

## **Balancing territories through development of ecotonic railway hubs**

### *Summary*

On the one hand, **railway hubs and interchanges are parts of territorial structures**, which actually represent past events and processes (as the time is needed to form a structure) and simultaneously influence current processes. Thus, a hub may have either positive or negative influence on territory. But nevertheless, it is still a stable node in territorial organization, i.e. a good basis for development and growth enhancement.

On the other hand, hubs are multifunctional, and that corresponds in the best way to the demand of modern society.

The closest surrounding of a hub forms an economic ecotone. From Ecological point of view, **an ecotone is a transition area** between two biomes. It is where two communities meet and integrate. A hub and even a common railway station is a **multi-dimensional ecotone**, the point of meeting and integration of (1) different transport and other social activities and (2) communities and representatives of nearby and remote territories. The more complex is a hub by the variety of transportation services or of flows coming from / going to different territories, the more dimensions has an ecotone.

The basic question is how to understand and measure the impact of an ecotonic station. A methodology for such evaluation is being tested on the examples of stations and hubs based on railway stations in Russia. The following parameters are used:

- The direction of an ecotonic hub, i.e. its liaison with smaller or larger hubs. In case a hub is connected to a more important one (for example, an international airport is more important than the largest national railway station), it becomes a kind of “exit” for the territory providing opportunity to get to the larger territorial center. If a hub is connected to smaller ones, it acts like an “entrance” collecting incoming flows from other places. The graphic illustration of entrances and exits of a territory can help understanding the existing misbalance for each level of territorial administration (as the proportion may change). The example of distribution of centrifugal and centripetal hubs in Russia (which already takes into account the project of high-speed rail line from Moscow to Kazan) shows the centrality of the system and the lack of regional exit-centers.

- The speed of a hub. High-speed lines bring flows faster and do not leave any time for transformation of origin characteristics of the flows.

- The dimensions of a hub. The more different means of transportation are connected in transport interchange, the more the flows get mixed and reallocated and the less is their direct influence.

The general positive or negative influence of a hub should also be taken into account for deeper studies.

Still, the evident rule is as follows: the higher is speed and the lower is dimension, the more is influence.

This rule applies not only to hubs in general, but to the inner part of stations, where there are different flows coming by different types of transport from different territories. Positive flows should be encouraged to pass more time at the station, while negative should be mixed with positive (or less negative) in order to diminish their influence. The precise strategies are yet to be developed.

As for the territories, three basic strategies may already be defined:

- G-Strategies: greenfield projects where new connections are to be established,
- B-Strategies: brownfield projects where existing flows are to be changed,
- HD-Strategies: a specific form of B-Strategies for high-density areas like large cities.

Two examples describe the approach from practical point of view. Two Russian stations being the first and the final points of the Trans-Siberian Railway: Yaroslavskiy station in Moscow and the railway station of Vladivostok.

A few years ago Yaroslavskiy station and its surroundings (the famous square of three stations in Moscow, having a direct connection with Moscow underground) could be characterized as a hub bringing together mainly flows with negative influence which formed a well-known criminogenic area. In 2009-2012 the area was completely restructured. The flows of Yaroslavskiy station were mixed with flows from Leningradskiy station that collects mainly people coming from more advantaged suburban zones and St-Petersburg and the unique area for two railway and one underground stations was organized. That help to reduce 2 points from negative influence power evaluation according to methodology described above.

Vladivostok station could have had benefit from the establishment of direct connection to the international airport Knevichi (bringing here new clients with higher purchase potential) due to the organization of APEC summit in 2012. But according to the final decision express connection to the airport was organized in a separate terminal, as well as marine transportation, without forming a common hub. This decision created an inversion of possible “entrance – exit” functions, and diminished the possible positive influence of this hub on station and on the territory by 2 points according to methodology described above.

These examples encourage further studies in this field and show the opportunities for the implementation of this approach in station and territory management practices.