

Impact of the Economic Situation in the Slovak Republic on Performances of Railway Transport

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RESEARCH ARTICLE

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Abstract

The paper deals with analysis of the development of performances in freight rail transport in comparison with the development of gross domestic product as the main indicator measuring the economic performance of the country and on the other hand the performances in passenger rail transport in relation to the development of the average monthly wage as one of the most important indicator characterizing the living standard. The change in demand for transport services is analyzed with respect to the change in the price of the ticket in passenger rail transport and also the change in the price for transport of one tonne of goods in freight rail transport.

Keywords

macro - economic indicators, passenger rail transport, freight rail transport, elasticity

1 Introduction

The development of the economy in the country is influenced by the effective activity and cooperation of households, companies, the state and foreign countries (Poliak et al., 2014). These four sectors are affected by each other. Consumers enter the market for their personal needs as a buyers, but also as a sellers. Their receipts from ownership of the production factors use for the purchase of goods, services, or savings. The companies produce goods, respectively offer the services, and come to the market for their sale (Gasparik et al., 2015).

The specific role in this cycle has a state, which should guarantee the appropriate conditions for companies but on the other hand also for the households, which are the main customers (Gasparik and Zitricky, 2010).

Transport is one of the most important sectors of the economy (Abramovic, 2017). The share of transport in gross domestic product (GDP) is about 6% in Slovakia. According to the Statistical Office of Slovakia were employed almost 99 thousand people in transport sector in 2014 while 12.5% of this number were employed in railway transport. Therefore, it is relevant to examine the impact of economic indicators on the change of performances in rail passenger and freight transport.

2 Comparison of the transport performances and macroeconomic indicators

Economic situation of the country can be characterized by a number of basic indicators (Kendra, 2014). The development of freight rail transport is compared in relation to the gross domestic product and the development of passenger rail transport depending on the average monthly wage.

2.1 Performances of freight rail transport in comparison with GDP

The most commonly used indicator characterizing the economic situation in the state is gross domestic product (Kampf et al., 2012). It represents the value of final goods and services produced in the time period on the national territory by production factors owned by the citizens of the country or foreigners working in that country. It is that part of gross production which

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is intended for final consumption (not to the next production) and satisfies the final consumers.

Fig. 1 shows the development of the GDP (in constant prices) and transport performances of freight rail transport (Annual report of ZSSK CARGO a.s., 2015)

The gross domestic product of Slovakia regularly increased by more than one billion eur in the last period, however the most significant increase was between the years 2013 and 2014 (more than 2.5 billion eur) with the assumption of a continuation of this trend in the future.

The same development was also in the performances of freight rail transport in the analysis period when the increase between the years 2013 and 2015 was 438 million tkm (almost 7%).

2.2 Performances of passenger rail transport in comparison with average monthly wage

Statistics indicate an average monthly level of wages of the employee for the whole economy of Slovakia, therefore include all sectors of economic activities with the exception of management or business receipts and also the receipts of their shareholders, military components, people on maternity and parental leave. The data are classified according to economic activity, geographical area, age groups or education (Lalinska et al., 2015)

Passenger kilometers (pkm) are the most appropriate measure for transport statistics and their comparison in passenger transport because an indicator the number of passengers can bring a high risk of double counting, especially in international transport (Camaj et al., 2015)

Fig. 2 shows the development of average gross monthly wage in the national economy in comparison with the performances of passenger rail transport (Annual report of ZSSK a.s., 2015).

The average monthly wage in Slovakia for the last five years reflects the development of the gross domestic product. An increase of almost 20€ is recorded each year, while the most significant increase was between years 2013 – 2014 (up to 34€). According to different economic situations of regions

is the average monthly wage regarded as substandard in certain areas of Slovakia in relation to others where the wage is much lower.

The development of performances in passenger rail transport (expressed in passenger kilometers) showed a similar trend in the years 2011 - 2015, however the last two months of 2014 and year 2015 were significantly affected by the introduction of free transport for certain groups of passengers.

3 Price elasticity of demand for services in passenger and freight rail transport

Price elasticity of demand (PED) shows the relationship between price and quantity demanded and provides a precise calculation of the effect of a change in price on quantity demanded (Mccarthy, 2001). The degree of response of quantity demanded to a change in price can vary considerably. The key benchmark for measuring elasticity is whether the co-efficient is greater or less than proportionate (Lizbetin et al, 2015). If quantity demanded changes proportionately, then the value of PED is 1, which is called 'unit elasticity'.

PED can also be:

- Less than one, which means PED is inelastic.
- Greater than one, which is elastic.
- Zero (0), which is perfectly inelastic.
- Infinite (∞), which is perfectly elastic.

PED on a linear demand curve will fall continuously as the curve slopes downwards, moving from left to right. $PED = 1$ at the midpoint of a linear demand curve.

3.1 Price elasticity of demand for services in passenger rail transport

Price elasticity of demand for transport is calculated as the ratio of change of quantity to change of price (Button, 2010). We investigated the dependence of the performances of passenger rail transport from the change in the price of the ticket. The price of the ticket is set out for each tariff zone (Table 1).

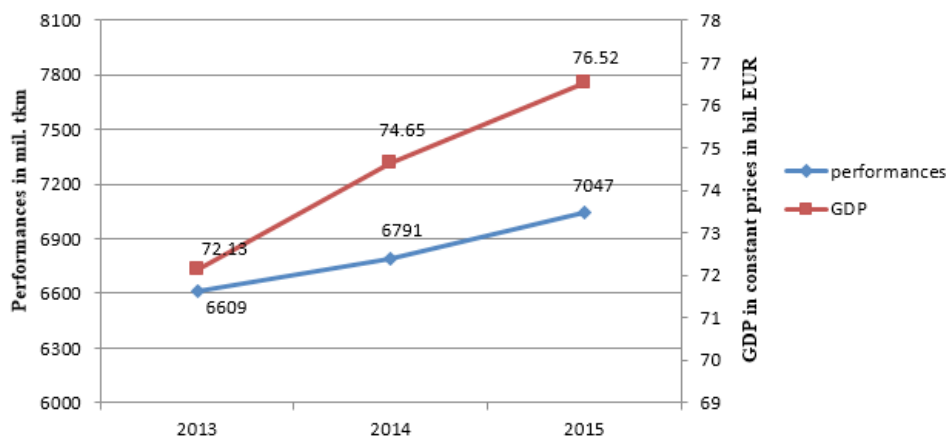


Fig. 1 Performances of freight rail transport in comparison with GDPe

Table 1 Calculation of average price for transport

Tarriff distance in km (from-to)	Center of interval	2011		2012		2013		2014		2015		
		ticket price (2nd class)	Ø price	ticket price (2nd class)	Ø price	ticket price (2nd class)	Ø price	ticket price (2nd class)	Ø price	ticket price (2nd class)	Ø price	
1	5	3	0.26	0.0687	0.5	0.1667	0.5	0.1667	0.5	0.1667	0.5	0.1667
6	10	8	0.40	0.0500	0.65	0.0813	0.65	0.0813	0.65	0.0813	0.65	0.0813
11	15	13	0.60	0.0462	0.90	0.0692	0.90	0.0692	0.90	0.0692	0.90	0.0692
16	20	18	0.80	0.0444	1.15	0.0639	1.15	0.0639	1.15	0.0639	1.15	0.0639
21	25	23	1.06	0.0461	1.40	0.0609	1.40	0.0609	1.40	0.0609	1.40	0.0609
26	30	28	1.18	0.0421	1.65	0.0589	1.65	0.0589	1.65	0.0589	1.65	0.0589
31	35	33	1.38	0.0418	1.90	0.0576	1.90	0.0576	1.90	0.0576	1.90	0.0576
36	40	38	1.58	0.0416	2.15	0.0566	2.15	0.0566	2.15	0.0566	2.15	0.0566
41	45	43	1.92	0.0447	2.40	0.0558	2.40	0.0558	2.40	0.0558	2.40	0.0558
46	50	48	2.18	0.0454	2.65	0.0552	2.65	0.0552	2.65	0.0552	2.65	0.0552
51	55	53	2.52	0.0475	2.90	0.0547	2.90	0.0547	2.90	0.0547	2.90	0.0547
56	60	58	2.72	0.0469	3.15	0.0543	3.15	0.0543	3.15	0.0543	3.15	0.0543
61	65	63	2.98	0.0473	3.40	0.0540	3.40	0.0540	3.40	0.0540	3.40	0.0540
66	70	68	3.18	0.0468	3.65	0.0537	3.65	0.0537	3.65	0.0537	3.65	0.0537
71	80	75.5	3.72	0.0493	4.02	0.0532	4.02	0.0532	4.02	0.0532	4.02	0.0532
81	90	85.5	4.18	0.0489	4.53	0.0529	4.53	0.0529	4.53	0.0529	4.53	0.0529
91	100	95.5	4.78	0.0501	5.02	0.0526	5.02	0.0526	5.02	0.0526	5.02	0.0526
101	110	105.5	5.10	0.0483	5.48	0.0519	5.48	0.0519	5.48	0.0519	5.48	0.0519
111	120	115.5	5.50	0.0476	5.88	0.0509	5.88	0.0509	5.88	0.0509	5.88	0.0509
121	130	125.5	5.96	0.0475	6.28	0.0500	6.28	0.0500	6.28	0.0500	6.28	0.0500
131	140	135.5	6.30	0.0465	6.68	0.0493	6.68	0.0493	6.68	0.0493	6.68	0.0493
141	150	145.5	6.64	0.0456	7.08	0.0487	7.08	0.0487	7.08	0.0487	7.08	0.0487
151	170	160.5	7.30	0.0455	7.67	0.0478	7.67	0.0478	7.67	0.0478	7.67	0.0478
171	190	180.5	8.02	0.0444	8.48	0.0470	8.48	0.0470	8.48	0.0470	8.48	0.0470
191	210	200.5	8.90	0.0444	9.28	0.0463	9.28	0.0463	9.28	0.0463	9.28	0.0463
211	230	220.5	9.68	0.0439	10.08	0.0457	10.08	0.0457	10.08	0.0457	10.08	0.0457
231	250	240.5	10.48	0.0436	10.86	0.0452	10.86	0.0452	10.86	0.0452	10.86	0.0452
251	270	260.5	11.48	0.0441	11.68	0.0448	11.68	0.0448	11.68	0.0448	11.68	0.0448
271	290	280.5	12.08	0.0431	12.48	0.0445	12.48	0.0445	12.48	0.0445	12.48	0.0445
291	310	300.5	12.48	0.0415	13.28	0.0442	13.28	0.0442	13.28	0.0442	13.28	0.0442
311	330	320.5	13.34	0.0416	14.08	0.0439	14.08	0.0439	14.08	0.0439	14.08	0.0439
331	350	340.5	13.94	0.0409	14.88	0.0437	14.88	0.0437	14.88	0.0437	14.88	0.0437
351	370	360.5	15.00	0.0416	15.68	0.0435	15.68	0.0435	15.68	0.0435	15.68	0.0435
371	390	380.5	15.60	0.0410	16.48	0.0433	16.48	0.0433	16.48	0.0433	16.48	0.0433
391	410	400.5	16.00	0.0400	17.07	0.0426	17.07	0.0426	17.07	0.0426	17.07	0.0426
411	430	420.5	16.66	0.0396	17.87	0.0425	17.87	0.0425	17.87	0.0425	17.87	0.0425
431	450	440.5	17.18	0.0390	18.59	0.0422	18.59	0.0422	18.59	0.0422	18.59	0.0422
451	470	460.5	17.98	0.0390	19.37	0.0421	19.37	0.0421	19.37	0.0421	19.37	0.0421
471	490	480.5	18.58	0.0387	20.19	0.0420	20.19	0.0420	20.19	0.0420	20.19	0.0420
491	510	500.5	18.98	0.0379	20.87	0.0417	20.87	0.0417	20.87	0.0417	20.87	0.0417
			∑ 1.8111		∑ 2.1453		∑ 2.1453		∑ 2.1453		∑ 2.1453	
			Aver. 0.0453		Aver. 0.0536		Aver. 0.0536		Aver. 0.0536		Aver. 0.0536	

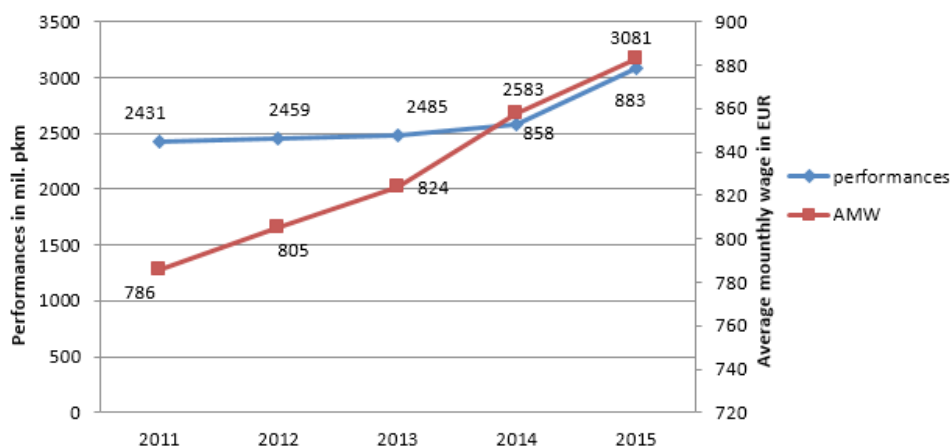


Fig. 2 Performances of passenger rail transport in comparison with average monthly wage

We calculated the average price as the average of the prices for one passenger kilometer in the individual tariff zones. Prices in passenger rail transport are regulated by the state therefore does not change often. Table 2 shows the price elasticity of demand for passenger rail transport in the years 2012-2015.

The coefficient of price elasticity is less than one in all cases, what means that the demand for services of public passenger rail transport is inelastic - it is not significantly affected by the change of the ticket price.

Table 2 Effect of change in performances of passenger rail transport to the price for one pkm

	2011	2012	2013	2014	2015
Performances of passenger rail transport in mil. pkm	2431	2459	2485	2583	3081
Average price for 1 pkm in EUR	0.0453	0.0536	0.0536	0.0536	0.0536
Price elasticity	X	0.0057	0.0053	0.0193	0.1186

3.2 Price elasticity of demand for services in freight rail transport Place of figures

Price elasticity of freight rail transport is focused on the dependence of the change in the rates for the transport of 1 tonne of goods from the transport performances. The rate for transport of 1 tonne of goods is set out for each tariff zone as well as in passenger transport (Table 3). The conversion is processed for each analyzed year, where the result is the average price for one tonne kilometer. The list of rates is referred in Tariff for freight rail transport – TR1 (TR 1, 2015).

We calculated the average price as the average of the prices for one tonne kilometer in the individual tariff zones. The used list of rates is for railway wagons, which are owned by the carrier.

Price elasticity of demand for freight rail transport in the years 2014 and 2015 is shown in Table 4.

The coefficient of price elasticity is more than one in both cases, what means that the demand for services of freight rail transport is elastic. Performances of freight rail transport increased every year, although the rate for transport of one tonne of goods also increased also. This fact could be affected by increased interest in intermodal transport.

4 Conclusion

The good economic situation and living standards is also reflected positively on the increasing demand for services in passenger and freight rail transport. The increase in the number of passengers carried in the period was recorded each year during the period, even between years 2011 and 2015 it was more than 21%. Despite this fact, we are concluded on the basis of price elasticity that the demand remains inelastic to change of price in passenger rail transport. This trend indicates that the price in passenger rail transport is not the most important factor for passengers in deciding on the choice of type of transport. The situation in freight transport was similar when the increase of performances was observed in comparing the years 2013 and 2015, despite the changes in the rates for transport of one tonne of goods. 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.

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Table 3 Calculation of average price for transport

Tariff distance in km (from-to)	Center of interval	2013			2014		2015	
		Rate for transport of one tonne	Ø price		Rate for transport of one tonne	Ø price	Rate for transport of one tonne	Ø price
1	10	5.5	6.45	1.1727	6.63	1.2055	6.77	1.2309
11	20	15.5	7.12	0.4594	7.32	0.4723	7.47	0.4819
21	30	25.5	8.04	0.3153	8.26	0.3239	8.43	0.3306
31	40	35.5	8.94	0.2518	9.19	0.2589	9.38	0.2642
41	50	45.5	9.97	0.2191	10.24	0.2251	10.45	0.2297
51	60	55.5	1.096	0.1975	11.26	0.2029	11.49	0.2070
61	70	65.5	12.06	0.1841	12.39	0.1892	12.64	0.1930
71	80	75.5	12.85	0.1702	13.20	0.1748	13.47	0.1784
81	90	85.5	13.65	0.1596	14.02	0.1640	14.31	0.1674
91	100	95.5	14.41	0.1509	14.80	0.1550	15.10	0.1581
101	110	105.5	15.21	0.1442	45.63	0.1482	15.95	0.1512
111	120	115.5	16.03	0.1388	16.47	0.1426	16.80	0.1455
121	130	125.5	16.70	0.1331	17.16	0.1367	17.51	0.1395
131	140	135.5	17.50	0.1292	17.98	0.1327	18.34	0.1354
141	150	145.5	18.32	0.1259	18.82	0.1293	19.20	0.1320
151	160	155.5	18.99	0.1221	19.51	0.1255	19.91	0.1280
161	180	170.5	20.29	0.1190	20.84	0.1222	21.26	0.1247
181	200	190.5	21.77	0.1143	22.36	0.1174	22.81	0.1197
201	220	210.5	23.18	0.1101	23.81	0.1131	24.29	0.1154
221	240	230.5	24.58	0.1066	25.25	0.1095	25.76	0.1118
241	260	250.5	25.88	0.1033	26.58	0.1061	27.12	0.1083
261	280	270.5	27.17	0.1004	27.91	0.1032	28.47	0.1052
281	300	290.5	28.46	0.0980	29.23	0.1006	29.82	0.1027
301	320	310.5	29.72	0.0957	30.53	0.0983	31.15	0.1003
321	340	330.5	30.94	0.0936	31.78	0.0962	32.42	0.0981
341	360	350.5	32.09	0.0916	32.96	0.0940	33.62	0.0959
361	380	370.5	33.23	0.0897	34.13	0.0921	34.82	0.0940
381	400	390.5	34.38	0.0880	35.31	0.0904	36.02	0.0922
401	420	410.5	35.45	0.0864	36.41	0.0887	37.14	0.0905
421	440	430.5	36.44	0.0846	37.43	0.0869	38.18	0.0887
441	460	450.5	37.51	0.0833	38.53	0.0855	39.31	0.0873
461	480	470.5	38.46	0.0817	39.50	0.08540	40.29	0.0856
481	500	490.5	39.48	0.0805	40.55	0.0827	41.37	0.0843
501	520	410.5	40.40	0.0791	41.50	0.0813	42.33	0.0829
521	540	430.5	41.27	0.0778	42.39	0.0799	43.24	0.0815
541	560	550.5	42.09	0.0765	43.23	0.0785	44.10	0.0801
561	580	570.5	42.93	0.0752	44.09	0.0773	44.98	0.0788
581	600	590.5	437.5	0.0741	44.94	0.0761	45.84	0.0776
			∑ 6.0835		∑ 6.2505		∑ 6.3784	
			Aver. 0.1601		Aver. 0.1645		Aver. 0.1679	

Table 4 Effect of change in performances of freight rail transport to the price for one tkm

	2013	2014	2015
Performances of passenger rail transport in mil. tkm	6609	6791	7047
Average price for 1 tkm in EUR	0.01601	0.1645	0.1679
Price elasticity	X	1.0019	1.8086

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