

Optimization of Railway Connections in the South-Western Part of the Łódzkie Province, with the City of Łódź

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Summary

The article presents the results of analyses of the economic and transport links between the south-western part of the Łódzkie Province and its capital, the city of Łódź, carried out for a study prepared by the Railway Institute. Railway network deficiencies preventing the efficient use of railway transport of passengers and cargo are outlined. An analysis of the potential utilization of the fact that the TEN-T runs through the province is carried out and a program of the necessary infrastructural projects is also proposed. Improving the accessibility of the region is analyzed in view of the multimodality of railway, bus, and private transport systems in combination with a system of interchanges and parking lots. This approach allows the synergy effects of the particular elements of the transport system to be evaluated.

Keywords: transport, railway, multimodality, regional development

1. Introduction

In spite of nearly 100 years of investment projects, the railway network in Poland is still highly non-cohesive, featuring structural deficiencies in many regions. Many of them are of a local nature and prevent economic and social cohesion on a regional scale. One such region is the south-western part of the Łódzkie Province, which borders with the Śląskie, Dolnośląskie, and Wielkopolskie Provinces. Even though the area in question is located in central Poland and is inhabited by approx. 230,000 people, it has virtually no railway or bus transport. In 2018, the Railway Institute produced a study [11] that presented proposals for creating a multimodal transport system using the infrastructural projects that are already under way, including a proposal for constructing a railway line approx. 30 km long that would hold this system together. The solutions proposed with respect to this model could also be used in other regions of Poland.

2. Geographical determinants

Currently, the south-western part of the Łódzkie Province, which comprises the neighboring districts

of Wieruszów, Wieluń, Pajęczno, Bełchatów, and the southern part of the Sieradz district, have no railway connections to Łódź. The districts of Bełchatów and Pajęczno have no railways at all and the district of Wieruszów has only one station (Wieruszów Miasto), which is used exclusively by long-distance trains, and the only existing regional connections are on the route between Wieluń and Herby in the Śląskie Province. Railway line No. 181, which connects, among others, Wieruszów and Wieluń is not connected to the rest of the province's railway lines, while railway lines No. 131 and No. 146 that run through the area in question feature no passenger trains.

Alternative transport to Łódź, which is by bus, is not attractive due to the travel time (over two hours) and difficult to accept from the point of view of the province's territorial cohesion and the need to strengthen social and economic links. Additionally, the bus network remains poor. In a number of cases (e.g. on the Łódź – Pajęczno route), only single train runs are available.

Paradoxically, even though the districts of Wieluń, Wieruszów, and Pajęczno are geographically located in the center of Poland, their transport options are of a peripheral nature. This is a result of historical divisions related to the partitions of Poland. The districts in ques-

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tion were taken over by the Russian Empire, but were marginalized, remaining in the shadow of the Łódź Industrial Region that was developed in the 19th century. Additionally, the Łódzkie Province in its current shape was created only after World War I and the social and economic links between the metropolis (Łódź) and the other towns of the province had no historical roots. For years, the area in question remained poor in terms of the transport network, especially in terms of higher categories of transport. It is true that, in the 1930s, the longitudinal Coal Trunk Line was constructed, running across it. However, its main purpose was to transport cargo and therefore its role in integrating towns was minimal, as it had little relevance for the spatial links between them. For several dozen years, passenger connections existed, although they were mainly transit routes to the Silesia, Kuyavia and Pomerania regions. An important moment was the completion, in the 2010s, of the SA8 expressway, which runs through the western part of the discussed area, including a section close to Wieruszów. However, its route means that the eastern part of the area (the districts of Pajęczno and the western outskirts of the district of Bełchatów) do not benefit from it as regards passenger transport to Łódź. The south-eastern part of the Łódzkie Province is covered by a depopulation phenomenon that has been ongoing for years [13]. The low availability of transport

connections is one of the factors reinforcing this negative demographic tendency.

Transport availability should also be analyzed in view of the links between this part of the province and the rest of the national transport network. Two of the eight main European Union transport corridors run through the Łódzkie Province. One of these corridors, connecting the Baltic Sea and the Adriatic Sea, cuts across the districts in question (railway line No. 131 is an element of it), but the railway links to this area are insufficient. The historically conditioned lack of integration with the settlement network and with railway line No. 181, which runs through Wieluń and Wieruszów, hinders local communities in taking advantage of the opportunities offered by the European transport network. The second of the corridors, running from the North Sea to the Baltic States and Russia, also has weak links to the southern part of the province. Furthermore, the analyzed districts have no direct railway connection to the local TEN-T node, i.e. the city of Łódź. Paradoxically, Wieluń and Wieruszów, in spite of being located in the Łódzkie Province, have access to the TEN-T via long-distance connections to Katowice and Poznań (Fig. 1).

Currently, the railway lines in the area in question, i.e.:

- railway line No. 14, in the section between Łódź Kaliska and Zduńska Wola,

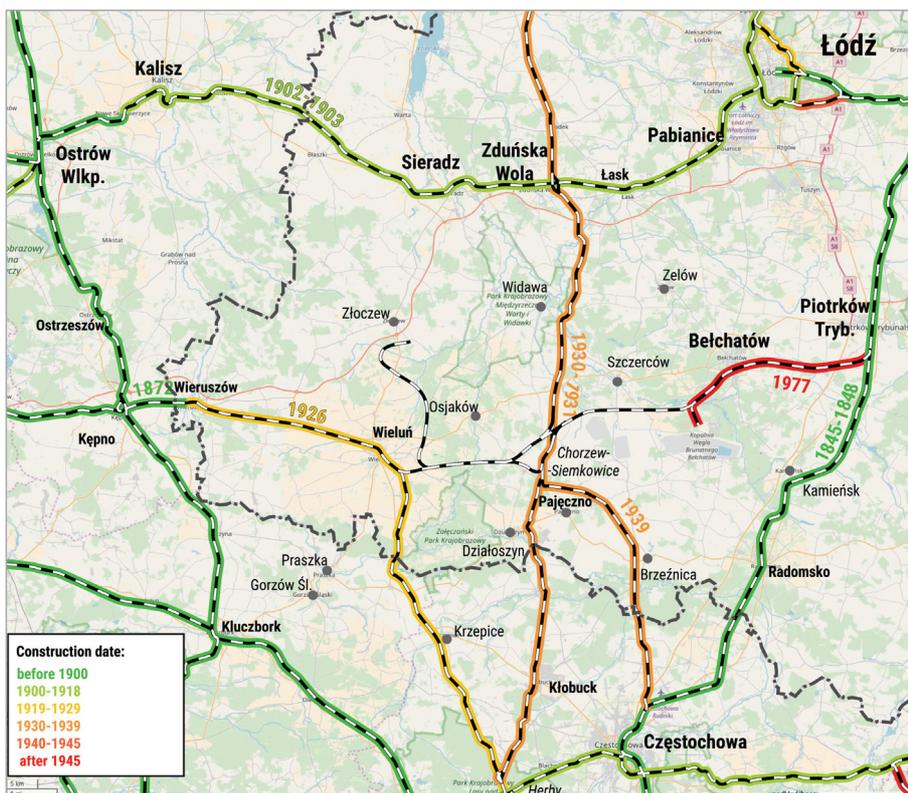


Fig. 1. A diagram of the railway network in the south-western part of the Łódzkie Province, including the dates of launching the particular lines; elaboration T. Bużalek, using the background © by OpenStreetMap

- railway line No. 131, in the section between Zduńska Wola and Chorzew Siemkowice,
- railway line No. 146, in the section between Chorzew Siemkowice and Częstochowa,

are being modernized or prepared for modernization (tender procedures). The technical condition of these railway lines is unsatisfactory. In connection with the numerous speed limits along lines No. 131 and No. 146, the Łódzkie and Śląskie Provinces decided in 2012 to cease passenger transport on these lines. In recent years, railway line No. 131 was revitalized in certain sections and the operational speed was increased to 120 km/h, but without modernizing the stop infrastructure. Since the line is awaiting further modernization that will result in temporary closure of sections and traffic limitations, regional passenger transport has not been reintroduced. In the section between Wieruszów and Wieluń, railway line No. 181 is in an acceptable technical condition and the running speeds of passenger trains are 100 km/h.

As part of the preparations to exploit the brown coal deposits in the Złoczew area, the authorities have returned to the plan of expanding railway line No. 24 to the west. The purpose of the line would be to transport brown coal from the mine to the existing power plant that is several dozen kilometers away. The line would join lines No. 131 and No. 181 and could be used for passenger transport [1, 2, 8, 13].

3. The concept of a multimodal node for the region

The concept of significantly improving public transport in the analyzed region, as presented in [11], consists of launching direct connections between the region and the city of Łódź by means of:

- using the existing lines No. 14, No. 131, and No. 146, which are being modernized, and line No. 181,
- constructing a railway line connecting line No. 131 and line No. 181 between Wieluń and Chorzew Siemkowice,
- creating a multimodal node next to the Chorzew Siemkowice railway station that would integrate railway and bus transport, also providing parking spaces for travelers using private vehicles,
- creating a bus system offering transport between the node and the towns of Pajęczyn and Działoszyn and their surroundings.

The construction of the Wieluń – Chorzew-Siemkowice line, including the launch of connections to Łódź (lines No. 14, No. 131, and No. 181), would allow a significant increase in the availability of railway transport and create a system of connections in line

with the links following the structure of the region. At the same time, however, due to the route being peripheral vis-a-vis any larger local town, it will be necessary to improve access to the particular stations by means of ensuring private and mass transport opportunities. This will allow settlement structures to be penetrated and the extent of the railway to be expanded in order to cover a larger area and reach new users. With well-organized multimodal chains of transport, the connections would cover all of the districts of Wieruszów, Wieluń, and Pajęczno, the municipality of Kępno and the neighboring municipalities, and selected municipalities of the Bełchatów, Sieradz, Łask, and Zduńska Wola districts located closest to railway line No. 131. This area is inhabited by a total of 230,000 people.

A special issue to be solved is the integration of the towns of Pajęczno and Działoszyn, as well as the villages of Trębaczew and Dylów located between them. The area is inhabited by a total of approx. 20,000 people and has access to the (currently non-functional) Działoszyn and Biała Pajęczańska stations, but its location is peripheral. The stations are approx 4.5 km away from the center of Pajęczno and Działoszyn, i.e. well beyond what is considered walking distance. Furthermore, it is necessary to create the possibility of moving between these two locations. Therefore, in order for these towns to be covered by the railway system, it would be optimal to create a multi-directional multimodal node next to the existing Chorzew Siemkowice station, which should be able to handle commuters from various places and transfers, including between the three planned railway connections. In addition to building Park&Ride and Bike&Ride facilities, it is recommended to launch a bus service for the nearby towns and main villages.

The node could handle both the direction towards Łódź, Wieluń, and Wieruszów and the direction towards Częstochowa. It could become a place for transfers between various railway connections, including long-distance ones. One opportunity to expand the network of railway connections could be the planned construction of the Złoczew – Bełchatów railway line for the purposes of the Złoczew opencast mine, which will allow railway connections to be launched through Bełchatów to Piotrków Trybunalski and may also be a way for mine employees to commute. Furthermore, the connections on railway line No. 131 to Tarnowskie Góry and Katowice may be reactivated if the Śląskie Province decides to finance them. The station may also be a point of coupling and decoupling trains if they are used on combined routes, e.g. Łódź – Częstochowa / Wieruszów or Wieruszów – Łódź / Piotrków Trybunalski. Two bus transport routes are proposed:

lages where railway stops will be constructed in the future (Ruda, Wierzchlas and Drobnice), Figure 2.

4. Proposed organization of regional and supraregional traffic

4.1. Connections to the Łódź conurbation

The main regional connection covering the south-western part of the province should link Łódź, via line No. 14, to line No. 131, up to the Chorzew Siemkowiec station; in general, smaller stations on line No. 14 should be omitted and trains should stop in Zduńska Wola only in the Karsznice district. From the station in Chorzew, the connection should go in two separate directions – via the existing line No. 146 to Częstochowa and via a new line to Wieluń and then to Wieruszów. According to the plans of the Marshal’s Office of the Łódzkie Province, the connection to Częstochowa will be launched first, as it does not require the construction of new sections, but only for lines No. 131 and No. 146 to be modernized (which is already under way). Ultimately, depending on the needs, various scenarios are possible: interchangeable connections to Wieluń and Częstochowa, partial shortening of the connection with other forms of transport added, or all trains leaving Łódź together and then being divided in Chorzew

Siemkowiec. It is also possible to launch single connections on the Częstochowa – Chorzew Siemkowiec – Wieluń – Wieruszów route (Fig.3).

4.2. Supraregional connections

As part of the proposed system of railway lines, it is also possible for long-distance regional connections and supraregional connections to function. Lines No. 131 and No. 146 featured long-distance connections (Gdynia / Bydgoszcz / Inowrocław / Toruń – Katowice / Mysłowice / Częstochowa) for years and one may assume that, in a modified form, limiting the number of stops, their re-launch would be justified. Line No. 181 also featured connections to the capitals of the neighboring provinces. Still today, the Poznań – Katowice line runs through there; it is operated by a long-distance carrier, but the route makes it more of an inter-regional connection. Furthermore, the proposed regional link would provide access to long-distance travel nodes in Zduńska Wola, Łódź, and Kępno.

The Łódź – line No. 14 – line No. 131 – line No. 146 – Częstochowa connection is particularly important. This connection, going beyond the border of the province, even though it performed a significant regional role, functioned until 2012 (as a shortened connection to Zduńska Wola). The Marshal’s Office of the Łódzkie Province decided to re-launch regional railway transport along this route after the comple-

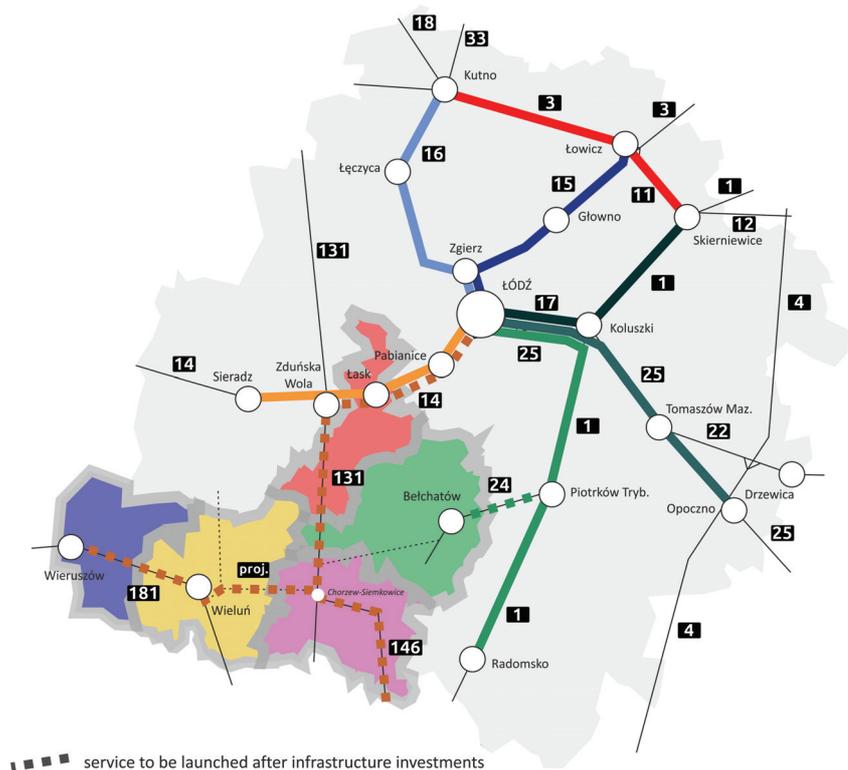


Fig. 3. The analyzed region within the system of internal connections of the Łódzkie Province; elaboration T. Bużalek, using the information received from the Marshal’s Office in Łódź [4]

tion of the ongoing modernization works on lines No. 14, No. 131, and No. 146, which will happen by 2023. Trains will run between Łódź and Częstochowa, in principle omitting the Zduńska Wola station. Initially, there will be 8 pairs per day.

However, it is also possible that, in line with the arrangements between the provinces, the future Łódź – Wieruszów connection will be extended to reach Kępno. If the railway lines from Kępno to Wrocław, via Oleśnica, are modernized in the future, it is possible that inter-regional trains to Wrocław will be launched. This would supplement coverage of the locations between Łódź and Wrocław:

- the existing coverage by the trains running on the Warsaw – Łódź – Kalisz – Ostrów – Wrocław route (regional and long-distance trains),
- in the future, by means of the planned Warsaw – Łódź – Sieradz – Kalisz / Ostrów Wielkopolski – Wrocław high speed route (long-distance trains, including international trains).

A regional connection between Łódź and Wrocław, via Chorzew Siemkowice, Wieluń, and Kępno, would have a supplementary nature and would complement both of the above connections (Fig. 4).

4.3. Inclusion in the TEN-T and cargo traffic

Line No. 131, which is a key element of one of the main corridors of the Trans-European Transport Net-

work (TEN-T), runs through the analyzed region. In its southern portion, this line is intensively used to transport cargo, mainly international, from the ports of the Gdańsk Pomerania region to southern Europe [7]. The TEN-T is also designed to serve local communities and, by means of creating local nodes, stations, and terminals, contribute to the economic development of regions. The construction of a railway link between Wieluń and the Chorzew Siemkowice station, which lies on line No. 131, will make it possible to include the districts of Wieluń, Wieruszów, and Kępno in the area of impact of the Baltic Sea – Adriatic Sea TEN-T corridor, which features a number of branching lines in Central and Southern Europe.

Lines No. 131 and No. 14 (which are both elements of the base part of the TEN-T) will allow the analyzed region to obtain a connection to Łódź, which is an urban node in the TEN-T. Ultimately, by 2030, Łódź should become a high speed railway node in Poland, with high quality connections to most cities in Poland and abroad [9, 10]. The construction of a new Wieluń – Chorzew Siemkowice line will also allow the inhabitants of the region to reach the planned central airport within approx. 1.5 hours (Fig. 5).

It will also be possible to establish a connection for cargo trains, supplementing the Warsaw – Łódź – Kalisz / Ostrów – Wrocław connections. The new connection from Łódź, via line No. 131, Wieluń, and Kępno, to Wrocław could be used in the event of problems with the capacity of the Ostrów Wielkopolski – Wrocław line.

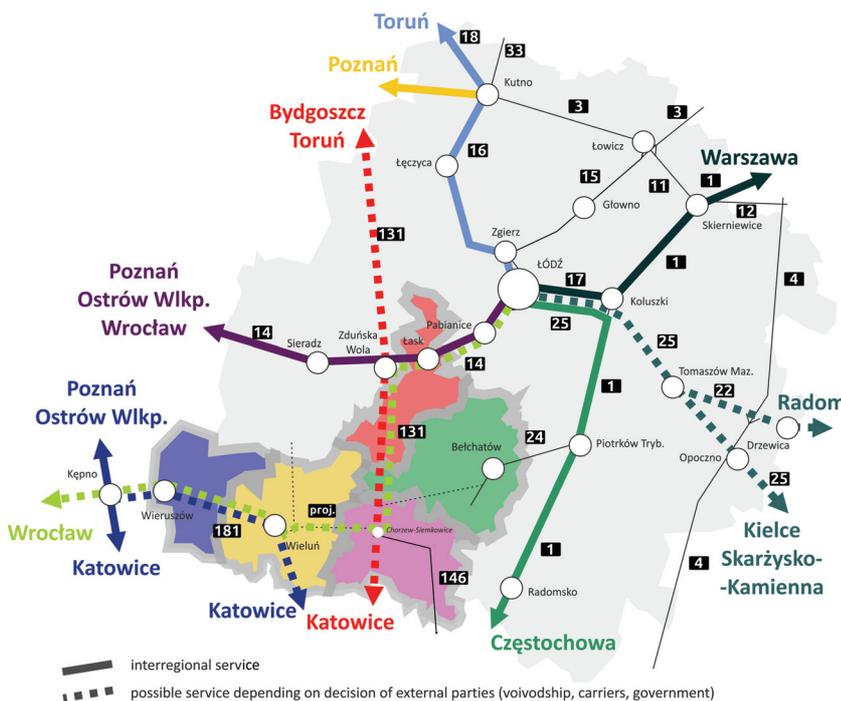


Fig. 4. The analyzed region within the system of the province's regional and supraregional connections [T. Bużalek]

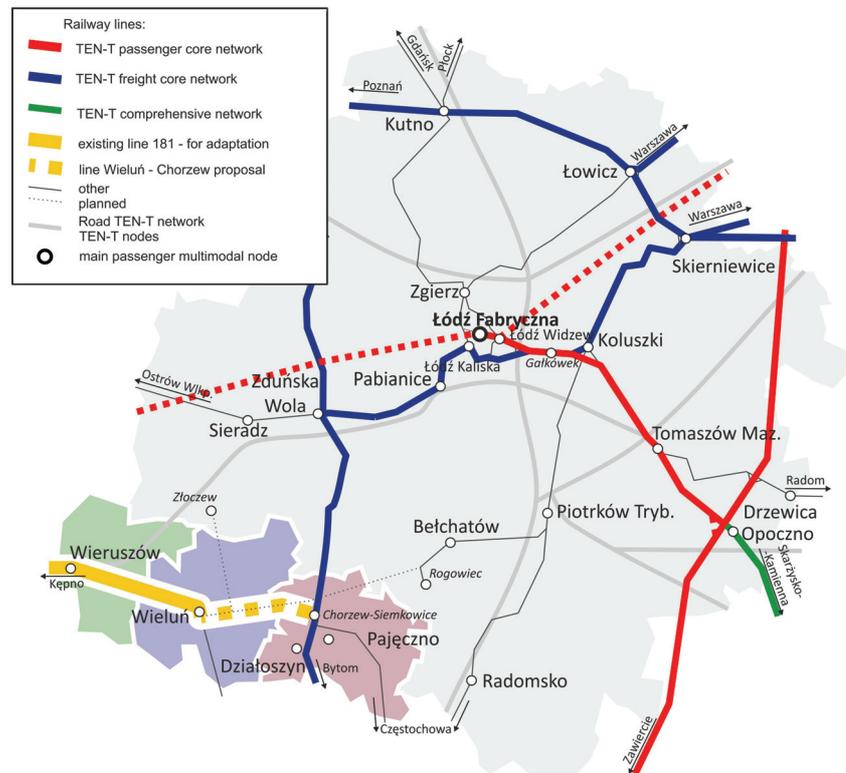


Fig. 5. Inclusion of the analyzed region in the TEN-T via the proposed section of the Wieluń – Chorzew Siemkowice railway line [9, 10]

5. Proposed scope of the project

5.1. Construction of the new Wieluń – Chorzew railway line

In order to supplement the railway network in the analyzed region, it is proposed to build a new railway line between the Chorzew-Siemkowice station and line No. 181 in the area of the Ruda k. Wielunia village. The estimated length of the line would be 30 km. The line should start at the Chorzew-Siemkowice station, run to the south, and then go east, to Wieluń. The proposed line parameters are as follows:

- 1) for passenger traffic:
 - P4 line category as per TSI INF (Regulation 1299/14),
 - maximum speed: at least 160 km/h;
- 2) for cargo traffic:
 - F1 line category as per TSI INF (Regulation 1299/14),
 - maximum speed: up to 120 km/h,
 - permissible axle load on tracks: 22.5 tons,
 - length of station tracks: at least 740 m. Along its entire length, the new line should have two-level intersections with vehicular roads.

It is proposed that the new line should feature one track with an option to add another one in the future,

depending on traffic needs, and at least one station for the purpose of crossing trains, as well as stations joining this line to line No. 131 and line No. 181.

5.2. Modernization of existing railway lines

The following lines, planned for use as part of the connection between Łódź and the analyzed region, are currently being modernized or their modernization is being prepared:

- line No. 14 in the section between Łódź Kaliska and Zduńska Wola (maximum speed: 120 km/h, with a possibility of higher speeds in the future, axle load on tracks: 22.5 tons),
- line No. 131 in the section between Zduńska Wola-Karsznice and Chorzew Siemkowice (maximum speed: 140 km/h, axle load on tracks: 22.5 tons),
- line No. 146 in the section between Chorzew Siemkowice and Wyczerpy, junction post in line No. 1 (maximum speed: 140 km/h, axle load on tracks: 22.5 tons).

The Wyczerpy – Częstochowa section of line No. 1, which will be used as part of the planned connections, was modernized in 2015 [6]. It is proposed to modernize the Ruda k. Wielunia – Wieruszów section (approx. 56 km), and the Wieruszów – Kępno section. The desired maximum speed in these sections is at least 120 km/h.

Railway line No. 181

Line No. 181 was built primarily to handle cargo traffic and is relatively young, which means that it is poorly integrated with built-up areas. For this line, certain changes to the network of stops are recommended, as analyzed in previous studies [12]. In addition to modernizing the existing stops, it is proposed to change the location of one stop and build one new stop.

The planned Chorzew – Wieluń railway line

This line, planned to connect lines No. 131 and No. 181, will run through various areas. However, along its route, there are built-up areas of larger villages and road routes allowing the line to be accessed. Conclusions concerning the location of the stations and stops are presented in Table 1.

Table 1
Passenger service points on the railway line planned between railway lines No. 181 and No. 131

Name	Characteristics	Proposed actions
Wierzchlas	Location: next to a large, dense village, close to a built-up area. Large potential in terms of access on foot.	Construction of a new stop
Drobnice	Location: next to a medium-size village, on a crossing with a district road providing access to the village of Krzeczów. Additional potential due to being located on the left bank of the Warta river, as there is no road bridge.	Construction of a new stop
Siemkowice	Location: by the Siemkowice – Radoszewice – Osjaków road. Direct access to the village and from neighboring localities.	Construction of a new stop

[Own elaboration].

5.5. The population covered by the impact area of the railway system

The extent of the impact of a railway line is always fluid and blurred, but some tendencies are noticeable. The impact may certainly go beyond walking distance, with multimodal solutions increasing it. For a peripheral area, and the area in question may be classified as such, it may be assumed that occasional commuting will take place within a radius of 20 km. Simply put, this means that three districts (Pajęczno, Wieluń, and Wieruszów) will be fully covered. However, it should also be noted that the extent of impact will also cover Kępno (located in the Wielkopolskie Province) and the directly adjacent municipalities and some of the municipalities in the Bełchatów, Łask, and Sieradz districts (those located close to the station on the existing railway line No. 131). Here,

considering a more central location and better availability, commuting should take place within a 10 km radius. Ultimately, the extent of impact will cover administrative entities inhabited by approx. 230,000 people (Table 2).

Table 2
Number of inhabitants of the municipalities covered by the proposed connection. Source: own work on the basis of the data from the Central Statistical Office

Districts	Municipalities	Number of inhabitants
Wieruszów	Bolesławiec	4,083
	Czastary	3,949
	Galewice	6,199
	Lututów	4,600
	Łubnice	4,121
	Sokolniki	4,999
	Wieruszów	14,304
Wieluń	Biała	5,512
	Czarnożyły	4,535
	Konopnica	3,815
	Mokrsko	5,399
	Osjaków	4,768
	Ostrówek	4,533
	Pątnów	6,590
	Skomlin	3,354
	Wieluń	31,849
Pajęczno	Wierzchlas	6,662
	Działoszyn	12,665
	Kielczygłów	4,074
	Nowa Brzeźnica	4,609
	Pajęczno	11,696
	Rząśnia	4,892
	Siemkowice	4,814
	Strzelce Wielkie	4,651
Bełchatów	Sulmierzyce	4,450
	Rusiec	5,139
	Szczerców	8,164
	District of Sieradz	
Łask	Burzenin	5,521
	Sędziejowice	6,419
Kępno	Widawa	7,439
	Baranów	7,948
	Bralin	6,093
	Kępno	24,520
	Łęka Opatowska	5,301
	Total:	233,982

[Own elaboration on the data base of the Central Statistical Office]

6. Conclusions

The region, covering three districts: Wieluń, Pajęczno, and Wieruszów, is currently very poorly connected to the capital of the province, Łódź. This is a result of historical conditions related to the partitioning border between the Russian and German Empires running through the western part of the Łódzkie Province. The investments after 1918 did not create full transport cohesion in this area. A significant drawback of the analyzed transport system is the lack of a railway connection between the region and the capital of the province, Łódź, as well as Warsaw, which is only 200 km away. Paradoxically, Wieluń, which is only 30 km away from one of the main corridors of the Trans-European Transport Network, is not connected to the TEN-T and can not enjoy the related benefits.

In the study produced by the Railway Research Institute [11], it is proposed, by means of carrying out relatively low-budget projects, to vastly improve the transport network covering the region. The proposed investment program is largely based on projects that are already completed or under way. New projects would include:

- the construction of a railway line between Wieluń and the Chorzew Siemkowice station (approx. 30 km),
- modernization of the existing stops and construction of new ones functioning as multimodal nodes, so as to increase the impact of railway lines.

The main element of the concept presented in the study is the creation of a multimodal node (Fig. 7) for the analyzed area, on the basis of the Chorzew Siemkowice station on line No. 131, from which regional passenger trains would run to Łódź, Wieruszów, and Częstochowa along the following routes:

- Łódź – Wieluń – Wieruszów,
- Łódź – Częstochowa,
- Wieruszów – Częstochowa (potentially).

This would result in the Chorzew Siemkowice station having a train run through it at least once every hour during rush hours, which would be an attractive offer for travelers. Furthermore, the station would be a node for local bus transport, especially for the Pajęczno district. Interchange nodes integrating railway transport and bus transport would also be created at the other major stations in the region. The study also presents a concept of locating and equipping multimodal nodes and the method of it accommodating various means of transport, including access to stations and stops by private cars. The proposed investment projects and conclusions may be used to produce feasibility studies for those projects.

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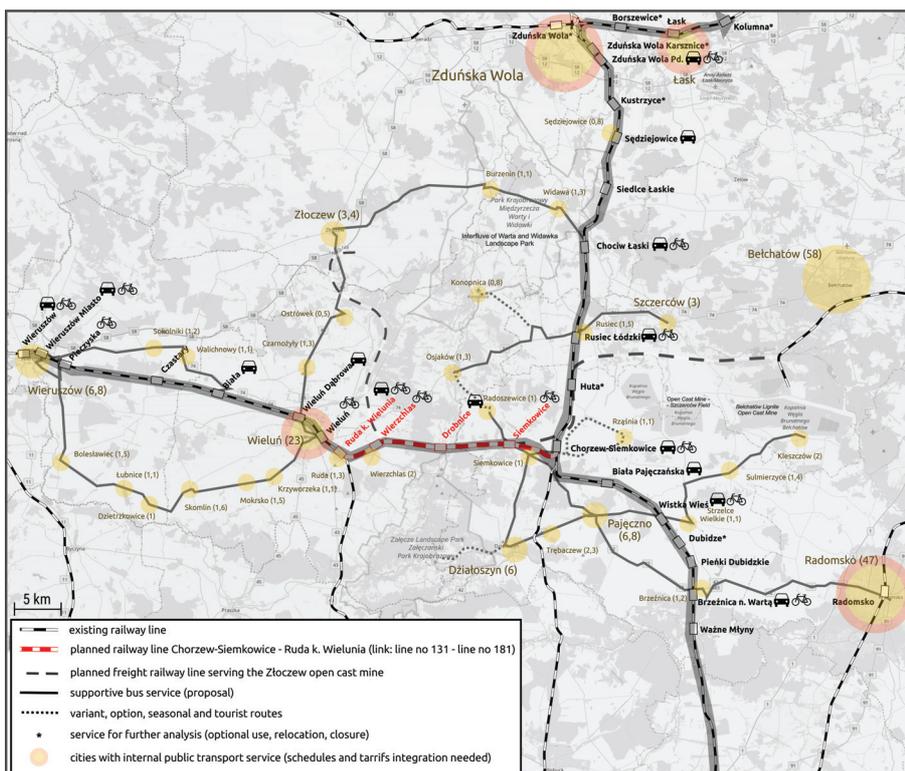


Fig. 7. The system of multimodal services in the region and the main locations of P&R and B&R facilities [elaboration T. Bużalek, using the background © by OpenStreetMap]

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