ASSESSMENT OF ALTERNATIVE MOBILITY OPPORTUNITIES FOR CONNECTING JELGAVA AND RIGA

Armands Veveris
Institute of Agricultural Resources and Economics, Latvia
arman2@inbox.lv

Abstract. The purpose of this article is to assess a sufficiency of mobility opportunities to connect the Jelgava City, Olaine and Ozolnieki Municipalities with Riga and evaluate alternative options for improvement of mobility, at the same time facilitating the use of environment-friendly means of transport. The existing and potential demand for the public transport and sufficiency thereof to connect the analysed territories to Riga during various times of the day and week was assessed in the article. The ratio of the private and public transport use was analysed. The factors affecting attractiveness of the public transport were analysed, and appropriate recommendations designed in the article. The use of the railroad transport and perspectives thereof, as well as creation of connection with the local importance bus routes was especially assessed. Two alternative options are recommended as the solutions in future. One of them prescribes an option to carry passengers on the route Riga-Jelgava mostly by train, simultaneously creating a network of local transport, which at the same time would improve provision of transport in regions and connect residential areas with the railway stations. The second option prescribes to maintain the existing route scheme, increasing the train running intensity, while maintaining the bus routes parallel to the railroad in a reduce volume. The study results may be used in development of the transport policy both in the analysed region and in other regions.

Keywords: passengers, transport, mobility, railway.

Introduction

The aim of the article is to assess a sufficiency of mobility opportunities in route connecting Jelgava with Riga, and evaluate possibilities to increase a role of the public rail transport on this route.

Public transport is one of the most important social services in Latvia. It is one of the main components of the state infrastructure, and development of many other fields and territories depends on its operation – good availability of transport significantly facilitates thereof, but on the contrary, insufficient availability delays it. It is also one of social security elements of the state, region or municipality. Importance of public transport in Latvia is great, while its potential is not used to a sufficient extent due to still high proportion of private transport also on the routes with well-developed public transport. It pertains also to rail transport. A route Jelgava-Riga was selected for this study due to developed carriage of passengers both by railway and buses and active use of private transport on this route.

When planning future development, the European Commission (EC) policy to reduce harmful emissions, including in the transport sector, planning to significantly limit the use of private cars with traditional fuel, setting limits for their total kilometres; introduce more effective vehicles, especially developing carriage by railway, facilitate high-speed passenger services and maintain dense railway network, must be taken into account [1]. It conforms to strategic vision of Latvia to create convenient and uniform public transport system, achieving mutual coordination of various types of transport and ensuring appropriate comfort level of public transport. By coordinating routes of public transport and a schedule of its maintenance time, it is planned to reduce the total time spent in commute [2].

Special place in the strategy is dedicated to the railway transport: Development of the railway transport should become the priority in the future because it is the most perspective type of terrestrial transport from the point of view of both, safety and environmental quality, and state support and investments in the provision of carriage of passengers should also be increased. It is necessary to improve railway infrastructure in routes between Riga and centres of national significance in order to reduce the time necessary for a trip [2].

Many European countries have created an integrated public transport system convenient for the passengers, by integrating various types of transport. Here are many examples: capitals of Denmark, Germany, Norway, the Netherlands, Sweden etc. [3-5]. Latvia is behind in this sense, as each carrier sells its tickets separately, and unified system still does not exist. Some studies have been conducted in this field a relatively long time ago [6]. Several pilot projects are being introduced, for example, by creating a possibility to buy a city bus pass with small discounts simultaneously with the train pass,

but such projects have mostly not been successful and therefore have been cancelled. It happened also in Riga and Jelgava. At the same time, the passenger flow between Riga and Jelgava, by including the residential areas on the route, is one of the most intense in the country and has well-developed railway traffic. It was therefore selected as an example for development of recommendations for the public transport organization.

Materials and methods

A combination of quantitative and qualitative research methods has been used in the article. Empirical methods have been used broadly for the data collection. Observations in various places on the roads and in means of transport were performed by the author to study the flow of people, by observing and calculating both the total flow of the persons using public transportation and also the flow of private vehicles. The total flow of passengers was recorded on the border of Riga (Highway A8 at the Tiraine Station), as well as in trains between the Tiraine and BA Turiba stations. Observations were made both in the weekdays and weekends at various times during the period of 2017 and 2019. In order to align the impact of the beginning and the end of the working week, the weekday observations were made in the middle of the week (Tuesday-Thursday), while during the weekend, they were made in a similar intensity on both Saturdays and Sundays. All calculations on the flow of private transport were made based on assumption that in average of 1.6 passengers are located in each vehicle.

Potential increase of passengers described in the table has been assessed, using performed studies of the flow and by making an assumption that the policy favourable to the passenger flow would be implemented. It includes development of connecting trips instead of parallel trips, uniform tickets in trains and other means of transport, construction of parking lots next to stations, increasing the train speed and comfort and a passenger-friendly price policy. It would facilitate that majority of the existing bus passengers (approximately 2/3) and 15-30 % of the personal vehicle drivers moving along the relevant route would use trains instead.

The interview method was also used. In order to find out an opinion and assessment of the local government representatives on the recommended development of public transport, interviews with the representatives of the involved local governments of Jelgava City and Jelgava County, Ozolnieki County, Olaine County were conducted. Also the passenger railway specialists have been interviewed. The analysis and synthesis methods were used for developing conclusions and recommendations.

Results and discussion

Popularity of railway transport increases in the entire European Union (EU). Thus, during the period between 2013 and 2018, the railway passenger flow in the entire EU was 472 billion passenger kilometres (pass·km) which is by 11 % more than in 2013 [7]. It varies based on countries, taking into account the transportation quality changes, investments made and other factors. It is interesting that only in 5 countries – Bulgaria, Croatia, Denmark, Latvia and Slovenia – from 23 EU Member States regarding which data is available, a volume of carriage by railway has reduced, while it has increased in the rest of them. The most rapid increase in terms of percentage is in Estonia (by 87 %) where the passenger flow slowly reduced until 2013. Subsequently, new trains (Stadler Flirt) were purchased, passenger infrastructure improved and train running intensity and speed increased. It all facilitated not only a single increase of the passenger flow in this country (by 25 % in 2014) but also a consequent increase in subsequent years, including by 14 % in 2018. It is exactly opposite in Latvia – during the period between 2008 and 2016, a reduction of railway passenger flow by 38 % can be observed, which may not be explained only by the reduction of the number of population and similar factors, but also points at the change of mobility priorities [8]. At the same time, it indicatively points at a potential of increasing the passenger volume in future if this type of transport is sufficiently attractive.

The route Riga-Jelgava is one of the most popular on the scale of Latvia and connects the capital with the fourth largest city in the country. It has a high potential for passenger traffic as it is located in a populated area with heavy private car traffic. Not only the residents of Jelgava are travelling from Jelgava to Riga, but in transit also the residents of Jelgava County, as well as other counties. According to the information in the possession of the Jelgava local government, approximately 12 000 residents of Jelgava regularly travel to Riga.

Public transportation sufficiency research has yielded the following results. Problematic locations for ensuring transport within the aforementioned municipalities were considered in the discussions with the local government representatives. One of the greatest problems may be observed in the Jelgava County, where public transport is not available in the further residential areas. Representatives of the local government recognize that demand is insufficient to maintain regular public transport, but the residents of these areas still are in a need to take trips. A legal framework, how to use the local government transport in the areas where public transport is not available, must be created. In turn, the representatives of the Olaine local government pointed at some residential areas (villages) without any public transport or with insufficient intensity thereof. These places are as follows: Grenas, Lubausi and Gaismas (Stunisi). A separate minibus route Riga-Gaismas is being provided (15 trips per day on weekdays, 7 trips on weekends). Residents still propose to improve traffic.

Observations were made also in the maximum intensity hours in the morning in Jelgava at the stop "Pernavas Street" from the centre in direction of Riga. It is complicated to get from there to the train stations but buses pass by along the main street. Yet, data shows that reaching Riga is not a great problem, as the large buses are filled only by 60 % but minibuses by almost 100 %. Entering transport is more complicated only during the time between 7:00 and 7:30 leaving Jelgava as large buses are not running during this time.

In order to determine a passenger flow in the relevant direction, observations were made as described in materials and method`s chapter. As we can see from the data in the Figure 1, certain trends are observed in the breakdown of the passenger flow. The flow of passengers in both directions is very different depending on the time of day.

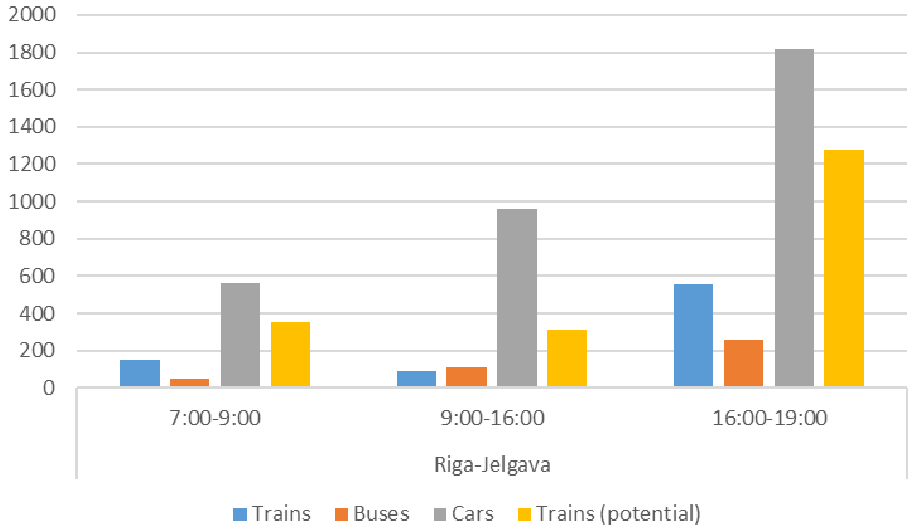

Fig. 1. **Author's estimation of average number of passengers per hour and distribution by means of transport at different times on the route Riga-Jelgava, years 2017-2019 (at border of Riga, Monday-Friday)**

The flow of passengers in both directions is very different depending on the time of day. If the highest flow towards Jelgava is from 16 to 19, then in the direction of Jelgava in the opposite direction, the peak of the flow is in the morning hours (Figure 2). The collected data also show that the importance of trains increases proportionally at the times when there is the largest passenger flow.

Aforementioned data allows drawing a conclusion that the greatest potential for the increase in number of the train passengers is during the times when currently this flow is comparatively low – during the day and on weekends. There are still times when a significant increase is possible only at the expense of the private transport users (especially in the morning and before noon from Riga and in evening – back), as buses are used comparatively less during these times and in these directions.

The paper assesses the plans of AS Pasazieru vilciens after procurement of new electric trains (initially it was planned from 2021, now approximately from 2022) to introduce an interval schedule in the train running, ensuring 4 train trips per hour on weekdays between 7:00 and 9:00 and between

16:00 and 19:00, while 2 trips per hour on weekends. Thus, a total number of the planned trips would be by 90 % more than a number of the existing trips in 2019.

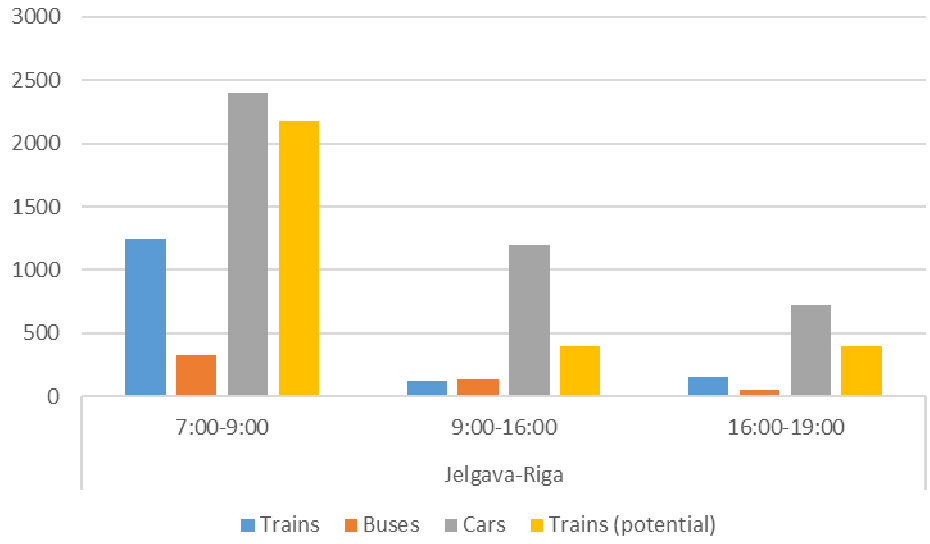

Fig. 2. **Author's estimation of average number of passengers per hour and distribution by means of transport at different times on the route Jelgava-Riga, years 2017-2019 (at border of Riga, Monday-Friday)**

The planned running intensity (one trip per each 15-30 minutes) and a regular train traffic conforms to the train running model accepted in Europe, where regular and sufficiently intense train running is ensured. Providing that sufficient speed and comfort of the trip, as well as acceptable price is ensured, it ensures an opportunity to abandon the parallel bus service, because intervals between the train trips would become so short that the bus trips do not need to be planned between them. A matter of servicing the passengers who have a relatively long distance to train stations remains unresolved.

By assessing the planned impact of such running intensity on the passenger flow and according to method described in Materials and method`s chapter, a potential number of passengers based on favourable conditions is calculated. This also is presented in Fig. 1 and Fig. 2. (the last column in each time interval). Taking into account the historical experience (passenger flow both in 90s and quite recently – 9-10 years ago), a similar passenger flow was already observed, so it is possible also in future.

It should also be noted that in order to ensure a passenger flow planned in Table 2, only changes to the train-running schedule would in no way be enough. A complex of measures is necessary for attraction of passengers with the following main components:

1. reduced trip time (compared to the existing);
2. increased comfort of the carriage (according to the level accepted in Europe);
3. acceptable price conforming to the paying capacity of passengers and not exceeding the costs of alternative transport;
4. comfortable boarding, kind and modern servicing, convenient options for purchasing tickets;
5. connections with other types of transport, ensuring transfer to residential areas further away from the stations (at the locations where it is necessary);
6. uniform tickets for a trip in trains and coordinated buses, which do not make a trip more expensive by making a connection.

All aforementioned items are important, and each gives its contribution in the formation of the total number of passengers. In the opinion of the train specialists, creation of the interval schedule (including increase of the running intensity) may increase the passenger flow by approximately 20 %, while introduction of new trains – by additional 20 %. In the author's opinion, increase of the train speed would have at least the same impact.

By summarizing the information analysed above – data on the existing and potential passenger flows, the opinions of local government representatives and specialists, two potential opportunities of solutions are being proposed.

Opportunity 1

Carriage of passengers on the route Riga-Jelgava takes place mostly by train, creating a network of local transport instead of the parallel service Riga-Olaine and Riga-Jelgava, which at the same time would improve provision of transport in regions and connect residential areas with the railway stations.

This solution, of course, may have various options, for example, whether only a transit bus service is maintained between Jelgava and Riga, or a portion of these buses run to Jelgava with a further making connection to train.

Opportunity 2

The existing route scheme is being preserved, but the parallel bus routes are executed in a smaller number. Reduction would be applicable to the routes 5034 Riga-Olaine (in this case, it is rational to combine it with the route 5139 Riga-Gaismas, creating a single route), 7017 Riga-Jelgava and partially to 7376 Riga-Dobele. The service intensity in these routes may be reduced by approximately 20 % already by 2021, thus, after introduction of new trains and interval schedule, it could be reduced by approximately additional 50 %. In such situation, a matter on performance of the service on the route Riga-Jelgava mostly by the large buses should be reviewed (by reducing intensity to one trip in approximately 30-60 minutes, incorporating also transit service). Minibuses may be preserved only in early hours and late evening hours where there are few passengers, as well as on the route Riga-Dobele.

Both offered opportunities have their advantages and risks presented in Table 1.

Table 1

Identified advantages and risks in the proposed options of the transport organization on the route Riga-Jelgava

Opportunity 1		Opportunity 2	
Advantages	**Risks**	**Advantages**	**Risks**
Costs of the route network are reduced by eliminating overlap	A network of local routes, its costs and funding model is not clear	A solution in terms of execution is more simple – a route network must not be significantly changed	Local routes inside the municipalities do not have to be created
Will facilitate creation of local transport network	So far, a majority of passengers does not accept riding with making connections	Alternative means of transport (bus or train) are being maintained	Demand for the parallel bus runs may reduce significantly
A conceptual support is available in local governments	Risks in event of unexpected traffic interruption	Smaller changes for passengers	Higher expenses are anticipated

The results of this paper are closely related to the considerations of the "The Concept of the Future of Public Transport from 2021 to 2030" and conform to its nature – to facilitate that people more often choose public transport instead of private vehicles. They conform to the principle included in the aforementioned conception regarding railway as the backbone of the public transport system and buses as a supplement to the carriage by railway [9]. The proposed Opportunity 1 for the organization of transport conforms more to these principles, while in practice the planned route network would more conform to Opportunity 2, as it is planned to maintain the bus routes Riga-Olaine and Riga-

Jelgava, but make them to be commercial (state non-granted) routes. Such solution includes a risk that merchants, who will obtain the right to make carriages, may implement aggressive policy for attraction of passengers to ensure a great passenger flow. Exactly opposite of the planned may take place in such situation – the passenger flow may redistributed in favour of buses by reducing it in trains. To avoid it, the volume of the trips made by commercial carriers should be regulated, and the minimum cost of a ride established.

Conclusions

1. The existing provision of public transport on the route Riga-Jelgava in general may be considered as sufficient, while during some times the residents have problems with getting into buses because small capacity buses are run on the route Riga-Jelgava. A solution is improvement of the train availability, as well as development of local routes taking to train stations.
2. The passenger flow on this route has a potential of important increase. For this reason, the planned changes in the train running on the route Riga-Jelgava may be assessed as necessary and supportable.
3. Simultaneously, in order to ensure an appropriate passenger flow, changes need to be made in the public transport organization to attract both the current bus passengers and a part of the passengers riding in private vehicles.
4. One of the most important measures is to develop a local bus route network, which would satisfy both a need for the trips inside the municipalities and connect residential areas with the train stations. It is crucial to create a uniform ticket system for successful operation of such network, so that a passenger may buy one ticket regardless of the carrier.
5. A complex of measures including increase of the running speed, acceptable price, interval schedule, convenient boarding and getting off, as well as high-quality service is important for increase of the passenger flow in trains. In such situations, parallel service from Riga to Olaine and Jelgava may be abandoned, or their running reduced several times.
6. By introducing commercial road vehicles, a framework is necessary that would not allow allocation of the passenger flow in favour of this commercial transport.

References

[1] European Commission. White Paper. Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. Brussels, 2011, 30 p.
[2] Latvijas ilgtspējīgas attīstības stratēģija Latvija 2030. (Latvian Sustainable Development Strategy Latvia 2030). Riga, LR Saeima, 2010, 100 p. (In Latvian).
[3] Bugheanu A-M. Comparative Analysis on Public Transport Systems in European Capitals: Bucharest & Berlin. Theoretical & Empirical Researches in Urban Management. Vol.13 Issue 2/ May 2018, pp. 65-75.
[4] Firth D. Urban Mobility Strategy. City of Stockholm, Traffic Administration, 2012, 72 p.
[5] Urban Transport Group. The Scandinavian Way to Better Public Transport. Transport Research Institute at Edinburgh Napier University, 2017, 70 p.
[6] Ministry of Transport, Republic of Latvia. Rīgas un Pierīgas Mobilitātes Plāns (Mobility Plan Riga and Pieriga). Riga, Witteven + Bos, 2010, 261 p. (In Latvian).
[7] Railway passenger transport statistics –quarterly and annual data. Eurostat [13.05.2020.] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Railway_passenger_transport_statistics_-_quarterly_and_annual_data
[8] Rail transport of passengers. Eurostat. [13.05.2020.] Available at: https://ec.europa.eu/eurostat/databrowser/view/ttr00015/default/table?lang=en
[9] Sabiedriskā transporta nākotnes koncepcija no 2021.līdz 2030.gadam. (The Concept of the Future of Public Transport from 2021 to 2030). Ministry of Transport, Road transport Administration, Latvia, 2019. [30.03.2020.] Presentation is available at: https://lvportals.lv/skaidrojumi/304932-sabiedriska-transporta-koncepcija-2021-2030-gadam-2019 (In Latvian).