PROPOSAL TRANSPORT SERVICES OF THE AIRPORT LEOŠ JANÁČEK OSTRAVA

Abstract. The article deals with the issue of transport service of Leoš Janáček Airport in Ostrava utilizing public passenger transport. The topicality of the issue is the seasonal operation of the airport. The article aims to adapt the airport traffic service to passengers and airport staff. The number of connections will be dimensioned using the formula of transport services, which is based on the potential of transport services in the area. This methodology has been used on lines connecting residential areas but has never been used on lines connecting the city centre the airport.

Keywords: railway line, airport, passengers

Tomáš Čechovič¹

¹ Department of Railway Transport, Faculty of Operational and Economics of Transport and Communications, University of Žilina, 01026 Žilina, Slovakia; tomas.cechovic@fpedas.uniza.sk

Zuzana Gerháťová¹

¹ Department of Railway Transport, Faculty of Operational and Economics of Transport and Communications, University of Žilina, 01026 Žilina, Slovakia; gerhatova@fpedas.uniza.sk

Martin Kendra¹

¹ Department of Railway Transport, Faculty of Operational and Economics of Transport and Communications, University of Žilina, 01026 Žilina, Slovakia; martin.kendra@fpedas.uniza.sk

Introduction

Air transport is one of the most dynamically developing transport modes. Despite occasional fatal accidents, it continues to grow in popularity. At the same time, according to statistics, it is considered the safest transport mode in the world.

Ancillary elements such as the availability of the airport by public passenger transport are an essential part of the transport activity. The accessibility factor plays an important role in planning the accessibility of airports by passengers. A long-term trend in the operation of public passenger transport to the airport is the incorporation of rail transport as a key element of airport accessibility. In many developed countries, routes are now being built to their largest airports. It is up to the carrier to plan the transport service to meet the needs of both passengers and airport staff.

However, there are also airports where flights are operated only seasonally, whether in the winter or summer season. This is also the case of Leoš Janáček Airport in Ostrava. The task of the article is to propose optimal airport operation all year round, considering the seasonal specifics of transport

The issue of transport service was already addressed in the article Research of passenger's demand for a travel companion as part of sustainable transport solutions. from authors J. Čamaj & J. Mašek (Čamaj, et al., 2018). The article deals with passenger demand for transport services.

1. Characteristics of Leoš Janáček Airport Ostrava

Leoš Janáček International Airport Ostrava is the third-largest airport in the Czech Republic with seasonal regular operation. It is located 5 km north of Příbor and the D1 highway.

It is situated in the territory of these municipalities (<http://www.airport-ostrava.cz>):

- Mošnov – 738 inhabitants,
- Albrechtický – 708 inhabitants,
- Petřvald – 1 800 inhabitants.

Figure 1 shows distances in kilometers from the largest cities in the region to the airport.

Fig. 1. Distance from the airport [km] (<http://www.airport-ostrava.cz>)

The airport has direct rail and bus connections from Ostrava and Studénka, but it has only a direct bus connection from Frýdek-Místek.

Leoš Janáček Airport was opened in 1959. It currently has two concrete runways, each 3 511m long (Leoš Janáček Ostrava Airport, 2019).

According to the portal www.idos.cz, the airport currently operates for the public only in the summer season. Table 1 shows individual departures with their date restrictions.

Table 1. Departures in the summer season 2020

Departure	Destination	Air company	Date restriction
9:55	Burgas	Travel Service, a. s.	from 10. 6. to 16. 9. on Wednesday
12:00	Burgas	Travel Service, a. s.	from 5. 6. to 12. 9. in Friday and Saturday
12:15	Varna	Travel Service, a. s.	from 2. 6. to 15. 9. on Tuesday
12:20	Heraklion	Travel Service, a. s.	from 27. 5. to 4. 10. on Wednesday, Thursday, Saturday, and Sunday, except for 28. and 30. 5.
12:50	Burgas	Travel Service, a. s.	from 9. 6. to 15. 9. on Tuesday
13:25	Warsaw	LOT – Polish Airlines	from 30. 3. on Monday, Thursday and Saturday
17:05	Warsaw	LOT – Polish Airlines	from 31. 3. on Tuesday and Friday
19:10	Palma de Mallorca	Travel Service, a. s.	from 30. 5. to 26. 9. on Saturday
19:20	Palma de Mallorca	Travel Service, a. s.	from 3. 6. to 30. 9. on Wednesday

The first flight from the airport this year is scheduled for 30 March. In the meantime, the airport will be used for private flights and will be maintained.

Despite seasonal operations, the airport offers the following services (Leoš Janáček Ostrava Airport, 2019):

- business lounge,
- packing of luggage in protective foil,
- luggage storage,
- complaints about lost and damaged luggage,
- children's play area and room for families with children,
- Ostrava City Information System
- meeting room,
- wi-fi,
- shops and fast foods.

Another important indicator of airport operations is the number of passengers handled. For example, the passenger's services provided also depend on this indicator. Figure 3 shows statistics on the number of

handled passengers on scheduled services for 2014-2018.

Fig. 2. The number of passengers Ostrava airport (Leoš Janáček Ostrava Airport, 2019)

From 2014 to 2017, the number of passengers gradually increased. In 2018, a decrease of 10 387 passengers was recorded compared to 2017.

2. The current state of airport transport service by rail

The railway line to Ostrava Airport was inaugurated on 13 April 2015. At that time it was the first airport to have access by rail. The railway station is called Mošnov, Ostrava airport. The railway line turns from Sedlnice station on line no. 323. This line connects Středěnka and Veřovice [1]. The railway station and the whole line is controlled by a dispatcher from the railway station Středěnka, therefore it is a remote-controlled line. There are two station tracks with a total length of 200 meters. The length of the platform is 174 meters and the whole station is fully wheelchair accessible [5]. Figure 4 shows the railway station Mošnov, Ostrava Airport.

Fig. 3. Station building (Dočkal, 2015)

Since the beginning of its operation, the carrier on this line was České Dráhy, Ltd. Until December 2015 trains operated on the route Mosty u Jablunkova - Bohumin -

Ostrava - Mosnov, Ostrava Airport [7]. When the timetables were changed in December 2015, the line was shortened and trains started to run only in the section Bohumín - Ostrava - Mošnov, Ostrava Airport [8]. All trains running to the airport have been low-floor since the start of the operation. Figure 5 shows the wheelchair

accessible passenger train set.

Fig. 4. Passenger train at the airport (Dočkal, 2015)

The carrier currently offers several services for passengers on the train during their journey.

They are [10]:

- first-class sections,
- transport of bicycles,
- carriage of immobile passengers.

The train ride to Ostrava - Mosnov, Ostrava Airport takes 23 minutes. In principle, the timetable tried to accommodate departures and arrivals at the airport. In

3. Design of transport service using railway transport as the main mode of transport

According to the valid timetable, as shown in Figure 6, a total of 10 pairs of trains operate at Ostrava-Svinov - Mošnov, Ostrava Airport. The timetable is divided into two basic parts - seasonal operation (from June 7 to October 3) and off-season. Out of season, the number of train pairs is reduced to 5 [10].

The basic factor to consider when modeling transport service is the time of arrival at the airport. In this case, it would be appropriate to arrive at the airport no later than two hours before departure. Table 2 shows departures and suitable train connections from the station Ostrava-Svinov [10].

Table 2. Transfer links between the arrival of the train and the departure of the aircraft

Departure	Final destination	The arrival of a suitable train
9:55	Burgas	7:57 – Os 3062
12:00	Burgas	9:57 – Os 3064
12:15	Varna	
12:20	Heraklion	
12:50	Burgas	11:57 – Os 3066
13:25	Warsaw	15:21 – Os 3054
17:05	Warsaw	
19:10	Palma de Mallorca	17:21 – Os 3056
19:20	Palma de Mallorca	

The worst situation is between the arrival of the train number 3066 and the departure of the aircraft in the direction of Burgas at 12:50. Passengers have only 53 minutes to check-in. For other ties between train arrivals and aircraft departures, passenger check-in times are acceptable. Table 3 shows the links between aircraft arrivals and train departures towards Ostrava-Svinov (Z Dopravy CZ, 2019).

Table 3. Transfer links between the arrival of the aircraft and the departure of the train

Arrival	From the direction	The departure of a suitable train
1:25	Palma de Mallorca	2:52 – Os 3061
11:00	Bourgas	12:02 – Os 3067
12:00	Bourgas	14:44 – Os 3053
12:50	Warsaw	
14:30	Bourgas	
16:30	Warsaw	18:44 – Os 3057
16:45	Varna	
18:20	Heraklion	
	Palma de Mallorca	19:44 – Os 3069
18:40	Varna	
19:55	Heraklion	22:44 – Os 3059

The table shows that the links between aircraft arrivals and departures of trains are worse addressed. This is due to the short transfer times, which can not be used in flight delays. The highest risk of losing the connection is where the passenger has less than an hour to transfer. It is

Osobní vlaky na přepravním rameni Bohumín - Mošnov, Ostrava Airport od 15. XII. 2019 - 12. XII. 2020

ČD, a.s., ROC Ostrava	Vlak	3060	3050	3062	3064	3066	3052	3054	3056	3068	3058	
		12	12	12	12	12	12	12	12	12	12	
	ze stanice											
Bohumín		2:05	4:46				12:50		16:42		20:50	
Ostrava hl.n.		2:13	4:54	7:26			12:57	14:50	16:50		20:57	
Ostrava-Mar. Hory		2:16	4:57				13:00	14:53	16:53		21:00	
Ostrava-Svinov		2:21	5:08	7:34	9:34	11:34	13:05	14:58	16:58	18:18	21:08	
Polanka nad Odrou		2:24	5:11	7:37	9:37	11:37	13:08	15:01	17:01	19:20	21:11	
Ustečnick		2:28	5:15	7:41	9:41	11:41	13:12	15:05	17:05	19:24	21:15	
Studénka		2:35	5:21	7:48	9:48	11:48	13:19	15:12	17:12	19:29	21:21	
Sedlnice		2:40	5:26	7:53	9:53	11:53	13:25	15:17	17:17	19:34	21:26	
Mošnov, Ostrava Airport		2:44	5:30	7:57	9:57	11:57	13:28	15:21	17:21	19:38	21:30	

ČD, a.s., ROC Ostrava	Vlak	3061	3051	3063	3065	3067	3053	3055	3057	3069	3059	
		12	12	12	12	12	12	12	12	12	12	
	Mošnov, Ostrava Airport	2:52	6:35	8:02	10:02	12:02	14:44	15:44	18:44	19:44	22:34	
Sedlnice		2:58	6:38	8:05	10:05	12:05	14:47	15:47	18:47	19:47	22:37	
Studénka		3:01	6:44	8:11	10:11	12:11	14:50	15:50	18:50	19:50	22:40	
Ustečnick		3:07	6:51	8:17	10:17	12:17	14:59	15:59	18:59	19:59	22:49	
Polanka nad Odrou		3:10	6:54	8:20	10:20	12:20	15:02	16:02	19:02	20:02	22:52	
Ostrava-Svinov		3:15	6:58	8:25	10:25	12:25	15:06	16:06	19:06	20:06	22:56	
Ostrava-Mar. Hory		3:19	7:03		12:30	15:12		19:12	20:12	23:02		
Ostrava hl.n.		3:22	7:06		12:33	15:15		19:15	20:15	23:05		
Bohumín		3:30	7:15		12:42	15:24		19:24	20:24	23:14		
	do stanice											

12 nejede 24. 12. XII.
 12 nejede 25. XII. a 1.
 12 jede 7. VI. - 3. X.
 12 nejede 25. XII., 1. I., 7. VI. - 3. X.
 12 nejede 7. VI. - 3. X.

O vlak nejezdí na žádnou přípoje
 O čas příjezdu
 x zastávka na zrameni - vlak zastavuje jen na zrameni nebo poži

Fig 5. The current timetable is valid from 15. 12. 2019.

appropriate to introduce a basic waiting time between air and rail traffic to ensure the continuity of the train when the aircraft is delayed. The compensation to passengers in cases of delay of modes of transport is enshrined in article Possibilities and solutions of compensation for the delay of passenger trains and their economic impacts by the authors Nedeliaková Eva, Lalinská Jana & Čamaj Juraj (Nedeliaková, et al., 2015).

There are train connections in the timetable that have no connection to any flight. These run to the airport empty. Most passengers get out evenly along the route. Table 4 lists the connections that do not follow any flight.

Table 4. Connection not linked to any flight

Arrival	From the direction	Departure	Direction
2:44	Bohumín	6:35	Bohumín
5:30		8:02	Ostrava-Svinov
13:28		10:02	
19:38	Ostrava-Svinov	15:44	
21:30	Bohumín		

These trains are designed primarily for airport staff, respectively. for passengers of adjacent villages. It is questionable how many employees use them.

The modified methodology of Ing. Milan Dedík, which was used in the article Determining the necessary extent of regional rail passenger transport in the selected area, will be used to calculate the number of trains. This article was published at the conference Future of Regional Transport 2020 in Týn nad Vltavou. The fundamentals of the methodology are represented by a computing relation dealing with the calculation of the potential coefficient.

$$K_p = \frac{A_n \cdot D_n}{L} \quad (1)$$

where:

- K_p – potential coefficient,
- A_n – the number of inhabitants in the n-th settlement of the monitored area expressed in thousands,
- D_n – availability of the n-th railway station from the center in km.
- L – transport distance (from A to B)

According to available data, 200-249 employees work at Ostrava Airport [11]. For the article, we will assume in the model situation that 230 employees work at the airport.

Model distribution of employees and distance from the railway station to the center (km):

- Ostrava - 157 employees and 4,6 km
- Polanka nad Odrou - 16 employees and 2,6 km,
- Jistebník - 9 employees and 1,8 km,
- Studénka - 35 employees and 2,2 km,
- Sedlnice - 13 employees and 3,7 km.

After substitution into the formula, we got a potential coefficient of 2.48. Besides, a higher proportion

of airport staff commutes to work by car. Table V shows the parameters of the range of transport services outside the flight season.

Table 5. Range of transport services

Range of transport services	Result value range	The optimal number of train pairs	The optimal number of seats
I.	0 – 700	4	up to 500 seats

At the same time, it will be necessary to adapt the transport service to individual work shifts of employees.

These measures will also result in a reduction in revenue from the rail infrastructure charge. This issue is addressed in article Charging railway infrastructure models and their impact to competitiveness of railway transport (Čamaj, et al., 2017).

Conclusion

The transport service of the airport is an important part of the quality of passenger services. At a time of enormous growth in individual motoring, it is important to build a transport service on ecological "green" transport. And this mode of transport is rail transport.

The article aimed to determine the optimal transport service of the airport in the period out of regular air operation. It is very disadvantageous for a region, as a rail transport customer, to order trains whose transportation potential is very low. It can be stated that 4 pairs of trains that will be prioritized for airport staff are sufficient.

References

- Čamaj, J., Dolinayová, A. & Kanis, J., 2017. Charging railway infrastructure models and their impact to competitiveness of railway transport. *Transport Problems: Scientific journal*, pp. 139 - 150.
- Čamaj, J. et al., 2018. *Research of passenger's demand for travel companion as the part of sustainable transport solutions*. Kaunas, s.n.
- České Dráhy, a. s., 2014. *Jízdní řád ČD 2014/2015*. Praha: GŘ ČD.
- České Dráhy, a. s., 2015. *Jízdní řád ČD 2015/2016*. Praha: GŘ ČD.
- Český statistický úřad, 2013. *Registr ekonomických subjektů - informace o subjektu*. [Online] Available at: https://apl.czso.cz/irsw/detail.jsp?prajed_id=3180855 [Cit. 3 Marec 2020].
- Dočkal, V., 2015. *Budova železničního terminálu zvenku*. [Umení] (cs.wikipedia.org - galéria obrázkov).
- Dočkal, V., 2015. *Souprava City Elefant na vlakovém terminálu*. [Umení] (cs.wikipedia.org - galéria obrázkov).
- Flightradar 24, 2006. *Flightradar 24: Live Flight Tracker*. [Online] Available at:

- <https://www.flightradar24.com/OSTRAHA3/24004cbd> [Cit. 27 Feb 2020].
- GVD.CZ, 2019. *Pomůcky GVD SŽ+ŽSR*. [Online]
Available at: <https://www.gvd.cz/>
[Cit. 28 Febr 2020;].
- Leoš Janáček Ostrava Airport, 2019. *Airport Guide*.
Ostrava: Airport Ostrava.
- Leoš Janáček Ostrava Airport, 2019. *Výroční zpráva 2018*. [Online]
Available at: http://www.airport-ostrava.cz/UserFiles/File/Vyrocní_zpravy/V%C3%BDro%C4%8Dn%C3%AD%20zpr%C3%A1va%202018.pdf [Cit. 3 Mar 2020].
- Nedeliaková, E., Čmaj, J. & Lalinská, J., 2015.
Possibilities and solutions of compensation for delay of passenger trains and their economic impacts. Kaunas, s.n.
- Z Dopravy CZ, 2019. *Železniční jízdní řád 2020*. Praha: Z Dopravy cz.