Mapping Investments for Improvement of Some Rail Hubs in South East Europe

Georgia Aifadopoulou / *Maria* Morfoulaki / *Glikeria* Myrovali / *Daniel* Pavlov

Abstract

The paper project emphasizes on pilot actions which will improve quality and governance schemes of transport services connecting major rail hubs in South East Europe: Bologna, Venice, Trieste, Ljubljana, Vienna, Bratislava, Budapest, Thessaloniki, Sofia, Zagreb, Bucharest (the hubs 11 involved in RAIL4SEE project). It presents comparative analyses of these transport hubs. The publication closes with key messages deriving from the whole analysis as regards the future needs of each hub and the necessary investments that can contribute to the development of a seamless passengers' intermodal public transport network rail based in South East Europe.

Keywords

Rail hubs · Investments · South East Europe · Passengers

Georgia Aifadopoulou

CERTH – HIT, Principal Research Scientist I, Head of Sector B: "Surface Transport and Networks" , 6th km Charilaou – Thermi Road – P.O. Box 60361 - 570 01 Thermi, Thessaloniki, Greece
e-mail: gea@certh.gr

Maria Morfoulaki

CERTH – HIT, Civil Engineer-Transport, Application Scientist B', 6th km Charilaou – Thermi Road – P.O. Box 60361 - 570 01 Thermi, Thessaloniki, Greece
e-mail: marmor@certh.gr

Glikeria Myrovali

CERTH – HIT, Dipl. Civil Engineer, M.Sc. Transport Engineer, Research Associate, 6th km Charilaou – Thermi Road – P.O. Box 60361 - 570 01 Thermi, Thessaloniki, Greece
e-mail: myrovali@certh.gr

Daniel Pavlov

Office European Integration and Project Financing, University of Ruse "Angel Kanchev", 8 Studentska Str., Ruse-7017, Bulgaria
e-mail: dpavlov@uni-ruse.bg

1 Introduction

The free movement of cargos and passengers in the European Union creates high competition among the different transport modes. In result the transport hubs have to face these challenges and improve the existing linkages and develop new ones. Their linkage policy could be done both by leaving it to the free market cooperation initiatives and the public regulations (Pavlov, 2010). Then it is possible to analyze the Hub effect (Krugman, 1995), having in mind that some of the RAIL4SEE hubs are also "world cities" (Keeling, 2000).

The intermodal transport in Europe is object of constantly growing interest from the triple helix representatives - scientists, businessmen and authorities, coordinating their efforts in international project consortiums, such as RAIL4SEE (2012b), INTRAREGIO (2012), City-HUB (2012), etc., funded under SEETCP, FP7 and other EU funds. It is obvious that Networking and cluster are up-to-date methods of the regional policy (Schulte 2010). Strengthening intermodality is without saying unlocking potentials for hubs growth since the inherent advantages of private car use are reached (Logo et. al, 2012). The enhancement of cooperation among Public Means of Transport results in better exploitation of existing infrastructure (Martí-Henneberg, 2013), in the limitation of congestion phenomena and therefore in environmental performance improvement (Logo, 2013) and in the overall improvement of quality of transport operations (Sitran et al., 2011). The achievement of sustainable urban transport (Bak et al., 2012) hubs integrates variety of issues such as:

- Innovation and technology,
- Efficient use of urban space;
- Management and business strategies;
- Accessibility improvements;
- Urban mobility concerns;
- Social exclusion issues;
- Stakeholders perspective, etc. (City-HUB, 2012)

South East Europe cities are the "first/last legs" of transnational transport chains. These chains consist of local, regional and transnational transport systems (Beskovnik and Twrdy, 2012). On

the one hand South East Europe (SEE) faces the need for transnational rail connections among rail hubs, especially on TEN-T networks and along the main intercity lines. On the other hand rail and in general public transport bound feeder lines need for upgrade, strengthening and better organization (Sivilevicius et al., 2012). That calls for a multimodal integration of local/city transport networks, regional transport systems and transnational transport axes. City rail hubs and Regions have a role to integrate these different transport levels as means for an improved transport interconnectivity in SEE. (RAIL4SEE, 2012a) The problem seems to be wider both in geographical and modal way (Simecki et al., 2013).

The usage of different types of local contexts as "capital cities", "metropolitan areas", "clusters of hubs", etc. shows the need of integration into transnational transport corridors and TEN-T and in particular model solutions to be included in the future actions of policy makers and investors (Griskeviciene et al., 2012). It is also necessary to answer the needs of the involved cities and regions to bring together all the main relevant stakeholders for the future sustainability of their transport systems feeding rail hubs, which is the base of the transnational transport corridors improved connectivity (South-East Europe, 2009). It is expected to share the need for integration between services and governance measures in terms of better transport services to/from the hubs, activate cooperation mechanisms among transport providers in the Public Transport Partnerships Perspective to develop integrated ticketing, timetables harmonisations and users info systems. (RAIL4SEE, 2012a) However, the benefits of Transport Partnerships that involve also private bodies are more than those deriving from conventional procurement (on-time, on-budget construction, improved value for money, improved customer service, more innovation, improved care of public assets, government focus on outcomes) and therefore this is a core pillar for the hubs to invest in (Lammam et al., 2013). About the hubs it also possible to following the goal of maximising the value of the total profit of the coalition which makes possible to adopt the levels of collaboration in a groupage system (Kopfer et al., 2011). In parallel every hub has to study the demand for passengers and foremost to gain insight into the principal parameters concerning users of various transport modes, such as elasticity with respect to price and time, and the value of the time factor (Voorde & Vanelslander, 2010). When considered in the context of interurban transportation networks, cities' centrality takes on a particularly tangible meaning, captured in the common sense notion of hubs. We recognize that easy access to these transportation hubs provides a range of practical benefits, including greater travel options at lower costs (Neal, 2013).

The RAIL4SEE is a project of "South East Europe programme" which, in the framework of the Regional Policy's Territorial Cooperation Objective, aims to improve integration and competitiveness in an area. RAIL4SEE deals with Priority Axis: "Improvement of the accessibility", and aims to implement actions that lead to a successful contribution on the improvement of rail and Public Transport (PuT) in South East Europe (SEE). (RAIL4SEE, 2012b)

RAIL4SEE objective is to provide passengers in SEE with an attractive and efficiently organized and developed (in terms of high interconnectivity and accessibility at all three existing layers – urban & regional, national and transnational level) Public Transport System based primarily on rail. Tackling the low use of PuT in SEE, from the one hand through supporting high speed and long distance connections among the hubs of the study area (transnational level) and from the other hand through developing a coherent and stable feeding network (urban and national level) (White paper, 2011), RAIL4SEE aims to contribute to the future policy making actions in EU Commission by providing, as regards the abovementioned issues, models, concepts and harmonized strategies for the improvement of intermodal rail based passenger transport inside the study area. (RAIL4SEE, 2012b)

The project emphasizes on analyzes of the major SEE rail hubs: Bologna, Venice, Trieste, Ljubljana, Vienna, Bratislava, Budapest, Thessaloniki, Sofia, Zagreb, Bucharest (the 11 involved RAIL4SEE hubs). Furthermore, RAIL4SEE goes one step further by bringing in touch other (non-partners) key actors in public transport provision and monitoring / management procedure and concluding in necessary actions taking in mind a wide spectrum of ideas and aspirations. (RAIL4SEE, 2012b)

2 Objectives and Methodology
2.1 Objectives (SEE, 2012)

The challenge that the RAIL4SEE partners share is the development of models, concepts, measures, harmonised strategies and policy actions targeted to the improvement of rail and intermodal transport in SEE. The strengthening of intermodality is EU and in SEE as well, depends on a cocktail of measures and policy actions among which the provision of integrated and real time door-to-door information, integrates tariffs and other legal and institutional agreements. (DG Energy and Transport, 2004) The above mentioned are in brief the main pillars of examination in this study. In particular partners call for complementary interventions facing the alleviation of barriers for rail hubs integration in the local, regional, transnational and TEN-T systems, transport services projecting & harmonisation, governance improvement, in particular in the transversal perspective of Public Transport Partnerships development, meant as operational agreements for a seamless provision of transport services & information to the citizens of South East Europe. RAIL4SEE answers the need for improved transnational rail connectivity in SEE by IT, governance, services & organization measures. It addresses non-infrastructural interventions aimed at integrating cities into transnational transport corridors and it works on the transnational transport backbone of SEE by involving 11

rail hubs and 11 TEN-T & PAN EU corridors. In this perspective RAIL4SEE will enhance rail transport by improving the feeding functions on rail of major hub-cities & of their respective regions and metropolitan contexts, integrate the primary & secondary transport networks via rail hubs, develop functional integration and multimodal cooperation among transport hubs. The RAIL4SEE activities are oriented to the long term sustainability of the project results from a political, financial and operational point of view, as the project directly involves the core decision makers in rail and public transport in SEE, that is to say policy makers and transport operators. In this sense the main visible outcomes are policy & investments improvements, pilot actions on integrated ticketing & information systems for transport users, the set up of regional & transnational cooperation platforms and improved rail services in SEE.

The main visible **outcomes** are (RAIL4SEE, 2012b): policy and investment improvements, pilot actions on integrated ticketing and information systems for transport users, the setup of regional and transnational cooperation platform and improved rail services in South East Europe.

One of the aims of the project under WP3 "Pilot investment actions and policies long term sustainability" is to create a clear picture for the current level of accessibility (inside the hub) and interconnectivity (among hubs) in South East Europe and to examine the changes that would be made by the investments (ongoing and planned) in each hub. The investments mapping also provides the special focus of the policy applied in each hub for achieving green & seamless accessibility of passengers, thus defining the individual orientation of the hubs regarding priority modes and services to be developed in the future in SEE region (RAIL4SEE, 2012b).

In particular, the aim of the project Action 3.1. "Mapping ongoing public and private investments" is to capture all the ongoing and future planned investments which would be developed under public or private financing (or mixed funding schemes) and that would improve hubs' current status of operation regarding hub's integration at urban /metropolitan level, accessibility at regional/national level and interconnectivity at transnational level. (RAIL4SEE, 2012b)

2.2 Methodology (RAIL4SEE, 2012b)

The methodological steps refer to analyses of each hub in terms of key profile characteristics (status quo) and future investments' focus. The presentation of each hub is structured around RAIL4SEE **pillars** (services projecting & management; governance in hubs development; financing of services; Public Transport Partnerships) and RAIL4SEE **pilots** (on integrated ticketing, timetables harmonization and info provision) core axis at the 3 level examined in the project:

- Urban/regional level (city hub integration);
- National level (city hub accessibility);
- Transnational level (city hub interconnectivity).

The abovementioned three level approach fits better to policy making procedure on the field of transport and intermodality (DG Energy and Transport, 2004).

The clustering analysis of the 11 RAIL4SEE hubs made also in the same 3 level approach and based on current profile and potential future changes brought by the mapped investments. The three levels of operation analysis of each hub result from the "Hub" definition approved by RAIL4SEE partners at the beginning of the project (Tab. 1). provides examples of investments /interventions projects that could substantiate changes in each level of hubs operation and thus identifies the pillars on the basis of which profiling of each hub and clustering of hubs may be performed.

Tab. 1. Levels of operation analyses of each hub under RAIL4SEE project

Transnational level	National level	Regional/Local level
- International Railway Gateway - International Airport	- National airport - Interregional busses terminal - Interregional railway station	- Metro terminal - Suburban railway terminal - Urban busses terminal
CITY HUB interconnectivity	CITY HUB accessibility	CITY HUB integration
• Projects promoting new & upgrade international connections • Integrated ticketing • Info-mobility services	• Projects promoting seamless transport • Coordination of time schedules	• Terminals physical integration • Integrated ticketing • Info-mobility services

In the framework of Action 3.1 the 11 RAIL4SEE hubs were requested to provide summary information regarding the status quo of their transportation system (organization, management, operation). Although the collection of those data can be considered as part of mapping the "AS IS" situation, an attempt to summary information collection under Action 3.1 was made in order to facilitate the clustering of hubs and for better understanding the main changes envisaged to be brought by the completion of the ongoing and future investments in each hub. More analytically as regards the current situation in each hub, partners were requested to provide:

- A description of *transportation services provided* in each hub (e.g. rail services connecting the hub with other cities in national and transnational level, metro and busses for urban transportation covering all hub or a part of it, air connection with other hubs in country and international connections, intercity buses connections, etc.).
- A *description of the legal background of the organizations* involved in transport issues (policy makers, operators, managers, transport associations, etc.) as regards

their hub (description of all existing and potential future stakeholders).

- A *description of Legal & Financial Framework* (definition of the legal basis of current rail services, long distance and feeder lines, funding etc.) of currently provided services.

This information has been collected through a table organizing the investments according to the RAIL4SEE pillars and a common template for collecting partners input. Through a critical analysis of the individual partners' reports it was possible to develop a clear picture for the current situation in transportation issues and for the changes brought by the investments in each hub (with special focus on RAIL4SEE pillars). Thus it is possible to understand the current governance for investments and to identify future plans for investments.

3 Results

Based on the information captured on data provided by partners and in other project activities, this chapter presents the results of hubs comparative analysis on the basis of a series of criteria, made at each level of examination - urban, national and international.

The following Tab. 2 has been elaborated with key categories of investments per hub, based on the data provided by the partners as regards the ongoing and planned investments in the short term horizon (up to 5 years).

Tab. 2. Ongoing investments in RAIL4SEE hubs, urban/regional level

Hubs / Investments	Bologna	Bratislava	Bucharest	Budapest	Ljubljana	Sofia	Thessaloniki	Trieste	Venice	Vienna	Zagreb	All/ 11
New rail services	X			X		X	X		X			5
New road public transport services										X		1
Rail network improvements	X			X	X			X				4
Road network improvements		X			X	X						3
Improvements of Railway Stations	X	X			X	X						4
Information and services provision	X	X	X	X	X	X			X		X	8
Harmonization of timetable	X											1
Integrated ticketing			X				X					2
Integrated Transport Authority	X						X					2
All per hub	6	3	2	3	4	4	3	1	2	1	1	30

The aspects (criteria) examined so as to compare the 11 RAIL4SEE hubs at national level refer to the level of accessibility provided for the hub by the national railway services and the maturity of the hub regarding:

- information and ticketing services provision to long distance traveling passengers;
- harmonization of timetables among long and short distance services operators;
- integrating ticketing at national regional level.

Tab. 3. Ongoing investments in RAIL4SEE hubs, national level

Hubs / Investments	Bologna	Bratislava	Bucharest	Budapest	Ljubljana	Sofia	Thessaloniki	Trieste	Venice	Vienna	Zagreb	All/ 11
New rail services					X						X	2
New road public transport services						X						1
Rail network improvements												0
Road network improvements					X	X						2
Rail network improvements		X		X	X	X	X		X	X	X	8
Airport accessibility		X			X	X			X			4
Information provision	X	X	X		X						X	5
Harmonization of timetables										X		1
Integrated ticketing			X									1
All per hub	1	3	2	1	5	4	1	0	2	2	3	24

The methodology used for the comparative analysis at translational level follows the same steps with the national level. Table 4 summarizes the ongoing investments categories per each RAIL4SEE hub on transnational level.

As regards the criterion called "Timetables harmonization", it refers to the existence of harmonized timetables among the rail operators of different countries. From the other side, the integrated ticketing can either refer to international rail transport and tickets purchased in a hub that are valid for complete journey in SEE or to combined train tickets and local transport passes.

As it is obvious from Tab. 4 five out of the eleven hubs are investing in international rail network improvement, fact that is very auspicious for increasing rail use in SEE. However, improvements only in infrastructures are not able to attract users. Investments on RAIL4SEE pilots' content are necessary in order to change travelers' perspective. From the same table

Tab. 4. Ongoing investments in RAIL4SEE hubs, transnational level

Hubs	Bologna	Bratislava	Bucharest	Budapest	Ljubljana	Sofia	Thessaloniki	Trieste	Venice	Vienna	Zagreb	All/11
New rail services			X				X				X	3
New road public transport services						X						1
New air services						X						1
Road network improvements				X		X						2
Rail network improvements	X			X			X	X		X		5
Information provision	X	X	X			X	X				X	6
Harmonization of timetables												0
Integrated ticketing												0
All per hub	2	1	2	2	0	4	3	1	0	1	2	18

we can see that Thessaloniki, Bologna, Bucharest, Bratislava, Sofia and Zagreb will invest on better information provision while none of the hubs seems to be aware (or willing to invest) of the benefits deriving from international timetables harmonization and integrated ticketing possibilities. This lack on investments at timetables harmonization and integrated ticketing can also be attributed to the difficulty in implementing such issues and the strong international partnerships that need to be concluded in order to support these efforts.

4 Discussion

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

It is possible to elaborate different conclusions (derived from the analysis of the current situation and future status in each hub that will be established after the completion of the ongoing investments), structured by levels:

4.1 Urban & regional level

Bologna is a hub that presents a remarkable dynamic. Today is served by buses and trolleys, however, within the next years its urban railway services will also be available to passengers. The current modal terminals interconnectivity is considered very good since an efficient bus system connects them (The bus terminal and the Central Railway Station is closely located). The planned improvements of Stations and the completion of the urban railway stations will enhance hub's interconnectivity. As regards the other pillars of RAIL4SEE, examples of harmonized timetables exist (among suburban railway and regional buses), however, it is not a common practice. Bologna seems very willing to invest on timetables harmonization and is an issue that will be further examined in the framework of RAIL4SEE project. As regards integrated tariffs, STIMER-Mimuovo project has resulted in the implementation of integrated ticketing in the urban area, a measure that has facilitated much the passengers. Finally, the development of an Integrated Transport Authority (ITA) which is among Bologna's plans, in view of the completion of Urban Railway will contribute in the better coordination of the provided Public Transport services.

Bratislava seems to have a large infrastructure agenda. Terminals' interconnectivity will be enhanced through the completion of Intermodal Terminals and the railway connection of its Airport. Integrated ticketing is an issue that also after the completion of ongoing investments will not be implemented. The investments foreseen seem that upgrade current status.

Bucharest will invest on information provision to passengers and on integrated tariffs, however seems that timetables harmonization at urban/regional level and among different operators will not take place.

Budapest seems a very active hub in South East Europe. After the completion of mapped investments almost at all RAIL4SEE pillars will present improvement. City hub interconnectivity will be upgraded by operating more frequent bus lines serving and connecting Budapest's Terminals. As also mentioned by Hungarian partners new governance models are already under examination.

Sofia presents very good interconnectivity of modal terminals that will be further enhanced with the completion of the underground session and a good information provision system at urban/regional level (interactive virtual schedules are available for individual travel planning).

Thessaloniki intents to develop an Integrated Transport Authority (ITA) which in view of the completion of Metropolitan Railway, will coordinate Public Transport services and can contribute more efficiently in the implementation of the issues dealt in the framework of RAIL4SEE project (ticket integration and timetables harmonization). Furthermore, at urban/regional level, the development of an integrated information platform that would combine data from the existing individual platforms will provide passengers with an advanced service, capable to make Public Transport more attractive to them.

Trieste shows a slight dynamic at urban/regional level and interventions are necessary to be made so as to catch up with the rest "medium speed" hubs.

Vienna is a "high speed" hub that has invested in all RAI-4SEE sectors of examination. As regards information provision is the most advanced hub in the study area (multimodal information, e-ticketing, intermodal public transport and Traffic

information system). Terminals interconnectivity is excellent while integrated ticketing applies for short and medium travels. Finally, due to regular services, timetables are considered as harmonized, while on major axis more frequent intervals will be realized in the near future.

Ljubljana, *Venice* and *Zagreb* although improving their status after the investments, they seem not to be able to implement integrated tariffs for passengers facilitation. Integrated Transport Authorities do not seem besides their plans also. As for Venice, the hub seems to lag in information provision.

It is very crucial to focus on new governance schemes and innovative partnerships that will guarantee long term sustainability and efficient operation of Public Transport. For all RAIL4SEE hubs the improvement of national rail network and the provision of competitive (in terms of cost and travel time) services is the most significant prerequisite in order to attract passengers.

4.2 National level

Vienna seems to be (and will continue after the investments) the most dynamic hub in the study area also as regards national level. Information provision on stakeholders' platforms facilitates travelers in organizing their trip. The only sector that needs further attention is the implementation of integrated ticketing at national level; no investments are foreseen for the total implementation of this measure.

Bologna seems to be a hub oriented towards becoming a strong national hub. High speed trains cross Bologna and links it with major Italian cities. Furthermore, the rail connection of its Airport (the 7th busiest in Italy) can distribute air passengers to other Italian areas.

Harmonization of timetables (except Vienna only Bologna, Budapest and Ljubljana present limited scale investments) and ticket integration (except Vienna, Bucharest seems to present a small progress) at national level seem not to be a common practice at South East Europe countries.

4.3 International level

Bologna is considered as a boundary of SEE while its position is stronger when it comes to passage to the rest Europe.

Bratislava intents to upgrade passengers information provision, however, no progress is made on ticket integration and timetables harmonization at international level.

Bucharest does not refer to any investment that can facilitate transnational connectivity.

Sofia seems to pay much attention to intermodal transport corridors (PAN EUROPEAN). The investment in Vidin-Calafat Bridge that would make Bulgaria – Romania connection easiest is of special interest. Sofia also intends to upgrade passengers' information provision.

Thessaloniki seems to be oriented towards making its "opening" to Balkans and to the rest SEE since by the spring of 2013 it would have reestablished the passenger rail connections to Skopje and Sofia. Furthermore, the e-ticket implementation for those connections planned by TRAINOSE is though as a service that will facilitate users and will act as a positive clue on travelers' perception.

Vienna is a hub already well developed and also presents a rail gate to Central Europe. It is a pioneer hub inside study area as regards progress on RAIL4SEE pillars. Its national rail operator website is the most advanced from all other sites, it provides information on rail connections all along over SEE and provides also information is some cases for existing international bus services. Links of other national rail operators' websites to OBB website is common. Furthermore, tickets purchased in Vienna from OBB PV AG are valid for complete journeys while harmonized timetables exist where possible among national and international rail connections. Better connections to Slovenia and Italy are necessary as also stated by Austrian partners.

The latter "black spot" (inexistence of bilateral/multilateral cooperation for integrated ticketing and harmonized timetables at transnational level) applies also in the majority of RAIL4SEE hubs (*Sofia*, *Venice*, *Trieste*, *Zagreb, Bucharest*, *Bologna* and *Thessaloniki*).

When referring to interventions in the framework of Rail4See project we do not only mean "hard" measures as development of new infrastructures and implementation of customized services but we refer also to "virtual" interventions as the exploitation of ICT systems able to enhance, upgrade and facilitate hub's operations. We refer also to "soft" interventions such as policy making actions (e.g. cooperation among transport operators in the promotion of rail, coordinated timetables, governance schemes etc.).

5 Conclusion

One of the aim is this project report to become a useful tool that can reveal the real needs of the 11 RAIL4SEE hubs in order to be transformed in powerful links of a strong rail network in SEE that serve passengers in the most efficient way. The following remarks can show the areas towards which the hubs could be oriented and can therefore feed hubs' pilot activities content.

5.1 Urban / metropolitan level

Figure 1 is indicative for the needs of each hub at urban and metropolitan level:

- Hubs that present low urban population and relatively low percentage of urban population in total metropolitan population should invest in better connecting suburban areas to city center (e.g. Bologna, Venice).
- Hubs with high urban population and high percentage of urban population in the total metropolitan population should pay attention in better hubs' integration and in services of high quality (e.g. Sofia, Bucharest).
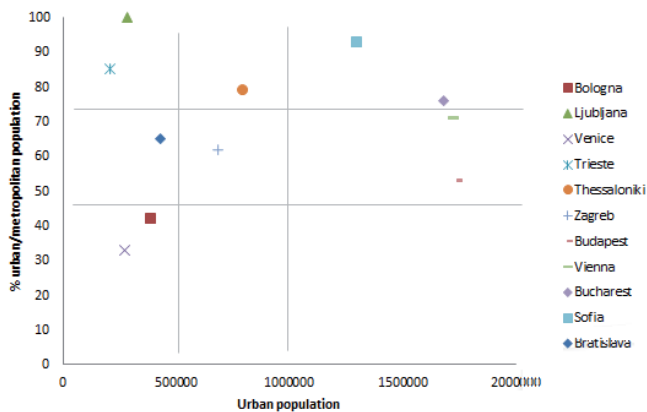
Fig. 1. Urban population and percentage of the urban population in metropolitan population

- Hubs presenting a medium-scale population along with a medium percentage of urban population in the total metropolitan population should invest on better city – hub accessibility.

5.2 Transnational level

Bologna could play the role of the National gateway nodal point to Europe. Bologna is considered as a boundary of South East Europe while its position is stronger when it comes to passage to the rest Europe. As regards to South East Europe, Bologna has to present high rail connectivity with Venice, need that is already taken in mind by the hub; fast interconnection to Venice is under development.

Bratislava is a good example of a hub that by investing in rail will easily upgrade its status as rail node since air connections are missing. Especially Bratislava – Vienna rail connection that is very competitive must be improved since daily commuters form Bratislava travel to Vienna and vice versa.

Bucharest–Budapest rail connection seems very attractive and also competitive and as a result investing on frequent and harmonized timetables and ticket integration could increase rail use.

Budapest seems to be along with Vienna the most important hubs in South East Europe. Better connection among the two strong hubs is appreciated.

Ljubljana could invest on better rail connections with Vienna, Zagreb and Trieste.

Sofia seems to pay much attention to intermodal transport corridors (PAN EUROPEAN). The investment in Vidin-Calafat Bridge that would make Bulgaria – Romania connection easiest is of special interest. Sofia should keep and reinforce through appropriate measures (frequent and harmonized timetables, good level of information provision and ticket integration) its connections to Beograd and Bucharest.

Thessaloniki presents limited connections that rail can be competitive due to its geographic location (boundary in South East Europe). Thessaloniki – Sofia rail connection is the only one that seems competitive to the alternatives (road and air).

Venice could act as the international passage of Italy to the rest South East Europe and connections with Vienna should be carefully considered.

Vienna is a hub already well developed and also presents a rail gate to Central Europe. As regards to South East Europe, better connections to Slovenia and Italy are necessary.

Zagreb seems to be a very strong rail node with direct connections to many other hubs. It is prerequisite to continue those connections in order to keep its strong position inside South East Europe.

These suggestions for investments are of key importance, because they improve the RAIL4SEE hubs and, also, they are able to bring real contribution to the development of the transport system in South East Europe.

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