

# **VARIOUS INTERPRETATIONS OF THE TERMINOLOGY CONCERNING MIXED TRANSPORT**

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A short history of existing types of mixed transport in Russia and abroad is presented. The system of export freight delivery is analyzed in association with all forms of interaction between various modes of transportation and the subjects of the transport service market (TSM). The authors point out that the diversity of mixed transport as well as the concepts of “aspects”, “areas”, “fields”, “forms” of coordination and interaction between various modes of transportation and TSM subjects are interpreted differently. The concepts of “interaction”, “coordination”, “cargo owner”, “logistics”, “marketing”, “transportation hub”, “export and import of transport services” are clarified. There is focus not only on the transport complex organization departments and management levels of various modes of transportation, but also on other TSM subjects (carriers, cargo owners, forwarders, stevedores, marine agents, banks, organizations responsible for expertise, customs control and document completion, etc.). The definition of “legal logistics” is suggested.

Mixed transport involving steam-powered railway transportation dates back to the early 19th century. In 1813-1814, the British began transporting coal from collieries to the River Tyne near Wylam, a small village in the county of Northumberland (among its renowned residents was George Stephenson, 'Father of Railway'). There the coal was loaded from railway carts onto river barges to be further carried to the Newcastle sea port.

Everybody knows that England is the country where first steam locomotives were put into operation. More than that: this country is the home to mixed steam-powered railway-water transport and (why not!) to transport logistics.

It is worth mentioning that wheel type machinery was transported by the 3rd Russian railway connecting Warsaw and Vienna. (At that time Poland was a part of the Russian Empire). Railways were used to carry this type of machinery during the Russo-Turkish War of 1877-78, the Russo-Japanese War of 1904-1905 and especially during the WW1 to bring armored vehicles and principally new tracked vehicles (tanks) to the front. It was the time to test and, later, introduce new loading technologies – Lift-on/Lift off and Roll-on/Roll-off.

During the WW1 wheeled and tracked machinery designed to move on highways and natural roads was transported not only by rail, but also by sea and by air.

Thus, during the Russo-Japanese War motor boats, small torpedo boats and submarines were transported on railway flat wagons.

Up to the end of the 20th century, sea transport was the only mode of transportation to connect European parts of Russia with the Far East. Russian military ships going from the Baltic Sea to the Pacific for resupplying and remaining were to 'half'-circumnavigate the earth across the Atlantic, Indian and Pacific Oceans.

When the war between Russia and Japan broke out at the end of January 1904, the question arose how to bring torpedo boats, small torpedo boats of various types (including submarines referred to as torpedo boats) and motor boats from the Baltic Sea to the Pacific.

Transportation of motor boats, small torpedo boats and submarines during the Russo-Japanese War showed that it is possible to carry small military ships by the Trans-Siberian Mainline west-to-east and east-to-west. Later, during the WW1 and the Civil War this way of carrying freight was successfully used. In the 1930s, Soviet sailors used railway Schnabel cars to bring shells of small M type submarines and sections of middle-sized boats of other types from the Baltic and Black Seas to the reviving Pacific Fleet.

During the Great Patriotic War these boats were transported by the Siberian railway to the west; it proved the Mainline's capacity to carry light forces of the fleet to the uncoordinated maritime warfare theaters.

During the WW2, to save aviation fuel Soviet and German tanks, self-propelled guns and trucks as well as airplanes were transported from manufacturers to the front on flat wagons of route trains.

The most unusual and (at first sight) strange way of carrying one type of rolling stock on other vehicles may be practiced to save fuel, to make the route shorter, etc. Sometimes it is impossible to use traditional modes of transport.

In the mid-1950s, when there was a desperate shortage of flat wagons, Ivan Kuzmich Akhromeyko, a graduate of Moscow State University of Railway Engineering, the head of the Gorky-Sortirovochny railway freight office suggested loading legendary GAS-51 trucks in a 'herringbone manner'. The front axle of the truck was put with its wheels onto the rear end of the chassis or the body. In this way the flat wagon accommodated not two but three trucks. After replacing two-axle wagon flats with four-axle ones, the carriage capacity increased.

Loading in a 'herringbone manner' enabled railways to save flat wagons. It was proven that on every route 5-6 flat wagons could be saved.

Later on, with five flat wagons forming one section, the 'herringbone' method was further developed. The automobiles were placed above the coupling. As a result, instead of 7 trucks 12 trucks were loaded.

Gondola cars were adapted to carry automobiles. Initially they were used to bring coal from Kuzbass and Ekibastus. To avoid empty return trip, a special 10-hour technology was introduced to remove coal dust from the inside walls of the car: the 'clean' wagons were then used to carry automobiles manufactured by the GAZ auto plant – two trucks below, two Pobeda motor cars (later two Volga motor cars) above them.

Transportation of agricultural machinery during the sowing campaign and of grain trucks during the harvest season refers to piggybacking.

Under planned economy nobody thought about economic efficiency (or inefficiency!) of using flat wagons for transporting agricultural or military machinery and empty trucks.

We think that railway transport did not benefit from carrying out these tasks. But with regard to providing sustainable economic development of the whole country and maintaining its military potential the importance of this kind of transportation cannot be overestimated.

These days the cargo owner prefers to deal with one forwarder at all stages of moving goods from departure to destination (when using all modes of transport and passing through the ports).

In future, to avoid delays caused by reconsignment at the points where the goods are transferred from one carrier to the other, steaming or other commercial drawbacks this transport is to be carried out not only in removable transport units (containers, conrailers, railtrailers, roadtrailers, etc.), but also according to a single document. Transport is to be monitored and controlled from one logistics dispatcher center (multimodal, intermodal, transmodal, amodal, bimodal, unimodal, threemodal, combined, segmented and other types of mixed transport involving various modes of transport).

However there are various approaches to interpreting the terms mentioned above. According to UNCTAD (United Nation Conference on Trade and Development) intermodal transport refers to carrying goods by several modes of transport when one carrier is responsible for the whole delivery from one departure point through one or more transshipment points to the destination point. Depending on responsibility for transporting goods various shipping documents are issued. The person organizing multimodal transport is responsible for transporting the goods along the whole route, irrespective of the number of carriers when completing the single shipping document [3].

At the European Conference of Ministers of Transport held in 1994 it was stated that multimodal transport refers to transporting one type of freight by not less than two modes of transport, whereas intermodal transport means transporting goods by one mode of transport with the transshipment of the sealed container en route [1].

A. Avetikyan and N. Solovyeva [2] say that “integration between transporting and manufacturing processes gradually shifts from intermodality of cargo movement, i.e. internal isolation and autonomy from the results of producing goods, to transmodality (integration of freight transport by various modes of transport according to the single documents)”.

According to V. Goryainov [5], L. Mirotina and Y. Tashbaev [11], intermodality is integrated ‘from door to door’ freight transport according to the single consignment; the transport involves at least two modes of transport.

The similar definition is given by V. Galaburda [13]: “Under the intermodal system the cargo is carried ‘from door to door’ by two or more modes of transport under single management and according to a single document (such system is also called ‘direct mixed transport’, though we don’t think this is an apt term to describe the process).

The idea of intermodal transport is to deliver ULD (a container or package) according to the schedule agreed by all modes of transport under control of the forwarder that takes responsibility for meeting transportation conditions and completing the required documents. The forwarder (transport organization, container association, special forwarding company, etc.) as a legal entity concludes a contract with the cargo owner and transport organization (carrier) and takes responsibility to calculate the optimal transportation process and to ensure its quality... The system with the forwarder being one of the modes of transport and interacting modes being its customers is called the multimodal transport system”.

The decision taken by the EU Ministers of Transport in January 1997 says: “Transport intermodality is the possibility to influence the dominance of one mode of transport over others... Transport intermodality is aimed at integrated use of every mode of transport to benefit from its specific characteristics...”

O. Goncharuk [4] as well as L. Mirotina and Y. Tashbaev [11] say that “in contrast to intermodal systems where ULD are carried according to the single tariffs and shipping documents with all carriers having equal rights, in multimodal transport one mode of transport is the carrier whereas interacting modes of transport are the customers paying for the services”.

S. Miloslavskaya [10] says: “Intermodal transport is successive transportation of cargo by several modes of transport in the same freight unit or vehicle without its reloading in transshipment. According to [10] “intermodal transport means carrying cargo in the same freight unit and the same vehicle which are successively used by the modes of transport without cargo handling when changing the mode of transport”.

In the proceedings of the Conference on Transport and Environment (1996) we read: “Combined transport is intermodal transport with the largest part of the European route handled by railway, inland water or sea transport; any initial and/or final route section operated by road transport is maximally short”.

According to N.Venzik [3] “combined transport in contrast to intermodal transport is transporting cargo in the same piece of freight or vehicle by combining road, railway and inland water transport”. L. Matyshina and L. Izosimova [28] write that ‘according to the European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) combined transport means transporting cargo in the same piece of freight, the same transport installations (large capacity containers, swap bodies, semitrailers and trucks) using several modes of transport”.

In the materials prepared for the board meeting of the Russian Transport Ministry (1998) [6] we read: “Combined transport means carrying cargo using more than one modes of transport and organizing door to door transportation according to the single document”. The definitions mentioned above are published in the digest prepared by the United Nation and Economic Commission for Europe – UN/ECE, European Conference of Ministers of Transport – ECMT and European Commission (Terminology on Combined Transport) [1], where all these definitions are reduced to the same denominator.

As for the terms like amodal, bimodal, unimodal, threemodal, segmented and other transport, there is no confusion about their interpreting because they are used not often.

Amodal transport is control of moving transport and freight units irrespective of the modes of transport involved and the role each one plays in the transportation process (successive, parallel or combined). Amodal transport is controlled from one dispatcher center [2].

Bimodal transport is carrying cargo in specialized vehicles having chassis and wheelsets capable of moving both on highways as tractor trailers and on rails as wagons of freight trains and even as passenger cars.

The trailer transportation system is a system of freight delivery in ULDs – trailers (automobile trailers or semitrailers with canopy or special demountable bodies). Main goods transported are trucks, self propelled machinery, bulky and heavy freight.

Bulky and heavy freight (pipes, steelwork) is placed on the vehicles (trailers, rolltrailers, heavy-load chassis) which avoids the need to dismantle the equipment into separate units for their transportation from the consigner to the consignee. Rolltrailers are used only for carrying freight in the sea and river links of this transport system. Other ULDs are used in continental transport involving motor and road and railway transport. Both vertical and horizontal (with various tractors) crane loading-unloading is used in depot processing.

Nowadays there are various approaches to interpreting the term 'piggybacking'. Can be transporting a truck, which initially was moving under its own power and later was placed onto the flat wagon, considered as piggybacking? Is the truck to be loaded? If so, transportation of neither the tsar's coach nor empty trucks on flat wagons can be referred to as piggybacking. Similarly, it would be incorrect to refer transportation of military machinery on flat wagons to piggybacking.

Mixed road-rail transport has been known for over 60 years. At the turn of 1980-90s, new types of mixed transport were introduced: carrying semitrailers on RoadRailer railway bogies, transportation of ACTS with transshipping containers or bodies on rollers as well as carrying Cargo freight units for less-than-car loads (LCLs). Manufacturers producing semitrailers, swap bodies and containers are to meet additional requirements with regard to contrailers and containers.

Transportation of semitrailers on RoadRailer rail bogies is popular in the USA. European alternatives of RoadRailer are Kombitrailer, Trailerzug, Transtrailer Semirail, etc. For transporting semitrailers on the wagons with vertical crane transshipment the semitrailers are to be equipped with special brackets. According to the RoadRailer system, semitrailers are to have a reinforced frame with special devices to put them onto the railway bogies. As compared with ordinary semitrailers used only for road traffic and piggybacking with vertical transshipment the heavier frame results in reducing semitrailer carrying capacity.

Compared with carrying semitrailers on wagons, transportation costs are reduced by 5-7 percent (Trailerzug). In mixed transport on the Alps routes the Trailerzug system is advantageous because the semitrailers on bogies match the railway dimensions.

Transportation costs on the Munich-Brenner-Verona route were reduced by 43 percent (compared to ordinary road traffic and by 20-25 percent (compared to other kinds of mixed transport).

Depending on the way the cargo is loaded onto the ship there are Ro-ro and Lo-Lo systems.

Under the ro-ro system automobiles, trucks, rail cars or intermodal transport units are driven on and off the ship on their own wheels. Rolling highways are used to load and unload only motor vehicles.

Under the lo-lo system, intermodal transport units are loaded with lifting equipment. In trailer transport ro-ro vessels are used; they have built-in ramps that allow the cargo to be efficiently rolled on and off the vessel when in port. The time of cargo handling is reduced and the vessel does not stay at the port berth for a long time.

However there some drawbacks of using trailer transport system. Due to design features of the vehicles for transporting trailers carrying capacity of rolling stock (flat wagons, sea and river ships) is not used to the best advantage. Trailers, tractors as well as ro-ro vessels are expensive. Their prices are much higher than those of cellular container carriers with the same tonnage.

The main advantage of the trailer transport system (as compared with the container one) is its lower capital intensity.

The American TOFC (trailer on flat car) system was introduced in 1955. It is also called piggyback. The trailers are brought from the consigner to the railway station by the motor transport. The railway station is equipped with special loading-unloading machinery. The trailers are transshipped onto the flat wagons moving to a certain station. From that station the trailers are delivered to the destination point by the tractor. Trailer trains are regular route trains which are to proceed to the destination station without rebuilding en route and to arrive at the station on time. Empty run is not to exceed 10 percent.

There are two schemes of organizing trailer transport: either trailers are carried according to single tariffs and shipping documents with all modes of transport having equal rights coordinated on the contract basis, or railways act as the carrier whereas the interacting modes of transport are the customers playing for the services.

In Germany the TOFC type trailer transport system known as "Hickle Pack" was introduced in 1959 as a result of establishing an association of railway, road and transport-forwarding businesses of Western Europe (Germany, France, the Netherlands, Belgium and Switzerland). Trailers are carried over the distance up to one thousand kilometers.

In France there are two trailer transport systems similar to TOFC - "Kengourou" and "MC-22". "Kengourou" uses special wagon flats; in their bottoms there are cavities for the trailer wheels. "MC-22" is mainly used to carry liquid goods and trailer tank cars.

One more variety of trailer transport is piggyback traffic – moving contrailers by road, railway and sea transport. Piggybacking is widely used in the USA.

The Flexi-Van system is widely used on the Missouri Pacific Railroad in the USA. The idea is to transfer only the body of the vehicle from one mode of transport to the other. The tractor is used to move the body from the bogie onto the automobile chassis.

The introduction of piggyback traffic on these routes is expected to reduce average idle time of freight at the border 1.7-12-fold (depending on motor transport congestion).

Piggybacking must be supported by modern logistic terminals. Their technical and technological characteristics are to offer competitive advantages of piggyback traffic:

- simplicity in organizing loading-unloading operations;
- reducing loading-unloading time;
- ensuring greater safety of loading-unloading operations;
- reducing operational costs.

For costs optimization and further freight flow distribution container handling stations should be integrated into the infrastructure of multiprofile terminal logistic centers (TLC).

In the Russian Federation it is planned to establish 15 TLCs adjacent to the places of freight flow distribution. Three 'railway ports' will be built in the Baltik, Azov-Black Sea and Primorye regions.

The network of logistic centers must be integrated according to the single technological process (electronic document management, unified technology of loading-unloading, etc.) based on innovative principles of interaction between various modes of transportation.

The main investment mechanism is public-private partnership (PPP) that provides mutually beneficial cooperation and coordinated achievement of the aims set by the federal and regional authorities, infrastructure owners and carriers.

Thus, design work and building of railway infrastructure as well as design documentations and certification of the all-purpose contrailer flat wagon should be financed from federal and regional budgets. Provided these conditions are met, it will encourage private capital to enter the contrailer transport market. As a result, we will have a reliable and stable rolling stock customer.

Tax privileges and low percentage loans, the practice of lifecycle contracts, concession agreements, etc. will have a stimulating effect. Major international players are expected to bring innovations to the transport logistics sector as a whole.

Nowadays one of the most important tasks set by the government is organizing high-speed traffic during the Football Championship 2018 and the World Exhibition in Yekaterinburg in 2020.

As a rule, major freight flows, that can be used for piggyback traffic, run between megapolises – the cities to be connected by high-speed lines.

The axle load of high-speed passenger trains and high-speed freight trains (including container and contrailer ones) is practically the same. Therefore when modernizing existing railway lines and building new ones for high-speed passenger traffic it is necessary to take into consideration that high-speed container and contrailer trains may run on these lines.

The axle loads of high-speed passenger and freight trains being the same, their speeds are different. Therefore special tracks are to be built to avoid counter-current airstream.

The development of high-speed freight and passenger trains must be supported by research work. The main tasks to be accomplished are:

- analysis of the infrastructure and suggestions for its improvement;
- modernization of the transport process technology under high-speed freight and passenger traffic;

- economic assessment of the infrastructure modernization, building new objects, introduction of innovative technologies and other measures taken to enhance transportation processes.

Analysis of the infrastructure and suggestions for its improvement include:

- analysis and suggestions for modernizing track maintenance, signaling, electrification and power supply according to higher standards;
- analysis of energy security and suggestions for strengthening the power infrastructure of operating objects;
- development of transport facilities projects, modernization of methods to calculate transport facilities structures, providing proper reliability, examining and testing defective facilities, recommendations for their further maintenance, repair and reconstruction;
- ensuring traffic safety (minimization of conflicting movement of passenger and freight trains on double-track running lines);

- ensuring traffic safety on railway crossings and on the territories adjacent to the railway lines, taking measures to provide complex safety, using latest methods and technologies.

Modernization of the transport process technology under high-speed freight and passenger traffic includes:

- changing the technology of station performance taking into account reduced number of freight trains slots in the schedule;
- analysis of the car flow volume adjacent to high-speed passenger and freight traffic, minimization of transit freight traffic and giving slots in the schedule to organize local work;
- giving (track) possession time to carry out maintenance and repair works of the infrastructure;
- analysis of passenger flows and car capacity of high-speed passenger trains to forecast passenger flows and calculate the optimal number of stops;

- developing the system to control high-speed traffic;
- developing contact schedules and ways of interaction between passenger municipal, high-speed, air and river transport.

Economic assessment of the infrastructure modernization, building new objects, introduction of innovative technologies and other measures taken to enhance transportation processes include:

- calculating the self-cost of high-speed freight and passenger traffic on given sections;
- economic assessment of changing the schedule of freight trains movement;
- economic assessment of the local work modernization on stations and sections;
- economic assessment of interaction between municipal, high-speed, air and river passenger transport;

- economic assessment of laying high-speed tracks – building of special trestles, building of new railway lines, modernization of existing lines.

High-speed freight and passenger trains have a bright future all over the world because:

- emissions of harmful substances into the air are considerably reduced (compared with road and air transport);
- investments are repaid in a short time (in 5-10 years depending on the length of the lines as well as traffic intensity, the amount of freight and passenger flows and the number of cars) after building new lines and reconstructing existing ones;
- high-quality transport service and comfort are provided for cargo owners and passengers making RZD JSC a reliable and stable player of the transport service market.

Calculations of various models of con-trailer business organization demonstrate that its payback and profitability are possible only with the government investment support, particularly with regard to building service terminals, track service development, as well as the development, certification and series production of the required rolling stock.

In Europe the swap body system (known as bimodal transport) is widely used. The body is taken from the chassis, and then it is transported by rail to the certain station. After that it is put onto another chassis and brought to the destination station.

Bimodal rolling stock refers to semitrailers-roadtrailers initially used in the USA. They can move both on highways and railways. This rolling stock is used to carry various goods, including frozen foods, automobiles and mail. Their use increases the potential of combines road-railway transport.

Roadtrailers are used to build specialized trains, they can be coupled to ordinary railway cars. Roadtrailers can be of any size and configuration.

Various types of semitrailers can be put onto the same bogies and all these trailers can be coupled to each other.

On June 28, 1988, France saw a Combitrans vehicle designed for transporting containers, swap bodies, tank cars, refrigerators and trucks on road and railway lines. Combitrans consists of one road element and two uniform railway elements (bogies).

The road element is a strengthened chassis of the truck semitrailer equipped with the standard coupling pin; it has two points to fasten the railway bogies and braking mechanisms. When on the road, Combitrans is towed by the tractor forming a tractor and trailer rig.

Every railway element consists of a standard bogie with the braking equipment and an intermediate unit fixed on the bogie and providing connection with the road element; it is equipped with the buffer, drawbar and auxiliary braking mechanisms.

When on the railway, Combitrans is a separate car; it may be included into regular and high-speed trains as well as route freight trains and descend from the hump.

Removing the Combitrans chassis and placing it into the operational mode is done with the built-in jacks.

It takes just a few minutes to bring Combitrans from 'on the road mode' to 'on the railway mode' and vice versa. There is no need in using any transport-lifting mechanisms; the operations can be carried out at any station or on any approaching track (where there is a short section with the asphalted intertrack space) and controlled by the tractor driver working at the terminal.

Bringing the automobile semitrailer onto the railway vehicle is carried out in the following way:

- the tractor puts the automobile semitrailer over the railway tracks;

- the rear part of the automobile semitrailer is lifted (with the modernized devices of the chassis) and the railway two-axle bogie is rolled under the automobile semitrailer;
- the rear part of the automobile semitrailer is fixed on the railway bogie; the chassis wheels are lifted into the transportation mode. Then the front part of the automobile semitrailer is lifted with the ordinary pull-out support device;
- the tractor drives off the automobile semitrailer; the second bogie is rolled under it;
- the front part of the automobile semitrailer is fixed on the railway bogie; its roll-out support device is lifted in the transportation mode.

At the destination station these operations are carried out inversely.

The threemodal terminal (apart from traditional road and railway options) has one more option – a river one.

The unimodal transport means carrying freight by one mode of transport and one or more carriers. If one carrier is involved, it issues its own transport document: a bill of lading, consignment note, etc. If there are more carriers (e.g. the carrier that moves freight from one port to the other with the transshipment in an intermediate port), one of them can issue a through B/L covering the whole journey. On the return side of the B/L certain terms of transportation may be specified, and the carrier is responsible for the whole trip or only for the part of the trip covered by its own vessel [10].

The segmented transport means that the carrier organizing transportation may take responsibility only for its own part of the process. In this case it issues the B/L to carry intermodal or combined transport [10].

Nowadays several systems of organizing transportation are used in the international practice, among them: container, palletized, trailer transport (and its varieties such as con-trailer, ro-ro, lo-lo and others), ferry and feeder systems.

There also lightgrade and roll-on/roll-off systems as well as systems operating river-sea vessels or using land bridges and air bridges.

Containerization has been successfully used since 1950s. According to "Internationale Transport Journal" (Switzerland), in 1995 the share of containerized cargo was 95 percent – one third was transported 'port-to-port' whereas the rest was carried out by mixed traffic. In 1995 the world container fleet was over 50 million units.

The main container fleet (over 80 percent) includes general-purpose large capacity ISO containers. Generally, mixed transport is carried out by 20- and 40-foot general-purpose containers. The International Convention for Safe Containers (CSC), 1972, has two goals: to maintain a high level of safety in the transport and handling of containers by providing generally acceptable test procedures and strength requirements, and to facilitate the international transport of containers by providing uniform international safety regulations.

The Convention applies to the great majority of freight containers used internationally, except those designed specifically for carriage by air. In the Russian Federation containers have the certificates issued by of the CIS Register or other standard certificates/documents. Special customs rules are drawn that regulate export and import of containers as well as container traffic record.

In the 1970s, shipping companies started unloading containers on the western coast of the USA; from there they were brought across the whole country to railway flat wagons with the final delivery by the road transport. American President Lines Ltd., a transportation and shipping company, that operated only in the Pacific region bought its own railway flat wagons and organized traffic of separate container trains. Initially, these trains went only to the East coast ports of the USA; from there containers were carried by road transport to eastern markets.

Later, amendments in the legislation enabled shipping companies to carry goods to the inland destination points, and these companies started transporting containers by rail from the western coast to every part of the country. Actually, this type of service known as 'landbridge' took the place of the marine container route across the Panama Canal to the East coast of the USA and to the Mexican Gulf.

This traffic can be divided into 'minibrIDGE', 'microbridge' and 'landbridge'. Their common feature is that they are carried out according to the single tariff, to the single B/L or other document; profit distribution between marine carriers responsible for door-to-door delivery and land carriers as their customers is agreed upon in the tariff.

The "minibrIDGE" transport includes carrying freight/container according to the single marine B/L from the port of one country to the port of another country, then by rail (landbridge) to the second port of this country and from there to the railway inland terminal of the destination country.

Its basis is the through container rate calculated from the port of the departure country to the end terminal in the destination country. The “minibridge” tariffs are issued by marine carriers, not by railways that receive commissions for transporting freight (containers) on the land section of the route. A classical example of the “minibridge” land section is the route carrying freight between the East and West coasts of the USA.

Compare with the marine transport the “minibridge” system has a number of advantages’ both the total time and transportation costs are reduced. Since 1983 double-deck trains have been operating between the USA coasts for container transportation, which resulted in 20-25 percent cost saving.

In 1996, Canadian, Pacific Rail System in association with one of its customers conducted an experiment. The idea was to organize transport of non-standard (special-purpose) containers loaded onto three decks in the dimensions limit of double-deck loading on the respective vehicle. These containers are 1.9m high whereas standard containers are 2.9m high.

Thus, three non-standard (special-purpose) containers (3 x 1.9m = 5.7m) can be piled; it matches the height of piling two standard containers (2 x 2.9m = 5.8m) / 934 /.

By order of the Australian shipping company Australia Japan Container Line, a daughter company of Pand O Containers & John Swire, the Japanese shipbuilding company Ishikawajima Harima Heavy Industries started building a container ship with carrying capacity of 2432 6m containers at the cost of 45 mln. dollars.

The new vessel is 238m long, 32.2m wide. It has a draught of 10.1m and register tonnage of 36 800 g.r.t. The vessel has six cargo holds accommodating standard containers and non-standards containers 13.7, 14.9 and 16.2m long. 800 refrigerators can be also transported.

Container transport on the Russian Railways in international traffic is regulated by the following documents:

- the instruction on how to record freight trains, wagons and containers passing through the division points;
- rules of operating, tracking each number of the container fleet and making calculations for using general-purpose containers of other countries' ownership;
- and other regulating documents.

Container systems prove to be highly efficient on the routes with stable flows of general cargo.

The essence of the palletized transport is to enlarge the piece of freight mainly with flexible bundling and flat pallets.

The cargo is placed on them forming packets with the parameters adequate to use freight capacity and carrying capacity of vehicles, transshipment equipment as well as to ensure safe transportation of cargo, to provide complex mechanization of loading-unloading operations, and to reduce the time required for handling the vehicles.

The terms of commerce have various interpretations. Thus, for example, the B/L tells about the cargo whereas the Customs code about the goods. One and the same cargo can be declared under different codes which may cause incorrect charging of the customs duty.

From what has been said above we can draw a conclusion that the definitions of the types of the mixed transport are to be formulated depending on what party is responsible for transportation, what procedure is followed when completing the shipment documents, the role of each mode of transport, the number of national boundaries to be crossed and geography of these countries and other factors.

However it should be admitted that the terminology concerning freight traffic involving various modes of transport is far from perfect.

It is easier to use the common definitions of various modes of transport: local, direct, mixed direct, direct international, direct mixed international, etc. However, to play an equal role on the international transport market and be adapted to globalization processes we are to know generally accepted terminology which is not as simple as one may think [8, 12, 14].

There is not much experience in the organization of piggyback traffic which causes a number of problems in the interaction of various agencies dealing with the customs clearance of cargo and vehicles used for its transportation (tractor and trailer rigs and railway flat wagons).

For this reason of primary importance is to analyze normative documents regulating this traffic both in the home country and abroad (international agreements, federal laws, other normative and regulatory legal acts) to pick up the rules and regulations that are to be captured in legislations or (if necessary) amended. As the concepts of “contrailer” and “piggyback traffic (shipment)” are ambiguous, a number of amendments should be introduced into some federal laws (for example, the federal bill “On mixed (combined) transport”) and other regulatory legal documents.

Under present economic conditions logistic management of the export freight delivery in the mixed transport is to provide optimal work of transport agencies; it is aimed at improving operating and regulating activity by using reserves of the transportations system and optimizing interaction and coordination of all TSM players involved in export freight delivery.

Managerial decisions are to provide coordinated solution of global and local tasks to achieve the common goal – increasing freight transport profitability and satisfying the cargo owner' needs (the cargo is to be delivered in time, in the required volume and according to high-quality standards). In other words, the managerial decision is to be taken on logistics principles.

According to the estimates of the 1970-80s, over 90 percent of cargo and about 50 percent of freight carried by river come to or transported by railways. Therefore the main problem of organizing the work not only of transport hubs based in sea ports but of those based in river ports was improving of all forms of interaction and coordination between railway and river transport.

Usually a transport hub is the place of interaction between railway and road transport; road and water transport; railway and water transport, railway, road and water transport. Besides, these modes of transport interact with the industrial transport.

Interaction between railway and water transport is carried out in a greater number of transfer points (compared with sea transport), but the volume of work in river ports is not as large as in sea ports. Compared with sea ports, river ports more actively interact with road transport.

During the pre-reform period, transport hubs used to solve their tasks through close interaction and cooperation between related enterprises – railway stations, sea and river ports being the part of the transport hub, as well as truck agencies.

Some authors interpret coordination and interaction as synonyms. We do not agree with this point of view. There is no single approach to picking out the forms, areas, methods, spheres, aspects etc. of coordination and interaction and describing the role every concept play in the whole process.

Some authors say that coordination is harmonization of fundamental directions, complex planning of the development of various transport modes, improving management and control systems, cooperating in legal regulation of all modes of transport in the Unified transport system. Coordination is mainly refer to the highest levels of transport hierarchy (ministries) and, partially, to the middle levels (railway administrations, shipping companies, regional department of road transport).

Interaction is aimed at coordinated decision making to complete fundamental directions of coordination between various transport modes; of primary importance is to complete the plans of transporting goods with the least expenses. Its goal is to optimize operational planning and monitoring of the coordinated work of every transport agency. It should be stressed that the interaction between the services within every mode of transport as well as other enterprises of the national economy is required.

Other authors say: “Interaction between modes of transport means coordination of operations in various transport modes involved in the whole transportation process. Coordination is coordination of the activities of the transport bodies and links to achieve maximum efficiency in carrying goods. With the increased traffic volume and modernized machinery and technology of all modes of transport their coordination is of special importance. Breaking freight delivery times and malicious use of vehicles is mainly caused by the lack in coordination between the links of the transportation chain. For this reason, better coordination in the transport industry is at the top of the agenda.

During the pre-reform period interaction was carried out at the middle links of the transport hierarchy (railway administrations and shipping companies) and, mainly, at its lower links (railway divisions, stations, ports, wharfs, truck agencies, etc.). Interaction between all modes of transport (in large hubs) was referred to as complex; in case two or three transport modes were involved interaction was bi-three-lateral.

Nowadays when export freight passes through sea and river ports interaction is carried out not only between various modes of transport but also between carriers and forwarders, between forwarders and cargo owners, between forwarders and stevedores, between stevedores and agents, between agents and the customs, between forwarders and the customs, etc. In other words, nowadays interaction and coordination cover practically all levels of management of all transport modes. As the export freight mixed transport involves not only government bodies but also private companies, the transport market is an intricate system: government and commercial structures both interact and coordinate at every level of management.

The system of freight goods delivery moves transport and freight flows as well as information, financial and energetic flows; hence various forms of coordination and interaction between various modes of transport and the TSM subjects.

Some authors say that “there are several forms of interaction between various transport modes: economic technical, technological, organizational, commercial and legal”.

Latest achievements in computer engineering encourage the development of the informational form of interaction.

V. Galaburda [13] says: “Interaction of transport modes is carried out in the technical, technological and economic forms. Coordination of transport modes is to be carried out in the organizational and legal areas. Coordination in the organizational area, to be more exact, in the area of the national transport management, is aimed at correcting mistakes caused by organizational disunity of separate transport modes and their subordination to various transport ministries, organizations and departments”.

A. Komarov [7] points out: “The tasks of development coordination and interaction between various modes of transport are diverse and can be solved in the planned-economic, technical, technological, financial, organizational and legal spheres (areas). There is also an informational sphere (area) of interaction, but it is obviously a component part of technological interaction”. Some authors say about the areas of interaction, whereas others prefer spheres of coordination.

According to A. Komarov, “the forms and methods of interaction and coordination of various transport modes are realized in technical, technological organizational, economic and legal areas (spheres). The areas of interaction are technical, technological, economic and legal, whereas the sphere of coordination is organizational.

Each form of interaction, in its turn, is realized in other forms. Thus, legal and commercial forms originated from the charter regulations of each mode of transport are realized in the financial and economic forms of interaction.

It is obvious, because the financial form of interaction realized in calculating mutual settlements when carrying goods in combined traffic, in calculating nonproductive demurrage of tonnage, etc, is actually the monetary value of the legal, commercial and economic forms of interaction. The planned and economic forms of interaction, originated from distributing traffic between separate modes of transport, allocating capital investments, setting the plan of maintenance supply and carrying out required technical economic calculations, are finally realized in the operational and technological forms of interaction, which can be seen in traffic management of various modes of transport, etc.”

Existing drawbacks in interaction between transport modes and the TSM subjects when transferring the freight from one mode of transport to the other are caused by:

- insufficient transfer capacities at some ports and connecting stations (Avtovo, Novorossiysk, Tuapse);

- disproportion in the development of related modes of transport;
- lack of coordination between railway and river transport as well as between the TSM subjects;
- the TSM subjects showing lack of economic interest in the development of mixed transport and logistization of commerce-transportation delivery chains;
- inefficient planning and monitoring of international mixed traffic;
- complicated procedure of carrying out commercial operations between the TSM subjects when transshipping the cargo from one mode of transport onto the other;
- paper document management in the system “sea(river) port-railway station”;
- time-consuming management of certification and customs documentation.

When the freight is delivered by several modes of transport, the maximum synergic effect does not satisfy the level of technical, operational and economic parameters of related enterprises.

Efficient interaction and coordination of all modes of transport and the TSM subjects supported by the latest computer technologies is an important reserve of reducing transport costs.

Under the market conditions, apart from interaction and coordination between various modes of transport and TSM subjects special attention should be paid to the competition factor.

However, competition does not prevent various modes of transport and TSM subjects from efficient interaction.

Competition on the TSM is seen not only between various modes of transport and between transport departments of various countries but also between transport companies dealing with forwarding, agency service, declaring, store handling, stevedoring etc. and having the right to render or resale services of one or several modes of transport.

Besides, competition is seen in every marine port, between Russian and foreign ports of one sea basin and one region.

Separate services and their combinations compete with each other actually improving the quality of the transportation process. It does not stand in the way of sustainable development of various transport modes. More than that: it opens the possibility of commerce based cooperation between the carriers of various modes of transport as well as between forwarders, agents, stevedores, etc.

Thus, cargo owners and forwarders representing their interests can use the services of various companies at every stage of the transportation chain in the mixed (sea-railway) transport and when passing through the ports as well as when moving on various routes with transshipment in one port.

The choice of the company depends on a number of factors:

- existing interrelations, forms, spheres, aspects of interaction between the TSM subjects;
- staffing;
- staff qualification;
- material and technical basis;
- financial conditions, etc.

Many transport companies begin to realize that to survive under present economic conditions they are to unite and, using international experience, establish associations, unions, and other organizations.

These days, there are International Association of Forwarders, Russian Association of International Forwarders (later merged into Freight Forwarders Association of Russian Federation, FAR),

Guild of Forwarders, Russian Association of Territorial Boards Managing Motorways, Association of Postal and Communications Workers of RF River Transport, Association of International Maritime Law, Association of Express Carriers, Russian Association of Independent Cargo Owners, Russian Association of Contractors in Road Service, Interregional Association of Airline Managers, Union of Russian Ship Owners, Association of Industrial and Transport Enterprises, Motor Transport Union of Moscow Region, Association of Ports and Ship Owners of River Transport, Association of International Truck Carriers, Association of Maritime Commercial Ports, Association of the Workers of Municipal Electric Transport, Association of Shipyards, National Association of Transport Workers, Cargo Owner Association, National Association of Forwarders, Association of St. Petersburg Forwarders, Russian Association of Ship Agents, and others. So far there are neither federal nor regional associations of stevedores.

Both common and particular interests are well balanced in the associations mentioned above. Thus, to join FAR you are to submit two reference letters from its members and the documents proving that you are an honest taxpayer.

From what has been said above we can formulate the terms “marketing”, “logistics”, and “goods logistic structure” with regard to freight traffic in the following way:

Marketing is managing the system of meeting demand for transport and other services with the aim to earn maximum profit thanks to the properly chosen strategy of playing on the transport market.

Logistics is complex managing of a given system or object to ensure that the consumers are provided with services related to freight transport at the right time, in the right volume, in the right place according to the generally accepted standards.

Goods logistic structure as compared with route is a complex of various interacting elements, flows and legal bonds in the system of export freight delivery ensuring the movement of goods from seller to buyer.

To attract export freight flows onto the Russian Railways and ports, to increase competitiveness of Russian carriers on the TSM, to provide good revenue prospects, to create new jobs the following measures are to be taken:

- interaction between Transport Service Center of RZD JSC, sea ports, ZAO Morcentr, cargo owners and forwarders in planning and regulating export freight traffic and transshipping the goods onto the Russian Railways and ports;
- maintaining the traditional base of national carriers and further development of the international transport; construction of cross border points and ports, reconstruction of existing transshipment complexes and building new ones; laying approaching tracks;

- including fishing and timber ports, shipyards and repair yards as well as the wharfs of commercial structures into the Russian transport system to use them in export freight traffic;
- making the procedure of clearing the Customs easier, granting equal rights to Russian and foreign ship owners both in ports and in inland waters.
- using to the maximum the potential of the Russian fleet to carry out export freight traffic; contracts for the sale of mass production goods should include the items allowing for transporting maximum possible amounts of freight by Russian commerce vessels;
- cooperation between RZD JSC and Transport Ministry in implementing the tariff policy and developing through rates (carriage and port duties);

- granting reduced tariffs, customs and tax privileges (reduction or abolition of duties and VAT) only for those Russian and foreign cargo owners which carry their cargo through the sea and river ports of the Russian Federation;
- participation of Transport Ministry and RZD JSC in concluding the contracts for export freight transport for state needs;
- cooperation between the State Tax Administration, the State Customs Committee and the bodies responsible for frontiers and certification control to ease the burden of taxing transportation services and capital funds and to reduce time of passing export freight through transport hubs;
- providing careful and timely documentation concerning normative and legal matters of interaction between the TSM subjects.

RZD JSC and Transport Ministry agencies are to conduct regular advertizing campaigns for ship owners and forwarders to attract export freight flows to the Russian transport communications and ports.

Integration and partnership of TSM subjects, EDM, latest computing technologies, flexible tariff and tax policy supported by the normative and legal basis, complex management of transport, freight, information, financial and energetic flows in the legal framework are certain to improve management efficiency at every stage of export freight traffic in the mixed transport.

To improve the quality of transport service the term “legal logistics” should be used meaning timely preparation and approval of normative legal acts regulating the interrelations in the legal framework, particularly, between the TSM subjects when carrying out export freight traffic in the mixed transport.

## REFERENCES

1. Terminology on combined transport. - New York and Geneva: Un. Nation and Economic Commission for Europe (UN/ECE). - 2001. - 69 p.
2. Avetikyan A.A., Solovyeva N.P. Marketing and its role in organizing the transport process // Railway transport. – 1992 - № 8. – Pp. 72-77.
3. Venzik N.G. The Role of Mixed Transport in Foreign Trade // Marine transport. “Technology of maritime transport and sea ports”: Mortechnikinformreklama. – M., 1996. – № 11. – Pp .1-20.
4. Goncharuk O.V. Economic efficiency of storage-and-retrieval systems. – M., Nauka, 1991. – 128 p.
5. Goryainov V.S. Intermodal transport //Maritime transport and international navigation: right and economic problems: XIV international conference “World on Sea”, Moscow, May 27-June 5, 1985. – M., 1990. – Pp. 539-542.
6. General results of the social and economic development of the transport complex in 1997 and the tasks set for 1998 // Materials for the meeting of the RF Transport Ministry Board. – M., 1998. – 60 p.

7. Komarov A.V. Interaction between railway and water transport in mixed traffic. – M.: River transport, 1957. – 212 p.
8. Markushin V. Globalization as God and Devil of the 21st century // *Zavtra*. – 2001.– № 32.– P.3.
9. Matyushin L.N., Izosimova L.P. Marketing research of the combined transport of high capacity trucks and semitrailers // *VNIIZHT Bulletin*. – 1996. – № 5. – Pp. 16-21.
10. Miloslavskaya S.V. Landbridges in the system of international transport communications // *Transport information bulletin*.– 2000.– № 5.– pp. 32-35.
11. Mirotin L.B., Tashbaev Y.E. Intermodal and Multimodal systems // *Transport: science, engineering, management*. - 1993.- № 3. – Pp. 3-9.
12. Persianov V.A. Economic globalization and transport // *Transport information bulletin*.- 2001.- № 2.- Pp. 48-55.
13. Persianov V.A., Timoshin A.A., Miloslavskaya S.V. et al. Unified transport system. Ed. by V.G. Galaburda.- M., 1996.- 295 p.

14. Persianov V.A., Fedorov L.S. transport in Russia and WTO // Railway transport.- 2001.- № 9.- Pp. 24-29.
15. Transport support of foreign-trade operations: Reference book. Volume 2.- SPb., 1997.- 448 p.

## СПИСОК ЛИТЕРАТУРЫ

1. Terminology on combined transport (Терминология комбинированных перевозок).- New York and Geneva: Un. Nation and Economic Commission for Europe (UN/ECE).- 2001.- 69 p.
2. Аветикян А.А., Соловьева Н.П. Маркетинг и его роль в организации перевозочного процесса // Железнодорожный транспорт.- 1992.- № 8.- С.72-77.
3. Вензик Н.Г. Роль смешанных перевозок в международной торговле // Морской транспорт. Сер. «Технология морских перевозок и морские порты»: ЭИ / В/О "Мортехинформреклама".- М., 1996.- № 11-12.- С.1-20.
4. Гончарук О.В. Экономическая эффективность транспортно-складских систем.- М.: Наука, 1991.- 128 с.
5. Горяинов В.С. Интермодальные перевозки: некоторые вопросы // Морская транспортировка и международное судоходство: права и экономические проблемы: XIV междунар. конф. "Мир на морях", Москва, 27 мая-5 июня 1985 г.- М.: 1990.- С.539-542.

6. Итоги социально-экономического развития транспортного комплекса в 1997 году и задачи на 1998 год // Материалы к заседанию коллегии Минтранса России.- М., 1998.- 60 с.
7. Комаров А.В. Взаимодействие железнодорожного и водного транспорта в смешанных сообщениях.- М.: Речной транспорт, 1957.- 212 с.;
8. Маркушин В. Глобализация как Бог и Дьявол XXI века // Завтра.- 2001.- № 32.- С.3.
9. Матюшин Л.Н., Изосимова Л.П. Маркетинговые исследования комбинированных перевозок большегрузных автомобилей и полуприцепов // Вестник ВНИИЖТ.- 1996.- № 5.- С.16-21.
10. Милославская С.В. Сухопутные мосты в системе международных транспортных коммуникаций // Бюллетень транспортной информации.- 2000.- № 5.- С.32-35.
11. Миротин Л.Б., Ташбаев Ы.Э. Интермодальные и мультимодальные системы // Транспорт: наука, техника, управление: Сб. ОИ / ВИНТИ.- 1993.- № 1.- С.3-9.

12. Персианов В.А. Глобализация экономики и транспорт // Бюллетень транспортной информации.- 2001.- № 2.- С.48-55.
13. Персианов В.А., Тимошин А.А., Милославская С.В., Н.А.Троицкая. Единая транспортная система. Под ред. В.Г. Галабурды.- М.: Транспорт, 1996.- 295 с.
14. Персианов В.А., Федоров Л.С. Транспорт России и Всемирная торговая организация // Железнодорожный транспорт.- 2001.- № 9.- С.24-29.
15. Транспортное обеспечение внешнеторговых операций: Справочник. Кн.2.- СПб.: ЦНИИМФ, 1997.- 448 с.

**Thank you for your attention! Merci pour votre l'attention!**  
**Danke fuer Ihre Aufmerksamkeit! Dank u voor uw aandacht!**  
**Tack för er uppmärksamhet! Takk for oppmerksomheten!**  
**Tak for din opmærksomhed! Obrigado pela vossa atenção!**  
**Grazie di attenzione! Gracias por su la atención! Kiitos**  
**huomiota! Tänan teid tähelepanu eest! Paldies par uzmanību!**  
**Таны анхаарлын төвд баярлалаа! Назарларыңызға рахмет!**  
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**Dziękuję za uwagę! Дякуємо за увагу! Дзякуем за ўвагу!**  
**Ďakujem(děkuji) vám za pozornost! Hvala za vašo pozornost!**  
**Vă mulțumesc pentru atenție! Благодаря за вниманието!**  
**Хвала вам на пажњу! Hvala na pažnji! Ви благодариме за**  
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