ON POSSIBILITY TO LAUNCH TRANSCONTINENTAL FREIGHT RAIL EXPRESS LINE SERVICES VIA RUSSIA AND OTHER RUSSIAN (1520) GAUGE COUNTRIES

ANDREY KRYAZHEV,

head of Department, Institute of International Transport Communications, Moscow State University of Railway Engineering

TIMUR YAKUBOV,

CEO, TriniCom Ltd. group

SERGEY ZIMIN,

Terminal Logistics Center Development Co. Ltd., Moscow, adviser to CEO

The recent bursting development of the information technologies resulted in globalization processes, witnessed nowadays in different spheres of life, and in particular – in the globalization of material markets. This transformation presents a critical challenge to a current status as well as to further developments of any national industrial system, including its transport & logistics infrastructure as an integral part.

Today a competitiveness of any manufacturer is defined not only by price/quality/specification of a produced item, but also by market availability, connected with the highly effective delivery & distribution logistics. Thus, according to experts' evaluation, the level of selling price reduction of some expensive consumer goods, like home appliances or electronics, could reach up to 2,5% of an original price per day. In the globalized markets successful

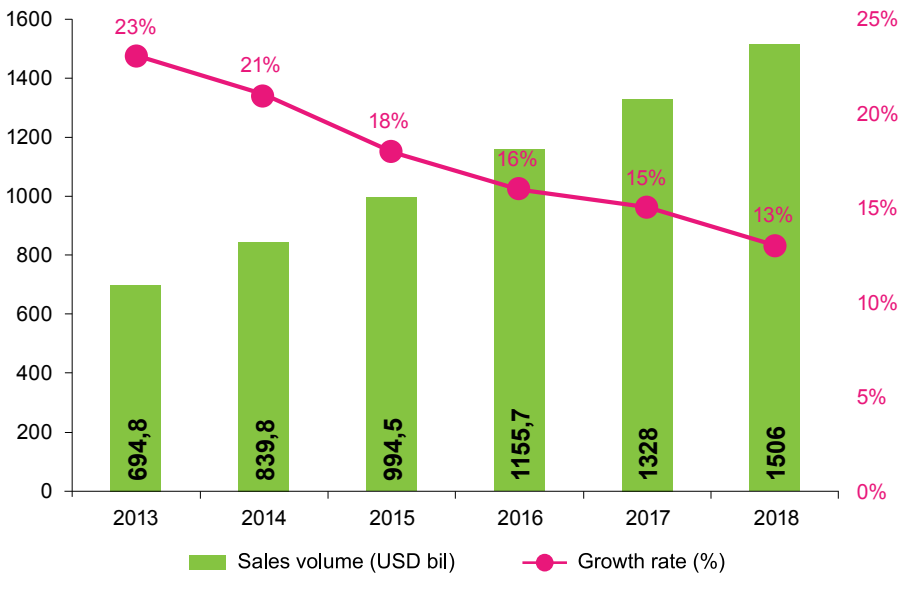

Figure 1. The global Internet sales volumes in 2013 – 2018 (source: A.T. Keatney)

sales of a wide variety of 'expensive' consumer goods should be inevitably supported by constant efforts to reduce a transportation & distribution portion of a self-cost of a product synchronized with efforts to reduce a delivery time period. The positive results of such efforts could be achieved by different ways, based upon comprehensive transportation & logistics technologies, international cooperation ties, etc.

The described market transformations caused the new sales forms like e-commerce technology, with diversified logistics approaches shifting from consolidation of batches of goods, establishing of huge distribution centers to a single product optimized direct delivery to a buyer.

The permanent worldwide growth of Internet users forms the respectful growth of the global e-commerce market (fig. 1 shows volumes and growth rate), which in its turn dictates somewhat new requirements on products, influencing the logistics-related parameters, such as design, specifications, handling limits, packing quality, and so on.

The described world market is characterized as the highly concentrated one, with global players like the U.S. Amazon.com Inc. and eBay Inc., China's Alibaba Group, and some others, which helps big logistic providers to develop supply chains and infrastructure network forming.

It could be quite interesting to analyze some peculiarities of the Russian e-commerce market and to identify potential logistics solutions. According to the Russian Association of Internet Trade Companies (AITC) data, the general on-line sales volume reached 760 billion RUR in 2015 (+7% to 2014) in Russia (fig. 2 shows the commodity pattern), while the volume of the direct trans-border e-commerce grew to 219.2 billion RUR (+5%) and the number of imported parcels doubled to 135 million pieces, and 90% of them were mailed from China. In monetary terms the share of the trans-border e-commerce deliveries enlarged to 29% of the overall volume (21% in 2014).

In 2015 the on-line trade share of the overall Russian retail volume was 4%, however, the national e-commerce market has profound potential to grow, as such shares in the USA, Great Britain or Germany are 2–3 times larger.

This new trade technology, which actually excludes wholesale, requires

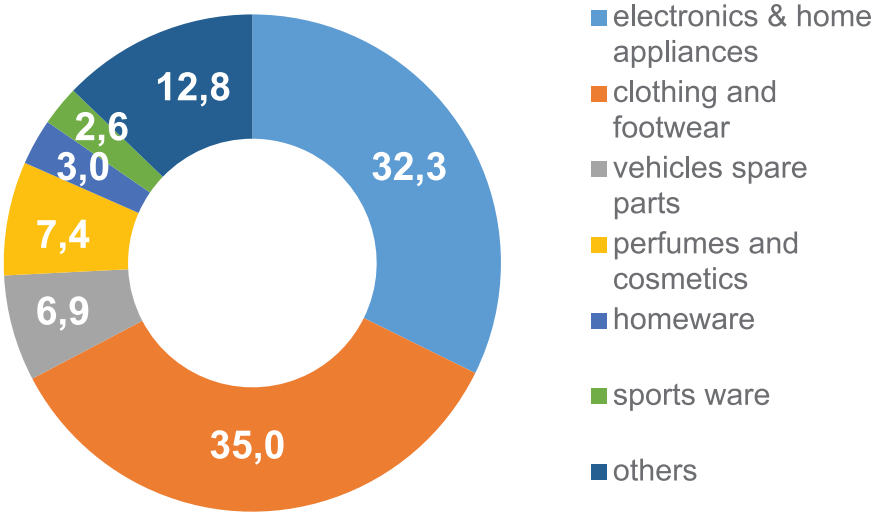

Figure 2. The commodity pattern of e-trade in Russia (source: AITC, 2015)

simultaneously new transportation & logistics solutions (in trans-border trade primarily), focused on 'fast and reliable direct delivery' to a customer, reducing the competiveness of 'cheap but slow shipments'. This trend is evidently illustrated by the massive increase in postal deliveries (see fig. 3), and this could be a lucky chance for railways to attract extra cargo depriving maritime and aviation lines of significant portion of mail volumes providing freight rail express line services would be launched.

It is foreseen nowadays that oil & coal export deliveries transported by the Russian freight rail transport, which account for a prevailing portion of its overall cargo flow, will drop gradually in the long term, caused by the global non-renewable energy sources price reduction, specific geographical features of the Russian territory, environmental demands, innovative alternative energy technologies, etc. Having in mind substantial length of such export routes, it seems unrealistic to hope that lost volumes of cargo flows could be compensated by transit payments unless new transportation solutions, aimed to reduce both transport costs and delivery time, are applied.

The described market trends pose a major challenge to rail freight transport, and supposedly one of the most promising counter-measures could be based on freight rail express line service system, primarily along the New

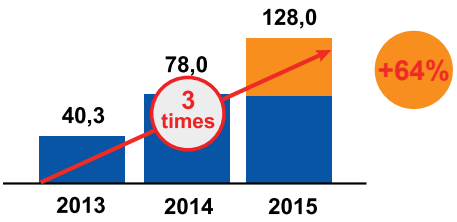

Figure 3. Postal Commercial Parcels Handled, million pieces (Source: "Russian Post" Federal State Enterprise)

Silk Road rail corridors. Evidently, practiced today 'old' trans-border postal shipments technology of using mail freight wagons, which are added to passenger trains, can not be considered as a variant of the proposed solution due to its limits, namely: customs clearance procedures as well as loading/unloading operations in case of expected HSR trains can be organized at departure/destination stations only, cutting off all intermediary stops centers, critically shrinking a potential cargo volume.

From this point of view it is interesting to consider an experience gained by air companies while launching cargo transportation. Not only existing passenger-type aircrafts have been adapted to cargo purposes, but deck containers and pallets, loading/unloading equipment, etc. were designed & manufactured as well as specific handling & storage, packing & fixing technologies

Figure 4. Air Cargo Technologies

at terminals were introduced to start effective operations (see fig. 4).

However, it is important to realize that the described air cargo technologies have been designed to meet quite specific aviation conditions of aircraft, which differ profoundly from those of rail rolling stock ones. For instance, in regular flights an aircraft pitch angle (an angle of an aircraft lateral axis and a platform) of 20 and more degrees is absolutely acceptable, 20 times exceeding the maximum allowable longitudinal pitch angle in main rail tracks. Similar correlation is valid for roll angles, acceleration and brake dynamics, etc. In air transportation exceptionally close tolerances of balancing, fixing and other loading operations while lading are vitally important, and just due to these demands air containers are introduced, and an unfeasible copy of these technologies in any types of wagons in rail transport seems to be unwise.

An ability to pass cross-border points with minimal delays caused by different gauges, power supply, traction, etc. is of critical importance for efficient trans-border rail transportation. Moreover, in case a mixed type (passenger/freight) rail track (HSR or express) is chosen for express cargo lines services, it is also important to foresee a possibility to expand a passenger dedicated track features to meet specific requirements of freight transportation, having in mind the following discrepancies:

– the main criteria for routing of a passenger-dedicated rail track is the shortest possible distance between cities with stations situated normally in centers of them;
– an optimal topology for mixed rail track lines should include into consideration configurations of a relevant international transport corridor, existing chain supply links, industrial & logistics parks and conglomerations, local development programs, etc.

We consider that the RENFE S130 train of Spanish Patentes Talgo S.L. (or its Russian modification named Talgo 250 'Strizh' – fig. 5) could be the most appropriate prototype to develop a suitable freight train to solve the challenges, described above, due to the following features of it:

– speed, max. – 250 km per hour;
– variable-gauge running gear of standard passenger wagons allow to pass any points of different gauges with no stops at the speed up to 15 km per hour (see fig. 5);
– no multiple units;
– train autonomous electric power supply system;
– relatively short (13.14 meter) wagon allows to reduce loading/unloading operations and to optimize cargo lading;
– Talgo 250 'Strizh' is in use on Moscow – Berlin and Moscow – Nizhny Novgorod routes, as well as on some routes in Kazakhstan;

Figure 5. Standard Talgo 250 train composition

Figure 6. Freight mail wagon of Talgo

– 'Tulpar-Talgo' passenger coaches manufacturing JV company in Kazakhstan;
– Patentes Talgo S.L. production assortment includes freight mail wagons, which can be used in RENFE S130 in particular (see fig. 6);
– Patentes Talgo S.L. has substantial experience in manufacturing and operating of Very High Speed and High Speed passenger trains in EU, Middle East and CIS countries.

Taking into consideration the topology of the existing passenger rail network in 1520 gauge countries, the initial stage of the Russian national program of HSR transport, the expressed intentions of China to develop the northern trans-Eurasian economic corridor under the 'One Belt, One Road' (OBOR) program, etc., we consider that the harmonized Trans-continental Freight Rail Express Lines network, consisting of the existing HSR routes of Europe, China and Russian gauge countries, could be formed as follows (see fig. 7).

The competitive advantages of the proposed Express Freight Rail Line Services:

- The topology of the suggested routes comprises all major centers of starting/final points of cargo flows;
- Punctuality to meet 'just-in-time' principle: freight trains are operated as passenger ones with fixed arrival/departure schedules as well as with fixed handling intervals at intermediate terminals, with no necessity to wait for cargo to fill in the full load capacity;

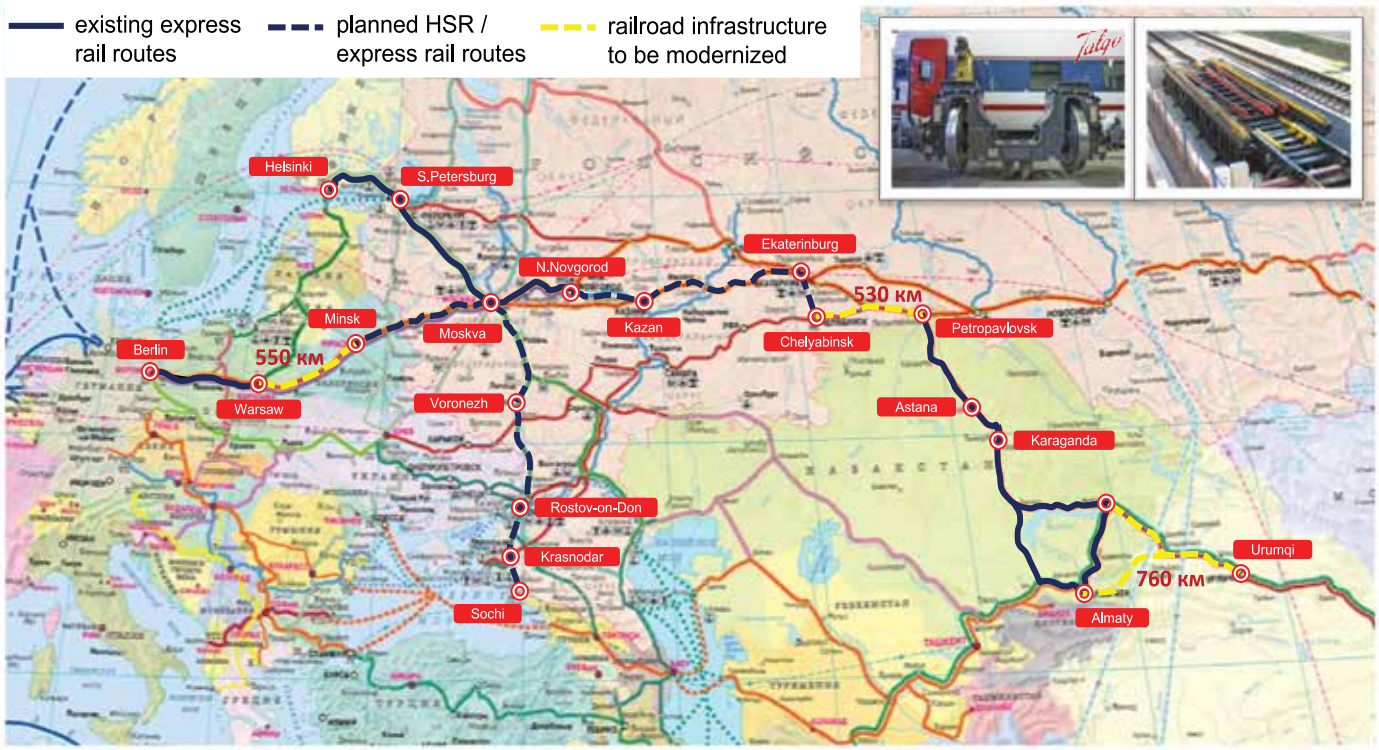

Figure 7. The Proposed Trans-Continental Freight Express Lines Network Using The Adapted Passenger Rail Tracks And Trains With Variable-gauge Running Gear

- High speed – the trains are running on the existing tracks with the passenger trains velocity, wherever possible – up to 200 km per hour, and upon completion of HSR tracks – up to 250 km/h on these parts;
- Smooth border crossing:
  - technologically – no bogie-changing;
  - administratively – no customs formalities (all terminals engaged in these services are officially recognizes as 'dry ports' under the UN ESCAP Intergovernmental Agreement on Dry Ports);
- Efficient terminal handling – the short wagon with dimensions close to 40 feet container with central sliding doors allows all types of terminal equipment to be used in loading/unloading operations;
- Reliability & safety;
- Relatively low investments to adapt the rolling stock.

As the suggested transportation system can be inaugurated within short time period, we consider it to be viable to develop more profound technological research as well as a feasibility study, which are to be confirmed and agreed by controlling bodies, infrastructure owners, operators, forwarders, etc., and should describe:

- details of potential cargo volumes;
- detailed routing;
- details of operational velocities, gauges and weight limits;
- details of the rolling stock;
- details of technical requirements to infrastructure with typical solutions;
- details of transportation, terminal and information technologies (loading/unloading, intermodal & terminal equipment, etc.);
- details of tariffs applicable;
- details of operators and forwarders operations (traction, terminals. Rolling stock, 'the last and the first mile', etc.);
- details of necessary amendments to the valid legislature, and so on.

SUMMARY

The suggested project is considered to be feasible for implementation in the framework of OBOR and Eurasian Union cooperation under the New Silk Road initiative.

REFERENCES

1. The Eurasian Economic Union. Electronic resource: https://docs.eaeunion.org/pd/ru-ru/0101330/pd_15092016.
2. The Ministry of Telecom & Mass communications of the RF. Electronic resource: http://minsvyaz.ru/ru/events/35003.
3. The Russian Association of Internet Trade Companies (AITC). Electronic resource: http://www.akit.ru/wp-content/uploads/2016/03/Akita-Results-2015-v1.pdf.
4. The passanger branch of JSC Kazakhstan Temir Zholy (Railways). Electronic resource: http://temirzholy.kz/press-tsentr/press-relizy.
5. The Tulpar-Talgo Passenger Coaches Manufacturing Plant. Electronic resource: http://tulpartalgo.kz/produkcziya.html.
6. Patentes Talgo S.L. Electronic resource: http://www.talgo.com/en.