terminals and Alternatives to Road Transport

During recent decades, there has been substantial growth in the freight transport sector to the extent that it is increasing faster than the economy or passenger transport. Demand is increasing more rapidly than supply and is resulting in environmental and social problems. Increasing congestion, too, is affecting efficient and reliable freight distribution, and consequently having a deleterious effect on local economies. Intermodality is therefore needed to make better use of alternative modes that have accessible spare capacity, such as railways, inland waterways and short sea shipping.

Based on key developments in freight haulage and the need for action, the aim of this section is 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, the following are recommended to support intermodal transport:

- 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 regulation (driving hours, weight, etc.).
- Manage road freight transport (slot management, reservation systems, information systems, etc.).

These measures would support the use of intermodal transport and would increase efficiency and improve quality and safety in freight transport overall. The performance of each mode would be improved.

Examples of best practises from different continents and nations concerning policies and measures designed to promote intermodal transport show that the implementation of several measures is often more appropriate than the implementation of just one single measure.

The following benefits can be expected from measures and framework conditions supporting intermodal transport:

Benefits due to support of intermodal transport itself:

- Improvement of efficiency and quality of intermodal transport (best practice from Austria achieved a significant improvement in 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 costs over the whole transport chain.
- Improvement of security in intermodal chains.

These improvements boost the position of intermodal freight transport in the freight market and therefore also create pressure for a modal shift.

Benefits due to modal shift:

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

Semi trailers on open wagons

Roll-on-roll-off (RO-RO)

Lift-on-lift-off (LO-LO)

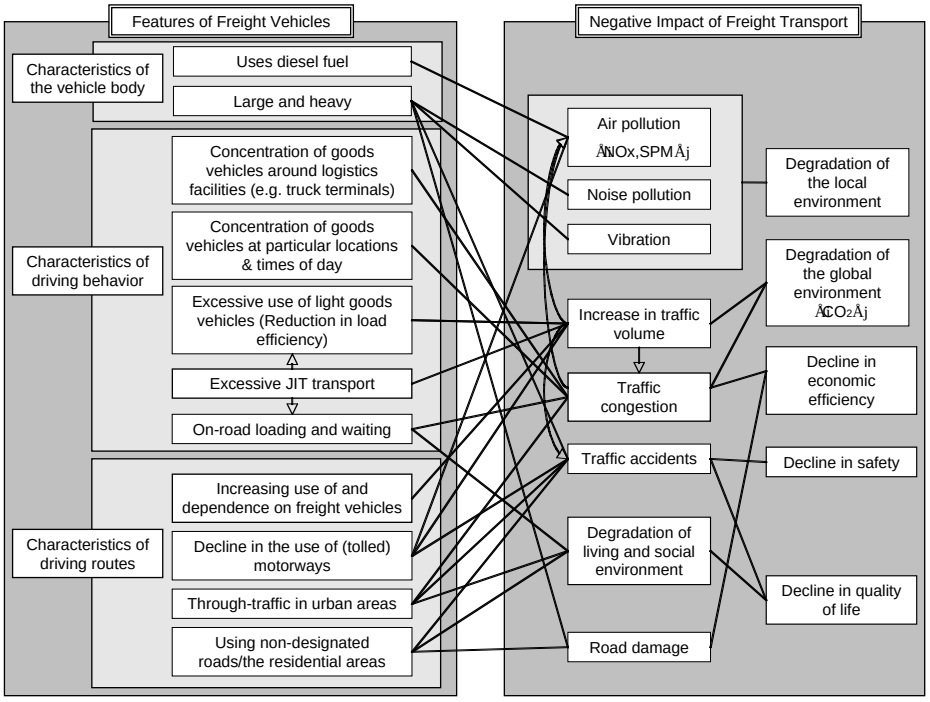
Best practise in Germany, Switzerland, Austria and Italy reflects a broad package of governmental measures promoting intermodal transport. These countries have also had significantly more positive development of intermodal transport than other countries in Europe. There seems to be a connection between governmental support schemes and growth in intermodal transport.

Development projects on river and waterways transport in the heart of the Sahel in Africa prove that it is possible to implement and improve good practice in alternative freight transport despite the difficulties and funding problems that can be encountered in low-income developing countries. Often the planning and implementation costs are much lower compared to the benefits.

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.

2.2 Mitigation of Negative Impacts Caused by the Increase in Freight Transport

Though freight vehicles are a necessary part of life, they can have a negative impact on the environment, economic efficiency, transportation safety and overall quality of life. These negative impacts are caused by such factors as their vehicle characteristics, as well as their driving behaviour and routes.



Relation between the feature of freight vehicles and negative impact of freight transport

Freight vehicles usually use diesel as fuel, and are both larger and heavier than regular vehicles, which can cause harm to the environment. Other negative impacts are connected to their specific driving behaviours, such as concentration of traffic at particular places and times of the day, frequent use of light vehicles, JIT (Just In Time) transport and on-street loading/waiting. In addition, freight vehicles make relatively little use of tolled motorways, and often take routes through town centres or through non-designated roads/ residential areas, all of which have negative impacts.

<u>The Development of Technology</u>

Technology is one way in which the negative effects of freight transport can be reduced. Recent innovations that could be part of the development of mitigation strategies are new energy sources, improvements in the manufacturing of vehicles, sensor and image recognition technology, GPS, optimization systems, information and communication technology, and transhipment and transfer systems.

To fully take advantage of the technology that is or will soon be available, it is important that they are properly promoted with 1) innovative government policies, 2) network management, 3) traffic management, 4) multi-modality and 5) vehicle engineering.

1) Innovative government policies can already be found in the field of transport management, logistics, integrated urban land planning, environmental policies and safety policies. The challenge of developing policies for sustainable transport development is to achieve a balance that maximizes the economic and social benefits whilst minimizing the associated environmental, social and economic costs. Although some of the technology required to achieve this balance is not new, the main difficulty is effective implementation, which requires a combination of regulations and the restructuring of charges and taxes to provide incentives to reduce external costs to optimal levels. It is also often necessary to improve the quality of transportation options, especially rail services, as well as the promoting inter-modal services.

2) Regarding network management, there has been considerable interest in intelligent transport systems (ITS) within Europe, the US and Japan, and research has been conducted on automated highway systems (AHS) - a lane, or set of lanes where specially equipped vehicles could travel together under computer control. Despite being technically feasible, barriers to the development of ITS systems include cost, liability, and societal and institutional issues.

3) Traffic management measures include modifications to the infrastructure to improve road capacity (road building) to enhance road safety (traffic calming) and to control the traffic. The latter uses sensors, computers and actuators that can monitor traffic flow and regulate traffic signals and flow at road junctions; and systems that dynamically adjust signals according to real-time traffic needs have already been installed in many European countries.

Although (GPS) and odometer sensors, which can track a vehicles position and display its location on a digital map, are used in some developed countries, more innovative “dynamic route guidance” technology that can provide drivers with updated road and traffic information is necessary to play a more effective part in traffic control. The RDS/TMC (Radio Data System / Traffic Message Communication) already provides updated information on non-recurrent congestion but the network of monitoring detectors is still sparse. An improved system exists in Japan on almost all major roads, where the ‘VICS’ (Vehicle Information and Communication System) technology enables drivers to receive real-time road traffic information about congested road segments, accident spots and roadwork segments, as well as helping them to plot their best route.

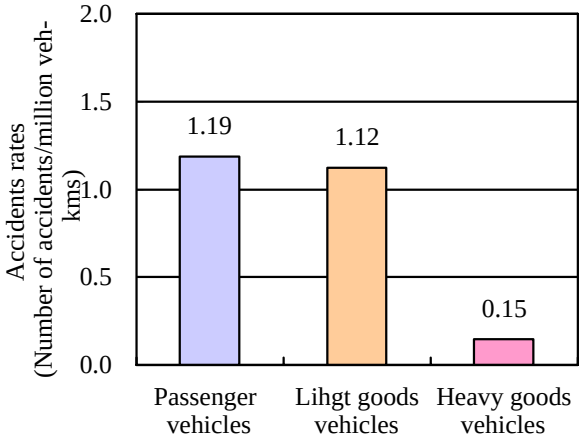
4) Multi-modality for freight transport shifts freight from road to rail or shipping and can be part of the solution to reduce the environmental burden of goods vehicles, as well as improving the safety and efficiency of the entire transport system.

5) Finally, there has been considerable progress in vehicle engineering development in terms of safety, power sources, energy consumption, and emissions: road-vehicle and vehicle-vehicle communication technology will soon be able to help drivers maintain a safer speed profile, dependent on actual road and traffic conditions; alternatives power sources such as fuel cells, bio-fuels and hydrogen could one day be available; improvements continue in reducing vehicle weight and thereby improving fuel economy; and lastly, catalysts are playing a major role in emission reduction as well as natural gas and liquid petroleum gas, however market penetration is still low.

Accident Assessment of Freight Transport

It was found that the heaviest goods vehicles seem to have a lower incidence of accidents but a higher severity rate; non-urban areas are generally safer than urban areas; and motorways have the lowest accident rate compared to trunk and municipal roads. In addition, accidents involving heavy goods vehicles have the highest social and comprehensive costs, and it is therefore imperative to implement measures which can reduce accidents involving freight vehicles.

As well as looking at the way that technology can be used to mitigate the negative impacts of freight, specific research was focused on the safety of freight vehicle traffic and measures to improve the road traffic environment. Accident data was collected from such countries as Japan, the US, GB and Belgium, and the accident characteristics of goods vehicles were assessed according to vehicle size, area and road type.



Accident Rates by vehicle Type in Japan

It must be noted, however, that there are differences in how countries classify light and heavy goods vehicles, as well as substantial variance in the methodology of counting accidents. Therefore more research with more comparable data is required and it is recommended that guidelines be prepared detailing an international, unified database on traffic accidents to aid countries in accumulating and processing their accident data.

Despite these challenges, some freight accident trends can still be observed. It was found that the heaviest goods vehicles often seem to have a lower incidence of accidents but a higher severity rate; non-urban areas are generally safer than urban areas; and motorways have the lowest accident rate compared to trunk and municipal roads. In addition, accidents involving heavy goods vehicles have the highest social and comprehensive costs, and it is therefore imperative to implement measures which can reduce accidents involving freight vehicles.

The “Freight Vehicle Transport Management” measures are a set of policies designed to improve the safety and efficiency of freight vehicles, as well as reducing their associated environmental burden. These measures include such procedures as improving the motorway network, reducing urban traffic and developing truck terminals and distribution centres. Using data from traffic accident studies, we can make a rough estimate of how implementing these policies could reduce the number of accidents. For example, developing the road network in urban fringes and preventing through-traffic movement of freight of urban areas could have the large impact, potentially reducing traffic accidents by as much as 18%.

To effectively manage and implement all of these measures for goods vehicle transport, it is necessary that there be a high level of collaboration between the public and private sectors. Therefore a goods vehicle department office should be created in central or local governments or within PPP (public/private partnership) organizations that can properly fulfil these responsibilities.

In short, the employment of new technology as previously discussed in this section, the effective implementation of a variety of safety measures and the facilitation of a shift to increased intermodality are all ways in which the negative impacts of the increase in freight transport can be mitigated. The government has a key role to play in these areas, whilst also having responsibility in ensuring that the economic benefits of the efficient and reliable transportation of goods are retained.

2.3 Guidance for Developing Countries in Building a Sustainable Freight Transport System

The history and characteristics of a nation's economic growth are different for all countries, regardless of whether it is developed or developing. The transportation system of each nation makes a distinct contribution to overall economic growth, and its elasticity has a quantifiable relation with the growth of GDP. The economy cannot maintain rising growth independently of social and political developments, and when we consider developing the transport system, it is therefore imperative to pay due attention to the overall growth of the given society.

The necessary aspects of a sustainable transport system for developing countries are international multimodal transport, transport development policies and international border crossings. In addition, comparable background information on the transport growth scenario of the developed economies can be of benefit to developing countries.

Roads in Mongolia

Global forces of supply and demand have opened up the world market and caused great changes in the economic scenes of individual countries and complete continents. There is an urgent need of international regulation to help facilitate the transportation of goods through various countries from the origin to the destination. In addition, it is essential to develop and maintain the infrastructure of intermodal transport. Once a country has a traffic-worthy transport network, e.g. national and regional roads, a rail system etc, international business through freight movements becomes viable. Regional imbalances can thus be eliminated by developing a good transport system.

Transport development policies include the promotion of land use planning, a congestion free system and the safety and quality of services.

Lastly, the issues that the RCSP (Regional Cooperation Strategy and Program) program of the ADB (Asian Development Bank) has identified with regard to international border crossings in Asia are as follows;

- Vehicle emission requirements
- Axle load control
- Dimension of the vehicles
- Tariffs, road user charges, and transit fees
- Traffic safety
- Provision of transport services

Member countries have been able to familiarize themselves with the prevailing bottlenecks, and a list of time bound action-program have been prepared that warrant further action. In short, since each country is unique, there is a need to develop an appropriate approach that is compatible with its specific economy. However, there are some universal points that can help promote sustainable transportation systems:

- Establishing complementary and viable multimodal transport systems
- Having regular conventions with concerned countries for transparent discussions of the related issues
- Constituting an independent body to regularly assess the impact of transport growth
- Utilizing the specialized services of a reputed group of international experts to formulate implementation schemes
- Cooperating and interacting with special bodies constituted by international agencies to simplify and harmonize transport regulations

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CONCLUSIONS

Measures Promoting Intermodal Terminals and Alternatives to Road Transport

1) Existing infrastructural, technical, operational barriers, etc., hindering a big breakthrough in intermodal transport can be summarized as follows:
   - Poor performance of railways with regard to reliability and quality of service (different traction systems, signalling systems, etc.)
   - Lack of integrated commercial services throughout the international logistics chain
   - Structural weakness of intermodal terminals with regard to capacity, accessibility and organization
   - Lack of security on terminals and network along the entire supply chain
   - Lack of a well-functioning system of reservation of potential slots across national borders linked to the priority systematically given to passenger trains
   - Investments for infrastructure are underway but many projects are unlikely to materialize for a number of years
   - Low degree of cooperation between the different actors in the logistics chain
   - Lack of ex post evaluation of projects and measures taken to supply the strategy and the action plans to set-up

2) The following governmental measures in support of intermodal transport are recommended:
   - Intermodal transport has to be considered in international, national and regional transport policies
   - Locations of intermodal terminals have to be secured in national transport plans
   - Access to terminals has to be secured by infrastructural and operational measures (road, rail and inland waterway services)
   - National authorities have to co-fund intermodal terminals when this is necessary
   - Subsidies for intermodal operations in the starting phase
   - Performance of each mode should be improved
   - Further international standardization
   - Harmonizing of framework conditions
   - Communication situation in intermodal transport should be improved
   - Co-funding of research and development
   - Creation of intermodal development centres
   - Improvement of intermodal transport statistics
   - Monitor and control effects of measures
   - Access to seaports for landlocked countries

Mitigation of Negative Impacts Caused by the Increase in Freight Transport

1) The development of innovative technologies to mitigate the negative effects of freight transport should be promoted by the government as well as by the transport industry. Some important areas are as follows:
   - Promoting the implementation of innovative government policies in the field of transport management, logistics, integrated urban land planning, environmental policies and safety policies.
   - Improving and standardizing worldwide implementation of ITS.
   - Implementing infrastructure modifications for enhancing road capacity or road safety, with innovative technology, such as “dynamic route guidance” using GPS and sensors or detectors located on or near the motorway network.

- Developing innovative vehicle engineering in terms of safety, power sources, energy consumption and emissions.
- Promoting the development of road-vehicle and vehicle-vehicle communication technologies as well as the use of alternative power sources such as fuel cells, bio-fuels and hydrogen.
- Improving the technology to decrease noise pollution. This will require a combination of measures to influence traffic, invest in noise barriers and reduce noise emissions at source.
- Improving driving behaviour is partly a task for the road administrator, but it appears from research and studies that the best way to achieve this is a combination of enforcement actions and driver education.

2) In addition to improving the safety of accident black spots, it is recommended that the following freight vehicle management policies are implemented to change the means of freight vehicles and the flow of traffic.

a. Infrastructure improvement

- Improving motorways to encourage more freight traffic onto the motorway network.
- Upgrading the road network to be more compatible with heavy goods vehicles so as to potentially reduce the traffic volume of light goods vehicles, which often have a higher accident rate than the heavy goods vehicles.
- Improving such road networks as ring roads and bypasses in urban fringes to reduce the traffic volume within urban areas.
- Setting out hierarchical structures around all road networks to redistribute traffic onto roads suitable for the purpose of freight transport.
- Improving transhipping bases, where freight is transferred from heavy goods vehicles to light goods vehicles (or vice versa), which enhances efficiency by improving loads and reducing the overall volume of freight traffic.
- Improving intermodal terminals to increase alternative modes of transporting freight to reduce the traffic volume of freight vehicles.
- Installing loading-unloading facilities within urban areas and improving sending and receiving facilities to relieve inner-city congestion and improve traffic safety.

b. Transportation Management

- Implementing through-traffic management and regulation to reduce the through-traffic in urban areas or even within smaller areas.
- Implementing in-bound/out-bound traffic management to restrict certain traffic from entering and exiting part, or all, of the urban area.
- Implementing parking/stopping management to reduce on-street parking.
- Supporting the promotion of shared freight transport to increase freight loads per vehicle and thereby reducing traffic volume.
- Establishing an organization to manage goods vehicle transport, such as a goods vehicle department office in central and local governments and PPP (public/private partnership) organizations.

c. Universal database

- Building a universal, international accident database that can be shared between nations.

Guidance for Developing Countries in Building a Sustainable Freight Transport System

1) A single, unified approach to develop a sustainable transport system cannot be applied over all countries or all continents.
2) It is therefore necessary to develop an appropriate approach in accordance with a given economy.
3) Provided the regional factors are appropriately considered, these are some important factors in promoting a sustainable transportation system:
    - Establishing a complementary and viable multimodal transport system
    - Regular conventions with concerned countries for transparent discussion of the related issues
    - Constituting an independent body to regularly assess the impact of transport growth
    - Utilizing the specialized services of a reputed group of international experts to formulate implementation schemes
    - Cooperating and interacting with the special bodies constituted by international agencies to simplify and harmonize the transport regulations