© **Eleonora Shabarova**

**Petersburg State Transport University**

# SPEED COMMUTER-URBAN RAIL TRANSPORT

**Abstract**
Transport crisis in the cities has become a ubiquitous problem. In Russia, the situation is deteriorated by the absence of the methodology of conceptual design of integrated transport systems in general, and the city-street-speed railway as part of the system. To mitigate this situation, two methodological tasks have been proposed: 1) the relevance of the use of the existing rail network in the city in order to solve the transport crisis and provide the simultaneous increase of its efficiency; 2) a way of organizing a relatively 'short' speed urban transportation of passengers on the ground of the rail system of 'urban trains' similarly to S-Bahn (Stadtschnellbahn).

**Keywords**: methodology, integration, implementation, innovation, passenger transport logistics, intelligent rail transport system, S-Bahn, Z-Bahn.

## 1 Logistic approach to the formation of urban public transport

Slogan of times was the integration in everything and everywhere, including public transport. Globalization, which is expressed in the transport sector through inter/multimodality, even in times of crisis and the economic downturn has changed the structure of passenger flows at all levels of transport communications. It has brought to a change in the methods of calculation of passenger traffic, the destination routing traffic and the organization of their technology. Passenger service of all types of transport communication (about 15) should be based on an integrated platform of innovative transportation systems of the two levels. Macrosystems: intermodal, international, long-distance and non-urban transport; microsystems: multimodal, commuter-urban and urban 'short' transport, which further considered in details.

The main type of transport service in microsystem cities and agglomerations should be multifunctional rail transport. Multidimensional solution of the transport problem requires the creation of the intelligent transport and logistics system (ITLS). Passenger logistics in the city should be based on well-developed public transport infrastructure (e.g. rail and vehicles, roads, rail and street ground transportation of all kinds, land and intermodal intercity corridors, ring roads and speed diameters). Urban passenger logistics of inter/multimodal nature should objectively determine the optimal segments of the market of certain types of urban transport mode and their integration into the end-to-end passenger service system.

The decline of solvency of the population in protracted crisis (since 2008) has changed the attitude to the travels, i.e. cost of travel and convenience trip that determined the transition to more efficient transport of passengers. The ‘cheap’ transportation of passengers with the allowance for the requirements and standards of service can only be provided by an integrated public transport with a railway as a basic mode of transport. Therefore, the primary task is to upgrade the existing rail network in the city to the off-street urban system.

Off-street urban system will improve mobility, increase throughput and carrying capacity of the railway and its profitability. Off-street system plays the role of inland transport corridor in the city. It provides a differentiation between various types of urban transport and transportation functions and relieves congestion in the city.

Passengers need comprehensive urban transport services (logistics products), such as safe and comfortable, fast and inexpensive trips based on ‘door to door’ and ’just in time’ principles. These characteristics can be provided by with the cooperation of various modes of transport, guaranteeing little efforts, and health problems. In the country, it is required to take into account the discomfort and ‘overhead’ costs time and health spent on the approaches to pedestrian stops, waiting for transport and transport connections. Improving the quality of public transport service, particularly rail, will attract passengers from other land transport modes, relieve the road network and improve the transport situation in the cities.

Logistics integration of rail transport is able to fulfill important requirements for passenger transportation. Off-street speed rail transport implements additional 3 principles of urban passenger logistics:

1. the time of waiting for transport should be significantly shorter than the full-time trip;
2. costs per trip on public transport should be much lower than by a car;
3. the minimum (absolute and relative) occupation of urban area and the streets and the maximum differentiation from its parallel transport.

The success of the operation and profitability of rail transport depend on the degree of its integration into the citywide system. All of the above is in conformity not only with time and problems in Russia, but also in comply with the strategy of development of European transport.

## 1.1Concept of formation of the intelligent transport systems

Formation of the city's transport infrastructure in Russia has to comply with current trends and strategies for European Transport 2030-2050. Innovative directions of the development of European transport, according to Transport Development Strategy 2020-2050, argue an inevitable shift of passenger traffic to railways and a sharp decline of the road in the proportion (up to 50%). These principles reflect the trend of time, i.e. a renaissance of rail transport in all kinds of transport communications. That is why one of the objectives of the International Union of Railways is the development of rail passenger transport in Europe at all levels. This is a response to the growing mobility of the population.

Rail transport can solve the problem of direct high-speed transportations in the connection ‘city- airport’ and eliminate the transport crisis in the cities. How? There is diversification of functions and increased traffic in favor of intercity passengers. By appropriate railway facilities for the use of citizens and change of their mode of operation in accordance with the requirements of passengers. The role and importance of railways at the city level are enhanced by the use of modern rail systems (e.g. off-street urban system or type S-Bahn), and the introduction of the service with high market appeal. Socio-economic competitiveness of the railway network in the context of globalization (including combination of social services and the traditional priority of safety) can and should bring additional services for the convenience and benefit for passengers.

Special role plays suburban (and not only!) railroad in the city. Historically, it has established a greater extent in urban areas, including downtown. Stations and just a boarding platform form an effective interchange circuit with a large area of gravity (e.g. in Riga, more than 60% of developed territory). Commuter rail system is easily integrated into high-speed urban transport functionally and financially. These advantages have been long ago understood and implemented in Europe on the basis of innovative modernization. That is why, by nowadays, it is difficult to distinguish between suburban and urban railways: one is a continuation of, or the start of another. And how is in Russia?

### 1.2 Problems and tasks of commuter traffic in Russia

Commuter traffic in Russia has the following issuers:

– for the railroad industry: the commuter traffic is unprofitable;

– for government (municipal and federal): commuter services need subsidies from scarce budget;

– for passenger: unacceptability timetable, discomfort in wagons, low availability of landing platforms (poor road access to the train stations and platforms or absences of roads), and the fare.

The disadvantages of commuter rail in the city include the small number of poorly equipped and stopping points and platforms, the lack of current information, the low state pedestrian approaches and access to them, a small amount of parking of personal vehicles and their insecurity. With the transition to tough market conditions shortcomings and contradictions intensified. The prolonged economic crisis has further aggravated them. The lack of competence, conservative thinking of railway men and human fear of the transfer functions of railways to professional logistics-operators in the form of outsourcing commuter traffic, dramatically reduces the potential for effective passenger service.

However, commuter rail is still in demand despite the downturn in recent years. Reasons for the decline are as follows:

– conservative attitude towards suburban transportation;

– updating obsolete rolling stock and the lack of long-term order for development and production of modern wagons;

– the lack of federal budget funds to compensate falling revenues of JSC RZD.

The abovementioned problems symbolized the need to raise the efficiency and profitability of commuter traffic and transportation in cities.

The main tasks were announced in the Ministry of Transport of the Russian Federation at a meeting on the organization of suburban rail services in 2014. Meanwhile, the proposals to replace commuter trains between nodal stations by bus service seem to be a wrong technology, as well as the use of rail bus in the low-density areas. There is a relatively long accumulation of passengers to fill them in multi-car-composition (why not 2-car?!), which does not allow to compete on waiting time minibuses and buses. Inconvenience in connection trips and long intervals dramatically reduce the competitiveness of intermodal and multimodal transportation by rail, replacing the railway by the direct communications provided by all kinds of road transport.

To eliminate most of these drawbacks, the Ministry of Economic Development in 201 developed a long-term target model of development commuter services. Implementation of the model will help to solve the economic issues of the industry. The term 'loss commuter traffic', according to President of 'Russian Railways' (JSC RZD), is not correct, because suburban development is large sector of the economy. The commuter traffic employs more than 50 thousand of people and operated about 16 thousand of rail cars. 'Any type of activity, if there is a demand and there is a task of the state to implement, should be self-sufficient'- reports Mr. Yakunin. One of the opportunities for self-sufficiency of commuter traffic is the inclusion of the financial activities of urban passengers, who use commuter trains.

## 2 Alternative solutions of transport problems in cities

Innovative ways of solving the transport problems in European cities are based on maximum use of rail transport (rail and its various modifications). Urban rail systems fully satisfy the passengers due to their modern service: availability, security, reliability and regularity, comfort and working conditions to the Internet while traveling with the main advantage of speed.

Nobody denies the role of vehicles and road network in the city. But one should be bared in mind that the new road construction:

– provokes the influx of private vehicles, increasing traffic;

– worsens the environment around, creates urbanized city, which is dead and uncomfortable.

The transportation problems of the city can be diminished through the two ways:

*first* is priority of public transport (80%) on the basis of an integrated system (S-Bahn, subway, traditional tram, trolley, bus and streetcars, all kinds of shuttle ground transportation and even air);

*second* is a clear differentiation of transport in space and time, of transport functions in power and range of flows as well as the differentiation of passengers in time, frequency of occurrence and purpose of travel.

The main principle of the formation of innovation intelligent transport system (ITS) is not opposition of railways to roads and their competition but their joint rational interaction (e.g. 'koopkurenz' – reasonable competition on the basis of cooperation, which is successfully used in Germany). This approach dramatically altered the author's concept to the formation of the transport system of Sochi-2014: to replace the incorrect orientation on the bus and car transportation to the need of building high tech and innovative system of integrated rail. This approach implies big capital investments. However many times lower operating costs, and almost zero negative impact on the environment.

## 2.1 Methodology of reformation of the railway passenger sector

There are many innovative ways to modernize the railways in the city. Special role for Russia plays the efficient analysis of advanced foreign experience and implementation of the technologies. The first and urgent step is to organize on the basis of existing (including abandoned driveways) and the construction of new sections:

1. off-street systems Bahn - S-Bahn and Light Rail,
2. high-speed direct communications in the connection 'city-airport' (trains- aeroexpress based on S-Bahn).

The term S-Bahn rail means a passenger public transportation, i.e. city trains organized in cities and metropolitan areas (e.g. in more than 150 cities in the world). S-Bahn provides speed and significant direct intercity, suburban - urban transportation.

S-Bahn has:

– signs of rail transport on the isolated or combined lane;

– low cost and the possibility of assigning favorable for passenger tariff;

– its rolling stock, with great acceleration and speed and convenient layout of the cabin.

S-Bahn is characterized by:

– rigid timetable with catchy departure time at a constant 'fork' routing scheme;

– high density and frequency of trains (repetition intervals during peak hours, at least of 10-20 min.) , which is particularly satisfy passengers.

S-Bahn occupies a middle position between the traditional rail and U-Bahn (Metro).

Metro (Metropoliten-rail) should be viewed as a special type of the railway for intercity transport over relatively short distances. Therefore, both systems are characterized by the same features and functions. But there are differences on the follow factors:

1. Degree of differentiation with respect to the earth's surface:

S-Bahn focuses on terrestrial and rarely on elevated land. Tunnel sections are an exception in the case of pass-through diameter below the center of the city,

U-Bahn (Metro), on the contrary, assumes the maximum underground tunnel tracing.

2. Characteristics of transportation functions:

S-Bahn collects, distributes passenger traffic in the suburbs, close agglomeration and regional areas and directly delivers passengers into the scattered city centers. It simultaneously serves intercity passenger traffic with the high passenger volume and capacity.

U-Bahn (Metro), on the contrary, serves a very dense network of streams and only intercity passengers with further transfer to the means of land transport (feeder road traffic). Rare exception is the output of individual external subway lines outside the city.

3. Power supply system: constant (U-Bahn) and alternating current network of contacts with pantographs or third contact rail (S-Bahn);

4. Rolling stock: S-Bahn in the first stage of formation extensively uses the existing rolling stock of commuter trains, including double-decker regional trains;

U-Bahn (Metro), on the contrary, initially uses a specially crafted rolling stock, with a specific plan lounge, according to the standards and the number of seating/standing places.

The best examples of modern train S-Bahn (including direct trains city-airport) is in Switzerland (important nodes of trains are duplicated), in Austria (low cost of wagons), and in Germany (the best electrical equipment, practicality and pragmatism of operation).

## 2.2 Examples of railway's transformation

### S-Bahn-Riga

The first drafts of justification of S-Bahn system in the former Soviet space for the city of Riga were developed by the author in 1975, 1991, in the working documents in 1993. The feasibility of such an experiment was made for the traditional Soviet underground option in Riga. Evaluation and comparison of two mutually exclusive alternatives with three choices for each tracing was performed on the ground of 46 criteria for four differentiated groups. Matrix of preferences was constructed with the results of calculation of the objective function (Table 1), showing the best option on the rank of the transport system with full machining S-Bahn. The choice has been officially confirmed by UNESCO experts (Germany) on transport, prof. G.Potthoff (1980) and prof. S.Rueger (1975, 1980, and 1993) at the enlarged meeting of the Government of the Republic of Latvia in 1993.

**Table 1**

Preferred embodiments of the matrix in the Integrated Transport system (ITS-Riga)

| **List recorded indicators in the group** | **Number of indica tors** | **Scoping usefulness** | | **Weighted value** | **Multipliers of the objective function** | |
|---|---|---|---|---|---|---|
| | | **Metro** | **S-Bahn** | | **Metro** | **S-Bahn** |
| **Economic**,including | **15** | **43** | **61** | **35** | **880** | **1270** |
| - investment | 10 | 30 | 44 | 25 | 750 | 1100 |
| - feasibility | 5 | 13 | 17 | 10 | 130 | 170 |
| **Specifications:** | **20** | **60** | **83** | **30** | **725** | **980** |
| -technical & operational | 12 | 39 | 50 | 15 | 585 | 750 |
| -urban | 3 | 7 | 13 | 10 | 70 | 130 |
| - building | 5 | 14 | 20 | 5 | 70 | 100 |
| Social, including. | **8** | **25** | **34** | **15** | **214** | **280** |
| -quality of service | 6 | 20 | 26 | 10 | 200 | 260 |
| -organizational & technical | 1 | 1 | 4 | 2 | 2 | 8 |
| -production and household | 1 | 1 | 4 | 3 | 3 | 12 |
| Natural & environmental: | **3** | **10** | **10** | **20** | **100** | **100** |
| - planning | 2 | 6 | 7 | 10 | 60 | 70 |
| - sanitary | 1 | 4 | 3 | 10 | 40 | 30 |
| In general, the embodiment | **46** | **138** | **178** | **100** | **1919** | **2630** |
| Rank options | **-** | **-** | **-** | **-** | **2** | **1** |

Nowadays, it is necessary to add one more differentiated group of indicators (Table 1) called the logistics efficiency (LE). Suggested codes for LE of the intercity passenger rail are as follows:

– Infrastructure and availability of the network and stops,
– Access to the direct trips;
– Routing and frequency of movement;
– Priority level of competence;
– The range and quality of logistics services;
– Travel time and timeliness (accuracy) of arrivals;
– Cost of transportation and payment methods.

The economic and transport-operational advantages of the designed S-Bahn-Riga are:

✓ a significant proportion of passenger transportation (42.5% ),
✓ high network density (0.49 km/sq. km),

✓ high rate of served population (63%) and area within the city (50%),
✓ high rate of direct-urban commuter communications (76%),
✓ minimum average time per labor trips in the city (27.7 min), implying the partial use of the feeder roads to stations of S-Bahn,
✓ max (for that time) of the vehicle capacity (214 people),
✓ high speed: average (38.9 km/h), on the new underground stations is more (45 km/h),
✓ small headways during peak hours: the whole network (7 min.), the minimum for new underground stations (1.5 min.),
✓ significantly lower compared with other types of high-speed off-street systems capital investment and low operating costs, which provide a relatively quick return on investment and profitability of the entire system.

But these author's projects are not implemented due to absence of the political will, and the objective Matrix of preferences took no account of the biased attitude of the Government of the Republic. Time lost, but the relevance is not lost. In 2007. Again the attention was returned to the idea, and there were even attempts of its realization: it was formed 2 short diameters in the city, and modernized land in the district of Bolderaya. However, instead of passenger transportation the transportation of coal to the port for shipments to Europe was organized. Meanwhile, the S-Bahn-Riga did not happen. By now, Latvia is in the EU, and all the more voices and new proposals for the implementation of the 'project of the century with a sad fate' could be heard.

**S-Bahn-Sochi**

The second post-Soviet copyright system design of S-Bahn, which was successfully implemented, excepting the innovative for Russian transport block - cog railway, is an integrated system of rail - based S-Bahn in Sochi (as opposed to other alternatives, including the subway). The difference between S-Bahn and U-Bahn, to the greatest extent, determined the choice of the main mode of transport option in the projects' documentation of 2006 and 2008 in Sochi in favor of S-Bahn-Sochi.

S-Bahn-Sochi on the stage of concepts and design studies are best met the requirements of the transport and construction, finance and real situation in the following terms:

*firstly,* strictly limited the period of construction (six years) before the Winter Olympic Games in Sochi in 2014,

*secondly*, the use of Russian -established methods of railway construction and operation,

*thirdly*, the availability of professional staff and well-functioning railway traffic organization of processing methods,

*fourthly*, the need for economic expenses of the allocated public and private funds.

In the designed system S-Bahn-Sochi under the development of transport concept the subsequent solutions were proposed:

1. Ramified network tracing of S-Bahn-Sochi in order to maximum use of existing railway sections for various purposes,
2. Combining the functions of intra- , peri–urban- , regional and mainline transport in densely populated areas and in new corridors of foothill resettlement as well transport functions of direct communication ‘city - the airport’.
3. Using at the first phase of an existing but upgraded infrastructure Tuapse- Sochi- Adler- Veseloje for the combined motion and construction of new sites in the future. Detached differentiated fabric, independent from the street surface transport, with the landing platform on the same level (high or low), with the organization of movement in 2 directions and with a continuously variable system of entry and exit of passengers on the platform, in the wagon and out of it.
4. Designing for Sochi 2014 the light rail- Krasnaya Polyana for the delivery of athletes, participants and spectators of the Winter Olympic Games from the station and airport Adler to the Olympic village in a mountain complex in Krasnaya Polyan, with the end point in the village of Rose Hutor. In service of Winter Olympic Games, the light rail- Krasnaya Polyana takes on the order of 80 % of the passenger transportation from the coast to the mountains. Adopted capacity of the one electric train is about 1,100 passengers. Maximum designed passenger traffic from Krasnaya Polyana to the coast during the Olympics is 31 thousand passengers per hour in a single direction.
5. The designing for Sochi 2014 a new terminal building, providing the simultaneous operation of 27 airliners from 2.5 to 3.8 passengers per hour (maximum 4.8 thousand pass.).
6. Organization of six main routes S-Bahn and additional routes along the diameter pendulum Sochi Central Station - Veseloje.
7. Rigid schedule with a 60 -, 30 - , 20 -, 15 - and 10 - minute interval of trains. The minimum interval in the rush-hour and force majeure is reduced to 5-7 minutes.
8. High capacity and carrying capacity (from 40 to 100 thousand passengers/hour).
9. Operation of special low-floor modular sections with fast partitioning of trains during peak hours and rapid passenger traffic at stops due to automatic door openers. Since December 2011, the train called ‘Lastochka’ was commissioned.
10. Modern alarm system and automation and driving trains by automatic computer (as in Hamburg, May 2008).
11. High quality of traffic due to walking distance accessibility, high cruising speed, 80 - 120 km/h (3 - 4 times higher than speed of the

tram), the reliability and the high frequency of the possible use of the vehicle, comfort in the passenger cabin, including spaces for luggage, bicycles and animals.

For the first time in Russia, for the Sochi Olympic Games 6 integrated interchange nodes were projected with a capacity of over 15 thousand passengers per hour (4 of the were realized). The created modern interchange nodes is to provide all conditions for the movement of passengers with disabilities, which is important for the Paralympic Winter Games in Sochi.

In Sochi-2014, 11 business intercepting parking for private cars has been provided near stops' platforms S-Bahn-Sochi, with the provision of certain benefits to owners of cars.

Implementation of the project system S-Bahn-Sochi-2014, allowed to solve four problems:

1. to release of street from trucks by differentiation of the transport needs of the population and traffic flow with minimal damage to urban planning and the environment, and maximum capital savings;
2. to bring down the significance and reduce the share of individual passenger transport due to transfer of passengers from car to public transport, the attractiveness of which should be comparable with the car;
3. to enhance the role of public transport due to a well-organized and precisely executed integrated operation of the rail system in Sochi. This is the maximum pedestrian access to public transport, transfers and minimum waiting time of vehicles, the cost of public transport (much less than the cost of gasoline and maintenance for the vehicle owner), providing the preferential parking locations in interchange nodes and intercepting parking in proximity to the pedestrian stations S-Bahn-Sochi;
4. to master the social employment in peripheral areas of agglomeration up to the limits and adjacent agricultural areas that will contribute to the outflow of population migration from the center of Sochi.

All of the above is in full compliance with the requirements of the International Olympic Committee (IOC) to build transport infrastructure for Sochi-2014, as well as the international standards and international experience of the Winter Olympics that can be seen from the ended Olympic and Paralympic Games Sochi-2014, where the abovementioned proposals have been successfully implemented.

Effective means of transport to service athletes, judges and spectators on the mountain tops and ridges of Aibga and Achishkho could become a mountain cogwheel railway or Zahn-Bahn–Sochi. An example of a profitable exploitation not only in winter, but in summer may be primarily Swiss, German and Austrian cogwheel railways. Best practices acceptable to the Olympic transport infrastructure of Sochi-2014, can be a system of service Bavarian winter

Olympic Center in Garmisch-Patterkirhen. To service the mountain Olympic village Sochi-2014 as an alternative to cable-lifts, gondolas and ski lifts in the future can be built the cogwheel railway with a special rolling stock, and a series of new models which were presented at the International Exhibition of vehicles in Berlin in the autumn of 2006 (German and Swiss production, such as Siemens and Stadler). But this alternative was not utilized. As a result, the lack of mountain cogwheel railway affected the Olympics Sochi-2014: around 7000 spectators of biathlon late at night (at the end of the competition) had to stand in the queue for 2.5 hours, waiting for the cable car.

**Moscow Ring Railway**

The opening of the Moscow Ring Railway was held in 1908 (54 km with allowance for 145 km of contiguity tracks). It was intended for freight and passenger traffic (up to 1934). In the70s, the road was upgraded, but for freight traffic. In 1997, the transport problems of Moscow forced to return to the organization of passenger transport on the Moscow Ring Railway. The purpose of the investment project (2007) was reconstruction and development of Small Ring of Moscow Railway in order to ensure the harmonious development of transport infrastructure and intercity rail passenger transportation.

To implement the project in 2011, the JSC ‘MKZD’ was founded by the Moscow Government and JSC ‘Russian Railways’. The volume of investments for 2011-2020 is 441 bl. Roubles. Since 2013, construction began (19 artificial structures, 6stopping points, 1158 catenary poles, 27 km of electric grid, 166 of engineering communications). In 2014, 16 bl. Roubles was allocated (reconstruction of 95 km of track, installation of 3101 catenary poles, 225 km of transmission lines and 64 km of signaling links, 11 artificial structures, 15 local stations, and 108 km of the noise shield). The project planes the electrification of the ring with the construction of two and reconstruction of three traction substations, and the construction of 38 km of the third main track.

In accordance with updated MKZD General Plan of Moscow, it is planned the establishment of passenger traffic with the clock movement size to 100 pairs trains per day on two routes of Moscow Ring Railway. Maximum speed is 120 km/h. This railway will provide the service of passenger traffic in the ‘peak’ hours with intervals up to 5 min. Meanwhile, cargo and technological traffic are shifted to the newly constructed third track.

The projected ridership around the ring railway in the morning rush hour (8:00-9:00) will be up to 100 thousand passengers per hour (in both directions). The interval in the rush hour traffic will be of 5 minutes in the one direction. Since 2016, the railway will annually carry over 50 mln. passengers. Its carrying capacity during peak hours will be up to 220 thousand passengers per hour. The trains will include from 5 to 7-10 wagons, length of the basic configuration is 170 m, the total number of passengers on the train at least 1,250 people.

The unique design of wagons is that the wagon will be without vestibule and will have three doors on each side that provide a quick drop-off/pick-up of passengers. Entrance and exit of passengers from the wagon will run for 30 seconds. Occupancy of wagons on all spans will be 3 pass/$m^2$ (less than for subway of 4.5 pass/$m^2$) due to a more even distribution of passengers across the ring.

At present, the ring railway together with ‘Moscow Metro’ prepared a plan for the integration of the passenger transport loop to urban public transport. For that reason, more than 350 variants stops will implemented, which will decrease the load on the center of the capital.

It is planned to provide combine tickets for access to ring railway and the underground: 90-minute universal and comprehensive 90-day tickets can be bought in 300 most modern vending machines in subway stations. These measures simplified the fare, including those for various types of transport. Since 2013, electronic purse “Troika” appeared.

Implementation of the project of reconstruction and development of Small Ring of Moscow Railway will significantly reduce the transport intensity in Moscow and move to a qualitatively new level of service passengers of urban rail transport. Therefore, the maximum efficiency of existing transport capacity of railways in the organization of high-speed traffic in the city will be achieved.

## 3 Conclusions

Railways are a universal form of transportation. They are best suited for mass transit, a variety of speeds and range of movement. They do not create congestion on the road network, independent of the time of year and weather conditions. They are economical and environmentally friendly. They are able to integrate into any transport system at different levels of service. The new features can increase the area of gravity to them, to increase their role and significance, and ensure their profitability. They are flexible and resilient to modernization and innovation. Modernization of the railway network should be started with the suburban railway network

Commuter traffic in Russian cities is in crisis for many reasons, such as financial, economic, technical and environmental. To raise their economic and social effectiveness it is necessary to involve them into intercity passenger service, the value of which is much higher than the traffic volumes of commuter passenger traffic.

In the present publication, the expediency of the innovative modernization of suburban (and not only) of railway stations in the city is considered. Common in Europe form of high-speed rail of Bahn (S-Bahn) reflects the process of formation of the system based on the existing infrastructure and its functional features. Stages of transformation of railway stations in S-Bahn system involves the use of logistical principles of passenger service. Methodological techniques of the evolutionary transformation of railways are disclosed through the specific examples of design and implementation in the agglomerations of Riga, Sochi and Moscow.

The urgency and the possibility to integrate the modernized railway in the city in the intelligent transport systems are presented. The mission of this modernized railway (for example, in Sochi 2014) concerns the following tasks:

• justification of integrated intermodal transport system,
• offering of new innovative forms of rail transport,
• socio-economic development of the city and the metropolitan area.

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