Ministry of Transport of the Russian Federation

The GENERAL SCHEME

for Deployment of the Transport Logistics Centers Network

(within the transportation part of the Federal Project ‘Comprehensive Plan for the Modernization and Expansion of the Core Infrastructure up to 2024’)

Moscow, 2019

Table of Content

Introduction…….…….. 3

Glossary…… 5

1. Goals and objectives ……..…….…….. 7

2. Estimated freight volume…….. 8

3. Technological model……... 13

4. Information and analytical support model……... 24

5. Project management…… 27

6. Legal and regulatory support……... 41

Introduction

The recent bursting development of the information and digital technologies resulted in new global trends, witnessed nowadays in different spheres of life, and one of the most important of them is the globalization of material markets. This transformation presents a critical challenge to any national productive tier of economy, including a country's transport & logistics infrastructure. Today a level of competitiveness of any manufacturer depends heavily not only on cost / quality / consumer characteristics of a product but also on efficiency of distribution and on product availability in a market.

It is well known. that the Russian Federation is placed into the group of countries suffering from the high level of logistics costs. For instance, in 2017 the studies of Armstrong & Associates, Inc., published in the 'Global and Regional Infrastructure, Logistics Costs, and Third-Party Logistics Market Trends and Analysis' report. assessed the Russian national logistics costs level as 16.1 per cent of GDP while the world's average level was assessed at 10.9 per cent (Fig. 1).

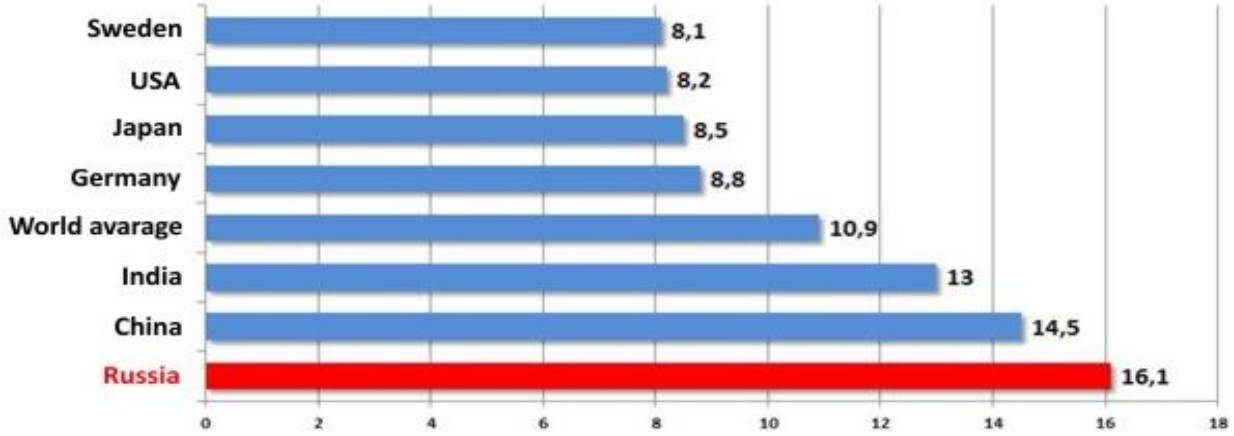

Fig.1. National logistics cost level, % of GDP

Evidently, this indicator is directly influenced by certain objective factors -for example, geographical, climatic, landform conditions in Russia vary greatly across different parts of the country. However, according to the 2018 World Bank Group survey on trade logistics, the Russian Federation took the 73^{d} position among 160 countries in the global Logistics Performance Index - LPI ranking, scoring the 61st place in Infrastructure component (other components are: Customs – 97th place, Ease of International Shipment – 96th place, Logistics Services Quality – 71st place, Tracking & Tracing – 97th place, Timeliness – 66th place).

Addressing this problem requires a comprehensive and integrated approach, which should include, among others, an introduction of efficient and low-cost transport technologies, which is particularly essential for non-primary (non-raw materials) sectors of national economy. One of the most effective ways to improve technologies used in the Russian transport industry is to enhance capacities of the national logistics infrastructure network. The Ministry of transport of the Russian Federation is continuously tackling the current tasks to meet today's challenges of upgrading the transport system of the country, which includes the development of transit capacity, increase of exports of transport services and deployment of core network of intermodal transport logistics centers, to name some of them. The recently adopted Road map for the development of this network consolidates also major sectoral, regional and corporate programs and plans to develop similar logistics networks, like Wholesale & Distribution Centers of the Ministry of Agriculture and Processing & Logistic Complexes of the Ministry of Defense of the Russian Federation, as well as Processing & Fulfillment Centers of the Russian Post company and logistics hubs of federal and regional wholesalers, etc.

The Decree of the President of the Russian Federation dated 05.07.2018 No. 204 On National Goals and Strategic Priorities of Development of the Russian Federation for the Period up to 2024, being the fundamental document of strategic policy planning in the country, defines among others the following targets:

- item 14 b): addressing logistics constrains in exports transported by rail, road and sea;
- item 15 a) deploying of a network of core freight intermodal transport logistics centers.

The governmental action plan 'Core activities of the Government of the Russian Federation for the period up to the year of 2012', accepted to meet the above described Presidential Decree requirements, also includes the item 1.2.1.1 aimed on creation of the network of core intermodal transport logistics centers (hereinafter referred to as TLC). Following these documents the Russian Government by its Decision dated 09.30.2018 No. 2101-p adopted the 'Comprehensive Plan for the Modernization and Expansion of the Core Infrastructure up to 2024', which comprises the Federal project (FP) titled 'Transport Logistics Centers'. The present General Scheme produced pursuant to requirement of the FP TLC Project Committee resolution dated 01.29.2019 No. 1.

Glossary

Transport & technological system (TTS) – set of coherent technical, technological, operational and legal solutions for enhancing the efficiency of transportation.

Core freight multimodal transport and logistics center (TLC) – a backbone element of a network with unified transport & technological system used to provide transport & logistics services for domestic, international and transit transportation, which comprises a group of general and specialized terminals and storage facilities with necessary infrastructure and operational environment.

Core TLC network – a necessary and sufficient number of centers synchronously commissioned into service to provide the infrastructural support to intermodal regular rail freight line services with fixed schedules, including high speed freight traffic.

Rail port – a multimodal public transport & logistics infrastructural object, suitable for the zonal distribution and handling of international, transit and domestic cargo, transported by rail freight line services with fixed schedules.

Satellite – a terminal or a group of terminals connected with a relevant TLC by integrated and unified transport & logistics technology, actually being a hinterland daughter terminal of such a TLC, or a specialized terminal oriented to handle cargo of specific categories which cannot be handled or stored at a core TLC due to restrictions or limits.

Multimodal carriage – the carriage of goods by at least two different modes of transport against a single transport document / contract, performed by a multimodal transport operator fully liable for an entire carriage from a starting point to a point of delivery.

Intermodal carriage – the multimodal carriage of goods in one and the same intermodal transport unit such as a container, semi-trailer, swap body or pallet, etc.

Combined transport **-** intermodal transport where a major part of a trip is by rail, inland waterways or sea and any initial and/or final legs carried out by road are as short as possible (the EU definition).

Intermodal transport unit (ITU) – a loading unit suitable for the successive carriage by two or more modes of transport without handling the goods during transshipment operation, i.e. moving ITUs from one means of transport to another.

Swap body - a freight carrying unit optimized to road vehicle dimensions and fitted with handling devices for transfer between modes, some of which are equipped with folding legs on which the unit stands when not on the vehicle.

Wholesale & Distribution Center – an infrastructure object in agriculture industry, which is oriented to provide a set of marketable services, including phyto-sanitary, veterinary, sanitary quarantine control inspections, acceptance sorting, initial processing, packing, controlled storage, as well as wholesale trading, supported by automated management and accounting systems.

Processing & Logistics Depots – a logistics infrastructure object for storage and maintenance of equipment and materials of the Russian Armed Forces with exceptions of military equipment, arms and armaments.

1. Goals and Objectives

The goal of the Federal Project is to increase efficiency of the national transport system by improving punctuality and speed of movement of goods and by providing beneficial conditions for expansion of export and transit potential of the country with the simultaneous decreasing of logistics costs.

The objective of the Federal Project is to develop advanced multimodal transport & technological system to enhance efficiency of regular fixed-scheduled rail freight transportation.

The implementation of the Federal Project shall provide:

- the increase of competitiveness of Russian producers both in domestic and international markets, primarily in non-raw materials sectors;
- the further development of connectivity of regions of Russia;
- the improvement of national and international supply chain operations by introduction of the 'just-in-time' model of transportation;
- the intensive development of the logistics services market, growth of entrepreneurial activities of SME companies, improvement of the country's positions in the LPI rating;
- the enhancement of urban spatial configurations due to liquidation of obsolete infrastructural logistics objects and subsequent optimization of cargo flows in transport nods of agglomerations;
- the increase of transport services' exports within global supply chains that should be channelized onto the Russian transport network at most;
- the reduction of traffic jams impact on environment;
- the reduction of roads maintenance & repair costs caused by the expected shift of a relevant share of cargo traffic to rail transport.

2. Estimated freight volume

Raw materials, mainly bulk and liquid bulk goods, constitute the major share (approx. 82 – 85 per cent) of the consolidated structure of the country's cargo turnover, summarizing all categories of goods transported by all modes of transport. Normally these goods are supplied by large enterprises, which use own infrastructure, rolling stock and logistics chains, therefore no transshipment facilities are required in this case. However, if an operation of transshipment of goods is still needed, then a sea or inland waterway river port terminal is used for such shift from one mode of transport to another one.

Evidently, a wide range of containerized goods would be handled at TLCs' facilities, constituting the priority target freight market of the deployed network (see Table 2.1).

Table 2.1 – The nomenclature of containerized cargoes

Items	Nomenclature
1	Paper and articles thereof, printed paper items, fibrous cellulosic material
2	Other general cargo commodities – rubber articles, refractories, textiles, garments and footwear, articles of leather, miscellaneous manufactured articles
3	Milling products, cereals
4	Miscellaneous chemical products
5	Sugars and sugar confectionary
6	Machinery, electrical, electronic equipment, optical apparatus, etc.
7	Ferrous metals and articles thereof
8	Perishable goods – foodstuff and beverages (excl. feed concentrates), agricultural products
9	Organic and inorganic fertilizers, mining chemical feedstuff
10	Forest products
11	Non-ferrous metals and articles thereof
12	Construction non-metallic and molding materials
13	Feed concentrates
14	Cement
15	Other bulk goods – wastes, residues

Typically, these types of cargoes are mostly carried by rail.

The shares of containerized goods transported by rail are shown in Fig. 2.1.

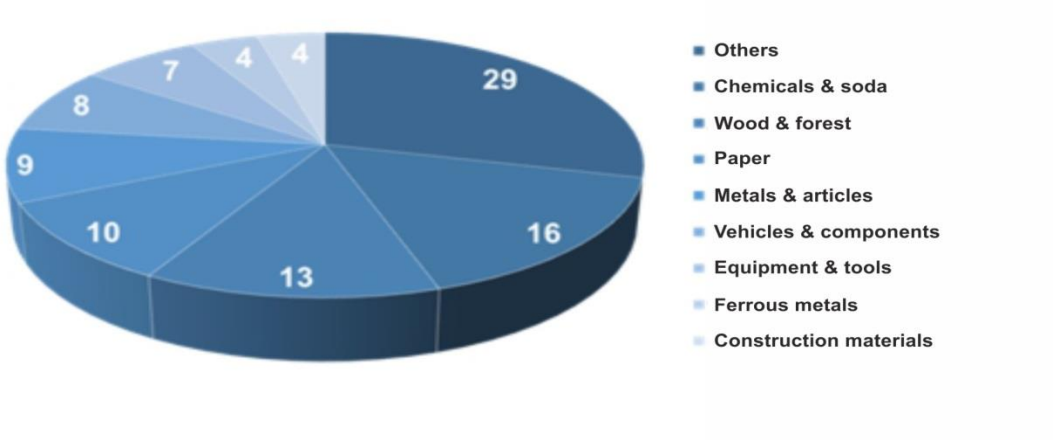

Fig.2.1 Structure of container rail transportation, in per cent (2018)

The total volume of cargo, transported by rail in 2017, reached 1 384 million tons, with the total weight of containerized / palletized goods of just 65.6 million tons (the share is 4.74 per cent - 118.2 billion tkm). The weight of goods, excluding international carriers, hauled by road domestically and internationally (containerized goods prevail) within the same period was 126.2 million tons (payload-distance was not less than 50 .7 billion tkm).

The current development of the new trends in the system of global supply chains added several new customers' demands to traditional requirements (punctuality, reliability and speed connected with the high rate of daily depreciation of expensive goods value up to 2.5%). The bursting expansion of e-commerce and the relevant diversification of logistics approaches of retailers led to increased requirements in direct B2C supplies, the shift from rather simple handling operations at traditional warehouses and distribution centers to more complex actions at fulfillment hubs, etc.

Therefore, all current logistics trends should be effectively incorporated in TTS practice of the TLC network to ensure competitiveness and efficiency of the national transport industry.

The actual situation in the Russian container trains traffic is depicted by routes and numbers of trains in relevant directions in Fig. 2.2, composed with 2018 open data of main rail container operators – TransContainer, Eurosib SPb – Transport Systems, FESCO, RUSCON and others.

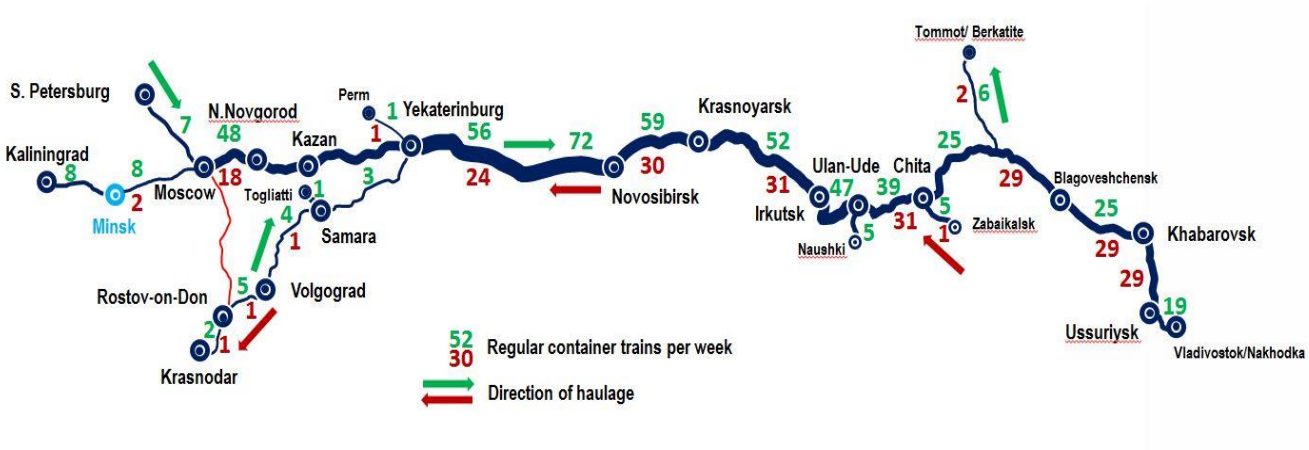

Fig. 2.2 - Integrated scheme of regular container line services

The analysis of the scheme's data reveals current gaps in rail transportation on some directions, i.e. no rail carriages along several important freight routes (for example, Moscow – Krasnodar) or the inadequately low traffic between Moscow and Saint-Petersburg. The calculations of traffic density, made by control posts on the federal roads M-1 'Belarus' (Moscow – the border with Belorussia), M-4 'Don' (Moscow – Novorossiysk) and M-10 'Russia' (Moscow - Saint-Petersburg), provided actual data on road transport cargo flows for these routes as a basis for estimations of potential cargo volumes which could be shifted to the rail transport and handled at relevant intermodal TLCs of the planned network. The gained results, grouped in Table 2.2, are adjusted, using average net loads of vehicles to calculate perspective volume of containerized goods, suitable for the rail carriage.

Table 2.2 – Estimated cargo flows on several sectors of federal roads M-1, M-4 and M-10, obtained by counting points of traffic density (2018)

Traffic density counting points (TDCP) locations	**Freight vehicles, thousand tons per year**				**Cargo volumes**	
	< 5 t	**5-12 t**	**12-20 t**	**> 20 t**	**thousand tons/ year**	**trains per week**
M-1 «Belarus» (TDCP No. 560097 and No. 560602) + A-240 388 km (TDCP No. 560574)	581,3	274,2	532,4	421,4	15 647,7	**59**
M-4 «Don», 135 km (TDCP No. 560147)	2 571,7	630,7	993,9	531,6	29 812,1	**113**
M-10 «Russia», 179 km (TDCP No. 560357)	1 062,9	1 146,7	4 167,9	900,4	70 022,3	**265**

It should be also taken into consideration that there are substantial differences (up to 8 times) in some regions of the network TLCs' locations if compared by main economic performance indicators and the rail transport

containers' throughput. For example, in the Republic of Tatarstan, where the volumes of the gross regional product (GRP) as well as of the retail trade turnover are almost two fold larger than those of the Novosibirsk Oblast, the rail containers traffic is 6 times smaller. Therefore, it is evident, that in the European part of Russia the road carriage of containers is preferred despite attractive rates' level of the rail transportation.

Table 2.3 - Comparative assessment of rail container turnover in some regions of Russia

Region	**Population, in million**	**GRP, in billion RUR**	**Retail trade volume, billion RUR/year**	**Rail container throughput**	
				TEUs, in thousand / year	**Compared to Novosibirsk Oblast**
Novosibirsk	2,79	1 140,86	491,77	335,0	–
Sverdlovsk	4,326	2 142,51	1 130,70	190,2	**56,8%**
Republic of Tatarstan	3,90	2 114,18	916,97	54,6	**16,3%**
Nizhny Novgorod	3,22	1 260,22	738,98	110,0	**32,8%**
Samara	3,18	1 349,89	648,40	74,0	**22,1%**

Since 2015 the Ministry of Defense of Russia is implementing the vast program of replacement of outdated logistics objects with 27 modern processing & logistics depots (PLD). Bearing in mind the functionality of these depots (the storage, maintenance, and so on) and the characteristics of expected goods' throughput (equipments, miscellaneous items, uniforms, etc., with the exclusion of arms and ammunition), it is appropriate and feasible to integrate such objects into the structures of TLCs as warehouses oriented on long-term storage.

Table 2.4 – Required parameters of PLD

Parameter description	**Unit**	**Value**
Required storage volume	tons, thousand	135,0
Required storage area	m^2, thousand	170,0
Outdoor storage area	m^2, thousand	20
Number of required storage slots for vehicles	pieces	100
Vehicles storage area, aisles and fire breaks excluded	m^2, thousand	2,5
Estimated throughput	tons, thousand per year	125,0

The typical design requirements for a PLD are presented in Table 2.4, where an example of the 'Sevastopol' PLD is used, and the parameters are given in the Decree of the Government of the Russian Federation dated 05.31.2018 No. 1089-p.

Maximal realization of the country's transit capacity is one of the main objectives of the present FP TLC. The network deployment shall contribute to the growth in cargo flows along International Transport Corridors due to reduced costs, increased speed and reliability of deliveries, advanced transportation technologies introduced, improved quality and variety of logistics services.

The transit potential of 'East-West' transport corridor could be assessed with the help of existing data on the current trade turnover, primarily between European countries and the most developed regions of South East Asia (Eurostat, 2017):

- China: €550 billion, 114 million tons, while the transit transportation across the Russian Federation was just a little over 2 million tons with container throughput of 261.5 thousand TEUs;
- Japan: €124 billion, 14 million tons;
- Korea: €50 billion, 26 million tons;
- Singapore: €50 billion, 20 million tons.

Besides, the infrastructure of 'East-West' transport corridor could be used for transit haulages on new cargo routes with other countries of South East Asia – Vietnam, Thailand, Malaysia, etc.

Table 2.5 – Indicators of summarized cargo turnover of China, Japan, Korea and Singapore with European countries (Eurostat, 2017).

Mode of transport	Cargo turnover		Trade volume	
	Thousand, tons	Thousand, TEU	€, million	€ / ton
Maritime	163 139	20 392	490 157	3 004
Rail	1 808	226	17 154	9 488
Road	5 186	648	49 406	9 527
Air	3 037		259 768	85 534
Total:	**173 170**	**~ 21 266**	**816 485**	

In 2008 the 'Russian Railways' company (RZD) finished a feasibility study on the construction of the Resht – Astara (Iran) – Astara (Azerbaijan) railway. Results of the studies estimated, that the volume of expected cargo flow of this essential sector of 'North – South' International Transport Corridor would reach more than 19 million tons in 2030.

3. **Technological model**

The network approach to development of the efficient transport & logistics system of TLCs means the introduction of uniformed technical, technological, tariff and information support policies, etc.

3.1 The selection criteria for TLCs' locations

The regions for creation of TLCs are selected at the initial stage, while during the next stage proper land sites are identified within the selected regions' territories.

The most important factors for the selection of a region are:

- the presence of major intermodal transport nods, existing routes of International Transport Corridors and infrastructural objects with intensive freight throughput, etc.;
- the availability of industrial zones / parks in major urban agglomerations or adopted decisions in official documents like spatial planning schemes, Master plans, etc., to develop territories for creation of industrial / logistics parks, and / or construct large industrial or transport facilities, able to generate / consume considerable cargo flows;
- the share of gross value added (GVA), generated by manufacturing industry and material services, in the GRP of the region;
- the retail trade turnover;
- the availability of existing transport & logistics infrastructural objects with characteristics, similar to the required parameters of a typical TLC of the network, or with capacities to be renovated / reconstructed up to these requirements.

The results of selection of the regions for the creation of the network TLCs are given in Table 3.1 (the first group of 26 regions).

The first ten top priority regions for deployment of TLCs are the Moscow and Saint-Petersburg agglomerations, Krasnodar Krai (Territory), Rostov Oblast, Republic of Tatarstan, Nizhny Novgorod, Sverdlovsk and Samara Oblasts, Primorskiy Krai, Novosibirsk Oblast.

Table 3.1 – Rating of selected regions of the Russian Federation

№	Region	Population, in thousand		GVA, manufacturing & services, 2018, billion, rubles		Retail trade turnover, 2018, billion, rubles		Multimodal transport nod	International Transport Corridors	Summarized score
		Value	Score	Value	Score	Value	Score	Score	Score	
1	Moscow & Moscow oblast	19 804	10	17 072	10	7 154	10	9	10	49
2	Saint-Petersburg & Leningrad oblast	7 074	10	4 403	10	1 818	8	10	10	48
3	Krasnodar krai	5 571	10	1 671	9	1 368	8	10	8	45
4	Rostov oblast	4 231	9	1 014	8	921	7	10	8	42
5	Republic of Tatarstan	3 885	8	1 337	8	917	7	9	7	39
6	Nizhny Novgorod oblast	3 248	8	1 089	8	739	7	9	7	39
7	Sverdlovsk oblast	4 329	9	1 832	9	1 131	8	7	5	38
8	Samara oblast	3 203	8	959	7	648	6	9	7	37
9	Primorskiy krai	1 923	6	628	7	406	5	10	7	35
10	Novosibirsk oblast	2 780	7	979	8	501	6	8	6	35
11	Volgograd oblast	2 535	7	584	7	390	5	9	7	35
12	Chelyabinsk oblast	3 502	8	1 097	8	519	6	7	5	34
13	Republic of Bashkortostan	4 067	9	1 141	8	879	7	5	5	34
14	Republic of Dagestan	3 042	8	477	6	565	6	8	6	34
15	Saratov oblast	2 479	7	474	6	357	5	9	7	34
16	Kaliningrad oblast	986	5	333	6	170	4	10	8	33
17	Krasnoyarsk krai	2 875	7	1 278	8	538	6	6	5	32
18	Perm krai	2 632	7	849	7	537	6	7	5	32
19	Stavropol krai	2 804	7	501	7	510	6	6	5	31
20	Tyumen oblast	1 478	6	721	7	384	5	7	5	30
21	Omsk oblast	1 973	6	550	7	331	5	7	5	30
22	Voronezh oblast	2 335	7	683	7	552	6	5	4	29
23	Kemerovo oblast	2 709	7	527	7	377	5	6	4	29
24	Orenburg oblast	1 990	6	396	6	308	5	6	6	29
25	Irkutsk oblast	2 409	7	665	7	348	5	5	5	29
26	Republic of Buryatia	983	5	166	6	177	4	6	7	28

The main selection criteria for land plots / sites are:

- maximal proximity to main transport lines (rail, waterways, motorways) with the capacity of direct connections to:
  - ❖ rail communications: the distance between a TLC of the network and a connection station should be not more than 3 km;
  - ❖ roads & urban network: technical parameters of a connection road should correspond to the category III at least, and should have an easy access, or there should be a capacity to upgrade this road to comply with the relevant requirements;
  - ❖ sea and inland waterways ports and airports: there should be appropriate conditions for convenient regular freight traffic with a TLC.
- the current reserve of carrying capacity of main transport lines as well as a possibility to significantly increase such capacities in correspondence with the accepted development plans for relevant transport & logistics infrastructure;
- a category of a land plot, stated in spatial planning documents, shal allow the creation of a TLC with no limitations and encumbrances;
- the availability of adjusting networks of power and utilities' supplies with reserved capacities to satisfy requirements for full-scale operations of a TLC;
- the availability of land plots suitable for development of industrial parks, 'Advanced Development Zones' (the Russian term, describing a kind of a Special Economic Zone), etc., located in the proximity or adjusting a site of a TLC;
- the absence of objects, prohibited by the valid rules and norms to be located in sanitary protection zones of the TLC's land site;
- the configuration and linear sizes of a land site should allow to construct terminal objects with the straight-line lengths not less than 1,200 meters;
- optimal topology conditions (relief of ground surfaces, soil composition and bearing capacity, seismicity, risks of flooding, water logging, etc.).

The technological criteria of compliance of the TLCs to the national-level classification requirements:

- the capacities to provide transport & logistics services with the full range of goods listed in the present General Scheme as the nomenclature of goods of the TLC network;

- the capacities to process transit trains' cargo as well as to provide operations with export – import goods;
- the possibility to process a transit train without decoupling / shunting of hauling locomotives during loading / unloading operations;
- the availability of loading / unloading zones with configurations and dimensions allowing to process the full-length trains with the required time and throughput parameters;
- the availability of technological equipment, mechanisms and systems (loading / unloading and lifting equipment, terminal vehicles, IT-hardware & software, etc.), complying with the minimum requirements for the quantity and the performance efficiency of such equipment.

3.2 The transport & technological systems

As a set of coherent technical, technological, operational and legal solutions for enhancing the efficiency of transportation, the transport & technological systems (TTS) embrace the rolling stock, terminals, as well as the hauling, handling, logistics and IT technologies, rules, norms, procedures, etc.

3.2.1 The TTS for container transportation

Containers shall be carried by the regular trains (fixed schedules) with the standard haulage parameters (the full-size lengths and load capacity, regardless of a number of containers loaded), using a 'passenger-type' routes (from a terminal to a terminal, excluding marshalling / shunting operations). There shall be 2 standards of trains' lengths - with 57 / 71 indicative (reference length) wagons, i.e. 850 / 1050 meters used in respectful rail gauge areas.

The standard fitting platforms (40, 60 and 80 feet) will be used as the rolling stock.

The container terminal should have at least 3 loading / unloading zones with capacities to handle goods of the regular container trains of 57 / 71 reference wagons' lengths without break-up of trains, as well as to handle trains of 2 different routes. For operations within track loading / unloading zones the use of rail mounted gantry (RMG) cranes with load capacity not less than 45 tons is preferable (2 + 1 scheme). To handle containers in depots, that shall be organized to meet requirements of owners, forwarders, sea lines operators, etc., it is also feasible to use RMG cranes without consoles (4 + 1 scheme).

Vertical loading / unloading operations with automobiles, swap bodies, semi-trailers, etc. shall be performed in terminals with the use of the appropriate spreader equipment.

Terminal trailers shall be used for intra-terminal movements of containers. Service and maintenance operations with containers are to be performed at a Container Service center.

The typical layout of a container terminal is depicted in Fig. 3.1.

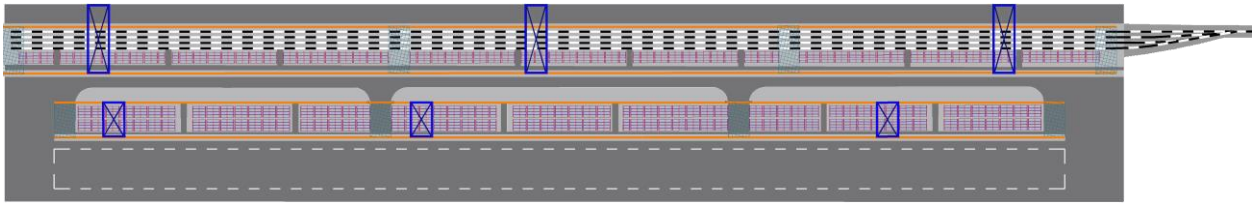

Fig. 3.1 – Typical container terminal

3.2.2 The TTS for contrailer transportation

In Russia, the term "contrailer" is used for the combined transportation, meaning specifically any movement of road motor vehicles with trailers, semi-trailers, etc. by rail ('piggy-back').

Contrailers shall be carried by the regular trains (fixed schedules) with the standard haulage parameters (the full-size lengths and load capacity, regardless of a number of ITUs loaded), using 'passenger-type' routes (from a terminal to a terminal, excluding marshalling / shunting operations). There shall be 2 standards of trains' lengths – with 57 / 71 indicative (reference length) wagons, i.e. 850 / 1050 meters used in respectful rail gauge areas.

The testing of different contrailer platforms (Sdggnqss-w, 13-9938, 13-9961 and others) with vertical and horizontal loading / unloading technologies, run between years of 2011 – 2018, gave negative results, mostly due to long durations of loading / unloading, which is unacceptable for the regular line services. Therefore, currently the low floor wagons equipped with turning ramps are considered to be the most suitable rolling stock for the contrailer transportation in Russia.

The contrailer terminal should have at least 2 loading / unloading zones with capacities to handle goods of the regular trains of 57 / 71 reference wagons' lengths without break-up of trains, as well as to handle trains of 2 different routes, while in terminals with relatively low freight traffic it is possible to organize just 1 loading / unloading zone for contrailers.

3.2.3 The TTS of the high-speed transportation of packaged goods.

Packaged goods shall be carried by the regular trains (fixed schedules) with the standard composition (regardless of number of packages loaded), using ‘passenger-type’ routes (from a terminal to a terminal, excluding marshalling / shunting operations). The maximal speed of a train shall correspond to the permissible maximum speed for the rail passenger transport, which is up to 160 km per hour, and the traction shall be provided by locomotives for passenger haulages. The length of such train should not exceed 625 meters, which allows for performing of goods’ handling in passenger stations inside urban territories. In the light of the prevailing types of prospective cargo (e-commerce items, FMSG and perishable goods, etc.), this solution shall facilitate deliveries on ‘the first & the last miles’ of transportation of goods.

It is foreseen, that goods to be transported by this system, will be mostly palletized, significantly increasing the efficiency of loading / unloading operations, which is particularly essential for transit terminals. The operations of palletizing could be performed either by a consignor of goods in compliance with all norms and regulations of the rail transportation for packaged goods (weight, size, volume, compatibility, classes of dangerous goods, etc.), or by terminal operators, who will be able to compose a ‘full-pallet-load’ batch with small miscellaneous items.

New special gondola freight wagons with central doors and with the inner dimensions equal to those of the High Cube Pallet Wide container, totaling 30 standard euro pallets, shall be used in this transportation system. Such wagons with added variable-gauge running gear systems (1 435 / 1520 mm) will be used for travelling along international routes (South East Asia countries – Russia – Europe, ITC ‘North – South’, as well as routes of ITCs ‘Primorje-1’ and ‘Primorje-2’ between the Russian Far East and northern part of China, etc.). The compositions of trains (number of wagons) shall also be fixed and stable.

A typical terminal for the high-speed freight transport shall have 2 loading / unloading zones with the lengths of not less than 635 meters each and with the capacities to handle trains of 2 different routes. Warehouse facilities with packing / unpacking equipment and storage areas for pallets should be also provided in such terminals. Parking lots for vehicles are to be located in the proximity.

Terminal trailers and forklifts shall be sufficient as the handling equipment.

The high-speed freight terminal of the network TLC could be located outside of the main intermodal site, being a sort of ‘remote unit’, and such arrangement seems to be more feasible in the rail ports or in the major transportation hubs, like Moscow or Saint-Petersburg.

3.2.4 The trains movement technologies.

The unified solution for all TTS used on the network is the introduction of the advanced technology, which implies the organization of rail line services, provided by the freight trains travelling according to the fixed schedules (including intervals at transit terminals), regardless of actual volumes of cargo loaded (passenger-type haulages).

It is envisaged that a full-length train is pushed / pulled into / from the loading / unloading zone of the terminal without break-up, shunting and assembling racks of wagons. The operations of placing / extracting wagons shall be performed by electric locomotives, pushing and pulling the entire trains. Therefore, all terminal tracks shall be electrified and connected to unified systems of control and signaling for both private and public tracks / sidings networks.

As these operations require some limits and restrictions, connected with safety, and the maximum speed of traction should not exceed 5 km per hour, the distance between a connection station and terminal zones should be in the range of 2.5 – 3 kilometers, that need to be also considered when a design of a terminal is elaborated.

The operations of placing / extraction of wagons of the high-speed freight trains are to be performed by electric locomotives pulling movement, which imply availability of electrified tracks in loading / unloading zones and of an additional locomotive release track.

Moreover, the direct access of trains from main lines to terminal sidings in both directions is envisaged, which also exclude shunting operations.

This technology also requires the completion of all trains' inspections, checks and tests to be conducted at terminal facilities instead of those at a connection station.

In 1520 rail gauge areas the same rail lines are used for the passenger (including the high speed) and freight transportation trains, which decreases the haulage capacity of infrastructure due to the significant difference of permissible speed of the passenger (140 and 160km/h) and freight transport (90km/h, actually not exceeding 85km/h). One of possible solutions for this problem could be the increase of freight trains speed up to the level of the passenger transport. Therefore, in 2019 the appropriate measures have been taken to test and launch first platforms (13-6990 model) with the characteristics similar to the passenger cars' parameters. Besides, appropriate experimental changes to be introduced in constructions of both the passenger (to haul freight trains) and the freight locomotives (to increase permitted speed up to 140km/h) are being elaborated nowadays.

3.2.5 The warehousing technologies

The set of warehouses (warehouse complex) located in the territory of a TLC of the network shall have capacities for all the range of warehousing and logistics services with added value covering the entire assortment of goods handled at the TLC.

The warehouse complex should include warehouse facilities of different classes with a wide range of functionalities, i.e. the short- and-long term storage, the cross-docking operations, the temperature- and humidity-controlled refrigerators, and so on. It is envisaged also, that rail access tracks could be provided, as well as open storage areas, parking slots for vehicles, etc., should it be considered as feasible and necessary.

The performance characteristics of handling equipment, technological vehicles, mechanisms and the like should correspond to those of the handling equipment of terminals, and, in some cases, could be interoperable.

3.2.6 The structural and layout requirements.

Each TLC of the network shall comprise:

- a container terminal;
- a contrailer terminal;
- a high-speed freight terminal;
- a warehousing complex;
- a Customs Center, comprising the Federal Customs Service inspection units, the temporary storage warehouse, outdoor storage areas, checkpoints, etc.;
- a business center;
- a terminal for out-of-gauge and overweight goods (optional);
- administrative and supporting facilities;
- transport infrastructure, including the rail network of public mainlines, the access tracks and terminal sidings, the internal road network, parking lots;
- utilities & engineering infrastructure, including power and gas supply grids, water supply and sewerage, wastes treatment plants, etc.

The layout parameters of major structural objects of a TLC, given in Table 3.2, should be taken in consideration as the network's unified requirements, particularly when a location of the TLC's site is chosen.

Table 3.2 – Recommended parameters of the TLC objects.

	Technological objects	Recommended parameters			
		Loading/ unloading zone length, meter	Number of loading/ unloading tracks	Structural zone dimensions, L x W, meter	Zone area, hectare
1	Customs center	–	–	180 x 120	2,2
2	Container terminal	1050	3 – 6	1150 x 130	15,0
3	Contrailer terminal	1050	1 – 2	1250 x 120	15,0
4	High-speed freight terminal*	620	1 – 2	1000 x 100	10,0
5	OOG terminal*	250	1 – 2	250 x 60	1,5
6	Business center, administrative and supporting facilities zone	–	–		25,0
7	Warehouse complex	*	*		Not less 30,0
				TOTAL	**~ 100**

* – optional

The number of loading/ unloading tracks in:

- the container terminals:
  - in rail ports – not less than 5 tracks (the complete loading / unloading of regular line services' full-size trains, handling of shuttle block trains of routes with satellites, racks with variable number of wagons, which could arrive from sea ports / border-cross stations in order to 'push' cargo out of congested departure facilities);
  - in other TLSs - at least 3 tracks;
- the contrailer terminals:
  - in terminals at endpoints of routes – not less than 2 tracks as the handling of complete loading / unloading of regular line services' full-size trains require longer time periods;
  - in transit terminals could be 1 or 2 tracks;
- the high-speed freight terminals:
  - in terminals at endpoints of routes – not less than 2 tracks as the handling of complete loading / unloading of regular line services' full-size trains require longer time periods;
  - in transit terminals could be 1 or 2 tracks

Evidently, the substantial growth of freight traffic volumes in areas of TLCs' locations would greatly impact the existing transport situations in respectful multimodal nods, which shall result in significant increase of pressure on local road networks. Taking into consideration the local conditions in Russian regions, one can predict, that the most probable connections of the inner road networks of TLCs will be provided to two-lanes roads of II – III categories with traffic volumes in the range of 2 – 10 thousand reference vehicles per a day. Variants of connections to roads of lower categories should be excluded at the stage of selection of land sites for the TLCs locations.

The simulation modeling of such connections was conducted to calculate the daily average traffic volume using the anticipated volume of approx. 800 vehicles per hour with daily variations up to 80 per cent. The calculations showed that the new traffic volumes of 100 vehicles per hour, generated by the new TLC operations and added to the above stated value, would result in critical volumes of total traffic with the probability of congestions constituting over 70 per cent level. To solve this problem the 'time-slotting' technology should be used to control the fixed slots which provides the authorized access to entry the territory of the TLC during periods of time, balanced with peaks of road traffic.

As the TLC of the network is supposed to additionally generate road traffic in the range of 5 ÷ 15 thousand vehicles daily, it should be taken into consideration, that at the total traffic volumes of 1 900 vehicles per hour main roads need to be upgraded to the higher categories (see Fig. 3.5).

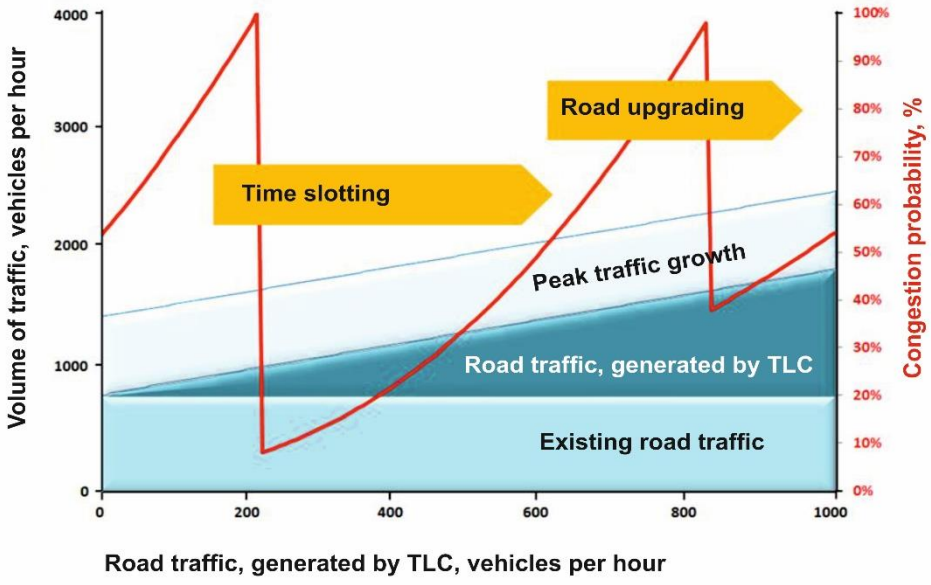

Fig. 3.5 – The assessment of the traffic volume in the road, connected to the new TLC

Sanitary protection zones' requirements should be also taken into account during the stage of layouts elaboration.

3.3 The logistics technologies.

3.3.1 The rail ports.

The rail ports present the further stage of development of the traditional concept of ‘dry ports’, which are traditionally created by stevedoring companies in hinterland areas to increase handling capacities of their facilities in sea ports. In such cases a dry port, being a sort of ‘remote unit’ of a sea port’s terminal with unified transport & logistics technologies, allows to expand volumes of loading / unloading operations for shipments in berth’s scarce area by relocating additional handling operations, like customs clearance and various inspections, unpacking, long-term storage, consolidation of ship loads, freight distribution, etc.

However, the local spatial situations in the locations of the Russian major ports (S.-Petersburg, Vladivostok, Novorossiysk, etc.) make it unfeasible for each stevedore company to set up its own dry port facility. Therefore, the rail port should provide the functions of, so to say, ‘a passenger railway station for cargo’, accumulating the cargo flows from the relevant surrounding zone of responsibility (large agglomerations, ocean / sea ports, industrial parks, border-crossings, etc.) with further transportation by the rail line services with fixed schedules along the fixed routes within the TLC network, including satellites.

It is evident, that the operations of the rail ports should be supported by the unified IT management system to provide electronic workflow management.

3.3.2 Customs administration.

The Russian term ‘a transport and logistics center’ might be also interpreted as ‘a dry port’ in accordance with the provisions of the UN treaty of 2013 ‘Intergovernmental Agreement on Dry Ports’ (valid in the Russian Federation since the Decree of the Government dated 10.31.2015), which defines “…a dry port of international importance ("dry port") shall refer to an inland location as a logistics center connected to one or more modes of transport for the handling, storage and regulatory inspection of goods moving in international trade and the execution of applicable customs control and formalities.”.

Under the Russian conditions it means, that imported maritime goods could be transported by an authorized customs’ carrier from a sea port directly to a TLC of the network, located in an area of consignee’s operations, with the possibility to perform all necessary formalities at the Customs’ facilities of the destination TLC.

Therefore, taking into account that significant volumes of international trade and transit goods will be handled in the TLCs of the network, the creation of the

integrated Customs center (consisting of the Customs Service unit, a temporary storage warehouse, etc.) is envisaged in the territory of each TLC as a part of the technological chain.

3.3.3 The ‘Just-in-time’ deliveries.

The transportation technologies (regular rail line services), which shall be used within the network, would enable providers to introduce into the market the range of advanced multimodal transport services with the high predictability of deliveries, based on the logistics concept of ‘just-in-time (JIT)’ inventory management system.

These logistics solutions used to support the supply chains management and manufacturing systems create the solid basis for the reduction of production cycles’ total duration as well as of inventory costs, for the acceleration of cash flows and efficiency growth, etc.

3.3.4 The value-added services.

It is predicted, that service providers, enjoying unique high-quality environment, shall propose to their customers the comprehensive range of warehousing and distribution value-added services, including fulfillment and reverse logistics, domestic and regional/international consolidation, kitting and assembly, pre-inspection and pre-installation, product customization, quality controls, re-packing, product disposal, cross dock and sorting, packing / repacking, labeling, etc.

4. The model of the information and analytical support for the transport & logistics operations in the network TLCs.

Nowadays, the efficient management of supply chains cannot be performed without the usage of relevant digital solutions applications, provided by modern automatic management and data exchange systems, integrated into appropriate platforms. The operations of all infrastructure objects of the TLC network shall be supported by the corporate Computerized Integrated Management System (CIMS), which is going to form an integrated part of a Digital Platform of the Russia’s Transport System.

Parameters of the future CIMS should correspond to the principles of the State Program ‘Digital Economy of the Russian Federation’ in regard of the national transport system.

It is planned, that the system shall integrate tools and engines, required to support all functions for the provision of transport & logistics services of the network in and between the TLCs, including customs clearance and release.

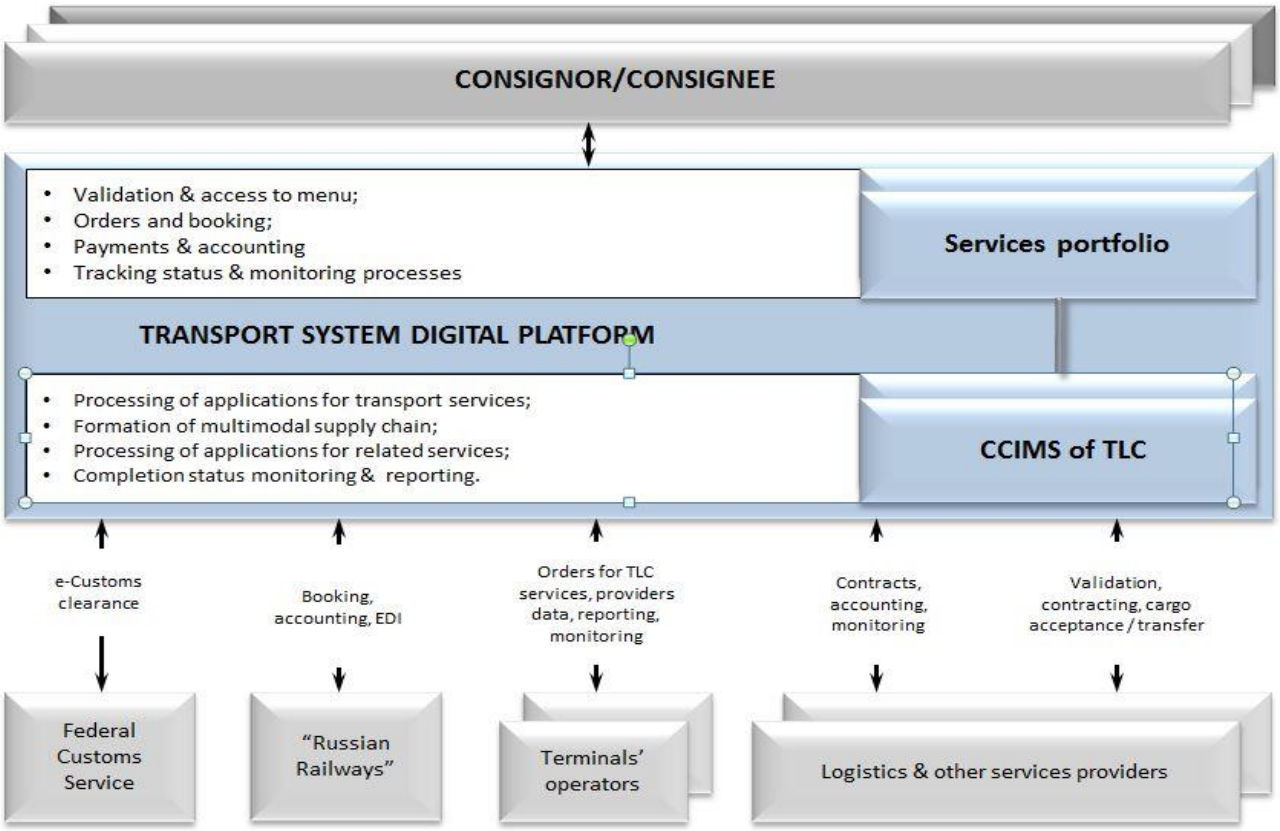

Fig. 4.1 – Scheme of interactions of transport & logistics companies and providers via CIMS

4.1 The architecture and platform of the CIMS

At the phase of development of the CIMS architecture the following requirements and aspects should be taken into consideration:

- the possibility to expand considerably functionalities of the system by adding appropriate modules, like data bases for customers' access, EDI features or services' engines, etc.;
- the autonomous and independent operability of the system, security and cyber-attacks resistance; multi-platform interfaces and work stations; enhanced big data processing effectiveness, etc.;
- the interoperability with the internal management systems in various fields of TLC operations, like CRM, PLM, ERP, WMS, TMS, etc.;
- the possibility to integrate with the existing and perspective domestic (ERA-GLONASS automated information and navigation system, ETRAN

system on e-consignment workflow in rail transport, ASU TK automated management system of the transport system of Russia, etc.) and international (LOGINK, Neal-Net, etc.) platform, automated systems and software products;

It should be also noted, that the existing management and information systems in Russia's freight transport industry are oriented to solve quite narrow set of applied sectorial and corporate problems, forming fragmented digital environment with non-interoperable various standards and architectures, that creates a serious obstacle for further development of digital transport. Therefore, it is desirable to take into consideration all the positive and negative features of the relevant IT systems, operated by the leading state and private entities of the Russian's transport industry, like 'Russian Railways', 'TransContainer', and so on.

4.2 The technological and commercial solutions

The CIMS of the TLCs should provide information management services to a wide spectrum of users, like consignors and carriers, forwarders and equipment owners, providers of logistics services and terminal operators, etc., as well as customs and inspections organs, tax and statistics offices, and so on. The users of the integrated system shall be provided with the following categories of services:

- the transport & logistics services at large;
- the information, ancillary and related services;
- the secure information interactions and communications;

It is envisaged, that all information and management services of the TLCs of the network shall be integrated into the Digital Platform of the Transport System of Russia to provide actual digitalization of transport industry.

Moreover, the safety and reliability of handling operations could be significantly improved by the usage of autonomous terminal vehicles (trailers, forklifts, etc.) under CIMS's sophisticated IT algorithms of cargo traffic management.

The network CIMS will provide open access to required information for all users, such as rail lines' services details, prices and rates, schedules, booking variants, etc., enabling customers to choose an appropriate set of transport & logistics services and customs operations, to contract service providers and to make payments via the CIMS in electronic format, as the system is supposed to be a concentrator for all financial transactions as well.

Using the appropriately received applications, orders and contracts of a customer, the CIMS shall configurate an entire chain of multimodal transport and logistics operations with visualization of results accessible for the authorized users.

The synergy, built by interoperability of the CIMS and other relevant IT systems, should provide for upgrading of digital transport environment to the higher quality level, creating a basis for the national e-platform of the multimodal freight transport in Russia and across the ITCs as well.

It is expected that the trusted information space of the CIMS integrated into the Digital Platform of the Transport System of Russia, shall unite the majority of the transport & logistics market actors, who will use the advanced digital technologies. The freight transport with improved efficiency, predictability and transparency as well as with comprehensive range of services provided and optimized pricing policies introduced, would also lead to expected substantial reduction of 'grey' transport traffics.

5. Project management

5.1. The progressive implementation

The general topology of the network of the TLCs, including centers, located outside the Russian territory but being essential for international and transit transportation, is depicted in Fig. 5.1.

It is evident that the full deployment of the entire network of all the TLCs with the described above parameters will be a lengthy (the acquiring of land sites, accumulating of investments, providing transport and engineering networks, etc.), a time-consuming (the design, engineering and construction of infrastructural objects) and a complex (from points of view of technologies – the development and introduction of advanced technologies in transport, logistics, terminal & warehousing, IT, customs administration fields, and of the management – the collaboration of actions of private and public entities, the synchronization of availability of several commissioned TLCs and start of rail line services transportation, the validity of necessary rules and procedures, etc.) process.

Therefore it is more sensible to phase the implementation process into stages in accordance with rating scores, identifying the back-bone TLCs, which constitute the core network, i.e. a necessary and sufficient number of centers synchronously commissioned into service to provide infrastructural support to the intermodal regular rail freight line services with fixed schedules, including the high speed freight traffic.

At the initial stage, the accumulated and sufficient financial, administrative and human resources will ensure the deployment of the core TLCs network within the time period, stipulated by the national strategic planning documents, listed above, thus achieving the strategic objectives of the Federal Program 'Transport and Logistics Centers'. The core network could be primarily configurated by connecting the existing transport & logistics infrastructure objects, upgraded to meet the network requirements, described above. The introduced advanced technologies, explained in respectful parts of the present General Scheme, would complete the formation of the core TLC network. During further stages, the rest of TLCs will be deployed to constitute the comprehensive federal network of transport & logistics infrastructure. Besides, it is expected, that the formation of the comprehensive TLCs network will be fostered by positive operational examples and experience, gained in application of effective implementation mechanisms.

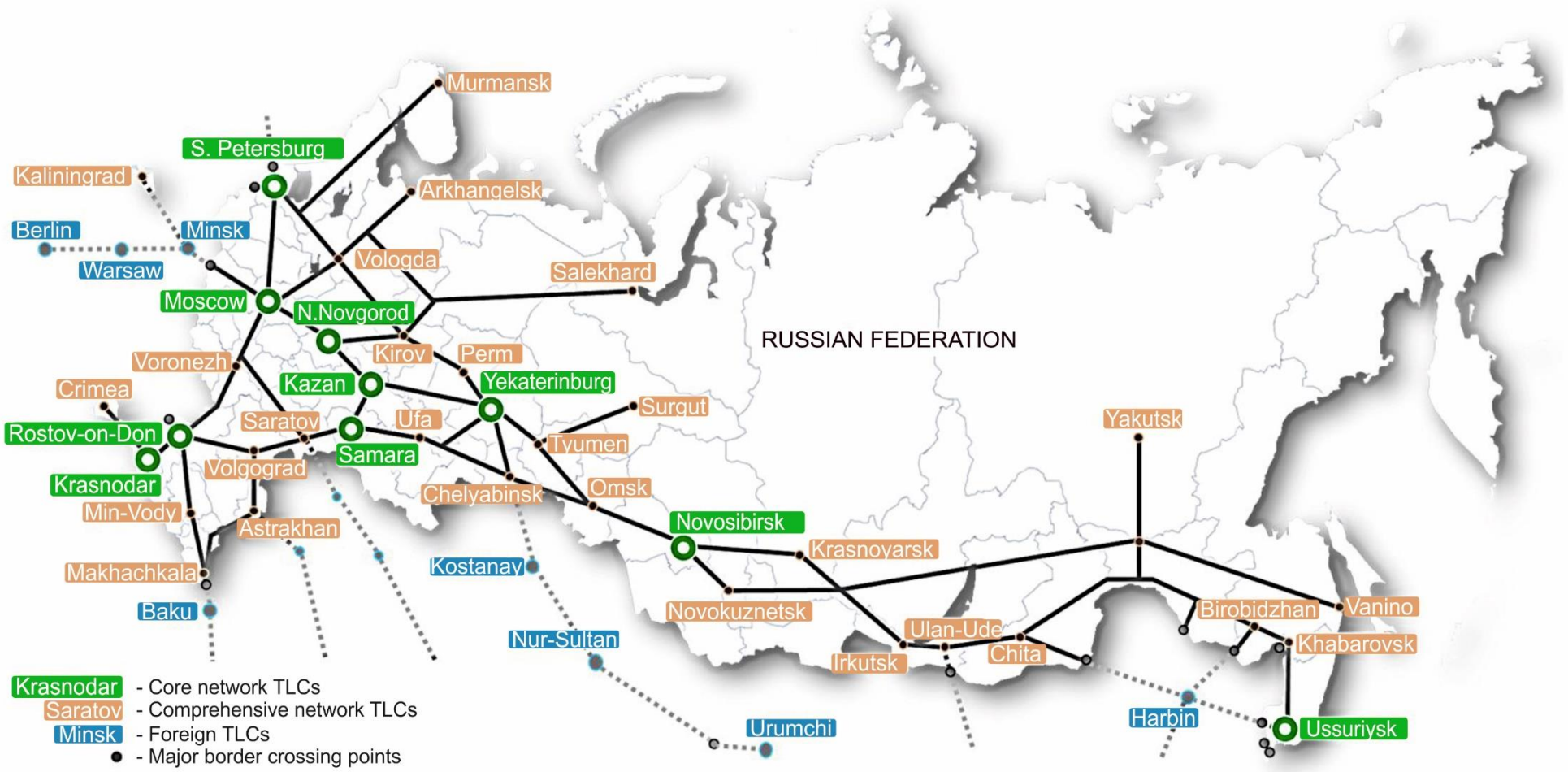

Fig. 5.1 – General topology of the TLCs' network

The prospective routes of the regular rail line services, including possible transport network outside Russia, are shown in Fig. 5.2. Traffic volumes (in pairs of trains) shall be defined later, when exact throughputs of the core TLCs with their satellites would be defined.

Fig. 5.2 – Prospective routes of regular rail line services via the core network TLCs

While elaborating locations of the core TLCs, the decision was made to add two more TLCs in the cities of Kaliningrad and Ulan-Ude, which should ensure the application of the network technologies on the routes between European countries and China (with transit via Mongolia). Thus, the general topology of the core network of TLCs is configurated as shown in Fig. 5.3.

The main characteristics of the suggested locations of the core TLCs are given in Table 5.1.

Table 5.1 – The parameters of the core TLCs' locations

Region	Category of land plot	Transport network connection point			Engineering network	Distribution
		Rail station	Road network	Inland Waterways		
Saint – Petersburg agglomeration	Industrial/transport	Bronka, < 3 km	S.–Petersburg Ring Road	Baltic Sea basin	available	0 km (Ring Road), Industrial park
	Industrial/transport	Shushary, 1 km	S.-Petersburg Ring Road	Baltic Sea basin	available	0 km (Ring Road), Wholesale & Distribution Center (WDC)
Primorskiy Krai (Ussuriysk)	Industrial/transport 320 ha	Ussuriysk 2, 1 km	Regional road 05K-182	Rail port, Pacific basin		WDC
Krasnodar Krai	Agricultural	'9th kilometer', < 3 km	Regional road 03K-016	Rail port, Azov-Black Seas basin	available	Crimea bridge
	Industrial/transport	Pashkovskaya, <3 km	Federal motorway M-4 'Don', urban network of Krasnodar		available	0 km, WDC
Kaliningrad Oblast	Industrial/transport	Dzerzhinskaya Novaya, 1 km	Urban network of Kaliningrad	Baltic Sea basin	available	0 km
Moscow agglomeration	'Bely Rat' TLC, 180 ha	Beliy Rast, 1 km	Federal road A-107	Moscow Canal	available	31 km (MRR), WDC
	'Vostochny' TLC	Elektrougli, <3 km	Regional road 46K-7012		available	25 км (MRR), WDC industrial park
	'Khovrino' TLC	Khovrino, < 3 км	Moscow Ring Road, urban network of Moscow		available	0 km (MRR)
	'Vorsino' TLC	Vorsino, < 3 km	Federal motorway M-3 'Ukraine'		available	Industrial park, WDC
Nizhny Novgorod Oblast	110 ha, no category	Doskino, 2 km	Federal motorway M-7 'Volga' (Western bypass)	River Volga		0 km, WDC

Sverdlovsk Oblast	Agricultural, no category	Sedelnikovo , < 3 km	Ekaterinburg Ring Road (8 km)			8 km (ERR), WDC
	Agricultural, no category	Apparatnaya, < 3 km	Urban network of Ekaterinburg			0 km
Samara Oblast	Agricultural, no category	Kinel, < 3 km	Regional road 36K-851	River Volga	available	12 km, WDC
Republic of Buryatia	Russian Railways freight yard with additional plot available	Taltsy, < 3 km	Urban network of Ulan-Ude, regional road 81K-010			0 km
Novosibirsk Oblast	Industrial/transport	Chik, 1 km	Interregional road P-254		available	20 km, industrial & logistics park
	Industrial/transport	Kleschikha, 1 km	Urban network of Novosibirsk		available	0 км
Rostov Oblast (Bataisk)	Industrial/transport 106 ha with additional agri plot available	Koysug, < 2 km	Federal motorway M-4 'Don' (1 km)	Azov-Black Seas basin, river Don	available	20 km (Rostov-on-Don), Processing & Logistics Depot, WDC, industrial zone
Republic of Tatarstan	'Sviyazhsk' TLC	Sviyazhsk, < 2 km	Federal motorway M-7 'Volga' (8 km)	River Volga		40 km

Fig. 5.3 – The core network topology

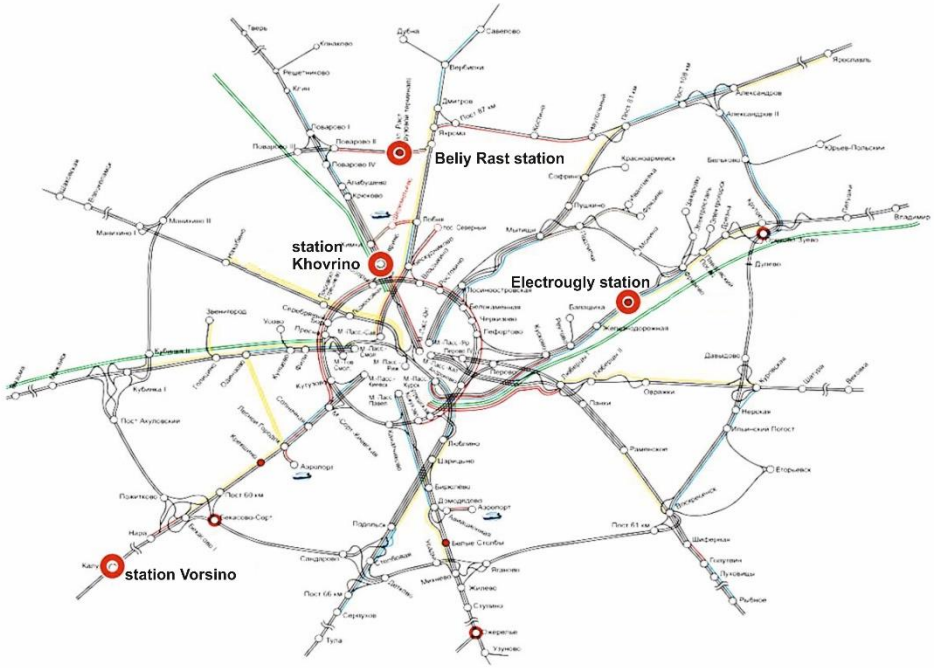

Fig. 5.4 – TLCs of the Moscow agglomeration

The satellites as terminals or groups of terminals connected with relevant TLCs by integrated and unified transport & logistics technologies, being hinterland daughter terminals of such TLCs, or specialized terminals oriented to handle cargo of specific categories which cannot be handled or stored at the core TLCs due to restrictions or limits, shall be essential infrastructural objects to expand the efficiency of the entire network.

Table 5.2 – Satellites of the core TLCs

TLC location	**Satellites**
Moscow agglomeration	‘Russian Railways’ freight yards - Kuntsevo-2, Moscow-tovarnaya-Yaroslavskaya
S.-Petersburg agglomeration	Murmansk, Petrozavodsk, border crossings – Brusnichnoe, Svetlogorsk, Ivangorod, Torfyanovka, sea ports – Ust-Luga, Vyborg, Primorsk, ‘Russian Railways’ freight yards - Shushary, S.-Petersburg – Finlandsky, S.-Petersburg-tovarny-Moskovsky
Krasnodar Krai	Sochi, Sevastopol, Simferopol, Maikop, sea ports – Novorossiysk, Taman, Temryuk, Kavkaz, Kerch
Primorskiy Krai	Vladivostok, Nakhodka, Artyom, Arsenyev, border crossings -–Khasan, Kraskino, Pogranichny, sea ports – Posyet, Zarubino, Slavyanka, Vladivostok, Nakhodka, ‘Russian Railways’ freight yards – Pervaya Rechka, Artyom-Primorsky, Grodekovo
Rostov Oblast	Mineralnie Vody, Stavropol, Nazran, sea ports – Makhachkala, Taganrog, Azov, Yeisk, border crossingS – Gukovo, Novoshakhtinsk
Nizhny Novgorod Oblast	Arzamas, Dzerzhinsk, Kstovo. Kirov, Cheboksary, Saransk, Yoshkar-Ola, Ivanovo, Kostroma, ‘Russian Railways’ freight yard – Yuryevets (Vladimir)
Sverdlovsk Oblast	Nizhniy Tagil, Serov, Perm, ‘Yuzhnouralsky’ TLC, ‘Russian Railways’ freight yard – Voynovka (Tyumen)
Novosibirsk Oblast	Tomsk, Novokuznetsk, Kemerovo, Barnaul
Samara Oblast	Ufa, Togliatti, Syzran, Chapaevsk, ‘Russian Railways’ freight yards – Bezimyanka, Menovoy Dvor, Uralsk (Kaxakhstan)
Kaliningrad Oblast	Chernyakhovsk, sea ports – Kaliningrad, Baltiysk, border crossings – Mamonovo, Bagrationovsk, Sovetsk
Republic of Buryatia	Irkutsk. Chita, border crossings – Naushki, Zabaikalsk
Republic of Tatarstan	Nizhnekamsk, Naberezhnye Chelny, Cheboksary, Saransk, Yoshkar-Ola, Ulyanovsk, ‘Russian Railways’ freight yard - Vakhitovo

The data bases of the analysis, information and management system of the transport system of Russia (ASU TK abbreviation in Russian), operating to fulfill the functional task of the Russia’s Ministry of transport ‘Creation and maintaining of the Transport and Economic Balance of the Russian Federation’, were used to

obtain the preliminary assessment (up to 2024) of the core TLCs' potential cargo volumes.

The term 'potential cargo volume of a TLC' means a definite volume of goods of intermodal supply chains, which make the use of a relevant TLC's services feasible technologically and commercially.

To make this assessment all the constituent entities of the Russian Federation were divided into logistics zones to be served by a specific TLC of the core network. Table 5.3 contains the results with esteemed potential cargo flows of each core TLC, calculated as the sum of incoming and outcoming containerized goods with the application of an individual ratio of containerization for each specific category of cargo. These results exclude freight volumes transported between areas within the same logistics zone of a TLC.

The volumes of transit traffics were calculated in order to estimate the possibility to meet the requirements of the Decree of the President of the Russian Federation dated 05.07.2018 No. 204 'On National Goals and Strategic Priorities of Development of the Russian Federation for the Period up to 2024', concerning the target '…to quadruple volumes of rail transit container traffic'. It is expected, that 60 per cent of the target transit container volumes would be transported on 'East – West' route via the TLCs' network.

Naturally, while design throughputs of the network TLCs should be adequate to handle the maximum potential cargo flows, it is understood, however, that, in spite of the complex nature of the implementation process, the cargo handling capacities of all TLCs, operable in 2024, should reach not less than 60 per cent of nominal throughput values.

Table 5.3 – Potential cargo flows of the core TLCs, thousands of tons per annum

TLCs' locations	Cargo flows				TLC throughput capacities in 2024
	domestic	import-export	transit	Total	
Moscow agglomeration	6 183	8 165	4 782	**19 130**	14 576
S.-Petersburg agglomeration	2 354	5 748	5 007	**13 109**	8 746
Krasnodar Krai	2 098	2 761	1 252	**6 111**	6 096
Rostov Oblast	2 388	1 613	200	**4 201**	4 298
Republic of Tatarstan	1 640	1 109	1 000	**3 749**	2 556
Nizhny Novgorod Oblast	1 661	938	500	**3 099**	2 556
Sverdlovsk Oblast	3 321	2 567	3 670	**9 558**	7 124
Samara Oblast	2 594	1 750	500	**4 844**	4 095
Primorskiy Krai	1 472	2 611	3 097	**7 180**	6 520
Novosibirsk Oblast	2 712	2 781		**5 493**	6 592
Kaliningrad Oblast	267	89	2 087	**2 443**	1 974
Republic of Buryatia	1 372	2 862	1 500	**5 734**	3 018
TOTAL:	**28 062**	**32 994**	**23 595**	**84 651**	**68 150**
	33,2 %	38,9 %	27,9 %	**100 %**	80 %

5.2 Socio-economic and budgetary effectiveness

The achievement of the goals of the development of the TLCs network shall have positive impacts on the implementation of several strategic planning documents of the Russian Federation, including:

- on national security – by improving the quality of life, and by strengthening of the national economy competitiveness;
- on economic security – by providing the sustainable development of primary sectors of economy, by the spatially balanced development of all the regions of the country, by realization of potential capabilities of the export-oriented sectors of the national economy;
- on spatial development – by eliminating infrastructural gaps and enhancing accessibility of transport infrastructure, by reducing interregional disparities in socio-economic development of Russian territories;
- on socio-economic development of the Russian Far East and the Baikal regions – by providing accelerated pace of development of the entities of the Russian Far East and the Baikal area, by creating condition for sustainable development of promising economic sectors in accordance with their natural resources and industrial potentials, by reducing barriers for the Far East regions' integration with other parts of Russia;
- on development of small and medium entrepreneurship – by creating innovative basis for competitive enhancement of SMEs development.

The achievement of the goals of the development of the TLCs network shall have positive impacts on the implementation of the following National Projects:

- the International cooperation and export – by creating modern infrastructure for export-oriented supply chains, by promoting of domestic agricultural products, by lowering logistics and regulatory barriers, by facilitating seamless rail, maritime and air transportation of export freight, by increasing export volume of transport services up to USD100 billion per annum;
- the Small and medium entrepreneurship and support of entrepreneurial initiatives – by increasing the number of employed personnel in SMEs, by enhancing of shares of SMEs both in the national GDP and in total exports of non-raw materials;
- the Digital economy – by creating the cross-cutting IT environment based primarily on the domestic hardware and software solutions;

- the Labor productivity and support for employment – by increasing the labor productivity in large and medium enterprises in non-raw material sectors of economy.

Besides, the deployment of the network of the TLCs will provide beneficial conditions for:

- the reduction of costs of the basic basket of goods and services and the increase of real incomes;

- the development of the transport & logistics market, creation of new highly skilled jobs;

- the improvement of spatial development of urban agglomeration by re-locating obsolete productive facilities outside urban areas and by eliminating the congestion generating objects, thus improving the quality level of habitat and reducing the negative impacts on environment;

- the improvement of emergency preparedness due to the development of logistics network of the Ministry of Defense of the Russian Federation.

The deployment of the network of the TLCs shall stimulate expanded and improved activities of economic operators in not only transport sectors but also in other non-raw material productive sectors of the national economy, which will provide for the increase of tax revenues to budgets of all levels.

The preliminary assessment of the additional tax revenues that would be generated during the first 10 years of the TLCs commission, will total not less than 77 billion of rubles, including 43 billion rubles of the Federal budget, 33 billion rubles revenues of the relevant entities of the country and 1 billion rubles shall be received by municipalities.

5.3 The risks analysis

The following critical and high risks of the development of the Program are identified:

the legal and regulatory – formalization of property rights in land plots (late transfer of land plots, improper demarcation and cadastral registration, complex conversion of lands into the category ‘industry and transport’, etc.) – the high risk;

the managerial:

- mismanagements, primarily in synchronized formation of the network’ infrastructure (transport, engineering, operational, etc.), in design and engineering (development and certification of new types of the rolling stock, obtaining of

permits, authorizations, approvals, etc.), in interactions with the federal, regional and municipal authorities as well as with foreign administration bodies – the critical risk;

– corruption, including unfair competition – the high risk;

the financial – lack of investments, including need for multiple investors to be attracted, highly leveraged structure of funding, etc., - the critical risk;

the technological – unforeseen problems in development and introduction of new technologies (transport, terminal, information) – the high risk.

The planning, design and implementation of relevant activities should be incorporated into the Federal Program 'TLC' to effectively hedge these risks.

5.4 The state support measures

The preliminary assessment of investments performance, made by comparison with the results of similar projects' implementation, showed the typical payback period to be in the range of 7 – 11 years. Such discrepancies are caused by the different volumes of cargo handles at transit and terminus terminals of the network. At the same time, however, operations of the transit terminals with the lower handling volumes and consequently with longer investments' payback periods, are technologically required in the network's nods to provide for modal shifts and re-routing of haulages.

The main beneficiaries of the Federal Program 'TLC' are various owners of cargo, carriers, logistics' services providers, etc., and the state and society at large, while significant investments risks are borne by an investor of a TLC, who develops and operates the facilities.

Therefore, it is sensible to provide an appropriate set of the most effective state support measures for each individual investment project, including interest rate subsidies, administrative support to acquiring of land plots and obtaining of permits, approvals, etc., facilitation of connections to public transport and utilities networks, and so on.

The essential cornerstones of the Program are the development and manufacturing of the innovation rolling stock (high-speed freight wagons and locomotives). To accomplish this mission the successful mechanism of the state funding via a leasing company could be used.

Besides, the Ministry of agriculture of the Russian Federation is authorized to subsidize interest rates of banks' loans to agricultural enterprises for the period of 2 – 8 years to develop:

- logistics centers for crop and livestock sectors;
- wholesale & distributions centers construction or renovation,

and on procurement of machinery and equipment for these purposes.

Moreover, in accordance with the valid legislation the creation of industrial parks, special productive economic zones, advanced special economic zone and so on, could be initiated by all levels' authorities to concentrate manufacturing / processing of products to be handled at a relevant TLC as the core transport & logistics facility of such areas.

5.5 The general organizational and financial modal

The mechanism of public-private partnerships, that most probably will be used to implement individual projects of the network, has some peculiarities to be taken into consideration, i.e. investors, committed to develop the facilities, are in no power to hedge the high and critical risks all by themselves. Besides, such investors are not major beneficiaries of the projects.

In the light of the described above, the basic principles of dividing responsibilities between collaborators within the PPPs' could be formulated as follows:

- the private investments shall be allocated for the creation of the technological facilities of the TLC as well as for the organization of activities of carriers, terminals' operators, providers of warehousing services, etc.;
- the federal co-funding should be allocated for the development of connection public rail and road networks, for the development and introduction of the TLCs' network technologies (transportation, terminal & warehousing, IT platform, etc.), for the deployment of infrastructure objects to be used within the framework of the TLCs network by the state fiscal, control and supervisory bodies (Customs service, border control, transport inspection, veterinary and phyto-sanitary control, etc.);
- the regional co-funding should be allocated for the support in acquiring of land plots and for the development of regional level's public roads and of connection of resources supplies' and utilities' networks.

Results of comprehensive feasibility studies, which should be prepared for each TLC project, shall comprise, *inter alia*, detailed assessments of funds to be allocated by each participant of the investment projects, as well as approved lists of

responsibilities to be fulfilled by them. These results shall be used as the basis for the elaboration of binding Investments Agreements.

It is envisaged also, that appropriate parts of the TLCs' investments projects, connected with the modernization of the core infrastructure, could be inserted into the relevant Federal Projects, like 'Europe – West China', 'Sea ports of Russia'. 'Rail transport and transit'. 'Connectivity of centers of economic growth', and others.

Besides, the authorities of various governmental bodies can support the implementation of the Project with relevant non-financial measures by amending or updating relevant legal instruments in force.

6 Legal and regulatory support

The legal framework of the Federal Project 'TLC' comprises various Federal Laws (statutes, norms and regulations of the rail and road transport, provisions of freight forwarding, etc.), governmental decrees (rules of haulage of goods), ministries regulations and orders, and so on.

However, to improve the efficiency of the network of the TLCs it is reasonable to speed up the adoption of the drafts of the relevant Federal Laws, in particular 'On carriage of the goods in transit through the territory of the Russian Federation' and 'On combined movement of goods', as well as to elaborate and adopt appropriate legal instruments on state support measures, on tariff policies, on new national technical standards for innovative rolling stock, etc.

Moreover, upon commission of the Federal level TLCs, the Russian Federation should suggest relevant updating amendments concerning lists of terminals / dry ports, which are included into numerous international agreements and projects with the participation of the Russian Federation, i.e. 'European Agreement on Important International Combined Transport Lines and Related Installations (AGTC)', 'Intergovernmental Agreement on the Trans-Asian Railway Network', 'Intergovernmental Agreement on Dry Ports', 'Intergovernmental Agreement on the Asian Highway Network', 'Intergovernmental Agreement on the International North-South Transport Corridor', 'Trans-European Railway (TER) project', 'Euro-Asia Transport Links (EATL) project', and others.