EUROPEAN TRANSPORT REGULATION SPOTLIGHT

Urban Mobility Systems

- Integrating the Railway with the Public Transport System of Warsaw

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Abstract

The transition process in Poland in the 1990s brought a number of changes, also affecting the transport system in Warsaw. The increased road traffic forced transport planners to modernise and improve the public transport system. The lack of common legislation and strategies for Polish metropolitan areas is an obstacle for the creation of a well-functioning public transport system, especially when the catchment area covers a number of independent cities and municipalities, and different owners of public transport providers. The Warsaw Transport Authority (ZTM) works towards integrating all public transport modes into one single system. This case study describes the development and steps taken towards an integrated system.

Keywords

public transport system, railways, integration, metropolitan area, transport authority

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I. Introduction

The last decade has brought important changes to the public transport system of Warsaw and its surroundings, and especially to the role and quality of the railway system. The successful integration of Warsaw’s railway into the public transport network and the resulting intermodal transport strategy has become an example for the other Polish metropolitan areas.

This case study describes the historic context and the steps taken by the City of Warsaw and its authorities to achieve this integration. It will be shown that the lack of cooperation between authorities, as well as between authorities and operators, created an inefficient system, not using its full potential, and without a coherent mobility strategy. To overcome this, collaboration among all stakeholders and intensive negotiations were needed. An important lesson from this case is that to integrate the diverse transport modes a strong political will is needed, but it also depends on the right moment and the appropriate use of policy windows.

After a short introduction to the Warsaw Metropolitan Area and its public transport system, the public transport authority will be described. Chapter IV explains the new role of railways, as the backbone of the system, foreseen by transport planners. Chapter V embeds the railways in its historic context before the integration, and finally chapter VI focuses on the step-by-step integration of the railway system. This case study concludes depicting today’s railway system in Warsaw and recapitulating the most stirring features of the integration.

II. The Warsaw Metropolitan Area and its Public Transport System

The city of Warsaw and its surrounding differ considerably: in 2009 the City of Warsaw has a population of 1.7 million\(^1\) living on a surface of 517 km\(^2\) (population density: 3,316 inhabitants/km\(^2\)), while the population of whole ZTM service area is about 2.4 million.

The public transport authority of Warsaw ZTM (Zarząd Transportu Miejskiego) serves the city and part of its surroundings via transport companies running its lines. However, ZTM does not cover the total Warsaw

\(^{1}\) Between 1999 and 2009 the population grew by 6.1%.
Metropolitan Area (WMA), it covers an area of 2,457km², while the rest is served by municipal² or private operators. 71% of the population of ZTM’s catchment area live within the borders of the City of Warsaw.

Figure 1: ZTM service area (ZTM, 2012)

It is difficult to speak of metropolitan areas, since in Poland there are no official laws or bodies for metropolitan areas, nor coherent definitions. The extent of the WMA depends on the definition used: (i) the City of Warsaw and the surrounding counties, (ii) the third level of the Nomenclature of Units for Territorial Statistics (NUTS 3), (iii) the City of Warsaw and surrounding municipalities. In this case study ZTM’s definition of the WMA is used. This area encompasses the territory served by ZTM and some additional municipalities, the data however only refer to the ZTM area.³ ZTM’s sees the WMA rather as an agglomeration than a fixed geographical term.

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² In this case study municipal operators always refer to operators owned by municipalities of the WMA, which are not part of the ZTM area.
³ Table 2 in the Annex lists all the municipalities with ZTM service.
On average, each person in WMA undertakes 1.8 trips per day, and most of them are motorised trips with an average duration of 39 minutes (EMTA, 2012). The modal share for motorised trips is 67.5%, compared to 4.8% for cycling and 27.7% for walking. Despite of a rather high car ownership compared to other European metropolis (535 cars per 1000 inhabitants), City of Warsaw documents with a model share of public transport of 54.6% one of the highest shares for trips within the city. However, this changes when looking at the whole metropolitan area, where the modal share of public transport is only 30.2%, while the cars’ share is 37.3% (compared to the just urban 23.5%) and non-motorised trips have a modal share of 32.5% (compared to the just urban 21.9%).

The public transport system in Warsaw is based on bus, tram and metro routes, as well as local railway lines. Historically, Warsaw’s public transport system relied heavily on bus and tram services. Buses in Warsaw, which all work on diesel, are either run by public or private operators. The vast majority (70%) of the service is provided by the public company, while the remaining lines are run by private operators. After a competition on a public tender, private operators are granted a contract for 8 or 10 years. In 2012, the bus lines in the whole WMA were used by 439 million passengers.

It was not until recently that the first metro line opened, while the second metro line is still under construction. The 23km long metro line is used by 152 million passengers per year. The integration of the local railway system into the public transport system started quite recently, just after the political transition in the early 1990s. In contrast to the bus services, there are no private companies operating on the tracks. The tram, metro and local railway operators are owned by the City of Warsaw. Besides the railway operator owned by the City, there is also a regional railway company operating in the city. The agreement between ZTM and the regional company (Koleje Mazowieckie, KM), allowing passenger with ZTM tickets to use the regional railways, is a major milestone in the creation of an integrated public transport system in Warsaw. In fact, it was not before 2009 that holders of a ZTM ticket could use the local railways in whole ZTM service area. The public transport services on tracks were used by about 1.5 million passengers per day in 2012.

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4 All the data from this paragraph has the same source: EMTA, 2012.
Table 1: ZTM Public Transport Network in the WMA in 2012

<table>
<thead>
<tr>
<th></th>
<th>Urban buses</th>
<th>Suburban buses</th>
<th>Tram A</th>
<th>Metro A</th>
<th>SKM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lines</td>
<td>164</td>
<td>62</td>
<td>24</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Network length (km)</td>
<td>725</td>
<td>691.99</td>
<td>348.2</td>
<td>23.1</td>
<td>146.7</td>
</tr>
<tr>
<td>Number of stops/stations</td>
<td>4951</td>
<td>557</td>
<td>21</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Number of vehicles</td>
<td>1859</td>
<td>762</td>
<td>240</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Density (lines length in km/total surface km³) C</td>
<td>0.58</td>
<td>0.67</td>
<td>0.044</td>
<td>0.059</td>
<td></td>
</tr>
<tr>
<td>Density (lines length in km/1000 inhabitants) C</td>
<td>0.57</td>
<td>0.20</td>
<td>0.013</td>
<td>0.059</td>
<td></td>
</tr>
<tr>
<td>Number of operators</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Number of Passengers (in million) B</td>
<td>439 C</td>
<td>206</td>
<td>152</td>
<td>62</td>
<td></td>
</tr>
</tbody>
</table>

Source: ZTM
A: data for the city of Warsaw, excluding the surroundings.
B: January-November 2012
C: With additional 42 night bus lines

Railway, whose integration is one of the major achievements of ZTM, is the main pillar of its public transport strategy, which aims at developing both the heavy and light railways as backbone with complementary bus services. Park&Ride facilities come right after this, in order to ensure better integration among transport modes. In 2009 there were 69 Park&Ride places per km of the suburban train network.

III. ZTM: Planning and Financing

The Warsaw Public Transport Authority (ZTM) was established in 1992 as a result of the changes Warsaw’s public transport underwent since Poland’s transition to democracy. In 1992, the formally integrated municipal transport body was split according to the service to be provided into operations and management bodies. ZTM is responsible for planning and managing the public transport system, as well as selling and controlling tickets. For the operation ZTM signed contracts with 8 main different providers.

Being an entity subordinate to the city of Warsaw, ZTM’s legal mandate is limited to the boundaries of the city, excluding the surroundings forming part of the WMA. However, by-laws and national acts (e.g. on
communities self-government) give ZTM the possibility to extend its scope beyond the city borders. Given that in Poland there are no official metropolitan entities, and the integration to agglomerations is voluntary, official bilateral cooperation has to be based on legal agreements. Generally, the lack of metropolitan regulations is one of the main problems of the WMA. However, public transport is a subject of general interest, this driving the communities to cooperate in a “metropolitan management”. Over the years, about 30 municipalities of the WMA acknowledged ZTM as the public transport organiser on their territory.\(^5\) In some municipalities ZTM organizes the whole transport system, in others cooperation is limited to specified transport lines (e.g. only night bus line).

The lack of metropolitan regulations also constitutes a limitation when it comes to strategic planning. The Strategy of Public Transport System of Warsaw includes the metropolitan service, yet suburban municipalities are not obliged to comply with it. So it occurs that some municipalities provide their own local transport (based on tenders), and one has even its own municipal bus company but not competing with ZTM bus lines.\(^6\) Another difficulty is given by the fact that the city of Warsaw cannot invest outside its boundaries. That is why some Park&Ride sites were built in Warsaw, even though they should have been ideally located in suburban municipalities. An ideal situation would be to have a metropolitan transport manager for all municipalities (like the STIF for Paris or AMMT for Turin). But the will of policymakers is necessary. The new public transport law (2011), which is based on EU 1370/2007 regulation, does allow municipal organisers to overlap their jurisdictions, but having a single public transport authority for the whole WMA is still a distant vision.

The services provided by ZTM are financed by fare revenues\(^7\) and the budgets of the WMA municipalities, without regional or national support. In 2012 the operation costs of the public transport system amount to 564 million Euros (excluding investments), 32.3% of which could be covered by fare revenues and the remaining 67.7% 382 million Euros by public subsidies (ZTM). Comparing the 2009 and 2012 financial data shows a decrease in the cost coverage by fare revenues from 38.6% (EMTA, 2012) to 32.3%.

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\(^5\) ZTM is not always the sole public transport organiser in the municipalities, there are also the regional railways, and some municipalities organise additional bus lines.

\(^6\) For historical reasons the municipality’s area is divided between service provided by ZTM and service provided by the local bus company.

\(^7\) In 2009 a single ticket costs 0.70EUR in the city of Warsaw, while the monthly pass costs 19.50EUR (9.75EUR for students). If a person undertakes at least 28 trips per month with public transport, buying a monthly ticket is more convenient than taking the single ones. In the surroundings of Warsaw the single ticket costs 1.05EUR and the monthly ticket 29.00EUR. Putting the cost of the monthly ticket with the monthly GDP per capita shows that public transport is a very cost efficient alternative, the single ticket costs also less than a litre of petrol. In 2009 the monthly ticket was equal to 0.9% of the monthly GDP per capita, and the single ticket cost 40% less than a litre of petrol.
According to the bilateral agreements, the communities’ contributions to the funding are based on vehicle-kilometres and its rate, which is the easiest and the clearest financing system of the suburban service, given the lack of metropolitan regulations. Despite the good cooperation between municipalities and the city, the financing of the system remains a delicate topic: suburban municipalities only finance up to 40% of the service costs on their territory (the remaining 60% is paid by the City of Warsaw). Nevertheless, some municipalities feel that they are confronted with a monopolist and see the vehicle-kilometre rate as an unfair commission charged by ZTM. Frequent complaints are that the increases of general service costs are not based by an increase in its quality or vehicle-kilometres level. Hence policymakers of the WMA call for the national government to recognise the scale of integration (more than 30 municipalities), allowing to gain more funds for the urban transport maintenance – the French “versement de transport” would be an example for this.

IV. The New Role of Railways

In the last decade the City of Warsaw has become a new player in the railway\(^9\) sector, and has developed a new vision for the role of railways: its goal is to (re-)integrate passenger railway transport in the public transport system in the WMA.

After many years of buses predominance, Warsaw’s Public Transport System Strategy of 2009 stresses that the railway, together with the metro, should become the backbone of the public transport system in the City and in the WMA. This vision is already partially achieved, and the City is working on the improvement of the railway system by:

- adapting the current system to new service standards (revitalization and modernization); and

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\(^9\) It is important to bear in mind that the railway lines are shared among the City, PKP Intercity and Cargo companies.

\(^9\) To improve the railway system the City focuses on three aspects:

a) infrastructure
- modernization of chosen railway lines – improvements in operational parameters
- modernization of the existing stops and stations
- construction of new stops related to origin and destination sources
- improvements in stops accessibility (disabled people)
- improvements in passengers information system (focusing on dynamic systems)
- improvements in passengers safety (e.g. CCTV)
- creation of multimodal hubs with metro, tram, and bus systems
- improvement of multimodality – Park&Ride, Kiss&Ride and Bike&Ride

b) rolling stock
- purchase of new trains fit for the metropolitan service (more entrances, no toilets, open-space interior)

c) organization
— complementing the current system with new stops and new lines (expansion, adaptation of unused lines to the passenger service).

The graph below visualises the model of public transport envisaged by the City:

![Diagram](image)

*Figure 2 Model of Public Transport envisaged by the City (ZTM, 2012)*

However, the necessary steps to make railways and metro the backbone of the Warsaw’s transport system are of great dimension and complexity, and they still require further cooperation with other entities, such as the Polish State Railways (PKP) Infrastructure Manger and the regional Mazovian Railways (KM).

The city found favourable conditions in their search to improve the system: the UEFA EURO 2012 incentivised the PKP Infrastructure Manager to modernize previously degraded stops, and to connect the

- achievement of 10/15 minutes frequency during the rush hours
- implementation of a schedule with equal interval
- coordination of the schedules with other transport modes
- tariff integration
Chopin Airport to the city centre with a new line. Besides this extraordinary event, the railway infrastructure in Poland is undergoing a general modernisation, which also favours Warsaw. Moreover, the City and PKP agreed to jointly build a new station in the Ursus District (see more details in later chapter) and a Park&Ride site to favour intermodal transport.

The UEFA EURO 2012 was an important test for Warsaw’s public transport system, especially as an increased number of people had to get simultaneously to the same destination. The graph below shows the modal choice of spectators who used public transport for the matches in Warsaw. The figures illustrate that most passengers using public transport to get from the city centre to the stadium opted for the railway system (heavy and light rail). Yet, one has to be cautious. This extraordinary event does not stand representatively for the usual travel behaviour of people in the WMA, and the high number of foreigners using the system distorts the numbers even more. Nevertheless, it indicates that the railways system can be indeed the backbone of the public transport system, and that ZTM’s strategy is successful.

![Passengers of PT going from the centre to the National Stadium (EURO 2012 venue)](image)

Figure 3 Passengers of PT going from the centre to the National Stadium during the UEFA EURO 2012 (ZTM, 2012)

V. The Early History of Railways in Warsaw

The railways influenced the development of the city considerably. The system founded in 1845 was gradually enlarged forming a radial shape. The decreasing distances between the surrounding rural side and the city and the idea of garden town were the impulse for the revival of old cities and the foundation of new cities, contributing to the urban sprawl.

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10 At the stadium there was no parking possibility for private cars, making it difficult for spectators to reach the stadium by private car.
The urbanisation alongside the railway made the railway system a natural choice for travelling. Nevertheless, in the 1950s bus transport became more flexible, gained popularity and was perceived as the 'future' of urban transport instead of railway lines. The lack of congestion on the streets made the bus service even more attractive for the citizens. Consequently investments in the development of the railway system decreased in favour of developing the network of municipal bus connections.

The general degradation of Polish economy in 1980s deteriorated the railway system (both infrastructure and service) even more. Finally, the transition of 1989 and the subsequent liberalisation process also had its share in the decreasing role of railways: private bus operators were allowed to provide services, most of them parallel to the railways lines connecting suburban municipalities with the city centre. In addition, the citizens of the WMA became able to afford and maintain private cars, making them less dependent on public transport.

Yet the breakthrough in the accessibility of cars resulted in massive increase of traffic. The road system, shaped in the times when the ownership of cars was rationed, was not able to cope with thousands of new vehicles. The increased traffic volume and the decreased traffic condition affected the bus system, which became ineffective and characterised by delays.

VI. The New Beginning

In the early 1990s studies and analyses of the public transport system in WMA highlighted the underutilized potential of the railway system, also the above mentioned increase in traffic volume after the transition led to a change of mind and policymakers started to consider moving traffic back on the tracks to alleviate the pressure on roads. This, however, required working on an integrated public transport system in terms of ticketing and planning the schedule, which were done independently for railways and busses. It was generally agreed that the integration of municipal and PKP tariffs in the WMA should be the first mile step. Unfortunately, it took over 10 years to find a viable solution on how to manage the integration and how to finance it.

In 2002 an incident opened the policy window for the necessary changes: one of Warsaw's road viaducts was about to collapse and had to be closed. This cut the Ursus district (in the western border of the city) off the city centre. The only remaining connection to the city centre was a regional railway line with a very good
frequency. This situation forced the two sides, the City of Warsaw and PKP, to cooperate. The parties agreed on the PKP allowing passengers with ZTM tickets to travel by regional trains, while PKP received a lump sum for the compensation of lost incomes.

Very soon the agreement was extended to all stations of the regional train within the boundaries of Warsaw and nearly all municipalities with ZTM bus service. This agreement was however short lasting and expired in May 2003 as the financial expectations of PKP exceeded the city’s capacity. This short-lived experience made authorities realise that railways could contribute to improving the public transport system suffering from the high traffic volume. Thus, policymakers developed the will to incorporate the railways into the urban public transport system, and they established a municipal railway operator as an agreement with PKP could not be reached.

The Urban Rapid Railway (Szybka Kolej Miejska, SKM), which was founded in 2004, was supposed to improve the quality of the WMA’s railway system. The City of Warsaw, which is the sole owner of SKM, bought new rolling stock and the first line (S-1 line, from Warszawa Felenica to Warsaw West Station) started in October 2005. The service stared in the middle of an already established railway schedule; hence SKM had to use unattractive slots, giving its service a marginal role in the system.

In 2005 the Mazovia Region\(^\text{11}\) was the first Polish region to take the control over the regional railway service, and established the Mazovian Railways Company (KM). This change was taken as an opportunity to initiate new negotiations on ticket integration. Following successful negotiations ZTM tickets were again valid in regional (KM) trains from the Ursus district to Warsaw East Station. Later in January 2006 the integration covered new section of KM lines within the borders of Warsaw, but passengers had to buy KM tickets extra. This extra ticket was needed due to incompatible ticketing systems. The KM trains were not equipped with the technology to check ZTM tickets, therefore passengers had to purchase a KM ticket for a symbolic price to be able to prove the validity of their ZTM ticket. The integration of different ticket categories (short-term, long-term, others) followed gradually.

Despite the step-by-step integration of KM services, the plans to develop SKM continued: in 2006 the second line (S-2 line, from Warszawa Rembertów to Pruszków) was inaugurated. This situation remained unsatisfactory for transport planners of the city of Warsaw. Initially, SKM trains competed with KM trains,

\(^{11}\) Mazovia Region is the region of which Warsaw is a capital city.
and the capacity of railway lines was not efficiently used, as the schedules of two operators did not supplement each other. Moreover, the separated tariffs forced passengers to choose which train to take.

After intensive negotiations as of January 2009 ZTM tickets became valid in KM trains in 15 suburban municipalities. Meanwhile the SKM system has been extended, opening new connection to Legionowo/Wieliszew and to Józefów/Otwock in 2010, also the coordination of the schedule of the two train operators improved considerably. In addition, the Warsaw Commute Railway line (WKD)\(^2\), which belongs to the region and six municipalities, is also a part of integrated tariff on a specified section.

**VII. Warsaw’s Railway System Today**

Today's railway system in Warsaw has a radial shape whose core is the diametric line that links together the West and East Station. The diametric line is important as it is connected to most of the other lines, and during rush hours its frequency is comparable to the metro (trains pass every three to four minutes). Furthermore, it is a crucial element of the transport network helping to achieve intermodal transport, even more as the transfer from east to west parts of the city was previously served by buses or trams.

\(^2\) The WKD belongs to the Mazovia Region, and is a light rail with one line.
Within the WMA two railway undertakings are operating: the Urban Rapid Railway (SKM) and the Regional Railways (KM). The first one is owned by the city of Warsaw, with which it signed an in-house gross-contract for 15 years (ending in 2024). The latter one belongs to the Mazovia Region. Although SKM operates on fewer lines than KM, in 2012 it has a higher vehicle-kilometres share: 14,149,362 compared to 5,160,513. Given that one of the main objectives of ZTM is to offer seamless travelling to its customers, to achieve this objective ZTM signed an agreement with KM (which usually lasts one year and has to be subsequently renewed) setting the rules for the integration which has a commercial name as “single ticket” offer. In this agreement ZTM consents to compensate\(^3\) KM for its lost incomes in WMA due to KM accepting ZTM tickets. This “single ticket” is well accepted by passengers. In 2012 54.7% of the passengers of KM trains used the ZTM “single ticket”, this is an increase by 9 percentage points compared to 2010.\(^4\) The schedules of the two operators are generally coordinated that results in a very good offer with regular headways.

### VIII. Concluding remarks

Nowadays, railways are considered an integral part of the public transport system, and nobody is questioning its relevance. The objective of creating a fully integrated public transport system for the Warsaw Metropolitan Area was achieved due to great efforts of ZTM and the political, financial commitment of the city and municipalities and the use of windows of opportunities. A remaining challenge to advance the system is the improvement of passenger information system. However, the current economic downturn in Europe is also constraining the budgets of Polish municipalities, making it difficult to take big steps to complete the full integration.

The lack of legislative or regulatory support to integrate public transport authorities of different municipalities constitutes a real challenge to create a coherent mobility strategy for a catchment area going beyond city boundaries. In a context of growing urbanisation and urban sprawl lawmakers have to create tools for authorities to efficiently cooperate where it becomes necessary. Next to the legal tools municipalities should be given the possibility to obtain additional funds to cover initial investment costs.

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\(^3\) The compensation is based on vehicle-kilometres.

\(^4\) For the percentage of ZTM “single ticket” holders on individual KM lines please see table 4 in the Annex.
Annex

Table 2: List of communities within ZTM service area

<table>
<thead>
<tr>
<th>Communities</th>
<th>Population (2012)</th>
<th>Area (sq km)</th>
<th>Density (per/sq km)</th>
<th>Official status</th>
</tr>
</thead>
<tbody>
<tr>
<td>HALINÓW</td>
<td>14,484</td>
<td>66.09</td>
<td>219.2</td>
<td>semi-urban</td>
</tr>
<tr>
<td>IZABELIN</td>
<td>10,343</td>
<td>64.98</td>
<td>159.2</td>
<td>rural*</td>
</tr>
<tr>
<td>JABŁONNA</td>
<td>16,809</td>
<td>64.55</td>
<td>260.4</td>
<td>rural</td>
</tr>
<tr>
<td>JÓZEFOW</td>
<td>19,685</td>
<td>23.92</td>
<td>822.9</td>
<td>urban</td>
</tr>
<tr>
<td>KARCZEW</td>
<td>15,975</td>
<td>28.12</td>
<td>568.1</td>
<td>urban</td>
</tr>
<tr>
<td>KODYŁKA</td>
<td>20,186</td>
<td>19.64</td>
<td>1027.8</td>
<td>urban</td>
</tr>
<tr>
<td>KONSTANCIN-JEZ</td>
<td>24,820</td>
<td>78.28</td>
<td>317.1</td>
<td>semi-urban</td>
</tr>
<tr>
<td>LEGIONOWO</td>
<td>53,749</td>
<td>13.54</td>
<td>3969.6</td>
<td>urban</td>
</tr>
<tr>
<td>LESZNO</td>
<td>9,770</td>
<td>125.03</td>
<td>78.1</td>
<td>rural</td>
</tr>
<tr>
<td>LESZNOWOLA</td>
<td>21,469</td>
<td>69.17</td>
<td>310.4</td>
<td>rural</td>
</tr>
<tr>
<td>ŁOMIANKI</td>
<td>24,231</td>
<td>38.06</td>
<td>636.7</td>
<td>semi-urban</td>
</tr>
<tr>
<td>MARKI</td>
<td>27,675</td>
<td>26.03</td>
<td>1063.2</td>
<td>urban</td>
</tr>
<tr>
<td>MICHAŁOWICE</td>
<td>16,918</td>
<td>34.88</td>
<td>485.0</td>
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<tr>
<td>NADARZYN</td>
<td>11,947</td>
<td>73.4</td>
<td>162.8</td>
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<tr>
<td>NIEPORODŁĘT</td>
<td>13,090</td>
<td>95.67</td>
<td>136.8</td>
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</tr>
<tr>
<td>OTWOCK</td>
<td>44,907</td>
<td>47.31</td>
<td>949.2</td>
<td>urban</td>
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<tr>
<td>OŻARÓW MAZ.</td>
<td>21,386</td>
<td>71.34</td>
<td>299.8</td>
<td>semi-urban</td>
</tr>
<tr>
<td>PIASECZNO</td>
<td>73,450</td>
<td>128.22</td>
<td>572.8</td>
<td>semi-urban</td>
</tr>
<tr>
<td>PIASTÓW</td>
<td>22,936</td>
<td>5.76</td>
<td>3981.9</td>
<td>urban</td>
</tr>
<tr>
<td>PRUSZKÓW</td>
<td>58,494</td>
<td>19.19</td>
<td>3048.2</td>
<td>urban</td>
</tr>
<tr>
<td>PRAŽMÓW</td>
<td>9,758</td>
<td>86.11</td>
<td>113.3</td>
<td>rural</td>
</tr>
<tr>
<td>RADZYMIN</td>
<td>23,177</td>
<td>129.87</td>
<td>178.5</td>
<td>semi-urban</td>
</tr>
<tr>
<td>RASZYN</td>
<td>21,190</td>
<td>43.89</td>
<td>482.8</td>
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</tr>
<tr>
<td>STARE BABICE</td>
<td>17,137</td>
<td>63.42</td>
<td>270.2</td>
<td>rural</td>
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<tr>
<td>SULEJÓWEK</td>
<td>19,323</td>
<td>19.31</td>
<td>1000.7</td>
<td>urban</td>
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<tr>
<td>WIĄZOWNA</td>
<td>11,275</td>
<td>102.12</td>
<td>110.4</td>
<td>rural</td>
</tr>
<tr>
<td>WIELISZEW</td>
<td>11,610</td>
<td>106.73</td>
<td>108.8</td>
<td>rural</td>
</tr>
<tr>
<td>GOŁA KALWARIA</td>
<td>25,563</td>
<td>145.11</td>
<td>176.2</td>
<td>semi-urban</td>
</tr>
<tr>
<td>WOLOMIN</td>
<td>51,385</td>
<td>59.52</td>
<td>863.3</td>
<td>semi-urban</td>
</tr>
<tr>
<td>ZABKI</td>
<td>29,665</td>
<td>11.13</td>
<td>2665.3</td>
<td>urban</td>
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<tr>
<td>ZIELONKA</td>
<td>17,436</td>
<td>79.48</td>
<td>219.4</td>
<td>urban</td>
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<tr>
<td>WARSZAW</td>
<td>1,708,491</td>
<td>517.24</td>
<td>3303.4</td>
<td>urban</td>
</tr>
<tr>
<td>WMA without Warsaw</td>
<td>759,843</td>
<td>1939.87</td>
<td>391.7</td>
<td>urban</td>
</tr>
<tr>
<td>WMA with Warsaw</td>
<td>2,468,334</td>
<td>2457.11</td>
<td>1005</td>
<td>urban</td>
</tr>
</tbody>
</table>

* All rural areas are influenced by the urban sprawl effect/suburbanisation.
Table 3: Supply Quality Indicators in 2012

<table>
<thead>
<tr>
<th></th>
<th>Urban buses</th>
<th>Suburban buses</th>
<th>Tram</th>
<th>Metro</th>
<th>SKM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial speed (km/h)</td>
<td>23.24</td>
<td>30.71</td>
<td>18.07</td>
<td>33.81</td>
<td>37.87</td>
</tr>
<tr>
<td>Amplitude of Service (hours)</td>
<td>20.5</td>
<td>19.0</td>
<td>21.0</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>Accessibility (% of buses, or stations)</td>
<td>96</td>
<td>25</td>
<td>100</td>
<td>100 (trains)</td>
<td></td>
</tr>
<tr>
<td>Average age of vehicles (years)</td>
<td>6.29</td>
<td>16.3</td>
<td>10.23</td>
<td>1.97</td>
<td></td>
</tr>
<tr>
<td>Frequency peak hours (% of lines running under 5 min)</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Number of night lines on weekend</td>
<td>42</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stops/station equipped with real time information (in %)</td>
<td>0</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicles equipped with air conditioning (in %)</td>
<td>53.90</td>
<td>21</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source ZTM. 2012

Table 4: Percentage of KM passengers using ZTM instead of KM tickets in WMA in 2010 and 2012

<table>
<thead>
<tr>
<th>Metropolitan relation</th>
<th>III 2010</th>
<th>X 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legionowo-Warsaw</td>
<td>39.35%</td>
<td>56.69%</td>
</tr>
<tr>
<td>Sulejówek- Warsaw</td>
<td>43.94%</td>
<td>52.40%</td>
</tr>
<tr>
<td>Ożarów Maz.- Warsaw</td>
<td>35.77%</td>
<td>41.86%</td>
</tr>
<tr>
<td>Wołomin- Warsaw</td>
<td>60.37%</td>
<td>61.63%</td>
</tr>
<tr>
<td>Otwock- Warsaw</td>
<td>52.61%</td>
<td>56.87%</td>
</tr>
<tr>
<td>Piaseczno- Warsaw</td>
<td>44.69%</td>
<td>55.10%</td>
</tr>
<tr>
<td>Pruszków- Warsaw</td>
<td>42.69%</td>
<td>52.59%</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td><strong>45.70%</strong></td>
<td><strong>54.71%</strong></td>
</tr>
</tbody>
</table>
Figure 5 Railway lines run by SKM (ZTM, 2012)
References
Capital City of Warsaw, 2007. Agreement between The Capital City of Warsaw and Michałowice Community.
Capital City of Warsaw, 2009. Agreement between The Capital City of Warsaw and Ożarów Mazowiecki Community.
Capital City of Warsaw, 2010. Agreement between The Capital City of Warsaw and Lesznowola Community.

Capital City of Warsaw, 2011. *Agreement between The Capital City of Warsaw and Izabelin Community.*


