

CHANGES IN THE SCHEDULE OF THE KOLEJE ŚLĄSKIE SP. Z O.O. AND THEIR IMPACT ON THE OPERATIONS OF THE CARRIER AND SUSTAINABLE TRANSPORT IN THE SILESIA PROVINCE

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Abstract

The aim of this article is to assess the quality railway transport (rail) in the province of Silesia (over a longer period of time) for the mobility of people, as an important element of carrier operations and the implementation of sustainable transport in the Silesia province.

The article presents an analysis of the amount of rail connections offered by one of the railway companies, whose main task is the implementation of local rail services in the Silesian agglomeration. A comparison of the current timetable for the selected route the schedule forced at the earlier period. The results allowed us to assess the current situation in the area of local rail transport as an important element of the management and implementation of public transport.

Keywords: city logistics, sustainable transport, rail transport.

Introduction

Silesian Province is the most urbanized and most densely populated area of Polish. Structure Location of cities and their mutual arrangement and geographical location of the region make the residents very often systematically move across the conurbation.

To the movement of population took place in an efficient, effective and efficient in terms of time and comfort way is necessary to ensure adequate well-developed infrastructure network, and network connections, both road

and rail. A characteristic feature of the Silesian province is the fact that these services are performed by several transport companies.

1. Communication system of Silesia province

Silesian Province is located in southern Poland in the area of the Silesian Lowland, Upland Silesian-Krakow, Oswiecim Basin, the Carpathian Plateau, and the Western Beskid. Is inhabited by 4.62 million people, representing almost 12% of the Polish (Wikipedia 2014).

A large number of residents and their congestion makes it necessary to organize an efficient and sustainable transport system. Operation urban transport system has a direct impact on the attractiveness and the economic potential of the region. Shorter commuting time and the opportunity to use this time to implement certain professional tasks (eg work on the computer, sending e-mail using WiFi network available in public transport) can be a very important factor incentives to replace individual transport public transport.

The communication system of the Silesian agglomeration consists of the following types of transport: bus, railway, tram, trolleybus (trolleybus transport is implemented in individual cities (e.g. Tychy) and transport tram is implemented in some urban cities and between them (e.g. Sosnowiec - Katowice, Katowice - Chorzow, Sosnowiec - Będzin, etc.).

Transportation from one end of the province to the other by one mode of transport is possible but only through individual or collective transport bus or rail.

Rail transport, taking into account the number of vehicles on the roads the region and the associated inconvenience and longer travel time of buses is a very attractive solution to travel long distance. An additional advantage of rail transport is also its impact on the environment (rail, in itself - not taking into consideration impurities formed during the production of electricity in power plants - is very eco-friendly), which is minimal in terms of emissions.

Such “ecological” approach is also consistent with the broad guidelines of the European Commission contained in the so-called. “White Paper”, which include requires reducing the use of means of transport with conventional combustion-powered for others (eg road transport vehicles with electric drive, means of rail transport with electric drive, etc.).

2. Rail transport collective agreement in the Silesia province

The railway network in the Silesia province is very well developed, it has the highest rate in the country's rail network density, which is 15.5 [km/km²], with the national average of 6.5 [km/km²]. It is also much higher than the European average of 6.2 [km/km²] (for EU countries of the so-called. "Old fifteen" ratio was 4.5 [km/km²] - join Polish to the UE structures resulted in an increase of this indicator).

In Silesia passenger rail are realized by some transport companies, the largest of which include:

- Koleje Śląskie Sp. z o. o.
- Przewozy Regionalne Sp. z o. o.
- PKP Intercity S.A.

However, according to the adopted policy of self-governing provinces of Silesia, rail transport within the region should be implemented by the company Koleje Śląskie Sp. z o. o.

3. Koleje Śląskie Sp. z o. o. as a provincial carrier rail

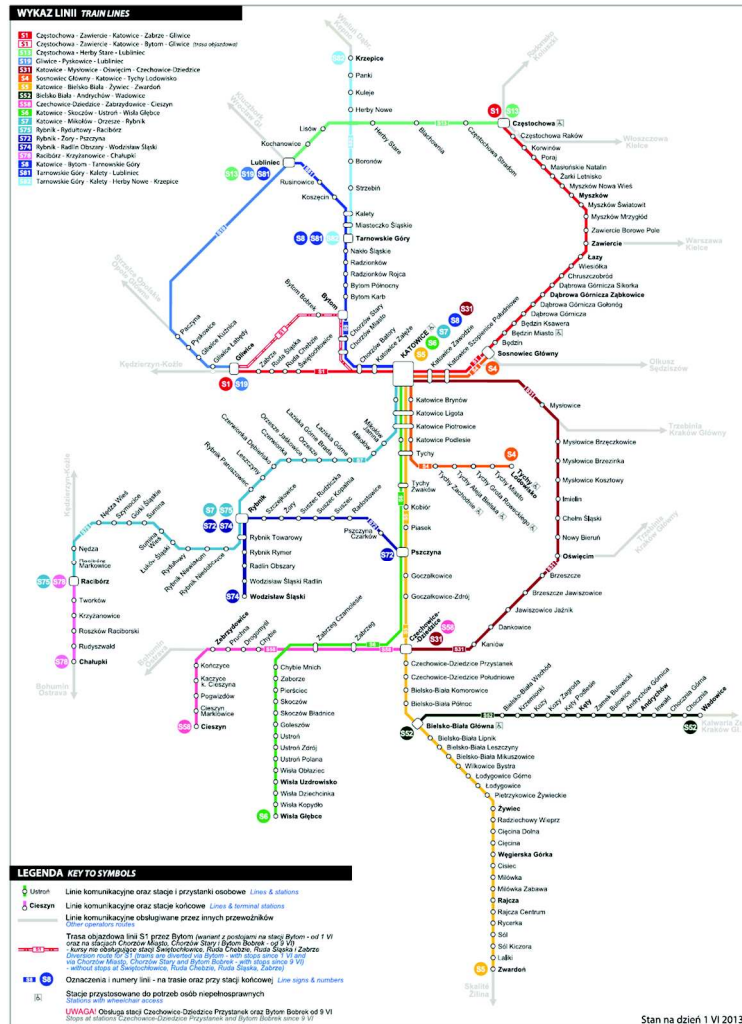
Railways Silesia Sp. z oo was established 8 April 2010, and the implementation of rail services within the company, was launched on 1 October 2010 following the provision of the Marshal's Office of the Silesian main business of the company should be primarily regional railway transport of passengers and goods and provision of services relating to the carriage. According to data provided by the company to the main objectives are:

- Providing mass transit railway in the province;
- Creating a positive image of the local suburban railway passengers and external stakeholders;
- Development of quantitative and qualitative owned rolling stock;
- Creation of a coherent and stable team of company employees (BIP 2014).

4. The railway network in Silesia

The railway network in the province of Silesia used to transport passengers by railways company Silesia was divided into 17 lines. Silesian Railway line diagram is shown in Figure 1.

Figure 1. Diagram of the company's lines of communication Koleje Śląskie Sp. z o.o.



Source: KSL 2013c.

Line which are implemented major population displacement is the line of Częstochowa - Zawiercie - Katowice - Zabrze - Gliwice, which was marked with the symbol S1.

5. Analysis of changes in timetable on the line S1

Line S1 is used to move passengers between the main centers of the Silesian province such as Częstochowa, Sosnowiec, Katowice and Gliwice.

Average time travel on the line is 2 hours 9 min, at 115 [km] distance to overcome gives average speed on the route equal to 53.5 [km/h]. Importantly, the resulting time and speed is very competitive to individual transport vehicle, whose speed is an average of 67 [km/h]. This speed transport the individual is obtainable in the absence of congestion, which, unfortunately, due to the number of vehicles moving on the roads every day are very often generating additional, unnecessary transport costs.

This situation means that rail transport is very attractive in relation to transport of individual or collective bus. This is especially true when moving in the center of the agglomeration, between the towns of Mining oak wood, Sosnowiec, Katowice. Distance between Sosnowiec and Katowice is about 10 [km] and rail transport, the current state of infrastructure overcomes it in about 14 [min], and transport individual or collective requires dedication approximately 20 to 30 minutes to travel the same road. Another advantage of using rail instead of the individual is the difficulty in finding an unpaid parking space in city centers, which also increases the total cost of private transport on the relationship.

Therefore, the speed of the train and travel time for the analyzed route is very attractive and competitive compared to private transport.

This situation causes that factor very heavily on the use of rail transport is its availability. Availability is very closely linked with the railway timetable. Schedule analyzed the carrier, which are Koleje Śląskie must therefore have a direct impact on the use of this means of transport by agglomeration, and this translates directly into obtained by the company profit and loss.

Taking into account the above factors and conditions in article compares the changes that have occurred in the number of calls and their distribution analyzed hourly on route S1 in the long term:

- from 9.12.2012 to 9.02.2013,
- from 2.08.2013 to 19.10.13,
- from 20.10.13 to 14.12.13,
- from 15.12.13 to 8.03.14,
- from 09.03.14 to 26.04.14,
- from 27.04.14 to 14.06.14,
- from 16.06.14 to 31.08.14 (timetable effective when given back the manuscript).

Themes presented in the article and the analysis is a continuation of the analysis presented in previous publications by the author (Kowalska, Sobczak, Sierpiński 2013; Sobczak 2014). Based on the data contained in (KSL 2012a, 2012b, 2013a, 2013b, 2014a, 2014b, 2014c) developed statement of the number of connections between stations for the following time periods: 3:31 ÷ 6:30; 6:31 ÷ 9:30; 9:31 ÷ 12:30; 12:30 ÷ 14:30; 14:31 ÷ 17:30 17:31 ÷ 20:30;

20:31 ÷ 23:30; 23:31 ÷ 3:30. Among the analyzed intervals are contained two peaks of communication occurring in the Silesian agglomeration, which are mainly due to the implementation of transport agglomeration associated with moving to and from work. They are the following timeframes: 6:31 ÷ 9:30 (the morning peak) and 14:31 ÷ 17:30 (the afternoon peak).

Table 1 summarizes the interfaces between the various stations for scheduled during the 09.02.2013 ÷ 9.12.2012.

Table 1. Summary of connections between stations for the timetable period 12/09/2012 ÷ 09/02/2013 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:30 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	7	7	5	3	5	4	2	0	33
Częstochowa-Sosnowiec Gł.	7	6	5	3	5	4	2	0	32
Częstochowa-Katowice	7	7	5	3	5	4	2	0	33
Częstochowa-Zabrze	4	4	3	2	3	3	2	0	21
Częstochowa-Gliwice	5	4	3	2	3	3	2	0	22
Zawiercie - Sosnowiec Gł.	8	11	4	4	9	4	2	0	42
Zawiercie - Katowice	8	11	4	4	9	4	2	0	42
Zawiercie - Zabrze	6	8	3	3	6	3	2	0	31
Zawiercie - Gliwice	6	8	3	3	6	3	2	0	31
Sosnowiec Gł. - Katowice	5	12	7	5	9	5	3	0	46
Sosnowiec Gł. - Zabrze	4	8	6	4	6	4	3	0	35
Sosnowiec Gł. - Gliwice	4	8	6	4	6	4	3	0	35
Katowice - Zabrze	4	9	6	4	7	6	7	0	43
Katowice - Gliwice	4	9	6	4	7	6	7	0	43
Zabrze - Gliwice	3	9	6	4	7	6	7	1	43

Source: Own study based on KSL 2012a.

Table 2 shows the analogous statement of connections between stations for the timetable period 08/02/2013 ÷ 10/19/2013 - relation Częstochowa - Gliwice.

Table 2. Summary of connections between stations for the timetable period 08/02/2013 ÷ 10/19/2013 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	9	5	3	1	6	4	5	0	33

Częstochowa-Sosnowiec Gł.	8	4	3	1	5	4	2	0	27
Częstochowa-Katowice	10	5	3	1	5	4	2	0	30
Częstochowa-Zabrze	3	3	3	1	3	3	2	0	18
Częstochowa-Gliwice	7	3	3	1	3	3	2	0	22
Zawiercie - Sosnowiec Gł.	4	6	2	1	5	3	2	0	23
Zawiercie - Katowice	6	7	2	2	6	3	2	0	28
Zawiercie - Zabrze	2	4	2	1	4	3	2	0	18
Zawiercie - Gliwice	4	6	2	1	4	3	2	0	22
Sosnowiec Gł. - Katowice	3	8	2	2	4	4	3	0	26
Sosnowiec Gł. - Zabrze	2	3	2	2	4	3	3	0	19
Sosnowiec Gł. - Gliwice	2	7	2	2	3	3	3	0	22
Katowice - Zabrze	2	3	2	2	2	4	2	1	18
Katowice - Gliwice	2	9	2	2	3	6	4	1	29
Zabrze - Gliwice	1	3	3	1	3	3	3	1	18

Source: Own study based on KSL 2012b.

Table 3 shows the analogous statement of connections between stations for scheduled during ÷ 20.10.2013 14.12.2013 – relation Częstochowa – Gliwice.

Table 3. Summary of connections between stations for scheduled during 20/10/2013 ÷ 12/14/2013 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	8	4	2	2	7	3	3	0	29
Częstochowa-Sosnowiec Gł.	7	4	2	2	6	3	2	0	26
Częstochowa-Katowice	7	4	2	2	6	3	2	0	26
Częstochowa-Zabrze	3	3	2	2	2	3	2	0	17
Częstochowa-Gliwice	6	3	2	2	3	3	2	0	21
Zawiercie - Sosnowiec Gł.	5	6	2	2	6	3	2	0	26
Zawiercie - Katowice	5	6	2	2	6	3	2	0	26
Zawiercie - Zabrze	3	3	2	2	2	3	2	0	17
Zawiercie - Gliwice	4	5	2	2	3	3	2	0	21
Sosnowiec Gł. - Katowice	3	8	2	2	6	3	3	0	27
Sosnowiec Gł. - Zabrze	2	2	2	2	3	2	3	0	16
Sosnowiec Gł. - Gliwice	2	6	2	2	3	3	3	0	21
Katowice - Zabrze	2	3	2	2	3	2	3	0	17
Katowice - Gliwice	2	8	2	2	5	5	5	0	29
Zabrze - Gliwice	1	3	3	1	3	2	3	1	17

Source: Own study based on KSL 2013a.

Table 4 shows the analogous statement of connections between stations for scheduled during 15/12/2013 ÷ 08/03/2014 - relation Częstochowa - Gliwice.

Table 4. Summary of connections between stations for scheduled during 15/12/2013 ÷ 03/08/2014 - relation Częstochowa – Gliwice.

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
	6:30	9:30	12:30	14:30	17:30	20:30	23:30	3:30	
Częstochowa-Zawiercie	4	4	2	3	3	3	4	0	23
Częstochowa-Sosnowiec Gł.	4	4	2	3	3	3	2	0	21
Częstochowa-Katowice	4	4	2	3	3	3	2	0	21
Częstochowa-Zabrze	3	4	2	2	3	3	2	0	19
Częstochowa-Gliwice	3	4	2	2	3	3	2	0	19
Zawiercie - Sosnowiec Gł.	5	4	3	3	4	4	2	0	25
Zawiercie - Katowice	5	4	3	3	4	4	2	0	25
Zawiercie - Zabrze	3	3	3	2	3	3	2	0	19
Zawiercie - Gliwice	3	4	3	2	3	4	2	0	21
Sosnowiec Gł. - Katowice	4	4	3	2	5	4	3	0	25
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	4	3	2	3	4	3	0	21
Katowice - Zabrze	3	6	4	4	4	6	6	2	35
Katowice - Gliwice	3	7	4	4	4	7	6	2	37
Zabrze - Gliwice	2	6	4	4	4	6	6	3	35

Source: Own study based on KSL 2013b.

Table 5 presents the next set of connections between stations, this time for the scheduled period 03/09/2014 ÷ 04/26/2014 - relation Częstochowa - Gliwice.

Table 5. Summary of connections between stations for the timetable period 03/09/2014 ÷ 04/26/2014 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
	6:30	9:30	12:30	14:30	17:30	20:30	23:30	3:30	
Częstochowa-Zawiercie	4	5	3	2	3	3	6	0	26
Częstochowa-Sosnowiec Gł.	4	5	3	3	3	3	2	0	23
Częstochowa-Katowice	4	5	2	3	3	3	2	0	22
Częstochowa-Zabrze	3	4	2	2	3	3	2	0	19
Częstochowa-Gliwice	3	4	2	2	3	3	2	0	19

Changes in the schedule of the Koleje Śląskie Sp. z o.o. and their impact on...

Zawiercie - Sosnowiec Gł.	5	5	2	3	3	4	2	0	24
Zawiercie - Katowice	5	5	2	4	3	4	2	0	25
Zawiercie - Zabrze	3	4	2	2	3	3	2	0	19
Zawiercie - Gliwice	3	4	2	2	3	3	2	0	19
Sosnowiec Gł. - Katowice	4	6	3	3	4	4	3	0	27
Sosnowiec Gł. - Zabrze	2	4	3	2	3	3	3	0	20
Sosnowiec Gł. - Gliwice	2	3	3	2	3	4	3	0	20
Katowice - Zabrze	3	7	6	3	3	6	6	2	36
Katowice - Gliwice	3	7	6	3	3	6	6	2	36
Zabrze - Gliwice	2	7	6	3	4	5	6	3	36

Source: Own study based on KSL 2014a.

Table 6 shows the next set of connections between stations, this time for the scheduled period 04/27/2014 ÷ 06/14/2014 - relation Częstochowa - Gliwice.

Table 6. Summary of connections between stations for the timetable period 04/27/2014 ÷ 14/06/2014 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	4	4	2	3	3	3	5	0	24
Częstochowa-Sosnowiec Gł.	4	4	2	3	3	3	2	0	21
Częstochowa-Katowice	4	4	2	3	3	3	2	0	21
Częstochowa-Zabrze	3	3	2	2	3	3	2	0	18
Częstochowa-Gliwice	3	3	2	2	3	3	2	0	18
Zawiercie - Sosnowiec Gł.	5	4	3	2	4	4	2	0	24
Zawiercie - Katowice	5	4	3	2	4	4	2	0	24
Zawiercie - Zabrze	3	3	3	1	4	3	2	0	19
Zawiercie - Gliwice	3	3	3	1	4	4	2	0	20
Sosnowiec Gł. - Katowice	4	5	3	3	5	4	3	0	27
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	3	3	2	3	4	3	0	20
Katowice - Zabrze	3	5	5	3	4	7	6	2	35
Katowice - Gliwice	3	6	5	4	4	8	6	2	38
Zabrze - Gliwice	2	5	5	3	4	7	6	3	35

Source: Own study based on KSL 2014b.

However, in Table 7 summarizes the connections between the individual stations, this time for the last of the analyzed timetables in force during the period of 15/06/2014 ÷ 31/08/2014 - relation Częstochowa - Gliwice.

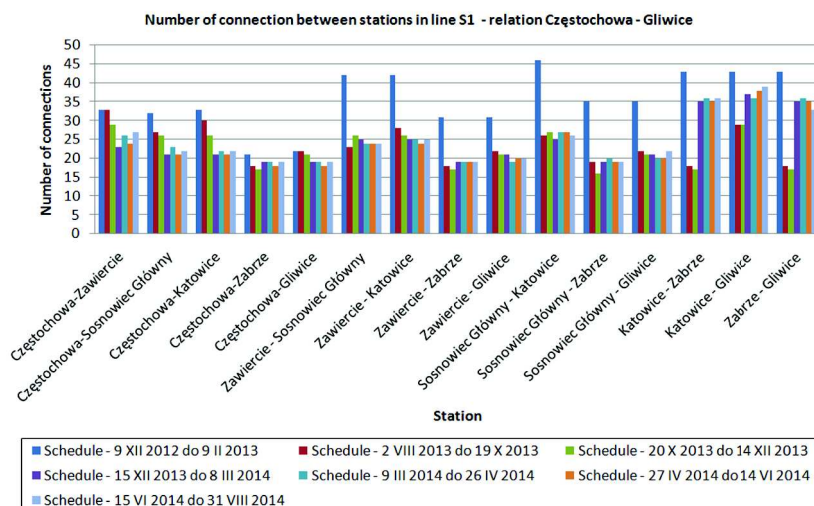
Table 7. Summary of connections between stations for the timetable period 06/15/2014 ÷ 31/08/2014 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	4	4	3	3	3	3	6	1	27
Częstochowa-Sosnowiec Gł.	4	4	3	3	3	3	2	0	22
Częstochowa-Katowice	4	4	3	3	3	3	2	0	22
Częstochowa-Zabrze	3	3	3	2	3	3	2	0	19
Częstochowa-Gliwice	3	3	3	2	3	3	2	0	19
Zawiercie - Sosnowiec Gł.	5	4	3	3	3	4	2	0	24
Zawiercie - Katowice	5	4	3	4	3	4	2	0	25
Zawiercie - Zabrze	3	3	3	2	3	3	2	0	19
Zawiercie - Gliwice	3	3	3	2	3	4	2	0	20
Sosnowiec Gł. - Katowice	3	6	3	2	5	4	3	0	26
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	3	3	3	3	5	3	0	22
Katowice - Zabrze	3	4	5	4	6	4	8	2	36
Katowice - Gliwice	3	4	5	4	6	6	9	2	39
Zabrze - Gliwice	2	4	5	4	4	4	7	3	33

Source: Own study based on KSL 2014c.

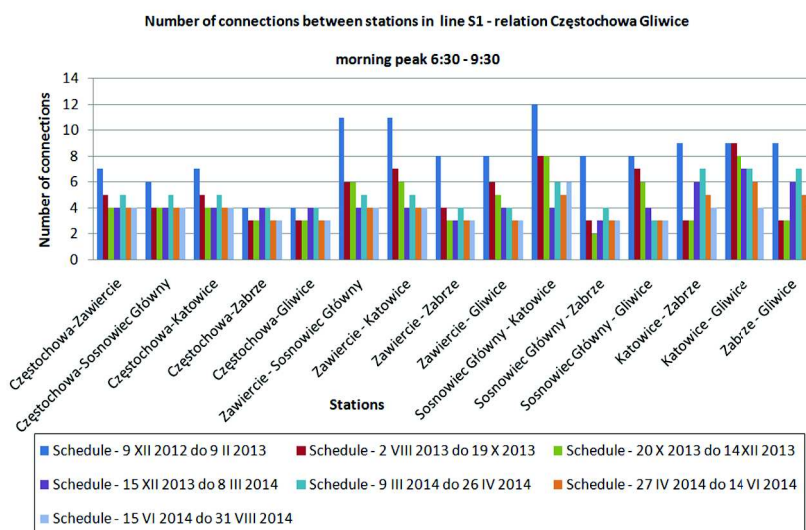
Summary of the number of connections in order to better observe changes in the number of available connections are also shown in graphical form. Summary of the total number of connections is shown in Figure 2, while the number of connections for morning peak is shown in Figure 3 and the afternoon peak in Figure 4.

Figure 2. Comparison of the total number of connections between stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



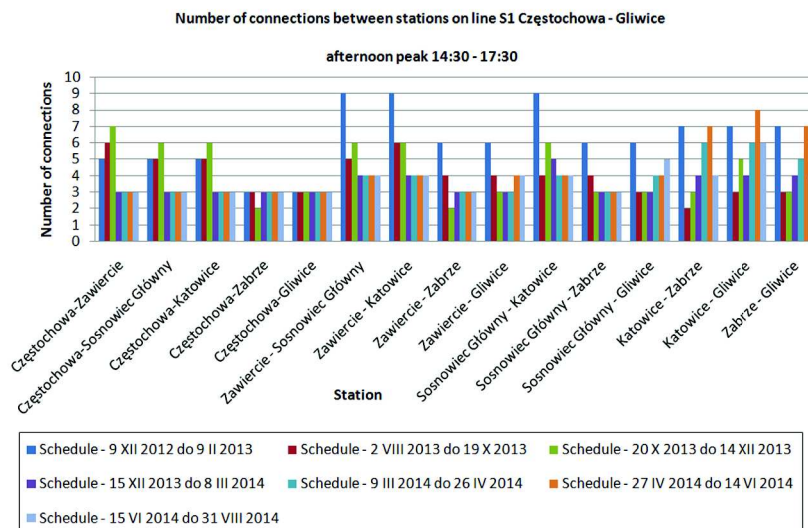
Source: Own study based on tables 1 ÷ 7.

Figure 3. Comparison of the total number of connections in the morning peak between stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



Source: Own study based on tables 1 ÷ 7.

Figure 4. Comparison of the total number of connections in the afternoon peak between the stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



Source: Own study based on tables 1 ÷ 7.

Based on the data in the tables 1 through 7 and Figures 2 to 4 it is seen that, unfortunately, in the period of over 1.5 years followed mainly fall in the number of railway connections implemented by Koleje Śląskie Sp. z o.o. between the cities of the Silesian agglomeration.

Conclusions

One of the key activities of a transport company that provides its services in such an area which is the Silesian agglomeration should be measures aimed at broadening the services offered, particularly on major routes pass. One such line is the line S1. The company should increase the number of available connections that they were attractive to others - competing in this case - the modes of transport. As shown in the article Koleje Śląskie company unfortunately does not implement such a policy operations. Still visible is observed in the earlier period, a very small number of connections and the number of cities is seen continuous progressive reduction of the number.

This allows to conclude that the Railways Silesia Sp. with o.o. still does not pursue actions, which it had hoped for. It also has a direct impact on projects, or rather the lack of implementation of the policy of sustainable transport in the agglomeration through the availability of passengers to a comprehensive range of transport and a wide number of connections.

The total number of connections in relation to the number of calls within a period of 9 February 2013 remains at a very low level (372 in relation to the connection 532 in February 2013). At the morning and afternoon peak is still observed a very small number of connections. For example, at the morning peak the number of connections between Sosnowiec and Katowice increased to 5, which is not sufficient to encourage more passengers to use this mode of transport instead of eg bus or individual.

In order to enhance sustainable mobility in the Silesian agglomeration and improve the effectiveness of the company's business Koleje Śląskie Sp. z o.o. it is necessary to increase the number of available connections and undertake long-term, systemic and more decisive action related to popularize rail transport as a mode of transport used not only as a means for moving within a larger distance, but also a very good means of transport between the local and in Urban.

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