Possibilities of Eliminating Train Delays by the Effective Management Transport on One-track Line Bratislava–Dunajská Streda–Komárno

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Keywords: Traffic, Passengers, Operator, Turn.

Abstract. At the end of 2010, RegioJet, a.s., succeeded in providing transport services on the Bratislava - Dunajská Streda - Komárno line and concluded a contract on transport services in the public interest with the Ministry of Transport and Construction of the Slovak Republic (MTC SR) in the operation of passenger transport on the Bratislava - Dunajská Streda - Komárno railway line. The new concept of regional rail transport on this major regional route has brought additional benefits for passengers - new and comfortable trains, more frequent connections and better passenger service. The goal of the contribution is to propose an optimal variation of train paths on a given track, with the possibility of modifying if conditions are improved, based on the current operating situation. It is also an effort to find, by analyzing the current timetable, places where critical points can be adjusted or removed, thus offering passengers better rail connections [1].

Introduction

The decision of the Ministry of Transport and Construction of the Slovak Republic (MTC SR) dated 27 December 2010 was acquired by private railway operator RegioJet (RJ) contract for the operation of subsidized public passenger rail transport over a period of nine years on the Komárno - Dunajská Streda - Bratislava hl. st. The operator uses vehicles of the Bombardier Talent, Siemens Desiro and 628 diesel units.

Due to the fact that there are an hour headways set on the line from Bratislava to Dunajská Streda, strengthened at peak by half-hour interval, and two-hour headways from Dunajska Streda to Komárno, it is necessary to create the optimal turn for these units. The turn need of units is inadequate in current conditions due to the constantly increasing number of passengers and at the same time due to accidents that have recently been hit by the company.

Basic Information about the Track Line-Bratislava–Dunajská Streda–Komárno

Railway line Bratislava – Dunajská Streda – Komárno, marked in timetable 131, connected cities Bratislava – Dunajská Streda – Komárno. It is 100 km long single track with gauged 1435 mm. The maximum speed limit is 80 kph. The object of the track is situated in an unpretentious terrain in region Zitny ostrov [2].

Maximum inclination is 5‰ and category of line class is D4. Organizing and transport service is provided from the center of operating point in Dunajská Streda. They operated transport from Komárno st. 4 (without) to Bratislava-Nove Mesto (without).

There was an extensive reconstruction between Podunajské Biskupice – Dunajská Streda in 2011.
The Current State of Transport Management on the Track Komárno - Dunajská Streda – Bratislava

At present, both, passenger and freight transport is operated on this line. As the one track line, it is necessary to cross trains many times, which, at the current frequency of transport and track technology, causes considerable problems both as an operator and as an infrastructure manager.

The problem is that some stations have only two traffic rails, as in the creation of the timetable considerably complicates the situation, as with regular crossing of passenger trains is not possible to simultaneously cross freight trains. The number of traffic rails at each station is also directly related to their useful length, which affects freight trains and to a great extent limits the length of the train set.

Another problem is related to the organization of transport, the use of self-resetting switches, which in many stations caused by the movement of trains in turning in one direction, which influence on the travelling time of trains, forced transitions through turns at a slower speed, and ultimately to the frequent damaging of parts of the infrastructure or various components of the railway vehicle.

Passenger rail transport is operated by RegioJet while in freight transport, besides ZSSK CARGO, which also manages handling trains there is also private operator METRANS DANUBIA, which owns the intermodal transport terminal in Dunajská Streda [3,4].

Since METRANS trains run on Just in Time (JIT), it is necessary to ensure that they run on time and according to the currently valid Rail Traffic Scheme (GVD).

Due the fact, that on the track is many passenger trains, in many cases there are collision situations between operators, which causes train delays.

Currently, operator RegioJet provides passenger transport system, which started to operate regional passenger services on the Bratislava - Komárno route on the basis of a direct contract and the conclusion of a contract for public transport services. The Ministry did not carry out any tendering procedure and entered these transport operations to a specific operator - RegioJet.

The contract was concluded in December 2010 for a period of 9 years from March 2012 to December 2020 and the contract had a volume of output of almost 1.3 mil. Train-kilometres. After
RegioJet, trains began running from March 2012 significantly increased the extent of train traffic on this line (in Dunajska Streda in Bratislava trains run every hour and during peak hours every 30 minutes), and consequently there is also a significant increase in transport performance. Between October 2012 and October 2013, the year-on-year increase in train kilometers was 74%, passenger-kilometers by 146%, and by 115% in passenger numbers. It was also found that the cost per kilometer was reduced to 5.7€, representing a cost reduction of 16% compared to the ZSSK national carrier [5].

In 2011, when the passenger railway transport was operated by the state railway company - Zeleznica spolocnost Slovensko (ZSSK), the number of passengers on the route was over 700,000 passengers. By changing the operator and increasing the number of train-kilometers the situation from year to year increase in passenger transport, which is shown in Figure 2.

The biggest difference can be seen in between 2012 and 2016, which in 2016 was the increase in passengers in 2012 to more than 100%. Increasing the number of train connections has ensured a high quality rail link between mentioned cities [6,7].

![Figure 2. Number of transported passengers between 2012 and 2016.](image)

**The Reasons that Affect the Origination of the Train Delays**

Due to the fact the mentioned track is one track line, the number of trains is from year to year higher and the capacity is already exhausted. It is mainly caused by passenger trains which are ordered by Ministry of Transportation of Slovak Republic, however the package of train-kilometers is every year the same. Not only passenger trains are the biggest problem.

There are also the other reasons why it is complicated to provide freight trains which don’t drive on time but usually delay.

We can divide reasons of delay due their origination:
- First group is formed by the effects caused by infrastructure,
- Second one is caused by problems on the side of operators,
- Last one is formed by problems caused by third side

**Effects Caused by Infrastructure**

There are many reasons and problems, why it is complicated to provide trains on this track. At first, there is a problem with the capacity. As a single track with no trackside security equipment, trains
drive from one station to the next station. Between some stations there is an automatic block signal, which divides interstationary section into 2 block sections; it is situated mainly between stations which are in a large distance [8,9,10].

Another reason is that some of the railway stations have only 2 traffic rails to cross the trains, for example station Lehnice. It isn’t possible to cross more than 2 trains. Closely linked with the stations are self-resetting switches. It means that trains from the one direction drive only to the branch by 40 kph. The length of traffic rails is also problem, mainly for freight trains of Metrans, because usually it is a problem to cross passenger train with freight train [11].

The speed limit is also problem, track is built in a very flat terrain and they drive only 80 kph.

**Effects on the Side of Operators**

In the actual train traffic diagram 2016/2017 there are 27 passenger trains from Bratislava to Dunajská Streda (Komárno) and 30 trains to Bratislava operated by Regiojet. Except of this 2 pairs of trains are operated as regional express situated during the rush hours, when many trains is necessary to cross very often.

For example in the morning hours, there is a passenger train 4315 from Bratislava to Komárno, it leaves at 8:05 and arrives 10:13 and during the journey it crosses 7 times. The intersection interval is too much short, so if the opposite train is delayed for more than 5 minutes, it disrupts the whole traffic diagram and passenger trains are delayed the whole day, because the time to turn over the rolling stock is short in final station, so final delay time may change.

The another problem seems to be in connections. Some of the passenger trains from Komárno or Dunajská Streda are connections to Regiojet trains to Prague and in reverse.

The most common problem is train failure, it is cause mainly by the old types of rolling stocks or insufficient quality of service.

Operator Metrans Danubia provides intermodal transport of containers across Europe. The most common destinations are port Koper, Trieste, Marien St. Lorenzen, Budapest, Česká Třebová or Haniska pri Košiciach (Slovakia).

The majority of these places are so far, so there is a very high risk that it could delay why it is necessary to communicate with other international operators and make a deal how to solve the problems to avoid a delay. The most common problems are damaged wagons or broken trains and then If train is delay, it will affect the turnovers of wagons and locomotives and furthermore it can cause that train will stop there longer, because it didn’t come on time and actually other operator can manipulate in terminal [12].
Effects Caused by Third Side

Effects caused by third side are connected mainly with things which operators can´t influence, for example, bad weather, traffic accident on the road when the trucks drive to terminal with containers or custom officer stop the trains and check the papers [13,14].

Summary

The basic problem of this line is that it is single track. There isn´t enough capacity so there will be more problems in the future how to provide personal and freight trains, because year to year the amount of passengers is higher and the operator RegioJet wants to add other trains. Also Metrans is forced to make a shorter trainsets because of length of rails in stations what causes that they break a trainset in two pieces and drive more than it´s necessary and it causes delay.

Another option is to build second track but this responsibility is for manager of railway infrastructure – ŽSR. This aim should be a part of the state policy. Nowadays the railway infrastructure manager also Ministry of Transport don´t have an action plan how solve this situation.

Acknowledgement

This research was financially supported by the project VEGA No. 1/0095/16 Assessment of the quality of connections on the transport network as a tool to enhance the competitiveness of public passenger transport system.

References


