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DOI: 10.35117/A_ENG_23_09_10_01

Genesis, Current State, and Development Directions of the Poznań Metropolitan Railway Considering Spatial, Demographic, and Technical-Economic Aspects

Abstract: The article presents the operational principles of the Poznań Metropolitan Railway (PMR) system as an alternative to the increasing share of car transport in the Poznań Agglomeration. One of the main reasons for establishing PMR is the issue of suburbanization, which has led to a significant number of Poznań residents relocating to neighboring municipalities, requiring an efficient commute to Poznań. Research findings indicate that the best solution to this problem is the provision of fast and regular rail connections, particularly for daily commutes to work and school. Furthermore, the article highlights that launching PMR is an economically attractive alternative to expanding the road network, which would be necessary if current transport trends continue.

Keywords: Metropolitan railway; Suburbanization; Sustainable transport; Agglomeration

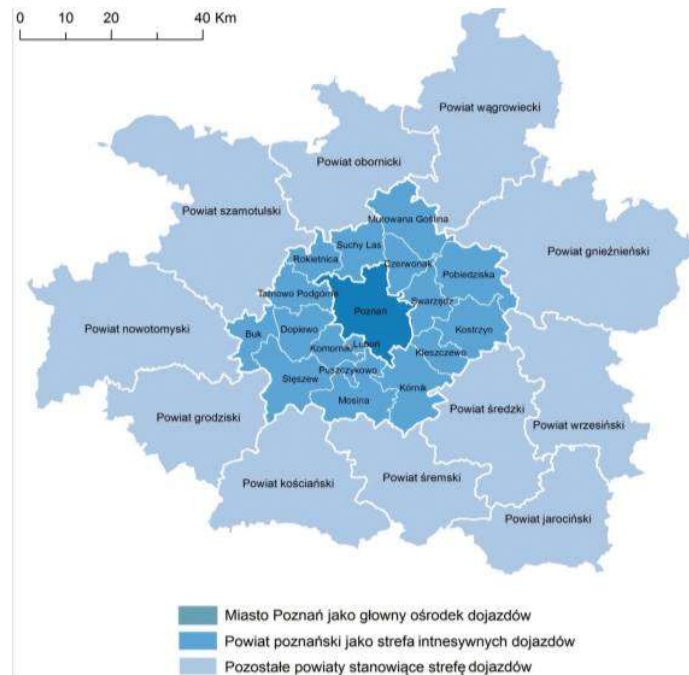
Introduction

With the development of industrialization, which began globally in the 19th century, the urbanization of cities followed. In Poland, this process started at the turn of the 19th and 20th centuries and continued for nearly the entire 20th century. Today, suburbanization is occurring, meaning city residents are moving to functional areas located in neighboring municipalities while still fulfilling most of their life needs—such as work, education, culture, and healthcare services—within cities. This type of migration is primarily driven by significant differences in real estate prices between areas outside large cities and within them.

This phenomenon results in a growing transportation problem caused by residents' daily commutes. Most of these trips occur during two peak hours each day. In the morning peak, residents travel to work and school, mainly to the central city of the agglomeration, while in the afternoon peak, they return home. The relocation process is much faster than the corresponding development of public road infrastructure or the expansion of an efficient public transport network. Consequently, car traffic is intensifying, leading to a drastic increase in congestion on roads leading to the main city.

A possible solution to this problem is to ensure efficient passenger transport using existing railway lines. The Poznań Agglomeration has nine railway lines radiating from Poznań Główny station. Rail transport is collision-free and provides direct access to the city center. This solution, combined with regular scheduling and appropriate service frequency, ensures smooth and attractive access to and from Poznań.

As a result of conducted analyses involving administrative authorities, railway market participants, and organizations interested in improving transport service quality, it was determined that the range of the Poznań Metropolitan Railway would cover the Poznań Metropolitan Area (Fig. 1).



1. The area encompassing the Poznań Metropolitan Area. Source: [2]

The Essence of the Poznań Metropolitan Railway

The Poznań Metropolitan Railway (PMR) is a transportation system ultimately based on nine railway lines radiating from the Poznań railway hub. It was inaugurated in 2018. Within the PMR framework, trains operated by Koleje Wielkopolskie and Polregio run, and the system is designed as a metropolitan railway, ensuring a 30-minute frequency on each of the lines covered by the system.

The Poznań Metropolitan Railway is co-financed by the Wielkopolskie Voivodeship and the local governments along the railway lines included in the PMR network. These lines extend towards Kościan, Jarocin, Września, Gniezno, Wągrowiec, Piła, Nowy Tomyśl, and Wolsztyn, covering 8 out of 9 routes emerging from the Poznań railway hub. The last remaining route, line 351, running from Poznań to Szczecin via Wronki and Krzyż, is not yet included in the PMR network [4].

The success of the Poznań Metropolitan Railway is reflected in its performance over recent years. In 2022, trains operated by Koleje Wielkopolskie (PMR operator) carried 14.25 million passengers. Notably, in the first half of the year, the number of passengers reached approximately 6.6 million, while the second half showed a significant increase. At the end of 2021, representatives of the regional railway operator projected that the red and white trains would carry between 12 and 12.5 million passengers in the following year. The final results far exceeded these estimates. In 2019, before the COVID-19 pandemic, Koleje Wielkopolskie transported over 12 million passengers [3].

Chronology of Events Related to the Poznań Metropolitan Railway

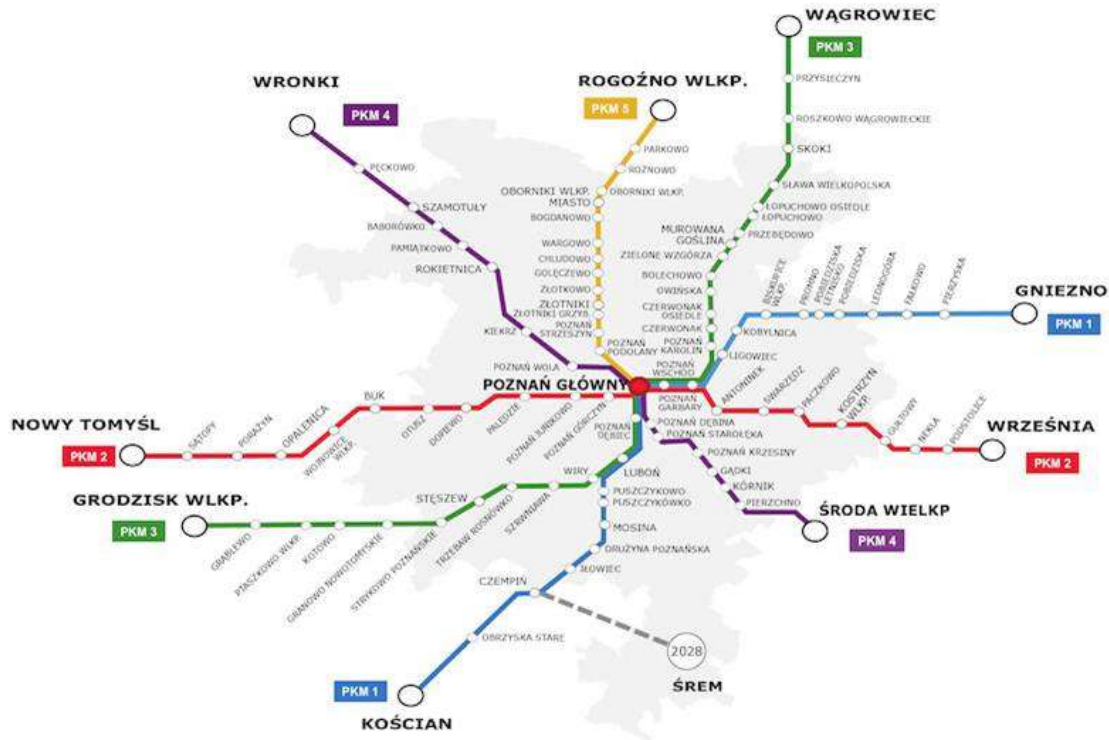
To provide readers with insight into the development process of the Poznań Metropolitan Railway, the following is a chronological list of key events leading to the establishment and operation of the system:

- November 2013
Signing of a partnership agreement for the implementation of the Master Plan for the Poznań Metropolitan Railway by:
 - Metropolia Poznań Association

- City of Poznań
- 24 local governments
- Wielkopolskie Voivodeship Government
- PKP Polskie Linie Kolejowe S.A.
- Center for Metropolitan Research of Adam Mickiewicz University
- Association of Engineers and Technicians of Transport (Poznań branch)
- Polish Urbanists Association (Poznań branch)
- Koleje Wielkopolskie sp. z o.o.
- Association of Village Leaders of the Wielkopolskie Voivodeship
- My-Poznaniacy Association
- February 2014
Start of the project "Master Plan for the Poznań Metropolitan Railway".
 - Project value: 1,907,609.00 PLN
 - Grant amount: 1,621,468.00 PLN from the European Economic Area Financial Mechanism (2009-2014).
- 2014 – 2015
Implementation of the "Master Plan for the Poznań Metropolitan Railway" project.
- October 10, 2016
Agreement signed between PKP Polskie Linie Kolejowe S.A., City of Poznań, and the Wielkopolskie Voivodeship Government for:
 - Conducting a feasibility study
 - Preparing an environmental impact report
 - Obtaining an environmental decision for the "Construction of a third track between Poznań Główny and Poznań Wschód".
- January 26, 2017
Agreement signed between Wielkopolskie Voivodeship Government, City of Poznań, and PKP Polskie Linie Kolejowe S.A. concerning the funding of a feasibility study for the "Construction of a third track between Poznań Główny and Poznań Wschód".
- April 2017
Completion of the "Master Plan for the Poznań Metropolitan Railway" project.
- June – November 2017
Negotiations between the Wielkopolskie Voivodeship Government and local governments along the 9 railway lines of the Poznań Railway Hub regarding co-financing arrangements for PMR services.
- October 2017
Agreement signed between:
 - Metropolia Poznań Association
 - Wielkopolskie Voivodeship Government
 - Śrem Municipalityto co-finance a preliminary feasibility study for restoring operational parameters and resuming railway traffic on Line 369 (Śrem – Czempień).
- December 11, 2017
Agreement signed between representatives of:
 - City of Poznań
 - Poznań County
 - Wielkopolskie Voivodeship Government
 - Metropolia Poznań Association
 - Counties and municipalities along the railway lines from Poznań to Jarocin, Wągrowiec, Nowy Tomyśl, and Grodzisk Wielkopolski concerning the launch of the Poznań Metropolitan Railway.

- 2017
Participation of the Metropolia Poznań Association, City of Poznań, and the Wielkopolskie Voivodeship Government in the Investment Project Evaluation Team established by PKP Polskie Linie Kolejowe S.A. for the project: "Construction of a third track between Poznań Wschód and Poznań Główny".
- April – May 2018
Signing of co-financing agreements for an increased number of PMR connections, between the Wielkopolskie Voivodeship Government and representatives of local governments along the railway lines from Poznań to Nowy Tomyśl, Wągrowiec, Jarocin, and Grodzisk Wielkopolski.
- May 25, 2018
Ceremonial inauguration of the Poznań Metropolitan Railway.
- June 10, 2018
First Poznań Metropolitan Railway services launched. PMR begins operations on routes between Poznań and Nowy Tomyśl, Wągrowiec, Jarocin, and Grodzisk Wielkopolski.
- September 6, 2018
PMR services expanded to include Poznań – Swarzędz connections.
- October 8, 2018
The Jerzy Regulski Award presented to the Metropolia Poznań Association and the Wielkopolskie Voivodeship Government for the Poznań Metropolitan Railway project.
- 2018
Development of a multi-sector concept and cost-benefit analysis, along with traffic and transport studies for the project "Modernization of Line 369 between Śrem and Czempin to restore operational parameters and resume rail traffic".
- 2018
Metropolia Poznań Association, City of Poznań, and the Wielkopolskie Voivodeship Government participate in the Investment Project Evaluation Team, established by PKP Polskie Linie Kolejowe S.A., for the project "Construction of a third track between Poznań Wschód and Poznań Główny".
- April 16, 2019
Agreement between representatives of City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, and counties and municipalities along the railway lines from Poznań to Gniezno and Kostrzyn regarding the expansion of PMR services.
- September 2, 2019
Launch of PMR services on the Poznań – Kostrzyn route.
- October 10, 2019
Agreement between City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, and counties and municipalities along the railway lines from Poznań to Rogoźno and Września regarding the expansion of PMR services.
- December 19, 2019
Co-financing agreements signed for increased PMR connections between the Wielkopolskie Voivodeship Government and local governments along the Poznań – Rogoźno, Poznań – Gniezno, and Poznań – Września railway lines.
- 2019
 - Cooperation between the City of Poznań, Wielkopolskie Voivodeship Government, and Metropolia Poznań Association with PKP Polskie Linie Kolejowe S.A. for the modernization of the Poznań freight bypass and its adaptation for passenger traffic.

- Participation of the Metropolia Poznań Association, City of Poznań, and Wielkopolskie Voivodeship Government in the Investment Project Evaluation Team, established by PKP Polskie Linie Kolejowe S.A., for the project "Construction of a third track between Poznań Wschód and Poznań Główny".
- January 2, 2020
Launch of PMR services on the Poznań – Rogoźno, Poznań – Gniezno, and Poznań – Września routes.
 - PMR now operates on 7 railway lines of the Poznań Railway Hub.
- August 25, 2020
The Wielkopolskie Voivodeship Government submits five projects to the national Railway+ Program for Local and Regional Railway Infrastructure Development (2028 target), including:
 - "Revitalization of Line 369 between Czempin and Śrem"
 - "Revitalization of Line 363 between Szamotuły and Międzychód"
- October 8, 2020
Agreement between City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, Kościan County, and municipalities along the Poznań – Kościan railway line regarding the expansion of PMR services.
- October 8, 2020
Agreement between City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, and counties and municipalities along the railway lines from Poznań to Nowy Tomyśl, Wągrowiec, and Grodzisk Wielkopolski concerning the continuation of PMR operations until the end of 2023.
- November 25, 2020
Agreement between City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, and counties and municipalities along the Poznań – Jarocin railway line regarding the continuation of PMR operations until the end of 2023.
- November 30, 2020
All projects submitted by the Wielkopolskie Voivodeship Government (including "Revitalization of Line 369 between Czempin and Śrem" and "Revitalization of Line 363 between Szamotuły and Międzychód") qualify for Stage II of the national Railway+ Program for Local and Regional Railway Infrastructure Development (2028 target).
- January 4, 2021
Launch of PMR services on the Poznań – Kościan route.
 - PMR now operates on 8 railway lines of the Poznań Railway Hub.
- June 12, 2022
Shortening of PMR Line 4 (Poznań Główny – Jarocin) due to the Jarocin County's refusal to continue co-financing the project.
 - Środa Wielkopolska becomes the final station of PMR Line 4.
- July 4, 2022
Agreement between City of Poznań, Poznań County, Wielkopolskie Voivodeship Government, Metropolia Poznań Association, Szamotuły County, and municipalities along the Poznań – Wronki railway line regarding the expansion of PMR services.
- January 2, 2023
Launch of PMR services on the Poznań – Wronki route.
 - PMR now operates on all railway lines of the Poznań Railway Hub [3].



2. Stations and passenger stops on PKM lines. Source: [3]

Poznań Metropolitan Railway in the Strategic Plans of the Wielkopolskie Voivodeship

In the Development Strategy of the Wielkopolskie Voivodeship until 2030, the growing importance of public transport, particularly railway transport (Koleje Wielkopolskie, Poznań Metropolitan Railway), is recognized as one of the region's strengths. On page 107 of the document, a declaration is included, stating that the development of Wielkopolska's railway network should be supported, including the construction of high-speed rail lines, modernization of regional lines, and improvements in service standards.

From Wielkopolska's perspective, the implementation of investments related to the Central Communication Port (CPK) primarily involves changes in the region's railway infrastructure. Establishing cooperation on this matter at all levels of administration is necessary.

Moreover, the document explicitly emphasizes that the Poznań Metropolitan Railway requires further development. There is a pressing need to accelerate work on the construction of a third track between Poznań Główny and Poznań Wschód. Building an additional platform and modernizing the existing ones are crucial for passenger comfort and expanding the services offered by railway operators.

Additionally, restoring railway connections to the cities of Czarnków, Międzychód, Gostyń, and Śrem—which, despite having access to the network, remain excluded due to suspended rail services—is considered highly important.

The strategy calls for the expansion of railway connections, the construction of new railway lines and hubs, such as the Konin – Turek – Koło railway line, and the urgent modernization of:

- Line 369 (Śrem – Czempień)
- Line 360 (Gostyń – Kąkolewo)

- Transport corridor on Lines 236 and 390 (Wągrowiec – Rogoźno – Czarnków)
- Other desired development directions include:
- Construction of a second track on Line 354 (Poznań – Piła)
 - Revitalization of the Piła – Kołobrzeg railway connection
 - Revitalization of Line 203 (Piła – Krzyż – Gorzów Wielkopolski – Kostrzyn), including electrification
 - Continuation of the revitalization of Line 356 towards Gołańcz and Line 357 towards Wolsztyn
 - Modernization of the Krotoszyn – Jarocin railway line (Line 281)

Summary

The information presented in this article aims to provide an insight into the essence, structure, operational principles, and development process of the Poznań Metropolitan Railway (PMR). It is important to emphasize that PMR is not a railway infrastructure manager or operator but rather a system—a pioneering initiative in Poland—that integrates various institutions to ensure high-quality public transport services in the Poznań Metropolitan Area.

Additionally, this article serves as a recognition and appreciation of the efforts of individuals and institutions that contributed to the creation of the Poznań Metropolitan Railway. It may also act as a reference for future developers of metropolitan railways in Poland, providing guidance for planning and implementing similar projects.

Furthermore, the Wielkopolskie Voivodeship Government acknowledges the significance and development of PMR, and its inclusion in the Development Strategy—with references to Poland’s strategic transport goals (CPK)—can be interpreted as an endorsement of national transport policies that will benefit the residents of the Wielkopolskie Voivodeship.

Source materials

- [1] Strategia rozwoju Województwa Wielkopolskiego do 2030 roku
- [2] R. Bull, Migracje wahadłowe ludności w aglomeracji poznańskiej, Biblioteka Aglomeracji Poznańskiej, numer 24, Bogucki Wydawnictwo Naukowe, Poznań 2014
- [3] Informacje zamieszczone na stronie internetowej Poznańskiej Kolei Metropolitalnej, <https://kolej.metropoliapoznan.pl/kalendarium.html>
- [4] Informacje zamieszczone na stronie internetowej Rynek Kolejowy, <https://www.rynek-kolejowy.pl/mobile/poznanska-kolej-metropolitalna-wreszcie-wjedzie-na-linie-do-wronek-108824.html>