THE CONCEPT OF DEVELOPMENT OF THE TERMINAL LOGISTICS CENTERS NETWORK IN THE RUSSIAN FEDERATION

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CONTENT

Summary

The present Concept defines technological and organizational interactions of parties of the 'Project (hereinafter - the Project) on Development of Terminal Logistics Centers (hereinafter - TLC) Network on the territory of the Russian Federation', to be implemented as the integral part of the programs of infrastructure development of the Joint Stock Company 'Russian Railways' (hereinafter - the RZD).

The Concept is elaborated on the basis of core provisions of several strategic planning programs of rail transport, including the RZD plans of enhancing the efficiency of container and combined transport, and is correlated with planning documents of the Federal Customs Service and with development programs of relevant regions of Russia.

Comprehensive solutions, proposed by the present Concept, proceed from the analysis' results of the current transport& logistics market environment as well as from expected development trends, and include the following aspects:

- TLC network operational model;
- land site choice criteria;
- TLC units' descriptions;
- basic parameters of technological processes and standard requirements;
- TLC intermodal operations, etc.

The present Concept classifies different types of TLCs (i.e. rail ports, dry ports, satellite terminal centers), and provides standard requirements and basic parameters of deployment and operation of the network.

The TLC network's deployment Project envisages step-by-step implementation. At the first stage the core TLCs of the network shall be constructed with a view to stimulate potential investors to expand further over country's regions at the next stages.

It is expected that the RZD would support implementations of each individual TLC project of the network by investments to create necessary railway infrastructures, including sidings from main rail lines. Besides, the significant volumes of such investments would be allocated, if needed, to improve adjusting infrastructure to provide for accessibility. including expansion of shunting and marshalling facilities, relevant stations' extensions for processing of trains with standard length of 71 indicative (reference) wagons (*the measurement reference unit of length of a wagon used by the RZD*), improvement of signaling and interlocking arrangements, etc. Furthermore, the RZD intends to provide contributions to individual projects with other available assets and resources, like land plots' title rights, freight yards' facilities, stuff competence, engineering support, etc.

The major expected benefits of the Project implementation are:

- For the Russian Federation – the improvement of the national transport system efficiency and the logistics services' market growth;
- For the RZD – the increase in rail freight traffic volumes (the core TLC network is expected to attract additional 100 – 120 million tons of cargo), the net costs reduction, the acceleration of the investment activities, the optimization of the assets management.

The analysis of the main Project risks revealed strong dependence on availability of considerable investments to be attracted from various sources. Such dependence may be hedged by effective project management, which brings efficient operations of special purpose vehicle (SPVs) companies to the Project's top priorities.

Actually, the deployment of the TLC network based on the RZD infrastructure shall mean the launch of a national project of innovative development of terminals and logistics infrastructure.

1. OBJECTIVES.

The implementation of the Project pursues the next main objectives:

- Improvement of rail transport competitiveness by development of the modern terminal and logistics infrastructure;
- Additional revenues gained due to intensive growth of the RZD transport activities with additionally attracted high-yield freight traffic volumes, and the increase of efficiency of the assets and facilities management;
- Increase of investments into terminal & warehouse assets of the RZD.

The present Concept is correlated with national, regional, sectorial and corporate strategic documents, of which the most important are:

- The Transport Strategy of the Russian Federation up to 2030;
- The Strategy for Development of Rail Transport in the Russian Federation up to 2030;
- The Concept of development of the RZD terminal & warehouse Directorate;
- The Concept of comprehensive development of the RZD container business;
- Russian Federation regions' development strategies;
- Development Strategies of the RZD subsidiaries and affiliates ("TransContainer", "RZD-Logistics", TLC "Bely Rast", etc).

2. ANALYSIS OF CURRENT MARKET ENVIRONMENT.

At present the RZD operates terminal & warehouse freight yards at more than 545 railway stations. Most of the above assets have been constructed under the central planning economy programs with a view to secure free access of a client to the rail infrastructure (materials supplies for industrial and construction enterprises, storage and distribution of products and components, national security supplies, personal carriage of household items, community utilities items, vehicles, etc.).

As the result of drastic socio-economic changes in the national economy, new supply chains and distribution models, relocations of regional centers of generation and consumption of goods, etc., the majority of these facilities are almost non-operational. At the same time, quite a number of these freight yards retain their strategic positions for serving logistics demands of quite a number of towns and settlements, key enterprises, national security objects and so on.

Nowadays, quite a lot of clients, facing a limited range of services at deteriorated sites operated by obsolete terminal equipment and vehicles, have preferred to use 'door-to-door' services of more flexible road transport operators.

Furthermore, over the last years many logistics operators created their own modern terminals with logistics centers, i.e. Eurosib (St. Petersburg, Novosibirsk), Logoprom (Nizhny Novgorod), National Container Co. (St. Petersburg, Ust-Luga), FESCO, etc.

The above factors have contributed to the cargo outflow from the RZD freight yards.

According to the Federal State Statistics Service (Rosstat) the total freight volume carried by all modes of transport (except pipelines and private rail transport) in 2010 amounted to 8365.4 million tons with cargo turnover close to 2480.5 billion tons/km. Road transport and rail transport constitute the major part of commercial cargo transport volumes (shares of 68 per cent and 26.5 per cent respectively). Along with that, the rail transport share demonstrates decline trend (in 2008 road transport share was 58.3 per cent, while rail transport – 36.5 per cent).

In connection with that, the following strategic tasks are considered as the top priorities of the transport sector development:

- Increase of the RZD share in the international transport market (primarily in Eurasia);
- Improvement of the RZD competitiveness as to alternative transport modes;
- Attraction of additional transit cargo flows to the RZD network;
- Upgrading of infrastructure through investments.

To analyze the current situation of the RZD freight yards the existing cargo flows should be assessed to identify the cargo flows' structure, its dynamics and disproportions, which will indicate the key services required by the clients.

The analysis of freight yards cargo flows for the years 2007 – 2010 demonstrated quite positive dynamics. However, during the period of the global / domestic economic crisis the cargo turnover sharply decreased starting from Q IV of 2008 and throughout the year 2009 (decrease by 30 per cent in 2009 as compared to 2008). The RZD freight yards, servicing the needs of the 2014 Olympics in Sochi, were the only exceptions.

In the year of 2010, the cargo turnover almost reached the pre-crisis level.

Bulk / construction materials along with containerized cargo constitute the major part of the turnover, while the balance of non-ISO (*obsolete containers with 3 and 5 tons load capacities*) and ISO containers handled was in the proportion of 1: 1.

An average cargo storage period was not a long one, which reveals the lack of storage facilities. However, freight yards located in the vicinity of seaports demonstrated a longer storage period, caused by the necessity to accumulate shiploads.

The analysis of the current status of handling equipment demonstrates average deterioration of 85 per cent.

The summarized data on volumes of goods handled in 2010 are shown in the table below.

Table 2.1. Goods volumes handled at freight yards under the RZD Terminal & Warehouse Directorate, 2010

Branch of the RZD	Containers, TEU	Non-containerized goods, tons
Vostochno-Sibirskaya	106 818	859 440
Zapadno-Sibirskaya	843	2 423 930
Krasnoyarskaya	48 430	91 910
Zabaikalskaya	17 720	2 623 160
Kaliningradaya	86 290	1 572 100
Moskovskaya	597 550	2 436 260
Severo-Kavkazskaya	433 690	4 360 730
Privolzhskaya	46 400	4 940
Severnaya	176 180	2 516 800
Gor'kovskaya	13 350	872 240
Kuybyshevskaya	91 300	296 660
Sverdlovskaya	163 350	186 190
Yugo-Vostochnaya	61 370	1 792 750
Yuzhno-Uralskaya	150 280	3690 120
Oktyabrskaya	394 310	5 930
Dal'nevostochnaya	85 350	1 311 560
TOTAL:	**2 366 406**	**24 185 228**

The Table showes the considerable disproportion in volumes of different types of goods handled at different branches of the RZD.

Apart from obsolescence and physical wear-out of the handling equipment, the freight yards' intra terminal technologies do not meet the increased requirements of clients, which prevents these yards from handling geographically relevant goods. Besides, the deterioration of commercial warehousing facilities at the level of 80 per cent also contributes to that negative impact.

The limited range of services provided by the RZD freight yards (lack of "door-to-door", "just-in-time" and value-added services) in combination with a non-transparent tariff policy (in contrast to the road transport) as well as complicated documentary procedures are also compose constraining factors for the further development of these objects.

The results of structural analysis depicted on Fig. 2.1., demonstrate that for the last 25 years the share of raw materials increased from 1/3 to 2/3 of the total cargo turnover (public network only) of the RZD. Apparently, this trend is caused not only by raw materials orientation of the national economy but testifies also the low efficiency level of the terminal & logistics infrastructure.

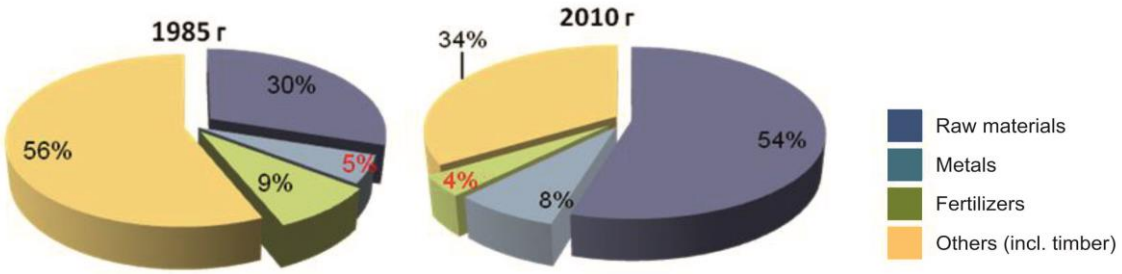


Fig. 2.1. Structure of rail transport cargo turnover in 1985 and in 2010.

It should be noted that the Group "Others" in the Figure above embraces categories of goods which form the largest portion of cargo handled at freight yards under the RZD Terminal & Warehouse Directorate.

The Fig. 2.2 shows the decreasing volumes of goods handled at the RZD freight yards in the same years:

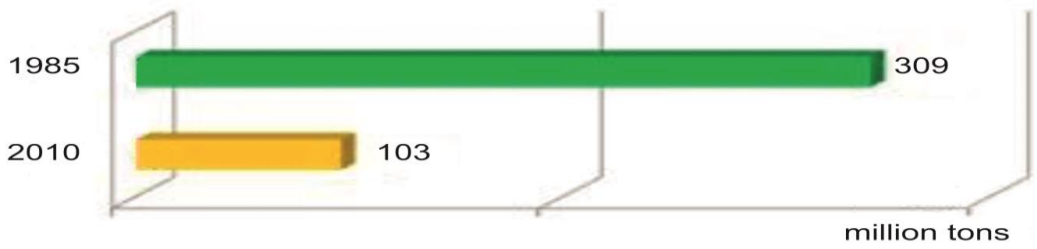


Fig. 2.2. Dynamics of decrease of volumes of goods handled, in million tons

Thus, the current status of the RZD freight yards presents the major restricting factor for the rail transport competitiveness, resulting in decrease of total amount of clients, as their demands for speed, punctuality and flexibility of deliveries are not met, which force them to switch to road transport instead.

Conclusions:

- The high deterioration of the capital assets (buildings, communications and utilities, handling equipment, etc.) of the RZD terminal & warehouse division;
- The obsolete terminal, warehousing and haulage technologies, low level of handling processes automation;
- The “unfriendly interface” in communications with clients, lack of services provided;
- Decrease of the rail transport competitiveness (primarily in general cargo segment).

2. KEY MARKET TRENDS

The key trends, affecting the rail freight transport market, are as follows.

- Growth of industrial output and per capita income;
- Integration of the national economic / transport system into the global market;
- Development of the national logistics services market as well as increase of competition among modes (road and water transports), growth of containerized goods volumes connected with the increased retailers’ share (FMCG supply chains) in the national market;
- Development of the national financial market;
- The ongoing reform of customs administration system.\

The Russian industrial sector output increased substantially (1.5 times within last 10 years), thus forming one of the most important source of new cargo flows relevant for the RZD freight yards.

The growth of the population’s per capita income is also considered as the major influencing factor for general goods turnover since it is stimulated by the national consumption level.

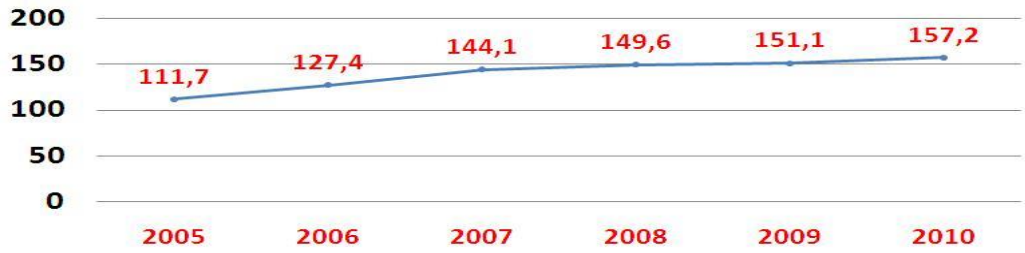


Fig. 3.2. Per capita income growth in the Russia (source: Rosstat).

The per capita income has increased 1.5 times during last 6 years, which had positive effect on the retail networks' distribution in terms of cargo flows generation/consumption.

The retailers, whose cargo flows are regarded as relevant for a TLC handling, (see Fig. 3.3.) constitute a considerable part of the market. As per experts' assessments, FMCG flows, supplied within retailers' networks in Russia, amounts up to 50 per cent of the overall retail trade turnover. This share is much higher in large cities, reaching 60 – 80 per cent in the segments of household appliances and mobile communication items.

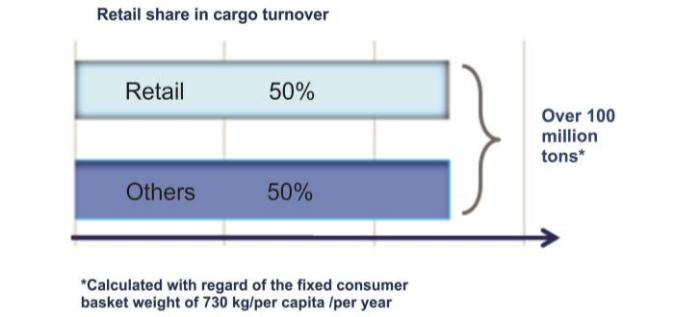


Fig. 3.3. Retail networks' share in overall trade volume. Source: RBC Agency.

Thus, development of the FMCG retail networking system in Russia stimulates a relevant development of the national terminal & logistics system in terms of expansion of logistics services and increase of goods turnover.

The next important factor for the development of logistics market in Russia is a potential growth of the level of containerization of goods.

According to DTZ consulting company, the level of containerization in the EU and North American countries amounts to 140 TEUs per 1 000 persons per year. The same index hardly reaches 30 TEUs in Russia. At the same time, the research center Volgaenergoproekt - Samara published data showing that the turnover of goods suitable for containerized transportation in this highly developed Russian region is at the level of 245 TEUs (see Fig. 3.4 below).

One can predict that the difference between indices described above could be used to identify the potential containerization level of the country which could be reached with the support of comprehensive, duly formed and equipped infrastructure, adequate for a wide range of logistics services to be provided.

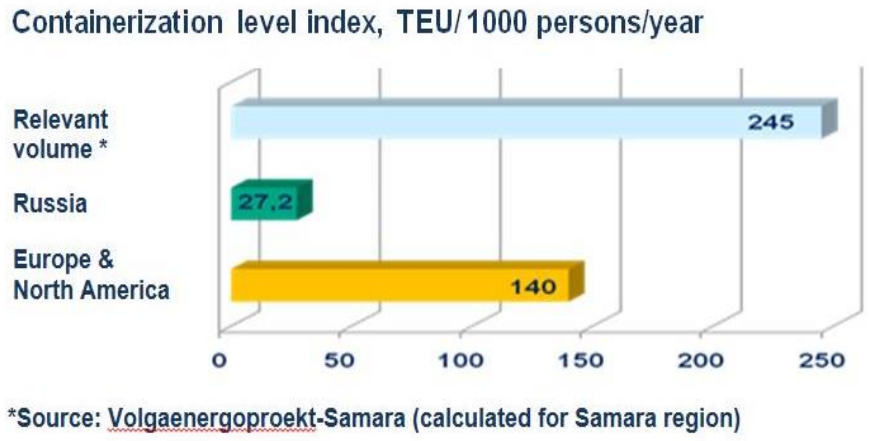


Fig. 3.4. Containerization level growth potential.

The trend, described above, is confirmed by the key macroeconomic indices within the period from 2005 to 2008 years, reflecting the trends of active growth of the national logistics markets with new container terminals and other commercial facilities commenced in freight transport system. Cargo flows analysis reveals that the container turnover grew by 26 per cent, while the overall turnover of rail transport increased by 12 per cent with the growth of general cargo turnover of 1.8 per cent, and the GDP grew by 7 per cent annually (see Fig. 3.5).

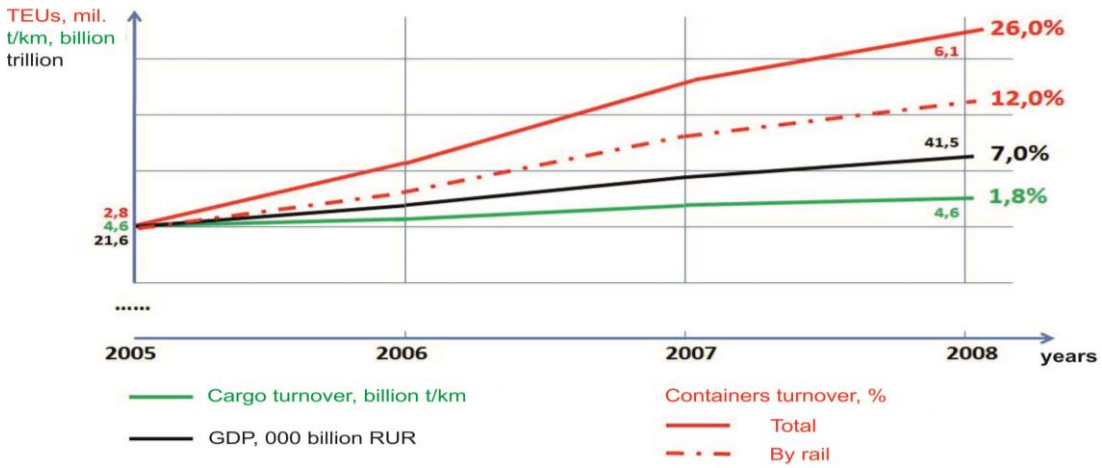


Fig. 3.5. Growth rates of some national indices in the Russian Federation, Source: Rosstat.

The further integration of the Russian transport system into the global network of International transport corridors (ITC) stipulates the harmonization of the national transport rules and practices with international transport standards in punctuality and speed of haulage, transparency of pricing, information exchange and tracking, customs procedures, and so on. The failure to accomplish this task will lead to a loss of high-margin goods, supplies of which require the shortest possible delivery time along with high predictability. The full scale integration of terminals and warehouses network into the existing ITCs network shall optimize supply chains, forming a strong potential for the reduction of transport costs.

Maritime and inland waterways transport development trends.

The major trends of development of maritime and IWW modes of transport include, first of all, the growth of vessels' deadweights and the expansion of maritime line services.

The terminal (on-shore) handling operations of loads of large sea vessels (for instance, a container ship with 14000 TEUs) are organized technologically to secure the shortest possible time needed to unload / load a ship with the quickest possible outflow of goods from the limited territory of a port. The provision of these conditions are maintained by intra port handling systems with highly efficient equipment and terminal vehicles and by external transport systems with regular block trains transportation and widely used system of connections with dry ports in hinterland.

Regular sea lines services (including container and RO-RO ships as well as ferries) contribute a lot to high standards of supply chain management. In addition to that, the low cost of the ocean / sea transport secures its high competitiveness, utmost fixed at transcontinental transport routes.

The competitiveness of national inland water transport shall be affected in the mid-term by the following factors:

- worn-out state of vessels used in inland waters (more than half of the fleet is 25+ years old) and inadequacy of waterside hydro structures (75 per cent of which were built 50 – 180 years ago);
- inadequate navigation conditions of several IWW network sectors (the Nizhne-Swirsky sluice at the Volga-Baltic channel, the Gorodetsky hydronod at the Volga, the Kochetovsky hydro nod at the Don, etc.);
- scarce financial resources allocated for maintenance of navigation conditions of IWW network (incl. small rivers);
- development of national and regional road networks, that compress the competitiveness of inland waterways transport;
- seasonal nature of inland IWW transport, that limits terminal handling with stable supply chains;
- locality of navigable inland waterways, long delivery times, etc.

Thus, IWW transport could not compete with rail transport, including types of goods handled at freight rail yards.

Road transport development trend.

Development of domestic road transport is characterized by the following.

On the one hand:

- availability of road transport is improving due to expansion of public roads lengths and road quality;
- growth of load capacities of freight vehicles (up to 40 tons), and upgrade of operational parameters;

On the other hand:

- intensive growth of road transport fleet with the relatively slow expansion of the road network. For example, in the Moscow region the road transport fleet grows by 7 – 12 per cent each year while the road network growth is less than 1 per cent. Within the implementation period of the Federal program 'Modernization of the Russian Transport System (2002 – 2010)', the road network has been extended by 15 per cent, while the road transport fleet has tripled;
- intensive wear of road surfaces due to the increase of permissive axial loads of freight automobiles;
- severe climate conditions over a substantial part of the Russian road network;
- extra long distances of automobiles' one trip (1500 - 2000 km in average);
- seasonal limitations of road freight traffic (the majority of the Russian regions impose limits on heavy-load trucks movements from the end of April till the beginning of June);
- strengthening of rules and regulations on road safety as well as on crews' trip conditions and on environmental protection, (i.e. the Euro-3 and Euro-4 fuel standards, prohibition of obsolete commercial vehicles' access to the national network, noise reduction measures, etc).
- excessive road traffic (over permissible traffic norms) on significant segments of federal roads and related infrastructure (bridges, border cross-points, etc.), that reached 25-28 per cent of the total network (over 60 per cent in the Moscow region) while toll roads' network development just started;
- poor conditions of the substantial parts of roads and related infrastructure, that reached 62 per cent of the total network along with an inadequate level of supportive services.

Thus, it is expected that the above factors shall result in the short term perspective in increase of commercial road transport's costs within the range of 15 – 25 per cent, as well as in increase of delivery times up to 15 per cent.

National logistics services market development trends.

The US transport logistics market is the most developed in the world (€806 billion turnover in 2008) while the European is the next one with €683 billion turnover in 2008.

The intensive dynamics of global trade development, the globalization of cargo flows and complication of logistics and distribution technologies are the main factors of increased demand for comprehensive terminal & warehouse services.

The global trade has lately demonstrated radical changes, caused by trade regimes' liberalization on the one hand, and dynamic development of export-oriented sectors in the Asia-Pacific region, on the other hand. Thus, the global logistics market development was stimulated by the shift of manufacturing facilities from the US/Europe to the Asia-Pacific region and increase of the finished goods flows in backward directions.

Apart from China, into the said trend processes are actively involved the South-East Asia countries and India. Pre-crisis global trade volumes between Asia and Europe demonstrated growth by 20 per cent annually.

Table 3.1. Factors influencing demand and offer levels.

Demand factors	Offer factors
Economy/trade globalization and expansion; Cargo flows haulage globalization, extension of world trade routes, complicated delivery schemes; Increased demand for integrated transport communication solutions; Services development and personification, growing demand for quick response to the client's needs, intensification of competition; Necessity to shorten technological/production cycles, changes in the global cargo flows structure; Logistic chains extension/complication, strengthening of environmental aspects for the global transport, producers' strive to waste-free manufacturing.	Privatization of state owned transport and communication facilities; Orientation for integrated supply chains management (i.e. just-in-time) in order to meet the clients production cycles' demands; Merge of new players at logistics market, offering new services' packages, new forms of competition; Concentration on profile business with parallel outsourcing of non-profile business processes; New forms of interaction between "majors" and "juniors", multilevel subcontract operational schemes.

The global logistics market is severely fragmented due to the presence of more than 50.000 enterprises operating in the market, while 95 per cent of them are small scale companies with limited material and financial resources. Actually, 30 global players control over 35 per cent of the market share.

The development indicators of the Russian logistics market are shown below (see Fig. 3.6).

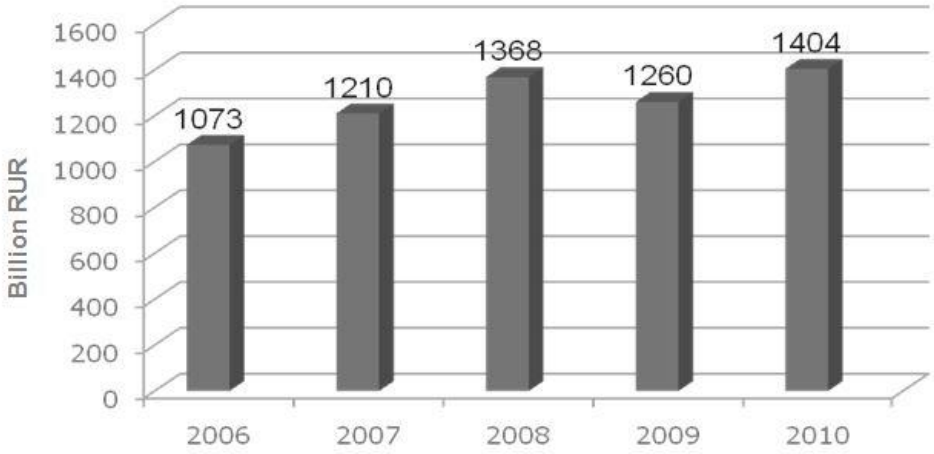


Fig. 3.6. Development indicators of national logistics market (Source: RBC Agency).

To assess the current status and the development potential of the national transport & logistics services market (approx. €35 billion in the years of 2008 and 2010, according to Armstrong & Associates Inc.), the basic parameters of some European markets are stated below for comparison.

3.2. European transport & logistics markets, 2008.

Country	Market volume, € billion.	European share in global market, %
Germany	184	27
UK	116	17
France	109	16
Italy	96	14
Spain	55	8
Norway	55	8
Russian Federation	**35**	
The Netherlands	27	4
Others	41	6
TOTAL:	**683**	**100**

The structure of the national transport & logistics services market is shown below (see Fig. 3.7).

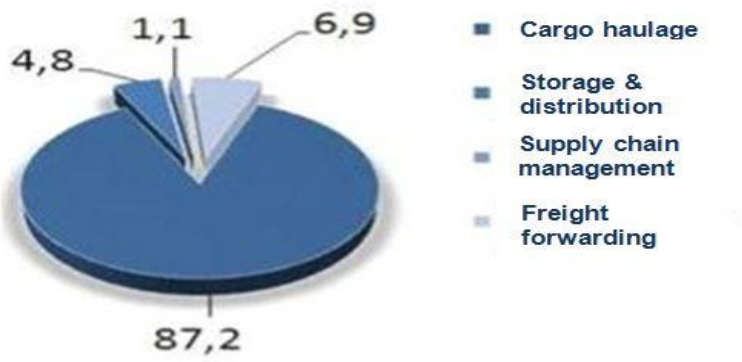


Fig. 3.7. Structure of national market of transport & logistics services, % (Source: RBC Agency).

According to the European classification, the major transport and logistics market segments are:

- Cargo transportation and forwarding;
- Integrated logistics services, including storage and distribution;
- Logistics management, including business processes optimization.

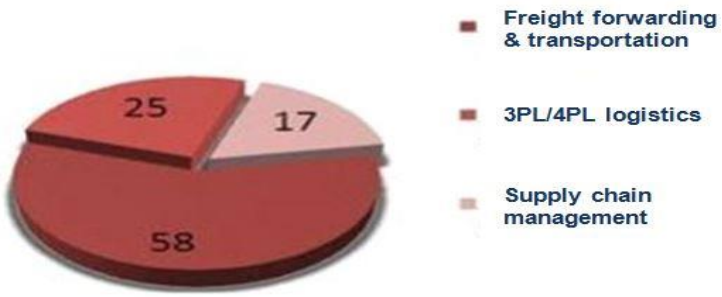


Fig. 3.8. World market of transport & logistics services structure, % (Source: RBC Agency).

The comparison of the Russian and the global transport & logistics markets reveals a certain disproportion of the national market in favor of freight transportation & forwarding sector, while the global market demonstrates larger shares of integrated logistics services (door-to-door, supply chain management etc.).

Following the general globalization trend of the development of the Russian economy, it is predicted that the national transport & logistics services market shall further develop more extensively in the sector of comprehensive logistics services. Therefore, global 3PL market players consider Russia as their strategic market for expansion. One can note the on-going reorientation of quite a number of global logistics services providers from international activities only to stable domestic operations in Russia, offering new logistic services and storage facilities of high quality.

The national market demonstrates the continuing growth of alliance agreements between international and Russian providers of logistic services. In such alliances Russian partners are in charge of operational and technical processes, while foreign partners provide technological and IT solutions, skills of management and investment processes implementation.

The RBC (Russian Business Consult) Agency experts identify the following major trends in national transport & logistics services market during last post-crisis years:

- The world crisis has boosted the market consolidation, several mergers and acquisitions are expected, which will bring new players into the market with significant resources and with high reputation;
- It is expected that in the nearest future the market's clients will demand more comprehensive logistics solutions of high quality which normally are offered by large and medium logistics providers, thus closing market opportunities for small/inefficient companies;
- Players with developed regional networks shall dominate the market, as they will be able to suggest services over the entire territory of Russia;
- Under increasing competition conditions, manufacturers are expected to contract outsourcing services' providers more intensively, and that may result in increased number of mergers of forwarders and terminal operators in order to improve their services;

In the light of the topic of this section it could be also interesting to analyze the changes in points scored by Russia in the World Bank's rating 'Logistics Performance Index'.

Improvement of Customs procedures.

At present the Federal Customs Service (FCS) implements the 'Concept of Customs Clearance / Customs Control in the Vicinity of the State Border' (adopted by the Russian Government on August 21, 2009).

The purpose of the above Concept is to improve customs clearance/control procedures through introduction of preliminary customs declaration, the application of the full-scale customs risks management system in accordance with the international market environment for the goods imported, electronic documents exchange, including e-declarations, etc. It also focuses on the following:

- infrastructure development of the regions along the Russian state border;

- reduction of excessive pressure on transport networks of big cities/hubs, caused by intensive international trade;
- securing full payments of the customs fees, taxes and duties.

The Concept implementation envisages that customs clearance of imported goods shall be effected not at border-cross check-points, but at customs/logistics terminals to be located within the 30-km zone of the Russian state border.

The introduction of the new customs technologies is scheduled as follows.

- road transport – starting in 2015;
- rail transport – starting in 2020.

Within the Concept implementation frameworks, on October 19, 2011 the FCS and the RZD accepted the plan of major actions' execution introducing the electronic documents exchange, deployment and joint testing of the necessary technological systems.

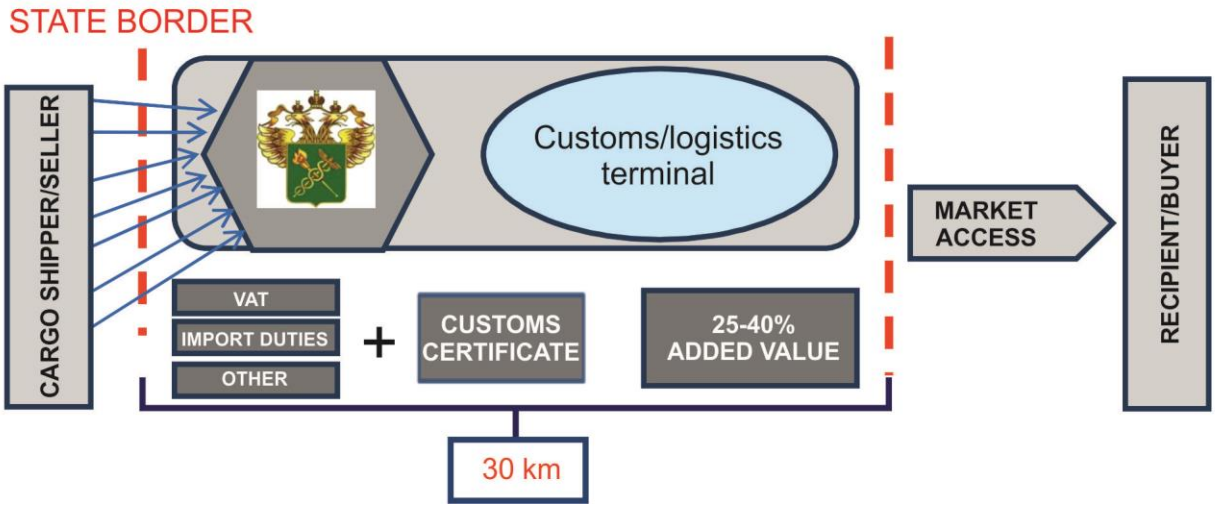


Fig. 3.9. Customs clearance/control scheme stipulated by FCS Concept for import/export cargoes.

The planned changes may lead to potential risks of cargo's shift from rail to road transport. Such assumption is based on existing regulations of the Customs Code, stipulating that goods/cargoes shall be the subject for customs inspection at the places of the most convenience for the customs (FCS decree No. 470 of 08.05.2002). Thus, the Service may require that rail transport cargo should be unloaded for inspection at a customs/logistic terminal next to the state border. Taking into account the unpredictability of the time period of customs inspection (for example, a procedure on correction of the declared customs value, etc.), one may assume that freight forwarders may prefer road transport as more flexible part of their supply chain.

Prospects in financial market

Taking into account the substantial volumes of investments, required to implement the Project, and the fact that terminal & logistics infrastructure development is not among the top priorities of the RZD, it is extremely important to evaluate rightly investments perspectives of the national finance market.

There is a number of Russian and international financial institutions capable of providing infrastructure investments. The most active and effective institutions, operating in Russia, are the following ones:

- The State corporation 'Bank for development and foreign economic affairs' (VneshEconomBank, VEB). The VEB actively participates in PPP investments projects;
- The VTB Banking Group (over 20 banks and financial institutions in 19 countries all over the world);
- The Sberbank of Russia.

The above institutions have accumulated considerable experience in financing infrastructure projects, such as the Ust-Luga Seaport (Sberbank), Pulkovo airport reconstruction (VTB), etc.

Apart from domestic bankers, several international financial institutions are also represented in the Russian Federation.

It should be mentioned that Russian transport sector is of interest for international investors. For example, in the course of IPO of TransContainer company (October 2010), held at the RTS (Russian Trading System) and at the LSE, $388 million were attracted, while the demand considerably exceeded the offer.

Conclusions:

- The key trends of the current economic development in the sectors, related to logistics, are favorable for the implementation of the wide-scale Project of deployment of terminals & logistics centers network, based on the RZD infrastructure;
- Any delay in the project implementation may lead to the loss of the relevant market share, the decrease of competitiveness and the reduction of revenues level in rail transport.

4. MARKETING ANALYSIS.

The structure of the rail freight transport is shown below (see Fig. 4.1):

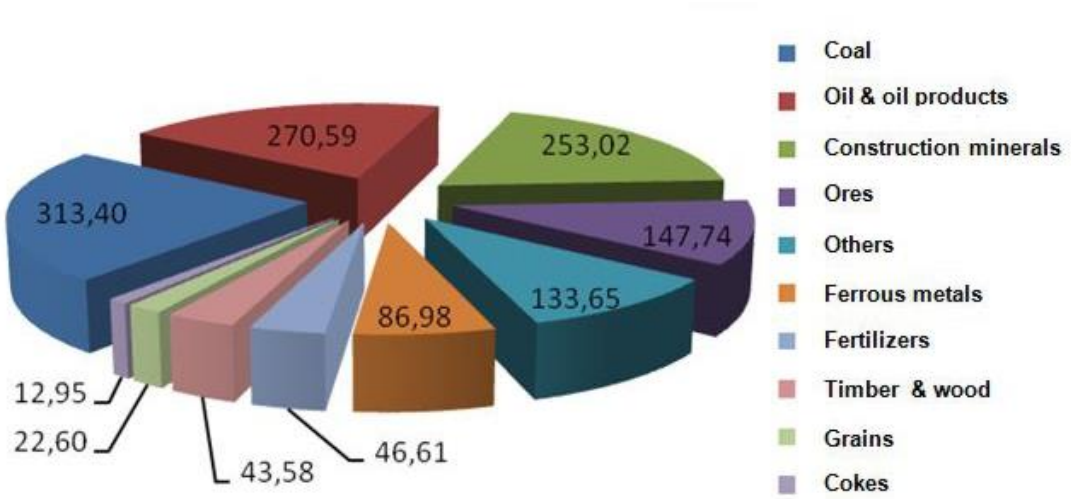


Fig. 4.1. Structure of railway freight transport, 2010, million tons.

The goods nomenclature of the rail transport freight, relevant to be handled at TLCs of the network, is quite wide one, and includes general goods, containers, construction materials, cement, steel and non-ferrous metals.

It is expected that a considerable part of freight forwarders and cargo owners will include the TLCs into their supplies chains, attracted by the range of integrated services, reasonable tariff/rates policy and regular transportation system.

Experts estimate the market share of the TLC network to be in the range of 17 – 20 per cent of the rail freight volumes, suitable for handling at terminals, and will include:

17 – 20% (43 – 50.6 million t) –construction minerals;

10% (4.4 million t) – wood products and timber;

7% (3.3 million t) – fertilizers;

5% (1.1 million t) – grains;

5% (10.5 million t) – metals and steel;

5% (13.5 million t) – oil and oil products;

20 – 25% (26.7 – 33,4 million t) – others.

Thus, the TLC network target market volume is estimated to be in the range of 104 – 117 million tons of goods. At present, quite a substantial share of goods, identified above as the relevant for the network, is carried by road transport.

The structure of road freight transport is shown below (see Fig. 4.2):

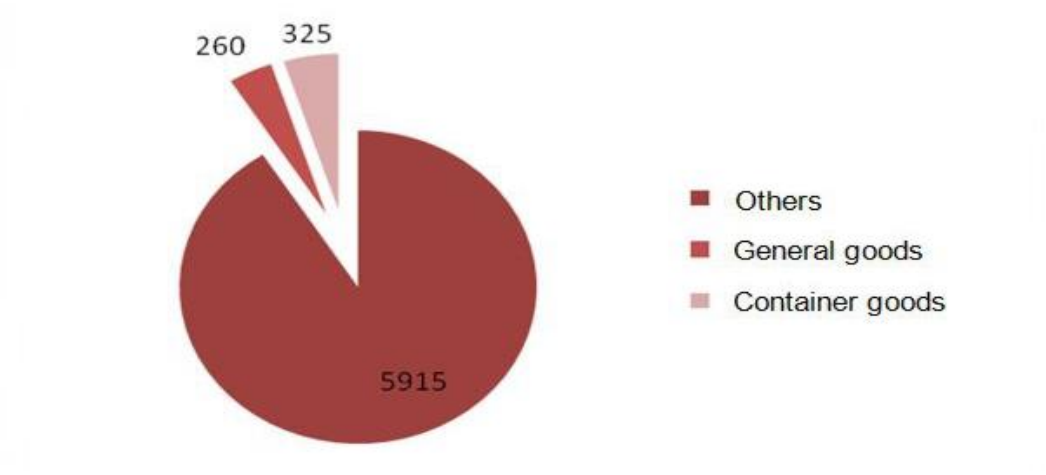


Fig. 4.2. Structure of road freight transport, 2010, million tons. Source: Rosstat.

Experts assess cargo flow volumes, currently moved by road transport, that potentially could be reoriented to intermodal rail transport via the TLC network, to be as follows:

7 – 10% (414 – 592 million t) – others;

30% (78 million t) – general goods;

50% (163 million t) – containerized goods.

The high potential of this category of goods is estimated due to considerable length of an average trip distances (mileage).

The overall volume of goods, currently transported by freight automobiles, that are considered to be relevant for the TLC network, is estimated as 655 – 833 million tons.

The assessments described above depict the total volume of goods, relevant for handling at TLCs of the network, to be in the range of 750 – 950 million tons annually (as per market conditions of 2010). However, one can predict that a real market share shall not exceed 25 – 30 per cent of the total market share (approx. 250 – 300 million tons). Considering 200 million tons decrease of cargo turnover at the RZD freight rail yards within the period of 1985 – 2010, such assumption seems quite realistic.

Export/import cargo flows constitute considerable part of the TLC network target market. For example, these categories of goods constitute around 50 per cent of TransContainer cargo flows.

Considerable changes in supply chains management in favor of freight forwarders and logistics services outsourcing should be also mentioned (see below the assessment of TransCare consultants – Fig 4.3). These market trends should be considered properly in the course of identification of potential clients of the TLC network.

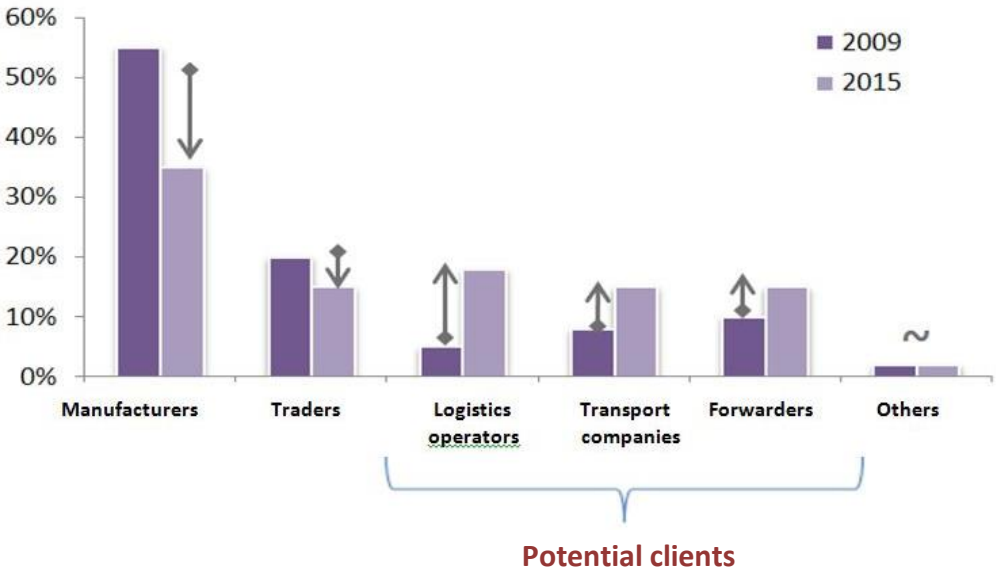


Fig. 4.3. Market segmentation and potential clients.

Thus, meeting exact demands of clients, identified above, shall be the basis for the successful implementation of the transport & logistics infrastructure development Project.

Experts' forecast for the next 5 years' trend in the national economy states the expected growth of industries' production volumes (particularly, in machine building and construction), as well as volumes of consumption in the consumer market, that may lead to substantial increase of cargo flows and of logistics services' volumes, especially in the segment of high-value-added services.

Fig 4.4. below demonstrates the dynamics of the development of the national logistics market (an optimistic scenario). This trend envisages the growth of the rail transport share in the supply chains, while terminals & warehouse centers modernization and renovation are regarded as the most substantial factor of such competitiveness improvement.

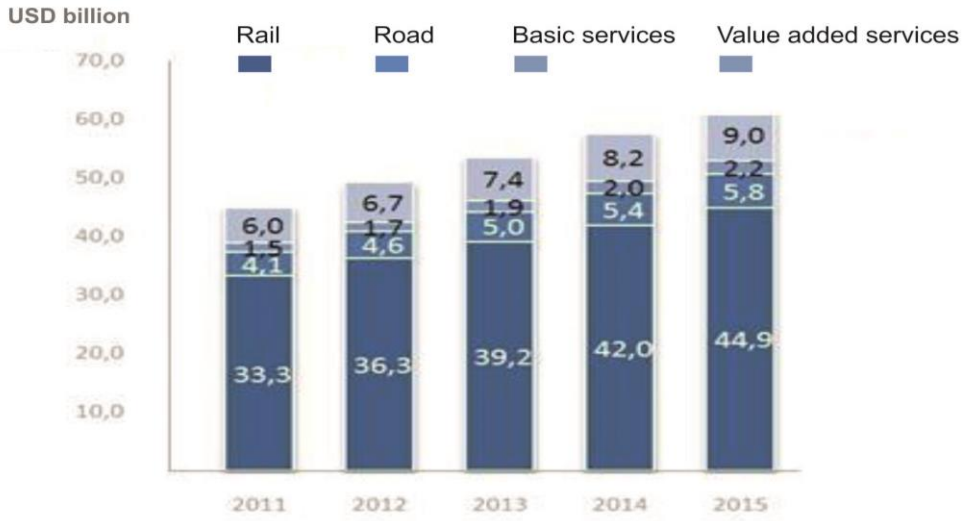


Fig. 4.4. Forecast of national logistics services market growth, RBC.

The potential of the Russian market of mail services and express freight is also regarded as important for the TLC network. In 2010 citizens of the Russian Federation posted 27 million parcels and packages. It is expected that in the short term it would reach one million tons of postal items per year.

The additional potential for the growth of the mail market is predicted due to development of e-commerce trade.

Taking into account the insufficient maturity of air freight network on domestic interregional routes, railway transport using new regular train line services and high-quality services to be provided by the TLCs of the network, can become the prime mode of transport for the expansion of post forwarders' (Russian Post, UPS, DHL, Pony Express, EMS, etc.) operations.

Comparison of alternative variants of delivery routes.

Taking into account the considerable volumes of China-born products imported by the Russian Federation, the analysis was made to compare the alternative delivery routes (sea + road and rail deliveries) between Shanghai – Moscow and Shanghai – St. Petersburg (see Fig. 4.5).

The calculations below are made for a single unite of a notebook with the selling price of RUR 30, 000.

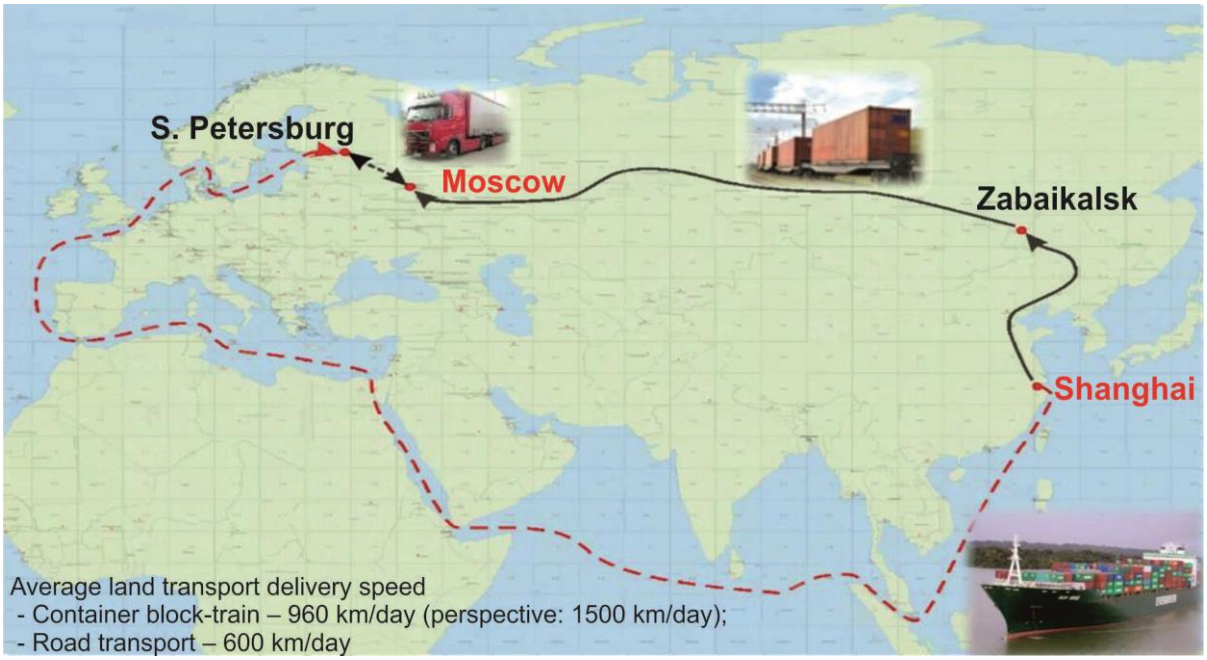


Fig. 4.5. Freight delivery alternative routes.

The routes analysis results (see Table 4.1.) revealed that high value goodsб delivered by rail transport via intra-Eurasian continental routes (instead of traditional ocean lines routes) are of great potential. The delivery cost increase (0.02 – 0.1 per cent of the original product cost) is less critical for a cargo owner if compared to the delivery time reduction, allowing a quicker capital turnover and expanded product availability.

Table 4.1 Alternative cargo routes delivery indicators

Delivery routes		Delivery time, days	Delivery costs breakdown		
			RUR/40F	cost per unit, RUR.	in per cent of unit cost
Shanghai –St. Petersburg	Land	26	158 700	147	0,4
	Sea	45	95 600	89	0,3
Shanghai – Moscow	Land	25	155 600	144	0,48
	Sea	48	149 700	139	0,46

In addition to the described category of goods, perishable goods could be also successfully delivered via such rail routes.

In this analysis the delivery time was calculated at the average speed of 960 km per day. However, the new rail service 'Transsib in 7 days' along the Trans-Siberian Railway speed up the delivery time on this line up to 1500 km a day, thus, increasing the competitive advantage of the rail transport.

The optimization of cargo delivery time and the reduction of transportation costs are vital tasks for the Russian Federation. Due to the tremendous area of the country, the haulage distances in the Russian Federation territory are much longer, than in any other country in the world (according to TransContainer company, the average trip distance of one TEU is about 4000 km). This aspect adds specific complex of problems to the transport industry, forcing to create the comprehensive logistics infrastructure network, in particular.

The current lack of rail line services determines the low routing level of container carriage, which, for example, on the Ussuriysk – Khabarovsk segment equals to 20 per cent of the total amount of container turnover (see Table 4.2.). The remaining container traffic volume on this route is transported as individual wagon-load shipments.

Table 4.2. Containers flow routing level.

Route	Daily station-to-station containerized flow, TEU			
	Total		In route block trains	
	2008	2009	2008	2009
Ussuriysk – Khabarovsk	1 096	712	228	114
Khabarovsk- Ussuriysk	821	534	137	68

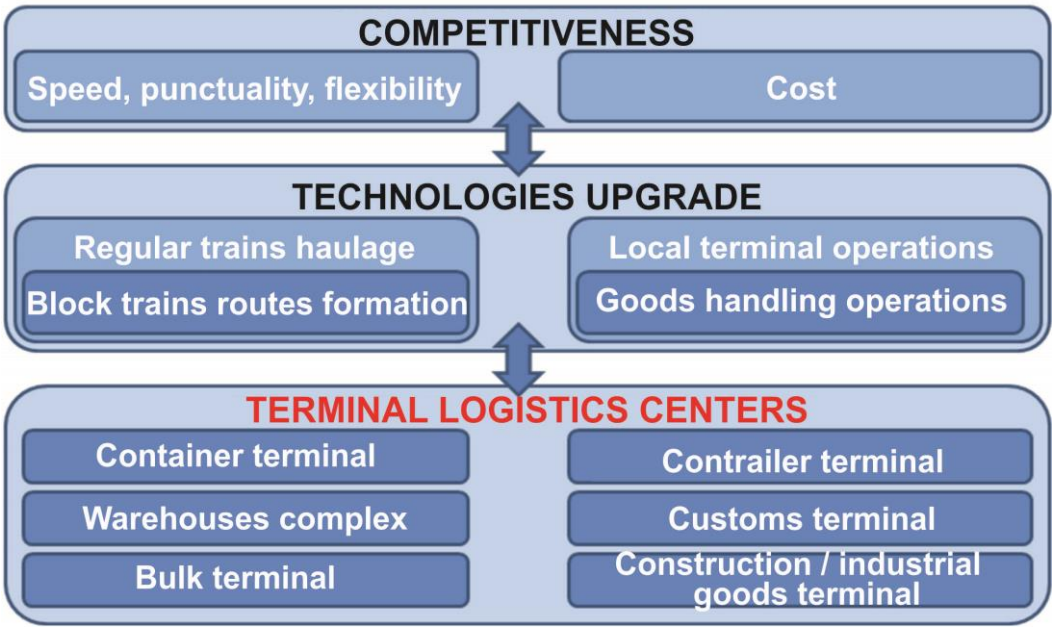
Conclusions:

- the most relevant cargoes for handling at the TLCs of the network are: expensive hi-tech products, spare parts and components, FMCG and perishable goods, and others (in particular, international cargo flows);
- expansion of the role of logistics service providers in supply chain management explains the growing demand for the up-to-date technological solutions based on adequate infrastructure objects;
- the actual summerized rail and road cargo traffic volume, relevant to the TLC network, is considered to be in the range of 250 – 300 million tons.

5. COMPREHENSIVE SOLUTIONS.

While the competition is the most important driver of the economical development, the competiveness of the transport & logistics provides for the enhancement of production and distribution industries.

The efficiency of transport services should have a major appeal for a customer through a combination of their qualitative and cost characteristics.



The present Project of the TLC network development suggest the comprehensive solutions oriented on the considerable increase of railway transport competitiveness as it embraces all levels of goods deliveries.

As in Russia there is yet no standard terminology, relevant for the topic of the present Concept, a special Glossary is elaborated for better understanding of some specific terms, like ‘logistics center’, ‘dry port’, etc.

Rail port – a core multimodal comprehensive technological set of special and general purpose terminals, with necessary transport and business infrastructure, utilities and communications, etc., located in a hinterland of a sea port(-s) area, oriented to handle in-coming / out-coming maritime goods to avoid time and area consuming logistics operations at port facilities, like customs clearance and various inspections, unpacking, long-term storage, consolidation, freight distribution and others activities, constituting non-core business of a sea port). The similar class of terminal centers, located in inland areas, often close to the state border rail crossing points, is identified as 'dry ports' and such centers can be also integrated into the network of terminal & logistics infrastructure objects.

Terminal Logistics Center **–** a multimodal comprehensive technological set of special and general purpose terminals, with necessary transport and business infrastructure, utilities and communications, etc., oriented to handle transit and regional traffic flows, providing players of the transport & logistics market with integrated value added service portfolio, including the advanced rail transportation technologies.

Satellite **–** a terminal (a group of terminals), which is connected with a relevant TLC by direct transport lines and identical operational technologies. Actually, a satellite center is a TLC's remote unit, being a special terminal for certain categories of goods, which processing is impossible, limited or impractical at mother TLC facilities.

Comprehensive solutions, used to elaborate the present Concept of deployment of the TLC network in the Russian territory, include:

- **The multilevel functional structure of the network elements (rail port, TLC, satellite).**

The principle of network formation of transport & logistics infrastructure objects assumes a hierarchy with a functional specificity for every class of network's elements, titled in the Glossary above.

- The technology of providing **regular rail freight line services** by container and contrailer (*the term used in Russia for combined or piggy-back transport*) fixed-routes trains, that stipulates:

  - ❖ Formation of fixed routes (service lines) network;
  - ❖ Fixed schedules of train movements (including fixed periods of time for terminal handling), which are compulsory regardless of a quantity of actually loaded wagons / platforms;
  - ❖ No marshalling or shunting of trains or wagons, terminal handling of goods instead;
  - ❖ Full length trains' loading / unloading within a fixed time interval;
  - ❖ Free clients' access to terminal services by means of open information systems.

• **Integrated customs infrastructure envisages** on-site operations of customs clearance centers **(**customs posts / departments, bonded warehouses, check-points facilities, etc.) as parts of functional TLC infrastructure. These objects will attract export/import freight flows to the TLC network and concentrate all types of customs activities in customer-friendly places.

• Application of **integrated technical, technological, tariff and investment policies** in the course of the Project implementation appears to be the essential condition of the development of the efficient transport & logistics system, ensuring the uniform technological processes, services and facilities, as well as tariff / rates calculations' transparency, and application of efficient investment mechanisms (public private partnership model, etc.).

• **Integrated IT environment** – a full-scale information & communication data exchange and management systems with client-friendly interfaces, providing customers with maximal possible volumes of information and consulting services. Such a system shall embrace all relevant software products, including exit / entrance control & checks, transport operations management, terminal & storage management, data exchange with customs and inspection bodies, accounting, etc. All TLCs of the network shall operate the same IT management system, which is the important condition of the efficient implementation of the Project.

• **Integrated distribution facilities** create conditions for the significant extension of the provision of value-added services in storage and distribution segment of the TLC network. Considering the notable lack (particularly in regions) of high-quality warehousing facilities with access to the developed roads and rail infrastructure networks with sufficient throughput capacities, such a factor will increase the Project's attractiveness.

• **Adjacent industrial facilities** shall practically form industrial & logistics parks on the basis of the TLC network infrastructure, thus stimulating mutual interests of producers and transport & logistics operators for close cooperation, enjoying benefits from the reduction of relevant costs, freight flows concentration at sites of massive generation and consumption, enhanced opportunities of providing / obtaining value added services, etc.

The synthesis of the comprehensive solutions which are to be implemented in the TLC network, shall provide *synergetic effects* for all parties involved.

Selection criteria for TLCs locations.

In order to develop the present Concept of the Project, several analysis and assumptions have been made, including: the trends of development of the logistics services' market, development strategies of relevant regions of Russia, master plans of

main road extensions, available development policies of transport & logistics operators and providers, etc.

During this process, the following factors influencing selection of TLCs' locations, have been identified:

Basic (determinative) factors:

- preferable usage of land plots owned or leased by the RZD, located either at premises of freight yards or in railway right-of-ways seems to be the most feasible opportunity to minimize substantial investments needed to acquire development land plots for the construction of TLCs (in particular, in large agglomerates with high costs of urban areas), as well as to cut off periods of time needed to formalize ownership (lease) right for such land plots;
- the availability of sufficient throughput capacities of a station of connection and of main rail lines (or possibility to increase such capacities);
- maximal closeness to an interregional transport nod and to a center of generation / consumption of considerable cargo flows;
- maximal closeness to a large urban agglomeration. This factor is important both for TLC's distribution operations and for the convenience of staff access to the premises;
- availability of sufficient resources & utilities capacities (electric power, heat, water supply, etc.) in the area of supposed TLC location;

Additional factors:

- presence in adjacent areas (or a possibility to develop) of the following objects:
  - industrial enterprises or parks of manufacturing companies with high dependence on logistics costs or on efficiency of supply chains shall form the natural cargo base for a TLC;
  - distribution & storage facilities (general cargo storage & trade centers, FMCG wholesale distribution centers, etc.) shall attract incoming / imported goods enjoying convenient environment of haulage technologies and on-site customs clearance.
- The possibility to set up additional facilities:
  - developed residential areas for accommodation of staff employed (the manpower qualitative factor);
  - comfortable commuter transit lines to TLC premises, which is an important factor of manpower competitiveness under the conditions of regular urban traffic jams.

The basic **structural and planning requirements** for a TLC infrastructure, elaborated in accordance with the above described operational principles, are given in Table 5.1. These requirements have been identified during pre-feasibility studies for a number of similar projects (rail ports, Moscow 'Bely Rast', Nizhny Novgorod, Kaliningrad, Novosibirsk, Kaluga and others).

Table. 5.1. Structural and planning requirements to infrastructure norms and parameters.

	Objects structure	Minimal norms / parameters			
		Loading/unloading zone length, m	number of railway trucks	dimensions LxW, m	area, Ha
1	Customs center – as a part of rail port – as a part of TLC	1 050 525	2 3	1400x160 850x200	22,4 17,0
2	Container terminal 20 / 40 / 45 F (line service)	1 050	2	1400x160	22,4
3	Terminal for industrial goods	850 525	2 3	1200x160 850x200	19,2 17,0
4	Contrailer terminal: – transit – dead end	1 050 525	2 2	1400x120 850x200	16,8 17,0
5	Container service center, business centre, motel, parking lots, automobile transport zone, administration unit	*	*		30
				Basic facilities, TOTAL	**100**
*	Bulk terminal	300	4	400x150	6
*	Multi-purpose warehouse center	*	*	600x150	9
*	Industrial parks, distribution zones and others	*	*	*	300**
				TOTAL	**415**

* optional; ** i.e. Industrial Zone "Vorsino" in the Kaluga region;

In order to provide the required set of services, a TLC should be composed of the following functional zones:

- The logistics infrastructure:
  - the container terminal capable to handle goods of regular container trains of 71 reference wagons without train splitting;
  - the contrailer terminal;
  - the multi-purpose terminal for industrial goods;
  - general goods warehouse complex 9set of warehouses);
  - the out-of-gauge goods terminal;
  - the bulk terminal;

- the hazardous goods terminal;
- the Customs center;
- the container maintenance & service center.

- Transport facilities:
  - the rail tracks network (internal / external), commuter passenger platform;
  - the road network (internal and external), including parking slots for cars and commercial freight vehicles.
- Administrative zone buildings (administration building, motor transport maintenance workshop, etc.);
- The business centre (offices, trade and exhibition spaces, catering services, financial and information services, etc.);
- Utilities network & infrastructure (power and gas distribution station, boilers, lighting systems, water supply and sewerage, telecommunications etc.);
- TLC security systems (checkpoints, video control and fire-protection systems, fencing and others);
- Optional industrial and residential zones.

The functional lay-out model of the TLC network connected to relevant rail ports and satellites, is represented in Fig. 5.1.

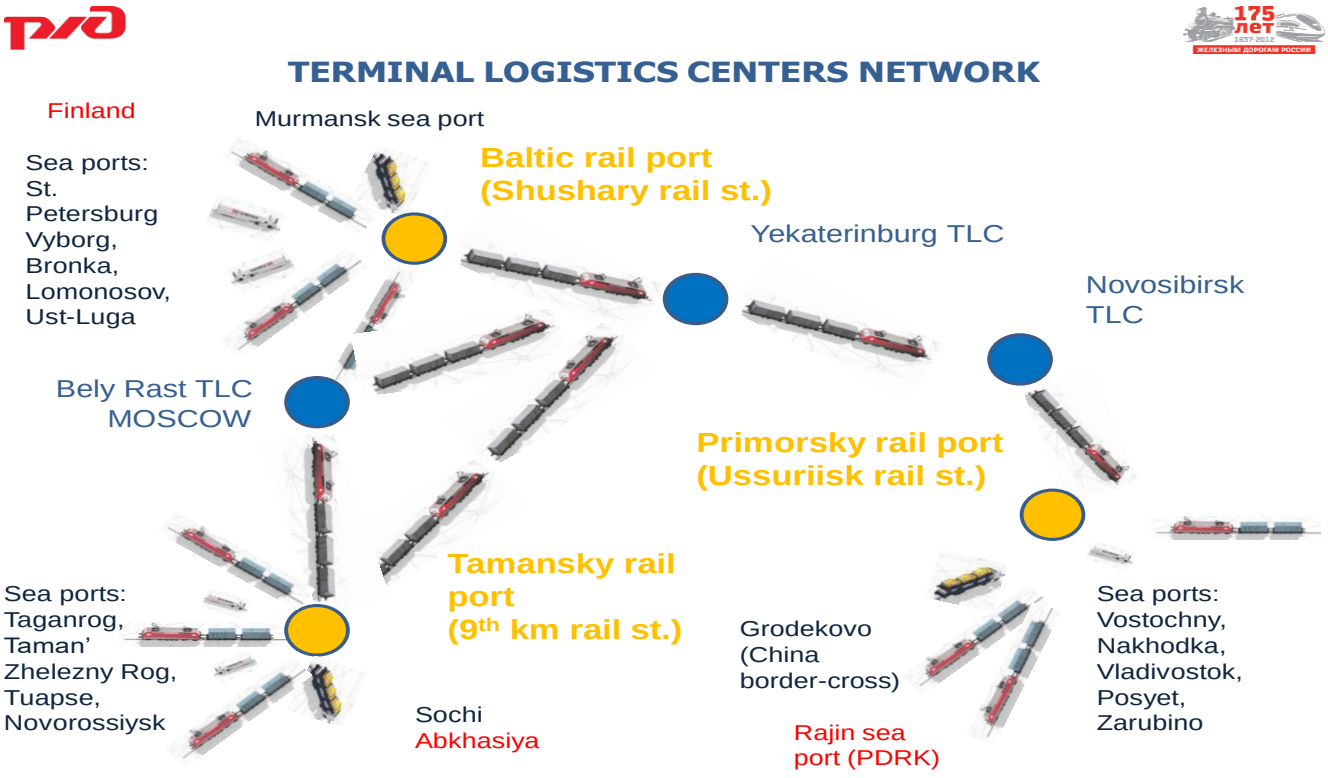


Fig. 5.1. Functional lay-out model of TLC network.

The perspective full-scale topology of locations of TLCs of the network in the area of the regular **container trains service lines** is represented in Fig. 5.2.

Fig. 5.2. Full-scale TLC network in 1520 rail gauge area.

The present Concept classifies the different types of container trains as follows:

- line service trains (71 ref. wagons length, with shortening on some lines (for example, in the Baltic states) to 57 ref. wagons, fixed schedules of departures / arrivals (passenger trains principle) on direct lines ‘rail port – rail port’, ‘rail port – TLC / large transport hub’, etc.);
- block trains (fixed routes) (57 – 71 ref. wagons, ‘departure station – arrival station’);
- shuttle block trains.

The rail ports.

The rail ports, being the core elements of the TLS network, shall be created in the hinterland areas of ocean / seaports of the Baltic Sea coast, Azov-Black Sea basin and of the Russian Far East.

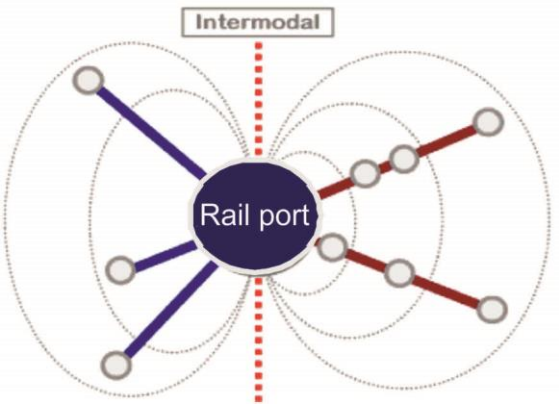


Fig. 5.4. Technological scheme of rail port operations.

A rail port plays the role of so-called “interface” between various transport systems (maritime transport / rail transport / road transport), as well as of the ‘system integrator’ in a logistics scheme, that provides infrastructural and technological conditions for efficient supply chains formation.

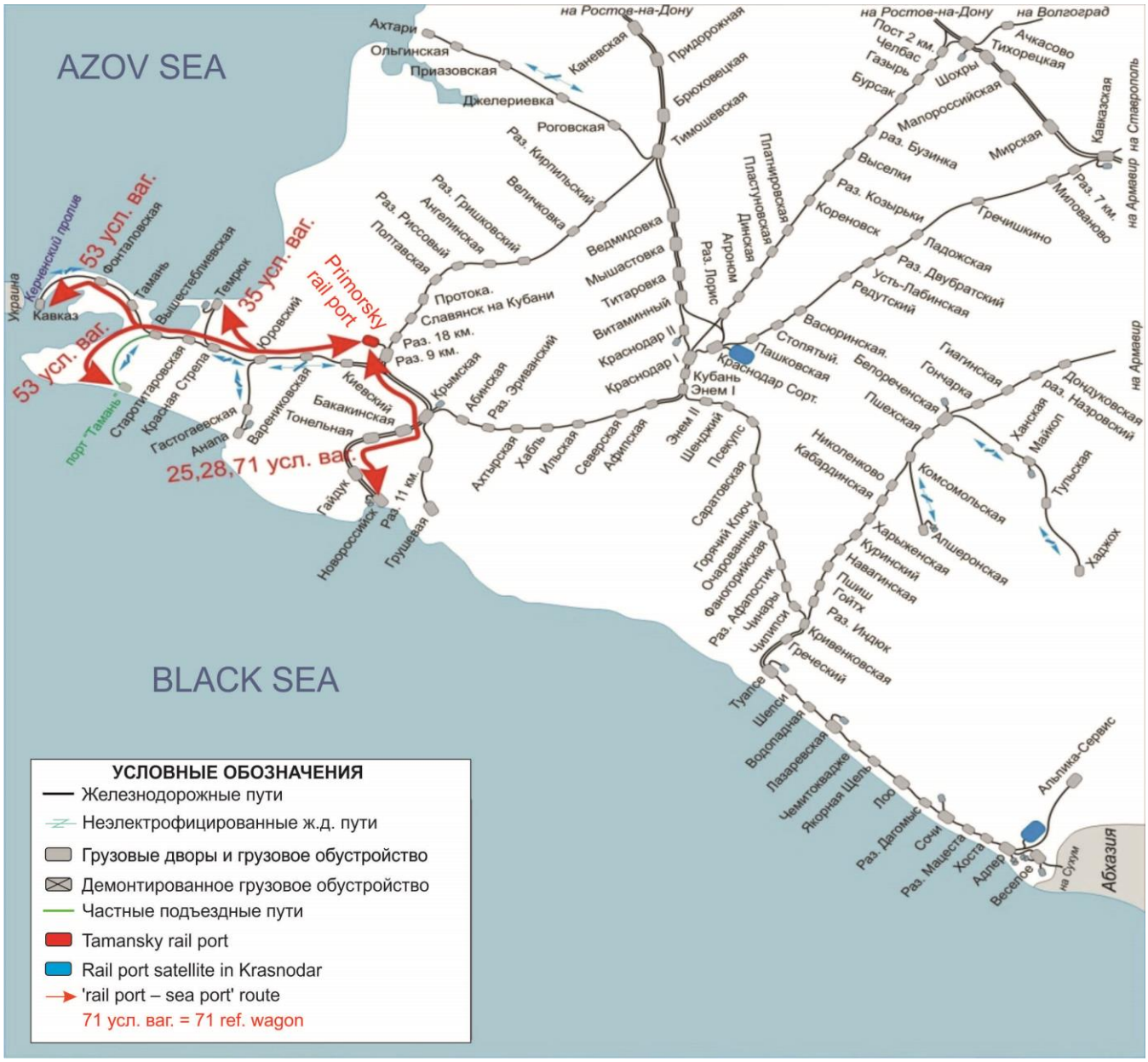


Fig. 5.5. Network of regular block / shuttle trains routes of ‘Tamansky’ rail port connecting relevant seaports of the Azov-Black Sea basin.

The network of routes that connect the rail port ‘Tamansky’ (the connecting station is ‘9th km’, the Severo-Kavkazskaya Branch of the RZD) and relevant ports of the Azov-Black Sea basin regular block / shuttle trains is shown in Fig. 5.5, and the similar network in the Southern part of Primorskiy Krai (the Russian Far East region) with the rail port ‘Primorsky’ (the connecting station is ‘Ussuriysk’ of ‘Dalnevostochny’ Branch) are represented in Fig. 5.5. and Fig. 5.6.

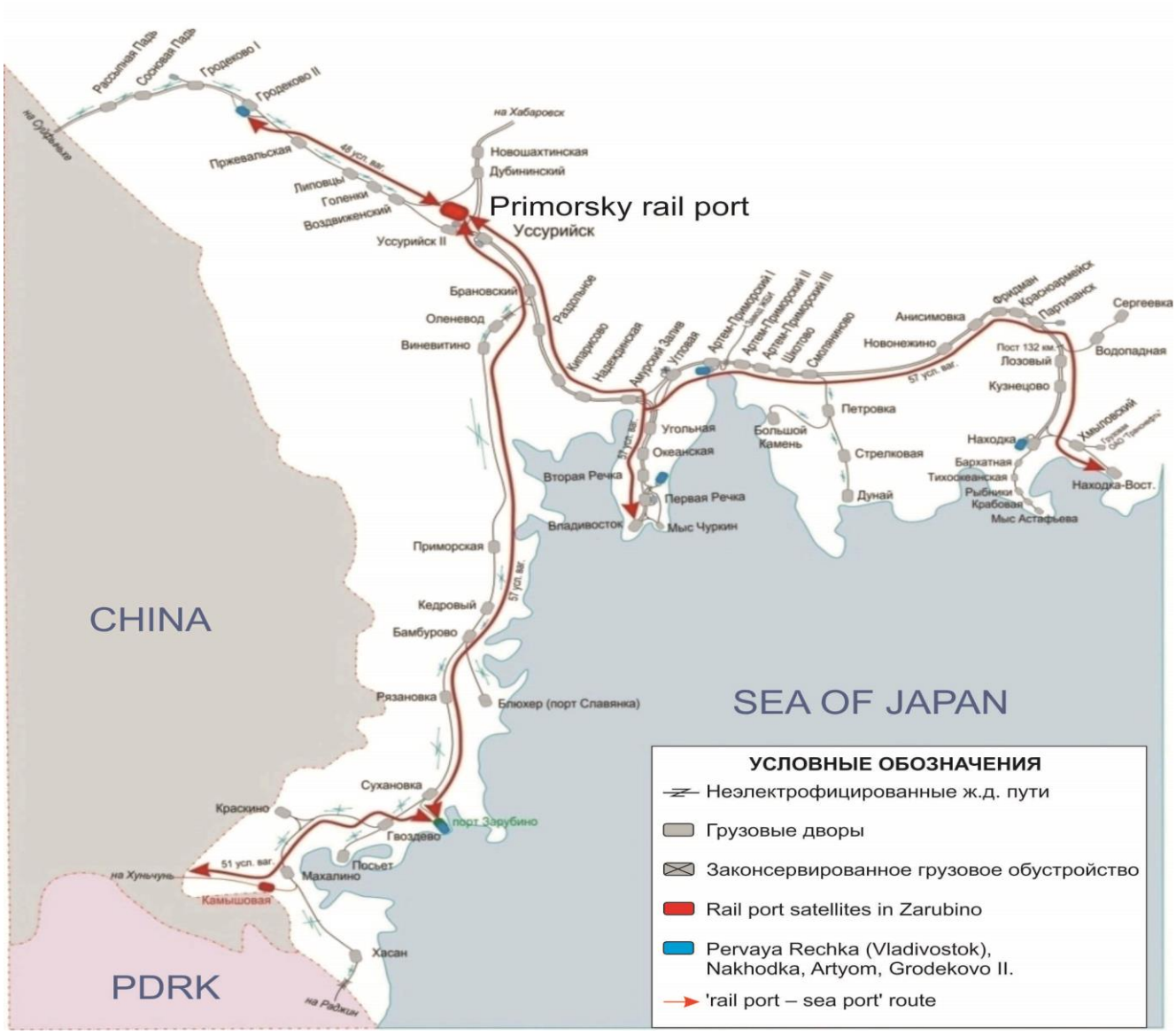


Fig. 5.6. Network of regular block / shuttle trains routes of ‘Primorsky’ rail port connecting relevant ports of the Southern Primorsky Krai basin.

The ‘Primorsky’ rail port provides transport & logistics services to the sea ports of Vladivostok, Nakhodka, Vostochny, Zarubino, Posyet, Rajin (PDRK) and to the in-land cross-border points with China in Grodekovo, Kraskino, and to the cross-border point with the North Korea in Khasan. Besides, the rail port is connected with its satellites based at the freight yards of Pervaya Rechka (Vladivostok), Artem-Primorsky stations, and others.

The draft of the Master Plan of the ‘Primorsky’ rail port (the connecting station is Ussuriysk) is shown in Fig. 5.7

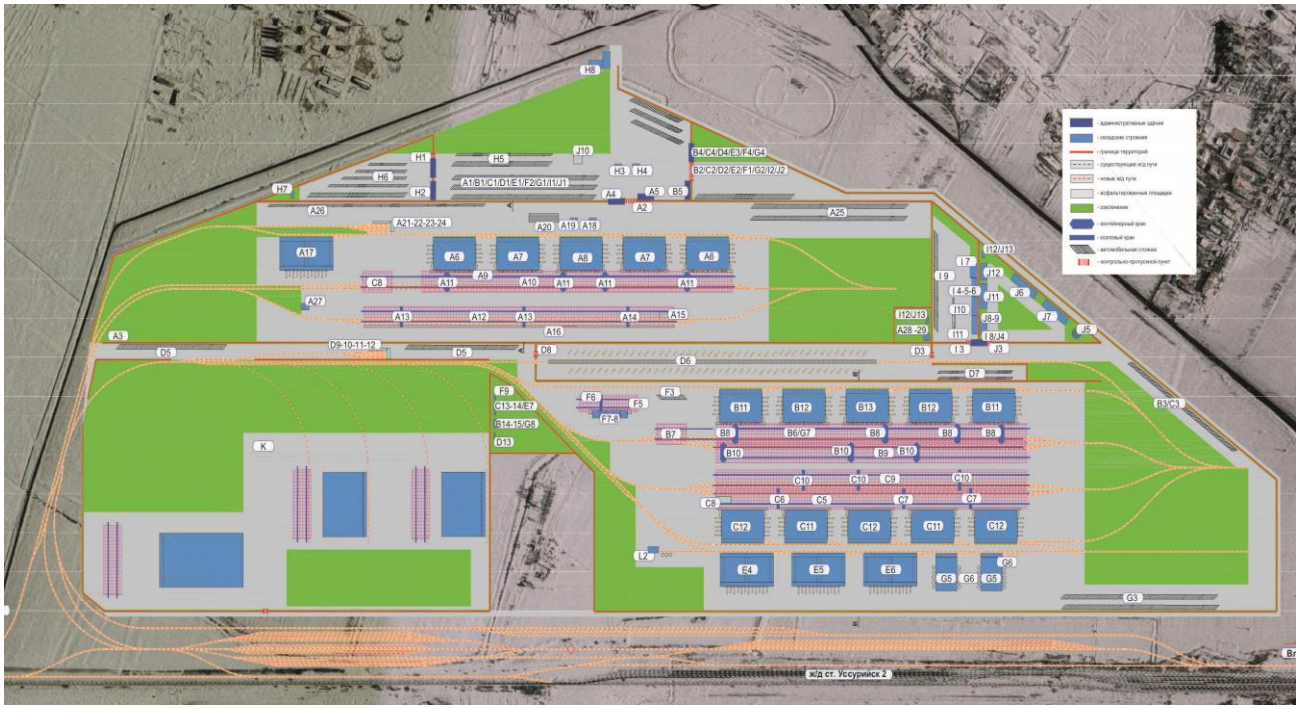


Fig. 5.7. Draft of Master Plan of ‘Primorsky’ rail port.

The compulsory condition under which a rail port cooperates with a seaport is the integrated common transport & logistics technology.

Traditionally, the creation of ‘dry ports’ as hinterland technological infrastructures of relevant ocean / seaports is stimulated by stevedoring companies in order to increase of owned ‘births’ loading/unloading capacities. Thus, a seaport provides just loading/unloading operations trying to ‘push out’ and ‘pull-in’ maritime cargo as soon as possible, while other operations with goods (long-term storage, customs clearance, shiploads accumulation, distribution & haulage, etc.) are performed at a hinterland terminal.

In our case of the present Concept a dry port shall be formed by transport & logistics companies to provide required services for a seaport / a group of seaports, using the benefits of the described network transport & logistics technologies.

The main functions of rail ports shall be:

- shift of handling operations (other than loading/unloading ones) with goods out of scarce and expensive territory of a rail port;
- accumulation of goods for maritime shipping, train haulage, etc.;
- sorting of goods;
- the storage of goods;
- the provision of value-added services.

The rail ports-based transport & logistics technologies shall ensure:

- increase of seaports throughput capacities
- improvement of efficiency of carriage of goods;
- reduction of transport & logistics costs;
- decrease of investments' volumes, required for the development of projects of ports' facilities improvement, shortening time periods for commission;
- decrease of environmental impacts and traffic pressure on roads' network.

Terminal logistics centers.

The second most important type of terminal objects in the vertical hierarchy of the Russian terminal & logistics system shall be a terminal logistics center.

Nowadays, the pilot project of the TLC is being implemented by Bely Rast company (fully owned by the RZD) in Dmitrovsky district of Moscow region, with Beliy Rast connecting rail station of Moscow Railroad. The project pre-feasibility study was elaborated by Deutsche Bahn International in 2009.

The 3D visualization of the General plan of the 'Bely Rast' TLC is depicted in Fig. 5.9. and may be regarded as the typical one in terms of the composition of technological zones.

BELY RAST TLC 3D MODEL AS THE NETWORK MATRIX

Fig. 5.9. 3D visualization of General plan of Bely Rast TLC.

Contrailer transport.

Contrailer transport shall constitute the substantial part of the TLC network services' portfolio.

Combined transport development (including contrailers - *in Russian, the term 'contrailer' does not refer to combined transport in general but specifically to the transport by rail of road trucks and semi-trailers*) is regarded as one of top priorities of the national transport policies in many countries (in the European Union member states in particular). The key factors, which determine the regulatory support for that type of transport, are mitigation of environmental impact, development of sustainability and safety of transport systems, etc.

In addition to these factors, in Russia one can add some others as preconditions of this type of transport development, like severe climatic conditions, improper quality and excessive traffic volumes of significant portions of the national motorways' network, extra long mileage of transport routes, seasonal traffic constraints, etc.

The establishment of the Customs Union with Kazakhstan and Belarus, Russia's active participation in Eurasian Economic Community, APEC and other communities' work, enhancement of the system of international transport corridors and so on, provide additional impetus for development of combined transport services, including contrailer transportation.

The perspective network of regular contrailer trains' routes in 1520-gauge area is represented in Fig. 5.10.

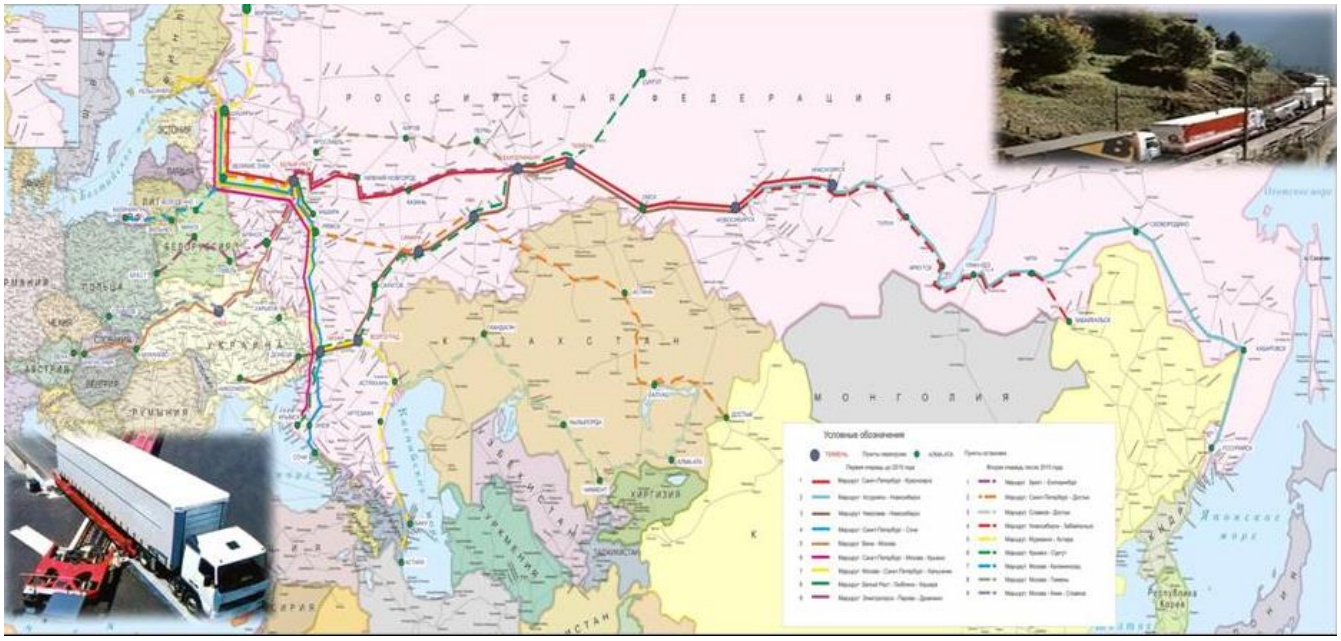


Fig. 5.10. Perspective network of regular contraler train line services.

Table 6.1 shows the details of perspective routes of contrailer train line services in the 1520 rail gauge area.

Tab 6.1. Contrailer routes details.

Route	Length, km	Intermediate stations
I stage		
Moscow – Helsinki (FIN)	1 069	Bely Rast – Buslovskaya – Kouvola (FIN)
Saint-Petersburg – Krasnodar	2 717	Shushary – Velikie Luki – Bely Rast – Voronezh – Likhaya – Enem
Khorgos (KZ) –Grodno (BY)	5 440	Khorgos (KZ) – Almaty (KZ) – Astana (KZ) – Ufa – Samara – Nizhny Novgorod – Bely Rast – Velikie Luki – Molodechno (BY)– Grodno (BY)
Moscow – Slavkov (PL)	1 913	Vorsino – Bryansk – Suzemka – Kiev (UA) – Slavkov (PL)
Moscow – Kaliningrad	1 374	Bely Rast – Velikie Luki – Sebezh – Elgava (LT) – Dzerzhinskaya – Novaya.
Saint-Petersburg – Irkutsk	5 460	Shushary– Velikie Luki – Bely Rast – Nizhny Novgorod – Kazan –Yekaterinburg – Tyumen – Omsk – Novosibirsk – Krasnoyarsk – Irkutsk
Yekaterinburg – Nikolaev (UA)	3 232	Yekaterinburg – Ufa – Samara – Saratov – Volgograd – Likhaya - Ufa – Gukovo – Donetsk (UA) – Nikolaev (UA)
Elektrogorsk – Drovnino	244	express route
Vorsino– Kievskaya Sort. (Moscow)	80	Express route
II stage		
Novosibirsk – Vladivostok	5 956	Kleschikha – Irkutsk – Ulan-Ude – Chita – Skovorodino – Khabarovsk – Ussuryisk– Vladivostok
Moscow – Vienna (AUS)	2 323	Vorsino – Bryansk - Suzemka – Kiev (UA) – Mukachevo (UA) – Bratislava (SK) – Vienna (AUS)
Slavkov (PL) – Khorgos (KZ)	6 939	Slavkov (PL) – Kiev (UA) – Kharkov (UA) – Gukovo – Likhaya – Volgograd – Astrakhan – Chimkent (KZ) – Kandagach (KZ) – Kyzylorda (KZ) – Almaty (KZ) – Khorgos (KZ)
Yekaterinburgr – Zabaikalsk	4 848	Yekaterinburg – Tyumen – Omsk – Novosibirsk – Irkutsk – Ulan-Ude – Chita – Zabaikalsk
Murmansk – Astara (AZ)	4 873	Murmansk – Shushary – Velikie Luki – Bely Rast – Likhaya – Volgograd – Astrakhan – Artezian – Derbent – Baku (AZ) – Astara (AZ)
Moscow - Tyumen	2 175	Bely Rast – Yaroslavl – Kirov – Perm – Yekaterinburg – Tyumen
Tyumen – Surgut	705	express route
Saint-Petersburg – Moscow	650	express route
Bely Rast – Ryazan	198	express route

-- rail border-crossing points

Recently technical requirements for ‘rolling stock - contrailer terminal’ system were identified. In accordance with the RZD regulation ‘Technical requirements for design of special contrailer platforms’, the rolling stock specifications include:

- train length – 71 ref. wagons (1050 meters), that is 48 actual platforms;
- platform breadth – 3 200 mm;
- design speed – up to 120 km/h;
- carrying capacity – not less than 48,4 tons;
- length of platform – not less than 20 m;
- special arrangements should be provided for the full length of a train through-way run of a vehicle with minimum obstacles;
- a platform should be suitable for carriage of all ISO containers types and should be equipped with a plug-in system for power supply.

In accordance with the RZD regulation ‘Typical design and operational technology of contrailer terminal’, a terminal’s parameters shall include:

- length of loading/unloading zone of rail track: 1 050 m (transit) or 525 m (dead-end terminal);
- pit hole width – 3350 mm and shall provide for free movement of a passenger carriage;
- clearance between boards of wagon and edges of terminal platform – 75 mm, each side;
- flat level of loading/unloading surface of terminal platform and of wagon deck should be provided.

Fig 5.11. depicts the cross-section of contrailer terminal with a rail track lowered in the pit.

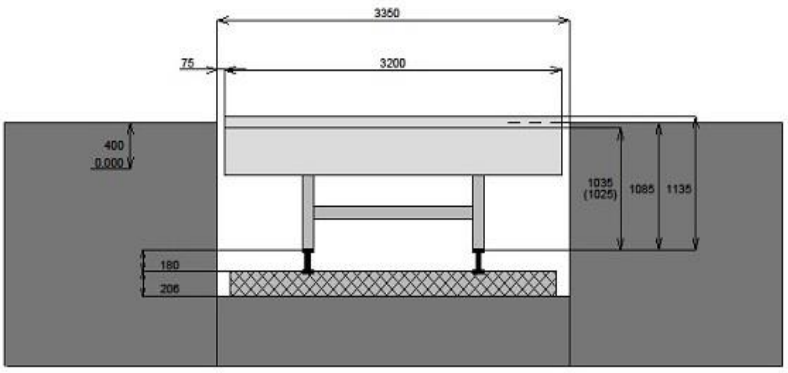


Fig. 5.11. Cross-section of contrailer terminal

The presented design of a contrailer terminal track with adjacent freight zones provides for direct RO-RO operations of loading/unloading of any vehicles, including towed semi-trailers, as well as easy loading/unloading of gondola wagons, or direct shifting of goods between rail wagons –freight vehicles.

Integrated customs infrastructure.

The TLC network is supposed to attract quite significant amount of additional cargo due to the integrated Customs Centers.

Recently both the RZD and the Federal Customs Service agreed upon the integration of customs infrastructure into rail transport objects inside the territory of Russia. Besides, in December 2011 the RZD accepted the Program of development of the integrated network of rail stations-based customs warehouses and customs clearance centers, which include:

- the topology of locations of customs clearance centers (CCC);
- the typical technological schemes of processing goods under customs control;
- updating of the 'Program of development of temporary storage warehouses' network in the RZD Branches'.

The implementation of these programs will allow to integrate rail CCCs into the comprehensive technological system of the TLC network, thus, eliminating requirements to provide customs clearance formalities at relevant facilities in the vicinity of the state border. Instead, the customs inspections, check, tests, etc., shall be shifted into the areas, convenient to clients

A typical rail customs clearance center is designed as an isolated zone of a TLC territory (see Fig. 5.12. The visualization of CCC in 'Bely Rast' TLC), arranged and equipped according to the Customs Code's norms and rules. In the territory of a CCC the Russian Customs unit shall be located, appropriate to conduct all procedures stipulated by the Customs Code. The customs clearance center's territory is isolated by its own protective fence with controlled exits / entrances.

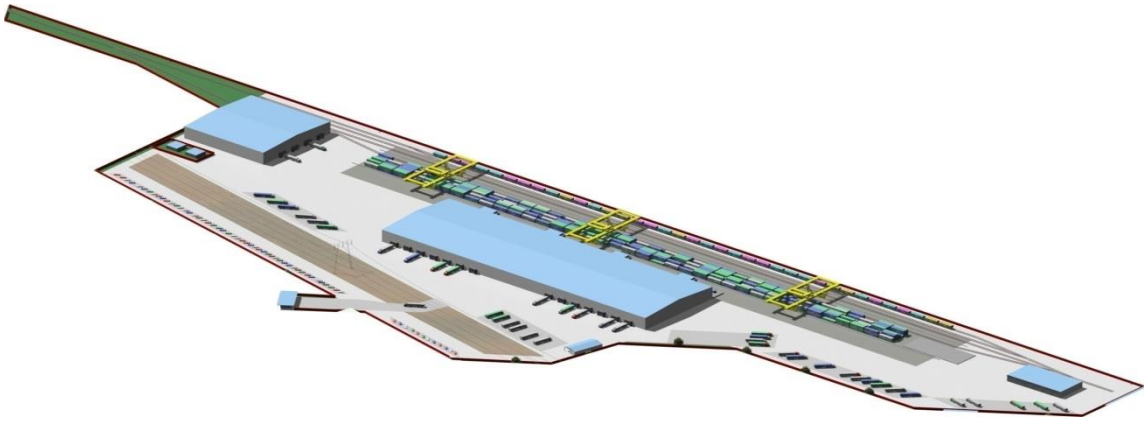


Fig. 5.12. 3D model of CCC in 'Bely Rast' TLC.

Customs clearance center operations at a TLC would provide competitive advantages for the network clients, using rail transport services, through availability of domestic rail freight transport with goods moved under customs control.

Intermodal technological solutions.

The basic characteristic of the deployed network is its intermodality. The typical technological solution for a TLC, based upon intermodal interoperability of different modes of transport, is shown in Fig. 5.13.

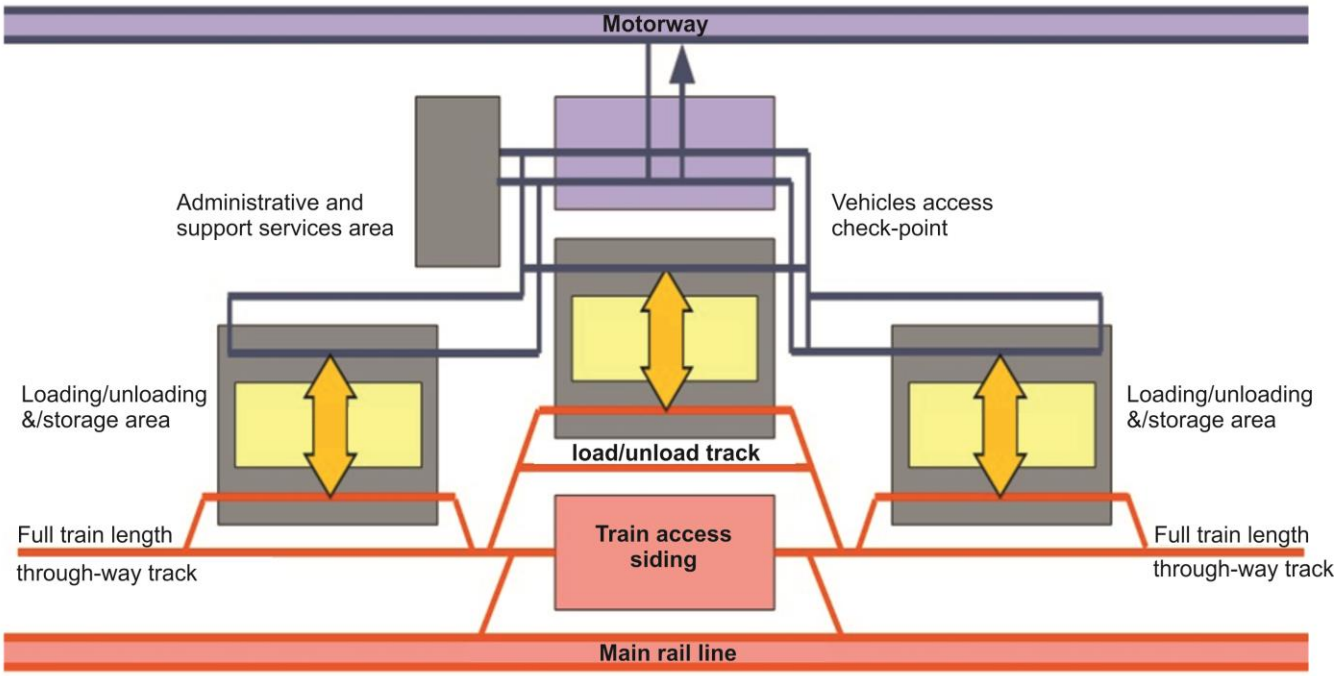


Fig. 5.13. Principal scheme of intermodal system of TLC.

This solution should be taken as a core principle at stages of a TLC site selection and further at design & engineering studies.

Taking into consideration significant cargo throughput characteristics, the intermodality and interoperability of different modes of transpoty seem to be the key factors of high efficiency of the TLC operations.

‘Rolling stock – terminals’ system.

Maritime transport demonstrates the most efficient ‘rolling stock – terminals’ system’s integration into port operations.

For instance, the comparison of nominal parameters (loading unit per space measuring unit ratio) of handling capabilities in seaports’ yards and in rail terminals demonstrates radical difference, which requires application of technologies and equipment, relevant for rail transport.

Table 5.5.Comparison of nominal parameters' characteristics for maritime and railroad transport.

Carrier of containers	Length, m	Capacity, TEU	Nominal loading ratio, TEU / m
СКН–1500 Atlantic Lady	174	1 472	9,1
Panamax Wan Hai 501	269	4 252	16,9
MSC Daniela	367	14 000	40,8
Container train (71 ref. wagons)	**1 050**	**142**	**0,14**

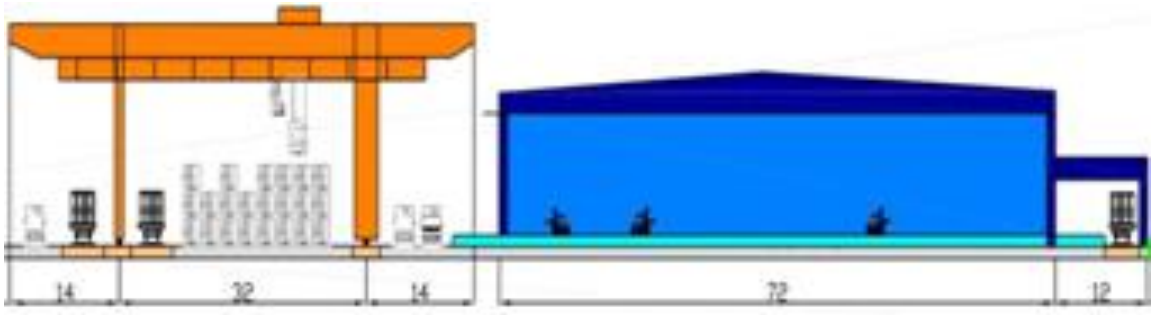
To improve loading capabilities of a TLC, it is feasible to use rail-mounted gantry cranes for containers' loading/unloading lifts to/from regular container trains, as their technological capabilities and operational features are the most suitable for rail transport. Depending on the terminal's design capacity, several cranes can be mounted at the same crane runways. Hypothetically, an ideal operation zone for one crane is up to 200 – 250 meters long.

The following technological solutions should be used at design stage of TLC project development:

Container terminal with set of warehouses:

1) Rail-mounted gantry cranes shall be foreseen for container terminal.

2) A warehouse building should have rail and vehicles loading ramps.



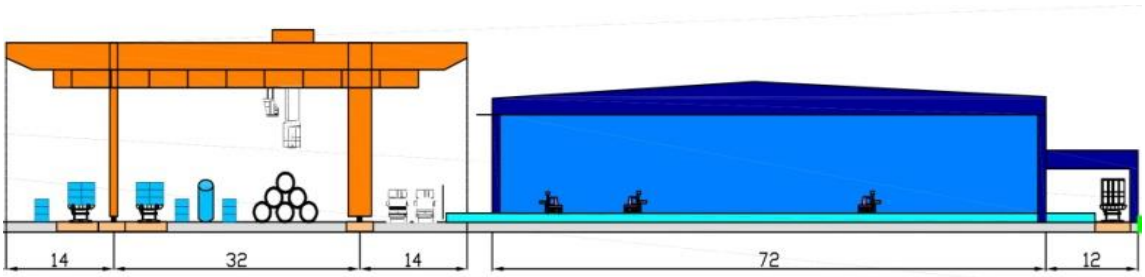
3) One cantilever of a gantry crane shall span over a ramp of a cross-dock warehouse for containers' direct lifts.

Industrial goods terminal.

1) Rail-mounted gantry cranes shall be also foreseen for such terminal.

2) Warehouse buildings should have rail and vehicles loading ramps.

3) One cantilever of a gantry crane shall span over a ramp of a warehouse for goods to be stored in closed space.



This technology of loading/unloading operations coupled with geometrical configuration of a terminal that allows to handle of industrial types of goods for trains of 57 ref. wagons' length, which surely will attract additional volumes of non-containerized cargo.

Bulk terminal.

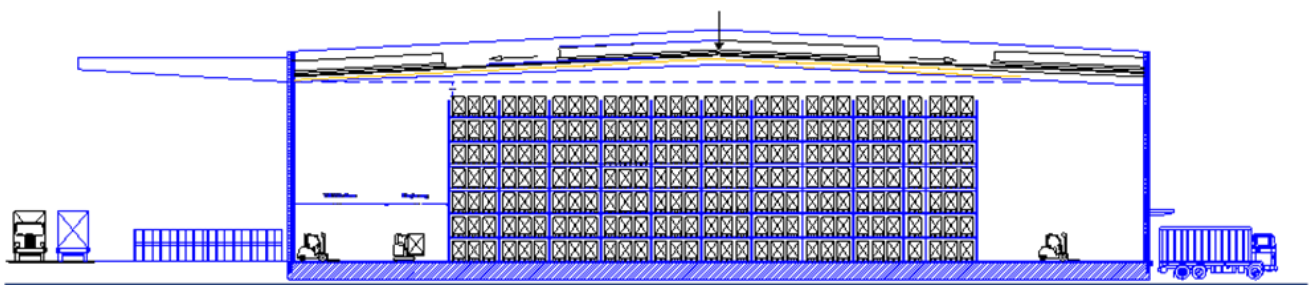
1) A terminal shall be located separately in isolated part of a TLC with its individual access check facilities.

2) Specific facilities' arrangements and equipment for handling and storage of wide nomenclature of bulk cargo (i.e. sands, rubble of various fractions, cements, etc.) should be provided;

3) It is feasible to set up facilities for production of value-added construction materials, like concrete, asphalt, etc. as a unit of the terminal (or as a part of industrial park, if available in adjusting area).

Fig. 5.14. 3D visualization of bulk terminal.

Warehouse complex (set of warehouses)



Typical configuration of a TLC of the network with its set of terminals and services-oriented infrastructure, provides business environment convenient for development of synergy-generating activities, like storage & distribution.

However, it is important to have in mind at the stage of Master plan designing that some classes of goods when handled or processed at TLC premises, are not compatible (like, for example, bulk materials and goods stored in a warehouse of 'A' class with temperature control and dust-free space, or some categories of dangerous goods, etc.). To avoid such incompatibility, it could be helpful to isolate storage facilities with the most problematic goods. For example, existing high-voltage air line crossing the territory of 'Bely Rat' TLC, serves as separation band for the warehouse complex and terminals area.

Should it be unfeasible for some reasons to set up facilities for goods with tough requirements on storage and/or handling, then 'TLC – satellite' system could be a solution.

Satellites are supposed to be formed primarily at renovated facilities of the RZD freight yards as remote units of TLCs to support and expand transport & logistics services' portfolio of the network by means of:

- specific infrastructure to enable provision of 'unique' services with prevailing classes of goods required in a zone of logistics responsibility, like, for example, out-of-gauge and overweight industrial equipment, dangerous or bulk goods, etc.
- provision of transport & logistics services in remote areas of responsibility zones of relevant TLCs.

Therefore, a satellite could be either a specialized unit of mother TLC with joint management and assets (for example, vehicles fleet) or a relatively small transport & storage yard of TLC-type (as, for example, freight yard in Surgut, being the satellite for the TLC in Tyumen).

Fig. 5.16 shows a scheme of interoperability between a satellite and a TLC.

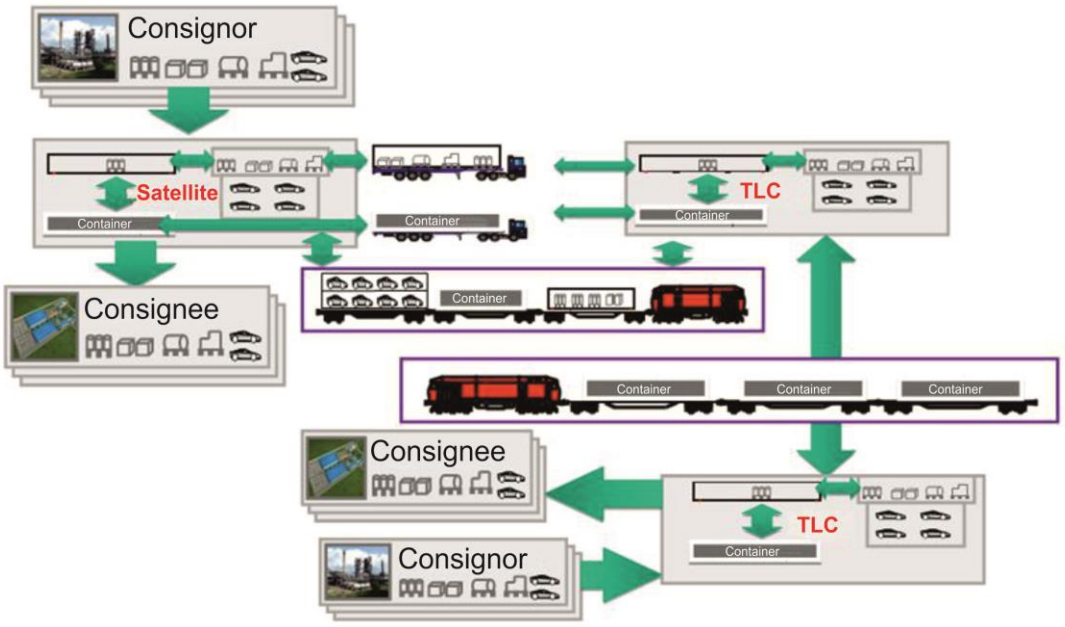


Fig. 5.16. TLC and satellite interoperability chart.

Satellites' network shall provide for sustainable growth of cargo volumes as well as expansion of services' portfolio of the TLC network

First stage of TLC network deployment.

The implementation of the Project is envisaged in stages. Criteria of selection of TLCs' for the first stage deployment (apart from the systemic rail ports as the highest-level objects of the TLCs' hierarchy, see Fig. 5.1), are as follows:

- Location of a TLC site:
  - on routes of international transport corridors;
  - in large multimodal transport hubs;
  - at places of generation / consumption of considerable cargo flows,
- High degree of readiness for a project implementation (land plots, utilities and transport communications with possibilities for extension), investments available, regional and municipal incentives, etc.

The results of the first-stage objects' identification based on assessments made with the help of a 10-score rating (the highest score means the greatest readiness as per the specified criteria) are presented in Table 5.6., while the second-stage terminals are listed in Table 5.7.

Among the TLCs of the first stage it is essential to identify TLCs that shall constitute the core network, i.e. the necessary and sufficient number of the terminals, put into operation at the same time to achieve 'integrated network effect.

Thus, the core network of TLCs consists of:

- rail port Baltiyskiy;
- rail port Tamansky;
- rail port “Primorskiy”;
- Bely Rast TLC (Moscow region);
- TLC in Yekaterinburg;

} systemic objects

- Kleshchikha TLC (Novosibirsk);
- TLCs in transport hubs of Kaliningrad, Nizhny Novgorod, Kazan and Volgograd.

Therefore, the coordination of simultaneous commissioning of these objects seems to be of absolute importance.

Table 5.6. First stage TLCs

№ Item number	DP	International transport corridor	Multimodal hubs	Relevant market volumes	Infrastructure readiness	Total score	Note	
1	Baltiyskiy rail port	10	10	10	9	39	Systemic objects	Core network
2	Moscow (Bely Rast)	10	10	9	9	38		
3	Tamansky rail port	10	10	9	8	37		
4	Primorsky rail port	10	9	9	8	36		
5	Novosibirsk	9	9	7	9	34		
6	Nizhny Novgorod	10	8	7	9	34		
7	Kazan	10	9	7	8	34		
8	Kaliningrad	10	8	6	9	33		
9	Yekaterinburg	9	9	8	7	33		
10	Volgograd	10	8	7	7	32		
11	Khabarovsk	10	7	7	7	31		
12	Samara	10	8	6	7	31		
13	Voronezh	9	7	8	7	31		
14	Bryansk	9	8	6	7	30		
15	Kirov	9	7	6	8	30		
16	Ufa	9	8	6	7	30		
17	Ulan-Ude	10	7	6	7	30		
18	Krasnoyarsk	10	7	6	7	30		

Table 5.7. Second stage TLCs

№ item number	DP	International transport corridors	Multimodal hubs	Relevant market volumes	Infrastructure readiness	Total scores
1	Rostov	10	9	7	3	29
2	Kaluga	8	5	8	8	29
3	Murmansk	10	7	7	5	29
4	Saratov	9	8	6	6	29
5	Irkutsk	9	7	6	7	29
6	Omsk	9	7	6	7	29
7	Arkhangelsk	10	7	6	5	28
8	Tyumen	8	7	7	6	28
9	Chita	8	8	6	6	28
10	Smolensk	8	6	7	7	28
11	Astrakhan	9	8	7	3	27
12	Orenburg	8	7	6	6	27
13	Chelyabinsk	8	7	6	6	27
14	Yaroslavl	9	7	6	5	27
15	Zabaikalsk	9	5	6	7	27
16	Perm	9	8	6	3	26
17	Ulyanovsk	7	6	6	7	26
18	Makhachkala	10	7	6	2	25
19	Kursk	7	7	6	5	25
20	Belgorod	7	5	7	6	25
21	Penza	6	6	6	6	24
22	Mineralnye Vody	7	6	6	5	24
23	Vanino	9	5	4	5	23
24	Novokuznetsk	8	7	5	3	23
25	Lipetsk	7	6	6	3	22
26	Tambov	6	6	6	4	22
27	Izhevsk	6	5	6	4	21
28	Ryazan	7	5	6	3	21

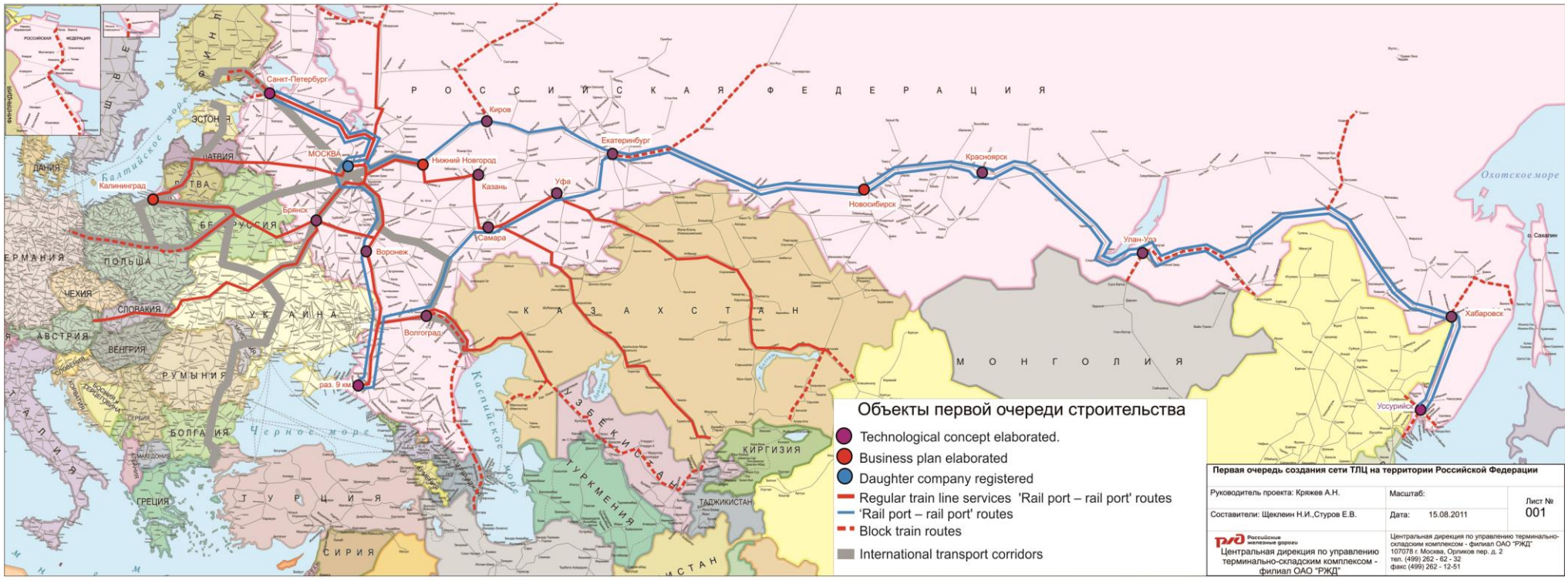


Fig. 5.17. Routes and topology of locations of first-stage TLC network

All first-stage elements of the TLC network and their current status are presented in Table 5.8.

Numbers in red color list the core network TLCs, the 2018 sign marks the cities hosting the FIFA World Cup in 2018.

The recent experience of the winter Olympic Games in Sochi 2014 demonstrated the important role of regional rail terminals & warehouse infrastructure for cargo flows, increased in pre-Olympics period (primarely, construction materials).

Table 5.8. Details of first-stage TLCs.

Nos.	TLC	Location*	Status	Satellites stations location	freight yards to be eliminated
1	Bely Rast 2018	Bely Rast station	Management company set up	Khovrino, Kuntsevo-II, Moscow-Butyrskaya, Moscow-tovarnaya.-Kurskaya	Dmitrov, Moscow-tovarnaya-Yaroslavskaya, Smolenskaya, Kievskaya, Moscow - Rizhskaya
2	Nizhny Novgorod 2018	Doskino station freight yard	Business plan	Mokhovye Gory, Arzamas, Vladimir	Kostarikha, Pochinki, Dzershinsk, Balakhna
3	Yekaterinburg 2018	Kosulino station	Technological concept	Pervouralsk, Nizhny Tagil, Egorshino, Bogdanovich	Sverdlovsk-Tovarny, Revda
4	Kazan 2018	Vakhitovo station freight yard	Technological concept	Volzhsk, Kanash, Sviyazhsk	Lagernaya, Yudino
5	Volgograd 2018	Maxim Gorky station	Technological concept	Volzhsky, Akhtuba	Sarepta, Volgograd 2, Maxim Gorky
6	Kaliningrad 2018	Dzershinskaya-Novaya station freight yard	Business plan	Chernyakhovsk, Sovetsk, Baltyisk	Kaliningrad-Sortirovochnaya
7	Baltiysky (rail port) 2018	Shushary station, including freight yard	Technological concept	Vyborg, Novgorod on Volkhov, Saint-Petersburg-Moskovsky, Saint-Petersburg-Finlyandsky, Gatchina-tovarnaya, Baltiyskaya	Saint-Petersburg - tovarnaya - Vitebsky
8	Tamansky (rail port) 2018	siding 9th km	Technological concept	Krasnodar-Sortirovochnaya	Krymskaya
9	Primorsky (rail port)	Ussuriysk	Technological concept	Pervaya Rechka, Artem-Primorskyl	Ussuriysk, Partizansk
10	Novosibirsk	Kleschikha station freight yard	Business plan	Iskitim, Kargat, Novosibirsk-Yuzhny	Inya-Vostochnaya, Mashkovo, Novosibirsk-Glavnaya

11	Kirov	Chukhlominsky	Technological concept	Kotelnich-II	Kirov, Kirov-Kotlassky, Orichi, Kotelnich-I
12	Khabarovsk	Volochaevka	Technological concept	Komsomolsk on Amur, Vanino	Khabarovsk-2
13	Samara	Rail station 1066 km.	Technological concept	Bezymyanka, Kryazh, Zhigulevskoe More, Syzran	Novokuibyshevskaya, Samara, Kinel
14	Ufa	Dyoma	Technological concept	Sterlitamak, Salavat	Urshak, Dyoma, Chernikovka
15	Bryansk	Bryansk-Lgovsky	Technological concept		Bryansk-Lgovsky
16	Ulan-Ude	Taltzy	Technological concept	Naushki	Ulan-Ude, Sayantui
17	Voronezh	Maslovka	Technological concept	Liski	Pridacha
18	Krasnoyarsk	Krasnoyarsk-Severnaya	Technological concept	Kansk 2, Achinsk-Eniseisky	Bugach, Krasnoyarsk, Bazaikha

* location is identified as per rating results (see p. 41) and is preliminary, changes are possible.

As the moment technological concepts, including preliminary sites locations and conditions for connections to transport communications, etc., have been elaborated for all first-stage objects of the TLC network

The transport hub of the Moscow agglomeration plays the most important role in the TLC network.

The permanent population in Moscow and in the Moscow region exceeds 17 million people, that explains large volumes' consumption of cargo comprising mostly FMCG (Moscow consumes more than 30 thousand tons of foodstuffs per day) and construction materials. Moreover, the Moscow hub traditionally plays the essential role as the all-Russian distribution center.

There are a number of decisions on development of both transport network and on freight infrastructure in the Moscow agglomeration, accepted jointly by governments of Moscow city and Moscow region.

In the course of development of the present Concept, several proposals on further expansion and reconstruction of terminal & warehouse infrastructure of the Moscow agglomeration transport hub were drafted and grouped as follows:

• the new elements of terminals & logistics infrastructure (Table 5.9);

• the existing freight yards subject to reconstruction / renovation (Table 5.10);

• the existing freight yards subject to elimination and / or redesign (Table 5.11).

Key criteria of selection sites for contrailer terminals' locations within the Moscow railway nod are:

- maximum substitution of freight vehicles movement in the most congested sectors of federal motorways at the approaches to Moscow and the Moscow Ring Road (MKAD) by contrailer trains' routes;

- optimization of rail traffic (changes of routes' direction) within Moscow railway nod;
- convenient locations correlated with development plans of urban expansion;
- sites' configurations matching relevant parameters of "rolling stock – terminals" system.

Zones of logistics responsibility of TLCs with satellites were defined using the following key factors:

- transport accessibility;
- level of competition in a regional logistics market;
- population density, and production structure output of the region, locations of centers of generation / consumption of relevant cargo flows;
- export-import potential, and so on.

Zones of logistics responsibility of the TLC network are presented in Fig. 5.18.

In these zones increase of capacities of regional logistics markets is expected along with positive changes of their structure due to provision of more comprehensive spectrum of services, as well as improvement of supply chains management. Enhanced infrastructure objects shall attract global operators and services providers with their advanced transport & logistics technologies supported by ITC solutions and platforms. Expected reduction of transports & logistics costs' level shall further stimulate competitiveness of local companies, which in turn will contribute to improvement of logistics services.

Table 5.9. New objects to be constructed

Nos.	TLC / FREIGHT HANDLING FACILITY	Cargo turnover,thousand tons		Goods handled						Freight traffic routes	Note
		Result, 2010	Throughput	Containers	OOG	Palletized and packaged	Bulk	Contrailers	Export / import		
1	Bely Rast TLC		18 000	+	+	+	+	+	+	All directions, Transit	
2	Khovrino		5 800	+		+		+	+	Saint-Petersburg, Riga, Murmansk, Helsinki	
3	Moscow–Sortirovochnaya - Kievskaya		4 200					+		Bryansk, Kiev, Odessa, Ilichevsk	Within boundaries of sorting station
4	Vorsino TLC		15 000	+	+	+	+	+	+	All directions, Transit	As part of 'Vorsino' industrial park (initiative of Kaluga region),
5	North Domodedovo TLC		12 000	+	+	+	+		+	Lipetsk, Tambov, Volgograd, Saratov, Astrakhan, Makhachkala, Baku	As part of 'North Domodedovo' logistics park
TOTAL:			**55000**								

Table 5.10. Renovation objects.

Nos.	Freight yards/container terminal	Cargo turnover, thousand tons		Goods handled						Freight traffic routes	Note
		Actual result 2010	Throughput current / potential	Containers	OOG	Palletized and packaged	Bulk	Contrailers	Export / import		
1	Moscow –Tovarnaya - Kurskaya (including TransContainer site)	154,8	430 / 500	+						Nizhny Novgorod, Vladimir, Kazan, Ufa	Comprehensive reconstruction
2	Moscow – Tovarnaya– Ryazanskaya	143,5	700 / 2 000	+	+	+				Ryazan, Tambov, Voronezh	Comprehensive reconstruction
3	Moscow – Butyrskaya	192,7	700 / 2 500	+	+	+				Saint-Petersburg, Murmansk, Vologda, Cherepovets	Comprehensive reconstruction
4	Moscow –Tovarnaya– Paveletskaya (including TransContainer site)	1 386,4	2 000 / 3 000	+	+	+		+	+	Voronezh, Rostov on Don, Novorossiysk, Krasnodar, Astrakhan, Tambov	Comprehensive reconstruction
5	Kuntsevo-2	630,1	1 000 / 2 500	+	+	+		+	+	Smolensk, Minsk, Riga, Warsaw, Berlin	Comprehensive reconstruction
TOTAL:		**2 507,5**	**4 830 / 10500**								

Table 5.11. Eliminated or redesigned objects.

Nos.	Freight yards/container terminal	Cargo turnover, thousand tons		Freight traffic routes						Note
		Actual result, 2010	Throughput current / potential	Containers	OOG	Palletized and packaged	Bulk	Contrailers	Export / import	
1	Moscow – Rizhskaya	0	900	Freight yard is closed						Subject to closure according to General scheme of Moscow railway nod development
2	Moscow –Tovarnaya – Yaroslavkaya	30,4	680			+			+	
3	Moscow–Tovarnaya - Kievskaya	88,0	600	+	+				+	
4	Moscow–Tovarnaya - Smolenskaya	188,7	600	+		+			+	
5	Moscow – Tovarnaya (TransContainer)	570,0	1050	+		+			+	
6	Moscow-II Mitkovo	76,7	400	+	+	+			+	Coordination Council proposal
	TOTAL:	**953,8**	**4 230**							

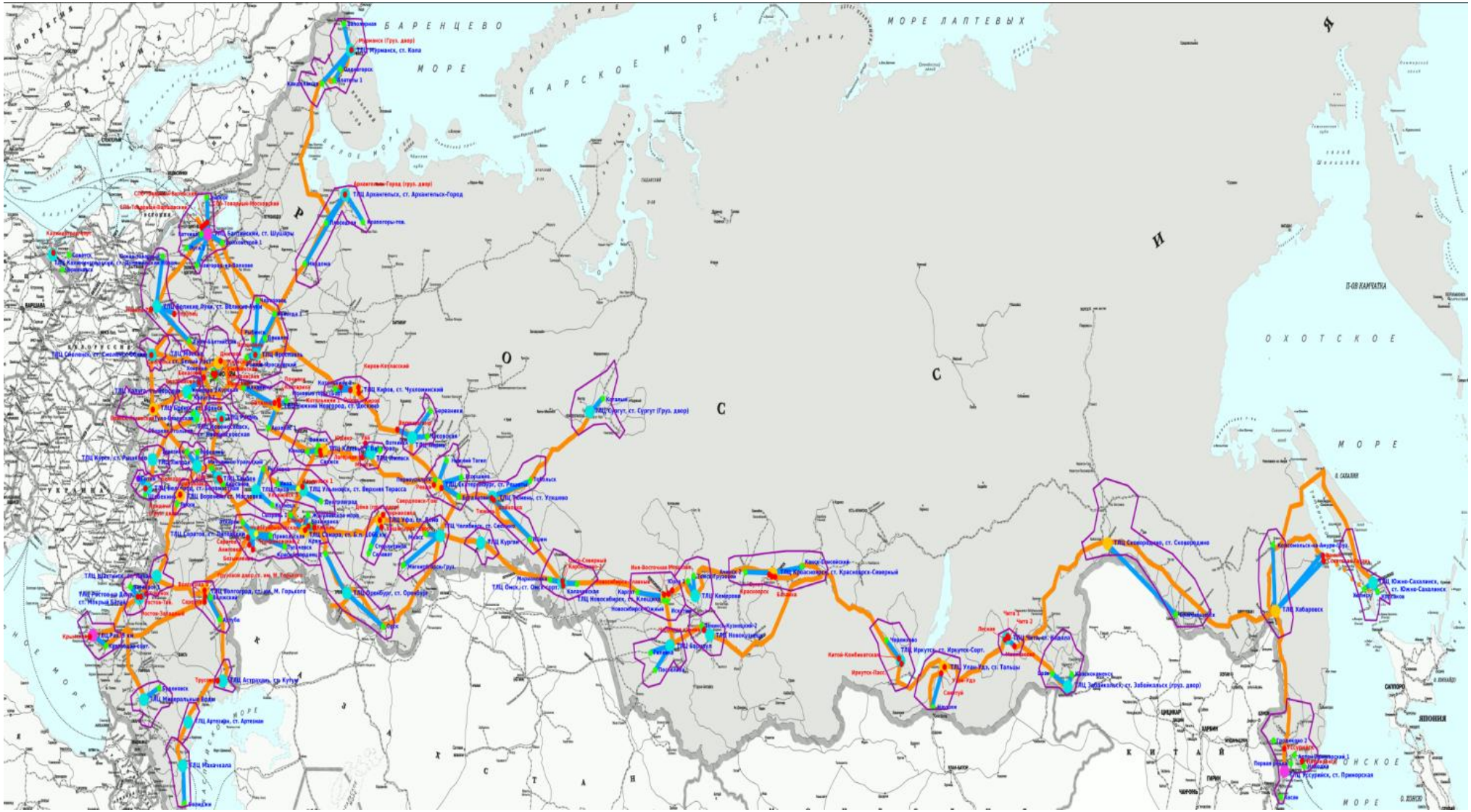


Fig. 5.18. Zones of TLCs responsibilities

Corporate integrated IT management system.

Customized corporate integrated IT management system (CIITS) is one of the most important features of efficient TLC operations. It is essential that CIITS structure and functionality comply with the international standards, including:

- data input/output formats;
- conditions for data bases access;
- friendliness of user interface;
- compatibility with widespread operational IT systems, systems of corporate administration (ERP), logistics processes control systems (SCM, WMS, CMS, TMS), etc;
- efficient Internet and WAP technologies.

The CIITS of the TLC network shall include the following functional modules:

- Warehouse automatic control system (ACS) of high level (including WMS – warehouse management system);
- Container terminal ACS (CMS);
- Container trains ACS;
- Terminal operations ACS (dispatch management of transport movements, handling equipment operations, optimization of storage areas, technological equipment status, staff employment features, etc.);
- Automated energy accounting and control system (ASKUE – *Russian abbreviation*);
- Customs database & exchange ACS;
- DBMS – the structured multipurpose database;
- Interactive multilingual Internet-site of e-TLC functions, like calculations of service rates, booking, accounting, goods trace & tracking, etc.;
- Data exchange interfaces with corporate and management IT systems of the RZD, including: ETRAN, Cargo Express, Dispark, Diskon, ASOUP, etc.
- Systems of electronic identification and registration of goods, rolling stock, vehicles and so on (including RFID).

Corporate standard services portfolio of a TLC of the network shall include the following services (see Table 5.12.):

Table 5.12. Standard TLC services portfolio.

Services	Groups of services	Service description	Typo of cargo
Basic	- Loading and unloading - Storage	Load / Unload/ Lifts / Direct shifts (between wagons and vehicles), storage	General cargoes, perishable goods, post items, containerized cargo, bulk, OOG, hazardous goods, vehicles
Value-added	- Warehousing - Packing - Consignments delivery	Selection, sorting and consolidation of goods, post items, palletizing, marking & labeling, packing / repacking, last mile deliveries, etc	General cargoes, perishable goods, post items, containerized cargo, bulk, OOG goods, hazardous goods, vehicles
	- Customs clearance	Storage at bonded warehouses, customs clearance, checks & inspections, etc.	
	- Service & maintenance - Accounting - Consultations	Containers repair /cleaning/, transport & accounting documents administration, consultancy & IT services, etc.	

Besides, companies engaged in transport & logistics servicing, forwarding, business centers' management, vehicles transportation and maintenance, insurance and financial services, HR recruitment, advertizing, cleaning services, resources & utilities supply, wastes processing, packaging, etc., are regarded as potential TLC' s business residents, which create additional business environment and synergy.

6. PROJECT MANAGEMENT.

The logistics strategy of the RZD includes, *inter alia*, 2 main components:

- development of activities as the operator;
- development of infrastructure.

In different segments of the Russian rail transport-based logistics services market there are several operating companies, established by the RZD (daughter or affiliated entities), like:

'TransContainer' – operates the largest container terminals (former freight yards, privatized and reconstructed), in main locations all over Russia, quite a significant fleet of rail fitting platforms and ISO containers (substantial part of which is former RZD

equipment, re-registered and privatized), the share of the rail container transport market is around 50 per cent;

‘Refservice’ – operates fleet of obsolete (privatized former RZD) refrigerating wagons, built in DDR;

‘Tamozhenno-brokersky center’ (customs brokerage) – monopolistic customs services provider at the RZD customs facilities / warehouses;

‘Russkaya troyka’ – operates (in cooperation with FESCO) mostly leased rolling stock and container equipment on container trains line services between ports of Russian Far East and major in-land container terminals;

‘RZD Logistika’ – the only provider of transport & logistics services in the RZD pool with no assets, domestically provides cargo forwarding, express deliveries, including LCL consignments, internationally - rail line services on routes between Europe and China (mostly), and others.

Thus, it is evident that most providers of rail transport services originating in the RZD system, are mostly engaged in services, using specialized rolling stocks, equipment and infrastructure.

However, in accordance with ‘Concept of reforming of the terminal & warehouse Directorate’ this Department of the RZD should be transformed into an entity to manage and operate all freight yards and similar assets of the RZD. It is supposed that the new company would create integrated network of TLCs, renovating and upgrading old facilities and equipment. The company shall provide comprehensive set of terminal logistics services with transparent tariff policy and competitive prices to all players of the transport market.

At the same time, in light of the present Concept’s provisions of development of the full scale national terminal & logistics infrastructure, the described network of the RZD reconstructed freight yards shall be able to form additional satellites system as most.

Thus, taking into consideration that the development of the TLC network will require significant investments and development skills, one can predict that in Russia none of the companies-operators, active in the market, is capable to implement the Project alone.

Therefore, for effective management of implementation of the Project it is expedient to set up a relevant center of competences which could be transformed further into special managing company (see Fig. 6.1), capable to allocate significant investment resources properly, to acquire land site property rights and to conduct design & construction phases, etc.

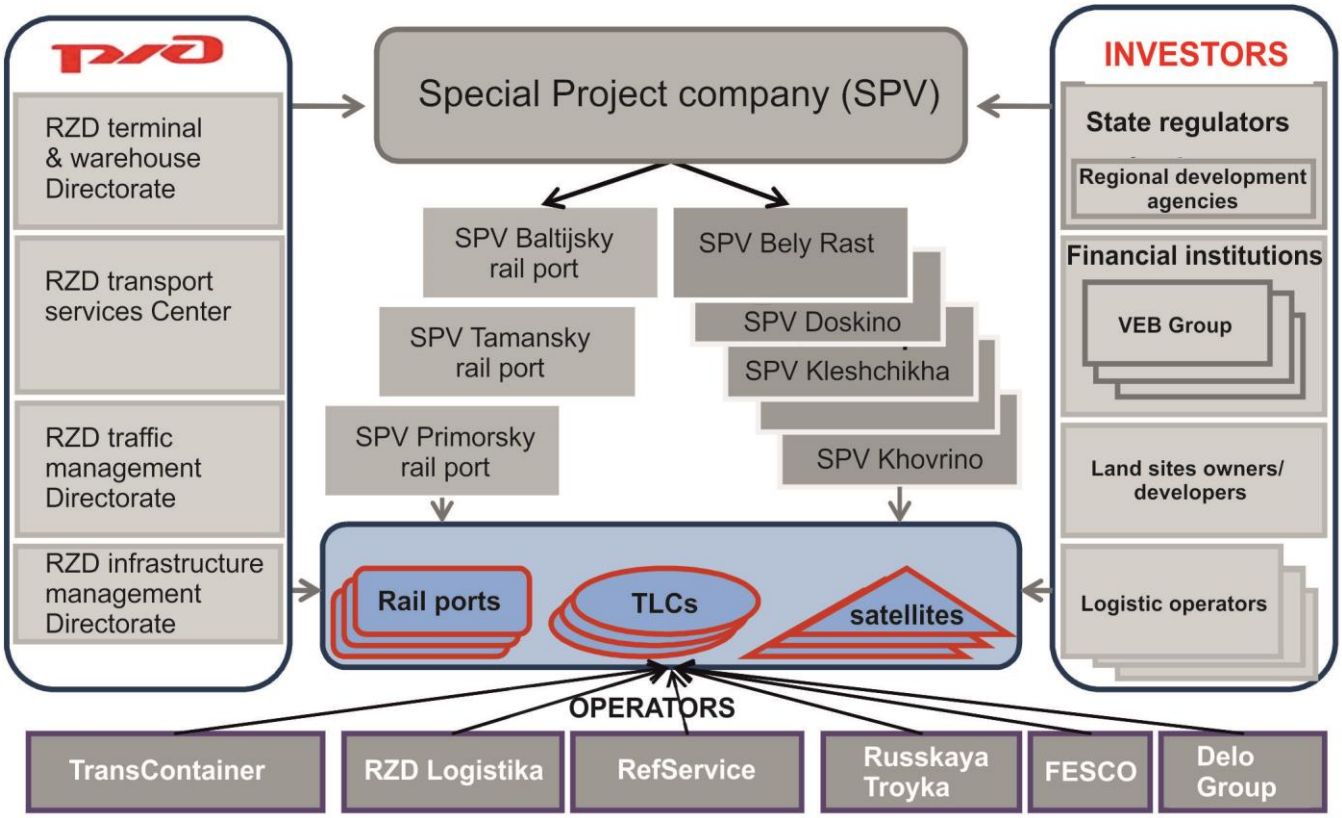


Fig. 6.1. Interaction scheme of Projects' actors.

The main functions of the competence center / SPV at various stages of the Project implementation are:

- Selection of land plots / sites of TLCs locations;
- Interaction and collaboration with Federal, regional and municipal authorities in issues of preparation of land plots, connection to external utilities networks and transport communications, coordination of development strategies of industrial and logistic infrastructure, etc;
- Interaction with the RZD divisions on coordination of rail network development programs, strategies of operators' activities (subsidiaries and affiliates), etc.;
- Development and execution of investment agreements (including public private partnerships);
- Responsibilities of a General Contractor for construction;
- Property assets management (buildings, constructions, supply & utilities' networks, cleaning equipment, wastes processing units, etc.), including provision of power, heat and water supplies, as well as integrated safety & security services;
- Organization of interactions with transport & logistics operators and providers;

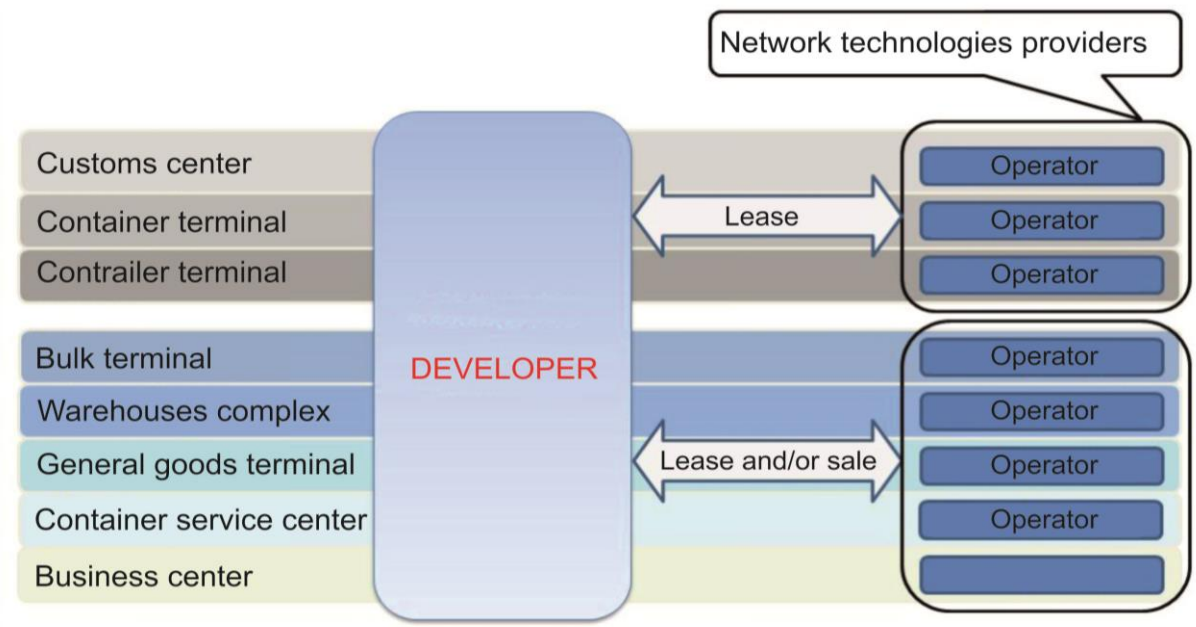


Fig. 6.2. Typical business model of TLC project implementation.

The typical model of implementation of each individual project of a TLC (see Fig. 6.2) under the network Project implies that a Special Purpose Vehicle (SPV) company shall be registered as developing entity to be controlled by the Management company (supposedly, jointly with other participants of this project, like a strategic investor, a regional state-controlled company / development agency, logistics services providers, financial institution, etc.). Such SPV company will form capital assets (for example, by transfer of land sites ownership rights, or financial / credit resources, etc., as participants' shares to registered capital) for further lease by operators of relevant technological units of a TLC.

The financial model of the TLC network development Project implies that:

- formation of the core network consisting of 3 rail ports, 7 TLCs and 29 satellites;
- the RZD investments resources to be allocated to:
  - development of rail infrastructure at TLC site;
  - contribution to authorized capital of the Management company (or in capitals of SPV companies) in form of transfer of ownership rights for land sites and / or for property assets plus cash funds to finance actions of daughter companies in initial stages of implementation process;
- actual participation of investors in control of activities of the Management company (or SPVs);
- the Management company or SPVs generate revenues by lease payments under market conditions.

Significant investments required for effective implementation of the Project, could be obtained by application of different investments instruments, including:

- budget financing in public private partnership (land plots, external transport & utilities connections);
- direct investments of project management entities' participants (contributions to SPV authorized capitals);
- loans & mortgages;
- project financing;
- development (for example, built-to-suit model);
- procurement of imported handling equipment, vehicles, boilers, etc., under export financing agencies' special conditions (for example, Japanese, Germany, Chinese, etc.);
- leasing of handling, warehouse and transport equipment as well as IT products and so on;
- private entities' investments – utilities & infrastructure, vehicles' service & maintenance, fuel station, cafes, business center offices, special terminals and warehouses, commercial real estate, and so on;
- IPO at the stages of the Management company or SPVs further development.

Cooperation and collaboration of a SPV company and local authorities is also essential for effective project implementation, as one of the main beneficiaries from the network Project implementation is the region of location, represented by regional administration and municipality. Comprehensive development of efficient transport and logistics infrastructure leads to improvement of investment attractiveness of the region, growth of enterprises' competiveness, new taxes and new jobs, generation of new business processes, etc., and as the result – the significant acceleration of social and economic development of the region. At the same time, a number of key aspects of the TLC project implementation lay in the competence of regional government and local authorities. Therefore, the following algorithm of cooperation in joint activities should be taken into consideration:

- approval of initiative proposal (put forward by the RZD or its subsidiaries, Federal or local authorities, business entities and so forth);
- establishing of joint working group;
- selection of most suitable configuration of a land site;
- obtaining of provisional specifications (technical conditions) on connecting to external utilities and transport lines;
- creation of effective project control mechanisms;
- elaboration pre-feasibility studies in accordance with TLC project's structural and functional requirements;

- establishing of SPV company;
- formalization of regional and municipal incentives in support for the project granted according to valid regional legislation and norms.

Stakeholders of public-private partnerships and issues of interactions to support implementation of a TLC investment project are shown in Table 6.1.

Table 6.1. Interaction issues in public-private partnership.

Issue	Authority
Correction of relevant Federal program	Regional government, Federal Ministries of Economic Development and of Transport
Development of customs infrastructure	Federal Customs Service, Regional government, Federal Agency for Russian State Border infrastructure development, Federal Ministry of Economic Development
Regional and municipal incentives	Regional government, municipality
Correction of transport and logistics infrastructure development programs	Federal Ministry of Transport, Regional government, municipal authorities
Provision of necessary land plots	Regional government, municipalities
Provision of connections to external utilities and transport network	Regional government, municipalities
Creation of industrial parks, special economic development zones	Regional government

7. EXPECTED RESULTS

Quite a substantial number of countries all over the world accumulated successful experiences in implementing transport & logistics infrastructure development projects of similar parameters and characteristics. Some examples of the ‘good practices’ are:

- Freight villages (Germany – more than 30, Italy, France, the Netherlands, etc.);
- Industrial and logistics parks (Great Britain, the USA, Germany, France, China, etc.);
- Technical and Economic Development Zones with logistics parks, Free Trade Zones, etc. (China).

The customer-oriented approach is a crucial success factor for the efficient TLC network, i.e. the maximal compliance with current demands of clients in the transport & logistics market.

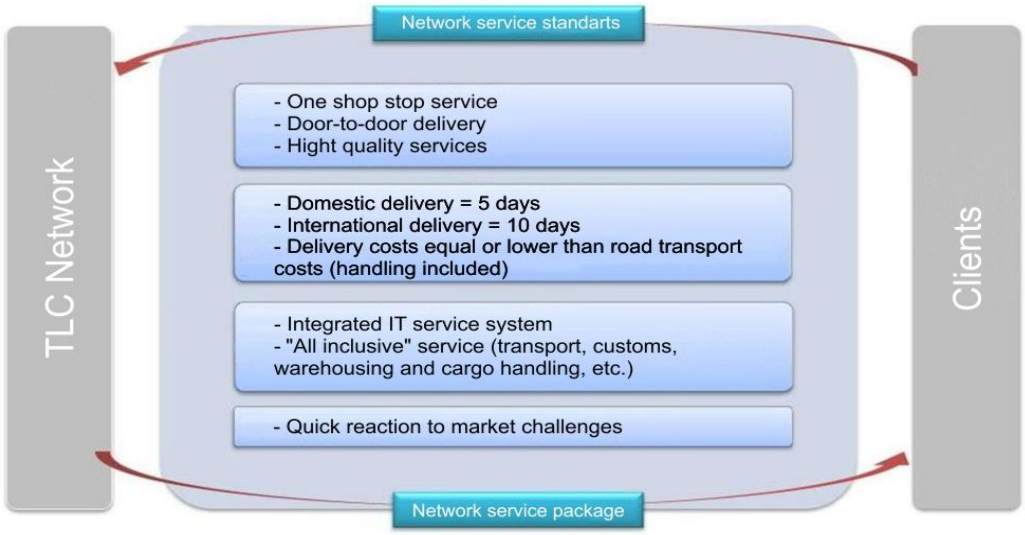


Fig. 7.1. Success factors of TLC network.

The scope and the level of quality provided in a TLC of the network, shall meet typical demands of logistics market with the following, but not limited to, characteristics:

- single consignment bill/note covering whole intermodal consignment haulage route;
- Internet and WAP service for booking, accounting, trace & tracking, etc.;
- friendly interface for data exchange between operators and customers;
- unified tariffs and rates;
- automated sales systems for such services as goods forwarding, terminal handling, storage, etc.

Table 7.1. Potential throughputs of first stage TLCs.

Name	Throughput, million tons per annum		Cargo flows volumes for target year, million tons
	Calculated	First stage	
Rail port Tamansky	20,4	10,2	39,6
Rail port Baltiysky	20,4	10,2	70,3
Rail port Primorsky	15,1	10,2	35,3
TLC Bely Rast	18,5	9,2	39,5
TLC Bryansk	8,9	4,4	19,5
TLC Volgograd	10,2	5,1	14,3
TLC Voronezh	10,2	5,1	26,5
TLC Nizhny Novgorod	10,2	5,1	14,3

TLC Yekaterinburg	10,2	5,1	17,8
TLC Kazan	10,2	5,1	14,3
TLC Kirov	8,9	4,4	14,3
TLC Krasnoyarsk	10,2	5,1	14,3
TLC Novosibirsk	10,2	5,1	14,3
TLC Samara	10,2	5,1	14,3
TLC Kaliningrad	8,6	6,8	17,8
TLC Ulan-Ude	8,9	4,4	14,3
TLC Ufa	10,2	5,1	14,3
TLC Khabarovsk	8,9	4,4	25,3
TOTAL:	**210,4 / 134**	**110,1 / 72,1**	**420,3 / 263,2**

Summarizing the calculated cargo flows estimated above with additional estimated flows of both road and private rail transportation relevant for TLCs of the network, it could be predicted that the commissioning of first-stage TLCs of the network will allow to attract on railway transport about 100 - 120 million tons of freight in addition to current volumes moved by rail.

The total amount of investments, needed for commissioning of the TLCs of the first stage, is preliminary estimated as 650.8 billion rubles, including 366.5 billion rubles for the core network objects.

The structure of investments is represented in Table 7.2.

Table 7.2. Investments - first stage of TLC network

№	Costs item	Railway port	TLC	Satellite
1	Acquisition of land site, design and survey works, billion rubles	2 ,0	1,2	0,3
2	New construction, billion rubles	15,6	13,4	3,0
3	Railway infrastructure (connecting station and siding), billion rubles	20,0	2,4	0,1
4	Road connection with upgrade, billion rubles.	1,0	0,8	-
5	Resources and utilities, billion rubles	3,0	1,4	0,3

6	Estimated investments for commissioning of 1 object, average, billion rubles	41,6	19,2	3,7
7	Number of first-stage objects **– including core network**	3 **3**	15 **7**	40 **29**
8	**Total**, billion rubles **– including core network**	124,8 **124,8**	288,0 **134,4**	148,0 **107,3**
9	**GRAND TOTAL, billion rubles** – including railway infrastructure	560,8 / **366,5 *** 100,0 / **79,7 ***		

* (first stage / core network)

The project implementation will provide for:

Improvement of efficiency of the national transport system due to:

- transport costs reduction;
- increase of haulage speed;
- enhancement of sustainability of the transport system.

Creation of infrastructure basis for:

- growth of competitiveness of enterprises in the production sector, increase of industrial outputs, modernizations of industrial capacities, growth of employment, mitigation of environmental impact, etc.;
- development of the national logistics market:
  - generation of new business processes;
  - diversification and improvement of quality of logistics services;
  - optimization of supply chains and distribution networks;
  - development of export of transportation services and of the transit potential of Russia;
- sustainable urban development:
  - creation of industrial and logistics parks, relocation of obsolete productive facilities outside urban areas;
  - spatial development of modern urban agglomerations.

The Project implementation will result in the following benefits for the RZD:

Enhancement of scope of rail freight transportation targeted to reach in the year of 2020**:**

- domestically (the first stage) 100 – 120 million tons per annum;
- transit routes of South-East Asian countries – TransSib – Europe not less than 8 million tons per annum;
- on international routes South-East Asian countries – regions of Russia not less than 5 million tons per annum;

Costs reduction due to:

- centralized handling of goods in large and efficient intermodal transport & logistics objects;
- enhancement of network of regular rail line routes (container trains– more than twice), substitution of trains marshalling and shunting by terminal processing of full-sized trains;
- decrease of number of 'abandoned' trains on public sidings by 2 – 3 per cent;

Intensification of investment activity:

- Dividends accumulated from:
  - project companies (SPVs);
  - companies - operators (acceleration of rolling stock turnover –reduction of idling periods of wagons / groups of wagons 's stay in queues at small stations by 10 – 15 per cent, increase of fitting platforms' turnover rate not less than by 15 per cent with containers turnover rate - by 10 – 15 per cent);
- growth of market capitalization of the RZD, particularly due to investing low-valued assets of old freight yards in the form of contributions into new efficient SPVs;

Moreover, additional essential result of the Concept implementation is the expected change of cargo turnover structure in favor of high added goods' volumes.

8. PROJECT RISKS ANALYSIS.

Considerable levels of necessary investments, intensity and scope of management control, wide range and complexity of Project's issues, variety of commercial interests of Project's participants, etc., which occur in the course of the TLC network implementation and operation, demand detailed analysis of basic Project risks, as well as elaboration of effective ways of their hedging. At the moment, the following main risks' categories are identified:

- Legal and regulatory;
- Political;
- Economic;
- Financial;
- Technological.

The results are shown in Table 8.1.

Table 8.1. Main project risks.

Risks		Hedging methods
Legal & regulatory	- institutional limitation of terminal & warehouse objects' turnover; - absence of Federal Law "On transit"; - absence of Federal Law "On combined transport".	- realization of relevant legislative initiatives;
Political	- customs service reforms; - project implementation in regions with different levels of development; - improper public private partnership mechanisms.	- Initiative on special Customs Service rules on customs clearance at Project's Customs Centers; - interaction with governmental and municipal authorities;
Economic	- Global and national crisis processes	- creation of effective Project's control mechanisms;
Financial	- considerable levels of investments; - variety of financing sources.	
Technological	- staging of container and contrailer block-trains organization; - difficulties with IT system development; - unified technological policy integration.	- coordination of development strategies of subsidiaries and affiliates.

——–acceptable risks —— – high risks

9. ESSENTIAL ACTIVITIES.

The Concept implementation will require the development of the RZD relevant policy documents as well as the comprehensive execution plan supported by effective coordination with authorities at federal, regional and municipal levels (including correction of the respectful Federal and regional planning documents, etc.).

Within the Concept framework the priority activities are identified:

- elimination of restrictions on free market turnover of terminal and warehouse assets of the RZD;
- development and implementation of public-private partnership mechanisms for the Project;
- development and reconciliation with regulating authorities (Ministry of Transport, Ministry of Economic Development, Federal Customs Service, etc.) optional customs legal acts for rail transport;
- development and reconciliation of Concepts on: contrailer transportation, TLC integrated safety and security systems, IT platform for logistics operation, etc. in co-operation with stakeholders, authorities and business community;
- creation of specialized competence center / Management company and SPV companies.