

Urban public transport development in Poland in 2004-2020 Co-financed by EU: geography and disparities

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Abstract

This paper deals with the projects in the field of urban public transport, which were implemented in Poland after its entrance to the European Union with financial support from the European Regional Development Fund, European Cohesion Fund, and Connecting Europe Facility instrument. These projects were classified by type of activities and main transport mode, and their geography across the country was considered. Urban public transport projects supported by the EU, no doubt, changed the face of a lot of Polish cities and towns in recent years. Despite this fact, they were distributed very unevenly throughout the country.

Keywords: *Poland, European Union, urban public transport, European Cohesion Policy, absorption of EU Funds*

Rezumat. Dezvoltarea transportului public urban în Polonia în perioada 2004-2020 co-finanțat de către UE: caracteristici geografice și disparități

Lucrarea prezintă proiectele din domeniul transportului public urban, care au fost implementate în Polonia după integrarea în Uniunea Europeană, cu sprijinul financiar al Fondului European Regional pentru Dezvoltare, Fondul European pentru Coeziune și Mecanismul de Conectare a Europei. Aceste proiecte au fost clasificate ținând cont de tipul de activități și modul de transport, precum și distribuția lor teritorială la nivelul țării. Proiectele privind transportul public urban, finanțate de către UE, au avut un impact considerabil asupra multor orașe mari și mici din Polonia în ultimi ani. Cu toate acestea, ele au fost raspândite foarte inegal la nivelul țării.

Cuvinte-cheie: *Polonia, Uniunea Europeană, transport public urban, Politica de Coeziune Socială, absorbția fondurilor UE*

Introduction and literature review

The role of urban public transport in mobility in Polish cities and towns remains crucial. In 2019, the last year before the COVID-19 pandemic, buses, trolleybuses, trams in overall Poland, and the only metro system in Warsaw carried 4 107 million passengers (GUS 2020, ZTM 2020). Even this number is not full because it does not include passenger flow of commuter trains within cities and urban agglomerations, cumulative data on which for the whole country are not available. In 2021 15 tram and 3 trolleybus systems exist in Poland while in every population centre with no less than 50 thousand inhabitants bus system is in operation. According to GUS (2020), 57,3 thousand kilometres of urban bus lines, 2,3 thousand kilometres of tram lines as well as 479 and 33 kilometres of trolleybus cables and Warsaw metro lines respectively existed in 2019.

In the late Polish people's republic usage of mass transit definitely prevailed over car trips. In 1987, for example, 88% of inner-city trips in Poland were made by urban public transport (Pucher, 1995). In the 1990s and early 2000s urban public transport in the country faced a massive crisis expressed mostly on

the deterioration of infrastructure and fleet. Three main reasons for such a state can be mentioned. Firstly, responsibility for maintenance on urban public transport was placed on local authorities, but they did not receive any opportunities for raising external financing (Radzimski & Gadziński, 2019). Besides, after the fall of communism in Poland car ownership had extremely grown from 5,3 million vehicles in 1990 to 10 million in 2000 (GUS 2018, 2021a). The private car was not only considered as faster and more efficient transport mean compared to mass transit. Vehicle ownership was regarded as very prestigious as it could show motorists' considerably higher social status (Domański, 2012). The enormous growth of car park had only exacerbated the degradation of urban public transport in Poland.

After the entrance to EU Poland became one of the major recipients of financial aid from European funds and should be the "showcase" of European structural policies and their achievements (Churski, 2008). In Polish academic literature, ecstatic assessments of this financial aid can be found. For example, it is compared with the Marshall Plan of financial support of Western Europe after World War II (Życki, 2019). Golinowska (2019) gave thanks to the EU for

investment in even the “civilization jump” of Poland. These metaphorical expressions do not supersede the critical review of aspects of EU investments in Poland. Bachtler & McMaster (2008) highlighted the trend towards gradual regionalisation, i.e. giving local authorities more credentials to select projects for EU co-financing according to their vision of the local circumstances, but also saw it as the source of tension between regions and central government because of existing of parallel decision-making structures on regional and central level. However, the most part of EU funding was spending on the major metropolitan areas of Poland (Churski, 2017). Among the probable reasons of this trend the higher population density and hence bigger opportunity for users to benefit from investment (Churski et al., 2016), disparity in human capital between large and medium cities on the one hand and smaller population centres (Wolek, 2018) and the bigger investment attractiveness of voivodeship capitals compared to cities and towns without this status (Przybyła et al., 2020) are identified. Bachtler et al. (2019) expressed that in the next version of EU Cohesion Policy for every certain medium- and underdeveloped region its local opportunities and challenges had to be better recognised by differentiating their support and allocating of financial resources.

Balance between investments in the technical infrastructure and the development of institutions in Poland was also reflected critically. According to Churski (2017) and Rodríguez-Pose (2013), the support of local institutes within European funding was not enough, and this situation may lead to difficulties in the maintenance of technical infrastructure in the future. Kozak (2012) stated that not the construction of “hard” infrastructure, but the improvement of “soft” factors such as social and human capital should be the main development factor in underdeveloped regions. Mucha et al. (2019), furthermore, underscored the fact that investments in urban public transport in Poland co-financed by EU had been made in almost the one-time period and that in future country would face the problem of the one-time modernisation of this infrastructure without aid of EU.

Either way, it was understandable that the development of urban public transport infrastructure in Poland was one of the priorities during all three EU budget periods – 2004-2006, 2007-2013, and 2014-2020.

All projects co-financed by EU funds should be part of the operational programmes which are “detailed plans in which the Member States set out how money from the European Structural and Investment Funds will be spent during the programming period. They can be drawn up for a specific region or a country-wide thematic goal” (EC, 2015b). Each project should

be part of sub-measure and category. The source of co-financing, in most cases European Regional Development Fund (ERDF) or European Cohesion Fund (ECF), depends on them.

In 2004-2006 projects on the development of urban public transport in Poland were included in two programmes, “Integrated programme of regional development” (hereinafter ZPORR, from Polish “Zintegrowany Programme Operacyjny Rozwoju Regionalnego”) and “Transport” (Table 1). ZPORR covered the development of bus, trolleybus, and tram infrastructure as well as of Warsaw metro. Programme “Transport” was focused on the inter-city network but encompassed several projects on the commuter railways in urban agglomerations. Towns with a population of fewer than 50 thousand inhabitants in fact did not have an opportunity to raise funding for the renovation of mass transit. Besides, projects were approved on the level of the Polish government. That aggravated the concentration of urban public transport development in major population centres and led to its underfinancing in poorer regions (Schötz-Sobczak, 2005).

These shortcomings were taken into account in the budget period 2007-2013. The operational programme “Development of Eastern Poland” was adopted especially for the support of less developed Warmian-Mazurian, Podlaskie, Lublin, Subcarpathian, and Holy Cross voivodeships. On the country-wide level urban public transport development projects were included in the operational programme “Infrastructure and environment” (POIiŚ, from Polish “Program Operacyjny Infrastruktura i Środowisko”). Smaller towns outside of urban agglomerations received an opportunity to claim the co-financing of urban public transport development within POIiŚ at least in sub-measure “Development of intelligent transport systems”. Furthermore, apart from the country-wide level 16 regional operational programmes (ROP) for each voivodeship were adopted, and in their case approval of projects took place on the regional level. The special algorithm was applied for division of funds between ROPs: 80% of funds were divided based on the proportion of population levels, 10% were divided in proportion of population size between voivodeships with GDP per capita less than 80% of average Polish in 2001-2003, and the rest 10% were allocated to poviats (administrative units of lower level than voivodeships) with unemployment rate 150% higher than average Polish in 2003-2005 (MRR, 2007a). In 2014-2020 more complicated algorithm, however, also based on population size, GDP per capita and unemployment rate, was applied (MIR, 2014c).

In 2014-2020 ROPs were also mandated apart from country-wide programmes. Besides, one financial instrument not within European Cohesion Policy was used. Connecting Europe Facility was

aimed at the development of Trans-European Transport Network (TEN-T) that will bring together the main communication lines of the continent. Focused mostly on the freight traffic, CEF Transport

nevertheless included several projects on the development of commuter passenger railways in the biggest Polish agglomerations.

Table 1. EU programmes covering mass transit development in Poland in 2004-2020

Programme	Sub-measure	Category	Fund	Declared area of intervention for sub-measure
Countrywide and sub-regional level				
2004-2006				
Transport	1.1 "Modernisation of railway lines in relations in urban agglomerations and between them"	-	ERDF	Agglomerations of major cities
ZPORR	1.1 "Modernisation and expansion of the regional transport systems"			Cities bigger than 50 thousand inhabitants and their environs
	1.6 "Development of public transport in agglomerations"			Agglomerations bigger than 500 thousand inhabitants
2007-2013				
POIiŚ	7.1 "Railway transport" (certain projects in urban agglomerations only)	16. Railways, 17. Railways (TEN-T), 18. Rolling stock	ECF	Entire Poland
	7.3 "Urban transport in agglomerations"	52. Promotion of eco-friendly urban transport	ECF	Nine agglomerations of voivodeship capitals
	8.3 "Development of intelligent transport systems"	28. Intelligent transport systems	ERDF	Entire Poland
Development of Eastern Poland	3.1. "Public transport systems"	25. Urban transport	ECF	Capitals of voivodeships of Eastern Poland
2014-2020				
POIiŚ	5.1. "Development of railways (TEN-T)", 5.2. "Development of railways (outside of TEN-T)" (certain projects in urban agglomerations only)	024. Railways (basic TEN-T network), 025. Railways (complex TEN-T network), 026. Other railways, 027. Rolling stock	ECF	Entire Poland
	6.1. "Development of public transport in cities"	043. Green urban transport infrastructure and its promotion, 044. Intelligent transport systems	ECF	13 agglomerations of voivodeship capitals (excluding Eastern Poland)
Eastern Poland	2.1 "Sustainable urban transport"	043. Green urban transport infrastructure and its promotion, 044. Intelligent transport systems	ERDF	Capitals of voivodeships of Eastern Poland
Not in Cohesion Policy:				
CEF Transport	-	-	CEF	Entire Poland
Regional level				
2007-2013				
16 ROP	Various names	25. Urban transport, 28. Intelligent transport systems, 52. Promotion of eco-friendly urban transport	ERDF	Entire voivodeships
2014-2020				
16 ROP	Various names	043. Green urban transport infrastructure and its promotion, 044. Intelligent transport systems	ERDF	Entire voivodeships

Sources: MRR, 2004, 2007b, c; MGP, 2004; MIR, 2014a, b, 2015a; Mucha et al., 2019, p. 101, own elaboration

The research problem within current investigation can be stated as uneven involvement of different Polish

cities, towns and voivodeships (the administrative-territorial entities of NUTS 2 level) in projects co-

financed by EU to promote urban public transport during the period under review. The research question can be worded as follows: "What are the territorial differences in the development of urban public transport in Poland within EU financial support in 2004-2020?". It is split into the two sub-questions:

1. What kind of projects were carried out?
2. How are these projects disseminated across whole Poland?

Methodology

For answering the research question, cartographical approach, whose goal is "to produce scientific insights by facilitating the identification of patterns, relationships and anomalies in data" (Maceachren & Ganter, 1990) was utilised. GIS-software ArcMap 10.5 was used as a cartographical tool.

Spatial data on the location of projects were required for mapping. Tables with data on activities in 2007-2013 and 2014-2020 were downloaded from the website "Portal Funduszy Europejskich" ("European Funds Portal") supported by the Polish Ministry of funds and regional policy. These datasets contained information on the name of the project, operational programme, sub-measure and category, and implementation area. File on the budget period 2014-2020 also comprised a short summary of the project in which data on the number of acquired fleet units or other objects was sometimes included. Data on projects implemented in 2004-2006 were not available as an integral set and were taken from the website "Mapa dotacji UE" ("Map of EU grants"). In most cases details concerning the content of the project and, in particular, procured rolling stock should be found in the documentation on the websites of local authorities or even in local media.

Besides, information on projects supported within the CEF Transport was drawn from the page of this financial instrument on the website of the European Commission.

Pursuant to Sejm Rzeczpospolitej Polskiej (2011), in Poland movements within cities and neighbouring communes are also considered as urban transportation. For this reason, projects aimed at the development of agglomeration transport were also taken into account within the current study. For the limitation of these agglomerations borders of so-called functional areas ("Obszary funkcjonalne" in Polish) around the voivodeship capitals were applied. According to Polish National Spatial Development Concept, functional areas are "spatially continuous settlement systems, composed of administratively separate units. They cover a city, an urbanised zone related to it and centres of close neighbourhoods" (MRR, 2011). Borders of functional areas around voivodeship capitals are defined and can be found, for example, in strategies of integrated territorial

investments. Only two deviations from officially set boundaries were done within the current investigation. Firstly, Świnoujście was excluded from Szczecin agglomeration because roads between these two cities run through territory outside of the functional area. Besides, for Katowice agglomeration borders of the legally established communal union "Metropolitan area of Upper Silesia and Zagłębie" were used.

Not all projects within sub-measures from Table 1 are examined. They were taken into account only if met at least one of five criteria based on the categorisation developed by Mucha et al. (2019):

1. Procurement of new fleet and rolling stock and renovation of available units;
2. Construction of new or upgrade of currently existing tram or commuter railway lines, bus lanes, trolleybus routes, stops and stations of all modes (excepting bus and railway terminals);
3. Installation of intermodal hubs: bus and railway terminals, interchange stations, P+R and B+R close to bus stops or commuter rail platforms.
4. Development of intelligent transport systems: installation of electronic ticket systems, ticket machines, traffic control systems, systems of passenger information.
5. Development of infrastructure for technical service of fleet and rolling stock (depots, parks, traction substations, stations for charging electric buses).

Railway projects were considered in case of meeting next criteria: 1) they are designed to the development of commuter or inner-city passenger traffic; 2) they are located in metropolitan areas voivodeship capitals, or at least no less than 50% of activities (by length of installed tracks or number of built platforms) were carried out within borders of these agglomerations. Projects located partially or fully in rural areas were taken into account only if these areas were located in urban agglomerations.

Research results

Thanks to EU co-financing 844 urban public transport projects with a total value of 19.97 billion euros were implemented in Poland in 2004-2020. ERDF, ESF, or CEF instrument provided 12.10 billion euros, while the rest 7.87 billion were paid from state and local budgets or by private investors. It could be assumed that Poland had received the largest EU financial support for urban public development among all new member states. At least from 2007 to 2020, Poland received 8.27 billion euros from ERDF and ESF for the development of urban public transport (excluding railway projects). It was almost a half of the total investments with this purpose from ERDF and ESF in new members of the EU excluding Cyprus and Malta, which amounted to 16.62 billion

euros (EC, 2022ab). By investments from these funds to the development of urban public transport in EU new member states in 2007-2020 per capita, Poland is outdone only by Hungary (217 and 231 euros per person respectively), according to data of EC (2022ab) and World Bank (2022).

In most cases projects in Poland encompassed several activities. The most popular one was the acquisition of fleet, which was included in almost half of the projects (Table 2). Despite that, installation of park+ride and bike+ride complexes and larger intermodal hubs became the most popular activity during the 2014-2020 budget period.

Table 2: Activities within EU-supported urban public transport projects in Poland in 2004-2020

Activity / Budget period	Number of projects				%			
	2004-2006	2007-2013	2014-2020	Total	2004-2006	2007-2013	2014-2020	Total
Purchase or renovation of fleet and rolling stock	27	161	230	418	57.4%	66.0%	41.6%	49.5%
Stops, platforms, lines	34	87	155	276	72.3%	35.7%	28.0%	32.7%
Intermodal hubs, P+R, B+R	6	30	352	388	12.8%	12.3%	63.7%	46.0%
Intelligent transport systems	11	74	171	256	23.4%	30.3%	30.9%	30.3%
Infrastructure for technical maintenance	9	34	95	138	19.1%	13.9%	17.2%	16.4%
Total	47	244	553	844	100%	100%	100%	100%

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019, own elaboration

Almost half of them (416) were concentrated in the four most populated voivodeships – Greater Poland, Mazovian, Silesian, and Lesser Poland (Fig. 1).

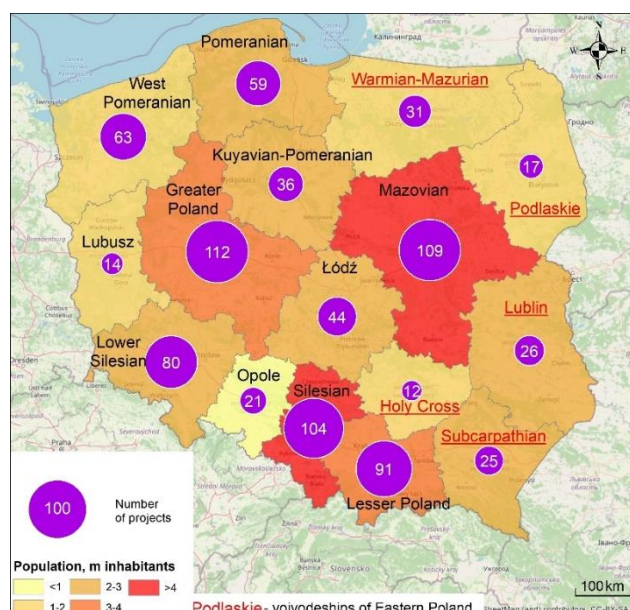


Fig. 1: Number of urban public transport projects in Poland in 2004-2020

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; GUS, 2021b, own elaboration

The biggest number of projects (112) is carried out in the Greater Poland voivodeship which is the biggest by square but not by the number of inhabitants while the most populated Mazovian voivodeship is in the second place (109). In smaller provinces,

fewer projects were realised. In Holy Cross, the lowest number of projects (12) was implemented although it is not the least populated province. In Opole, the only voivodeship with less than one million inhabitants, 21 projects are carried out.

In 2014-2020 considerable increase in urban transport projects compared to the previous budget period 2007-2013 took place in almost all regions (Fig. 2). It was the most substantial in Silesian (from 23 to 80) and in Greater Poland (from 26 to 82) voivodeships. In the entire country the number almost doubled from 244 to 553 – thus, 65% of EU-supported activities on the development of urban public transport in Poland accounted for the period 2014-2020.

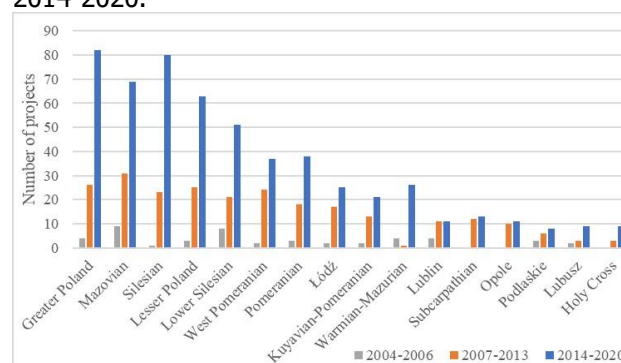


Fig. 2. Number of urban public transport projects in Poland in 2004-2020 by voivodeship and budget period

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; GUS, 2021b, own elaboration

However, in monetary terms, the ranking of provinces looks different. 6.55 billion euros or almost

one-third of expenditures was spent in Mazovian voivodeship, primarily in Warsaw. Łódź and Pomeranian voivodeships are in the second and third place with 1.91 and 1.90 billion euros respectively (Fig. 3). In Greater Poland that leads by the number of projects, their total cost was “only” 1.33 billion euros, fewer than in Lesser Poland and Silesia (1.63 and 1.56 billion euros respectively). In the least populated Opole voivodeship, the lowest amount (0.16 billion euros) was spent.

The reason for such distinction in expenditures on projects lies in the transport modes and scope of constructional works. In particular, in Warsaw, three projects aimed at the building of the second metro line were carried out. Their combined value reached 3.06 billion euros which is almost 47% of the total expenditures on the urban public transport development within EU programmes in Mazovian voivodeship. In terms of Pomeranian and Łódź voivodeships, it should be mentioned that in these regions as well as in Mazovia, Greater and Lesser Poland, and Silesia utmost costly projects on the renovation or the installation of new railway lines for the commuter transport were realised. In addition, upgrade and construction of new tram tracks, as well as procurements of new rolling stock, took place in all cities with tram networks. As these works are generally more expensive than the installation of new bus stops and acquisition of new buses, they also boosted the total expenditures on mass transit.

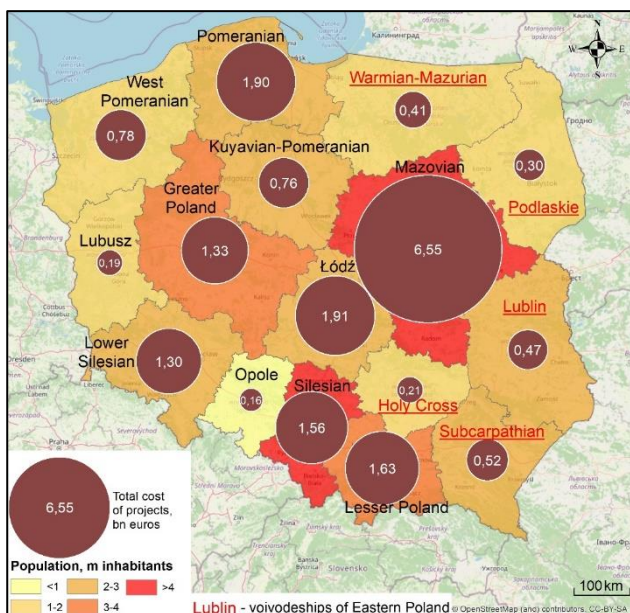


Fig. 3: Total cost of EU-supported urban public transport projects in Poland in 2004-2020

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; GUS, 2021b; ECB, 2022, own elaboration

Growth of total cost in entire Poland in 2014-2020 (10.32 billion euros) compared with 2007-2013 (8.71 billion) was not so significant compared with the number of projects and in several voivodeships was even negative (Fig. 4). This fact shows that increase in the number of projects took place mostly owing to the relatively cheap activities.

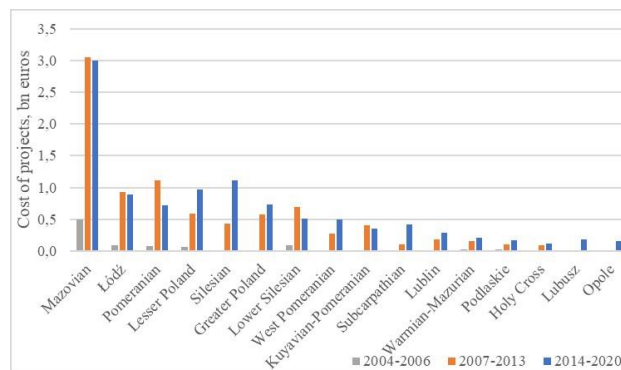


Fig. 4: Cost of urban public transport projects in Poland in 2004-2020 by budget period

Sources: EC 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; ECB, 2022, own elaboration

Regional operational programmes included 612 of 844 realised projects (Table 3). It can be explained by the massive increase of projects within ROPs. At the same time, the costliest projects were normally included in the national-level programme “Infrastructure and environment” (Table 4). Within its framework activities worth 15.89 billion euros were carried out which is almost 80% of total expenditures.

Coverage of Polish cities and towns by urban public transport development activities within EU funding rose steadily since 2004. In the budget period 2004-2006 even not all voivodeship capitals participated in programmes “Transport” and ZPORR with regard to mass transit (Fig. 5). From 2014-to 2020 aside from metropolitan areas of every province centre activities took place in 164 cities and towns. Cumulatively since 2004 EU-supported urban transport development projects had the most widespread distribution in Lower Silesian voivodeship where at least one of them was realised in 28 population centres outside of Wrocław agglomeration. The lowest value of this indicator can be observed in Lubusz voivodeship where only three towns apart from Gorzów Wielkopolski and Zielona Góra metropolitan areas were covered by these activities.

The number and total cost of projects within either programmes on the national level or ROP demonstrate a high correlation with the population of provinces (Fig. 6). On the regional level, it hardly might be different because the voivodeship population was one of the factors for the calculation of the total budget of ROP – although it did not affect the planned

distribution of funds by categories. Only the correlation coefficient of total expenditures on the national level and population is lower than 0.8. It can be explained by the fact that Pomeranian and Łódź voivodeships where a lot of commuter railway works took place are located only in the middle of the ranking of Polish provinces by population.

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Table 3: Number of EU-supported urban transport projects by programme and voivodeship

Voivodeship / Budget period / Level of programme	Number of projects														
	2004-2006			2007-2013				2014-2020					Total		Total
	Transport	ZPORR	Total	POIiŚ	DEP	ROP	Total	POIiŚ	CEF Transport	EP	ROP	Total	National	ROP	
Greater Poland	0	4	4	7	0	19	26	10	0	0	72	82	21	91	112
Mazovian	4	5	9	17	0	14	31	14	3	0	52	69	43	66	109
Silesian	0	1	1	6	0	17	23	12	0	0	68	80	19	85	104
Lesser Poland	0	3	3	10	0	15	25	7	1	0	55	63	21	70	91
Lower Silesian	0	8	8	7	0	14	21	6	0	0	45	51	21	59	80
West Pomeranian	0	2	2	5	0	19	24	7	0	0	30	37	14	49	63
Pomeranian	1	2	3	8	0	10	18	12	0	0	26	38	23	36	59
Łódź	0	2	2	5	0	12	17	2	0	0	23	25	9	35	44
Kuyavian-Pomeranian	0	2	2	8	0	5	13	4	0	0	17	21	14	22	36
Warmian-Mazurian	0	4	4	0	1	0	1	0	0	2	24	26	7	24	31
Lublin	0	4	4	0	2	9	11	0	0	4	7	11	10	16	26
Subcarpathian	0	0	0	1	1	10	12	3	0	3	7	13	8	17	25
Opole	0	0	0	0	0	10	10	4	0	0	7	11	4	17	21
Podlaskie	0	3	3	0	2	4	6	0	0	3	5	8	8	9	17
Lubusz	0	2	2	0	0	3	3	5	0	0	4	9	7	7	14
Holy Cross	0	0	0	0	1	2	3	0	0	2	7	9	3	9	12
Total	5	42	47	74	7	163	244	86	4	14	449	553	232	612	844

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; own elaboration

Table 4: Total cost of EU-supported urban transport projects in Poland in 2004-2020 by programme and voivodeship

Voivodeship / Budget period / Programme	Cost of projects, m euros														
	2004-2006			2007-2013				2014-2020					Total		Total
	Transport	ZPORR	Total	POIiŚ	DEP	ROP	Total	POIiŚ	CEF Transport	EP	ROP	Total	National	ROP	
Mazovian	390	108	498	2 821	0	226	3 047	2 603	128	0	268	3 000	6 051	495	6 546
Łódź	0	96	96	875	0	56	931	572	0	0	315	887	1 542	371	1 914
Pomeranian	4	71	75	908	0	199	1 107	455	0	0	265	720	1 438	464	1 902
Lesser Poland	0	70	70	519	0	70	589	415	243	0	311	970	1 248	381	1 629
Silesian	0	18	18	263	0	169	432	580	0	0	526	1 106	861	695	1 556
Greater Poland	0	17	17	432	0	149	581	441	0	0	290	731	891	439	1 329
Lower Silesian	0	94	94	640	0	48	688	301	0	0	215	516	1 036	262	1 298
West Pomeranian	0	8	8	215	0	57	272	381	0	0	116	497	604	173	777
Kuyavian-Pomeranian	0	3	3	339	0	62	401	202	0	0	157	359	545	219	764
Subcarpathian	0	0	0	4	83	16	103	202	0	133	82	417	422	98	520
Lublin	0	7	7	0	126	59	184	0	0	144	137	281	277	195	473
Warmian-Mazurian	0	32	32	0	162	0	162	0	0	148	65	213	342	65	407
Podlaskie	0	20	20	0	88	20	108	0	0	115	58	173	223	78	301
Holy Cross	0	0	0	0	85	4	89	0	0	80	40	120	165	43	208
Lubusz	0	5	5	0	0	8	8	160	0	0	18	178	165	26	191
Opole	0	0	0	0	0	10	10	78	0	0	72	150	78	82	160
Total	395	548	943	7 017	543	1 153	8 713	6 391	372	620	2 935	10 318	15 887	4 087	19 975

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019; ECB, 2022, own elaboration

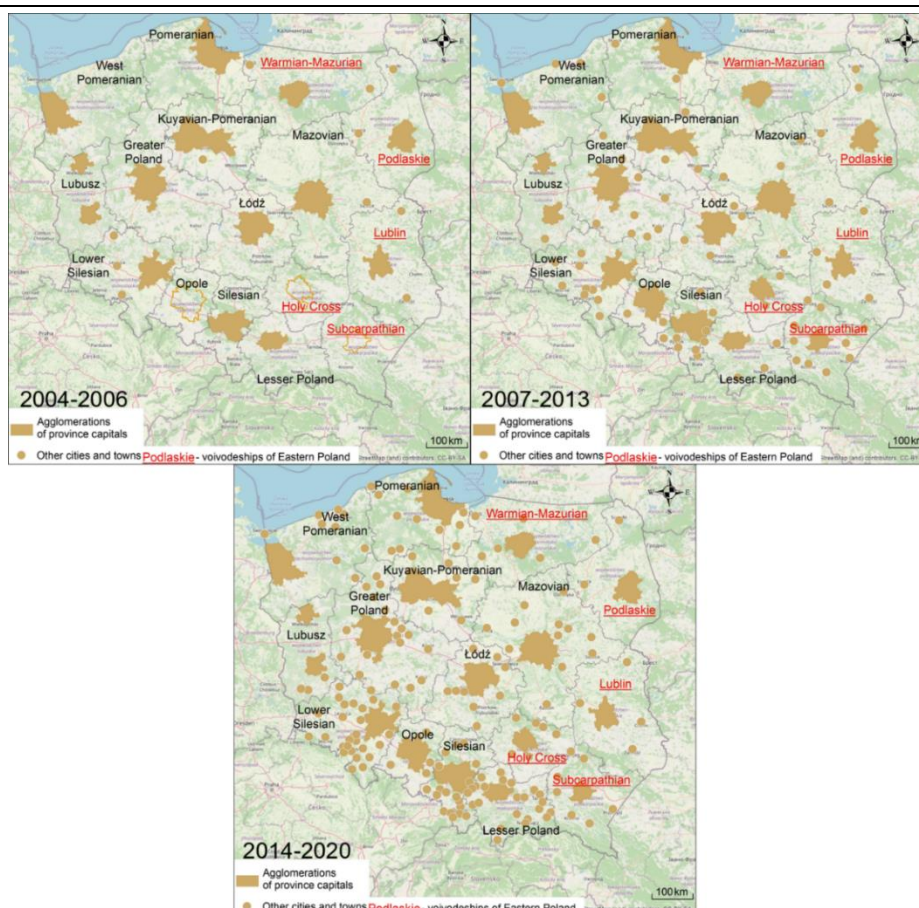


Fig. 5: Coverage of province capitals and other cities and towns of Poland by EU-supported urban public transport projects in 2004-2020

Sources: EC, 2015a; MFIPR, 2020, 2021; Mapa Dotacji UE, 2019; own elaboration

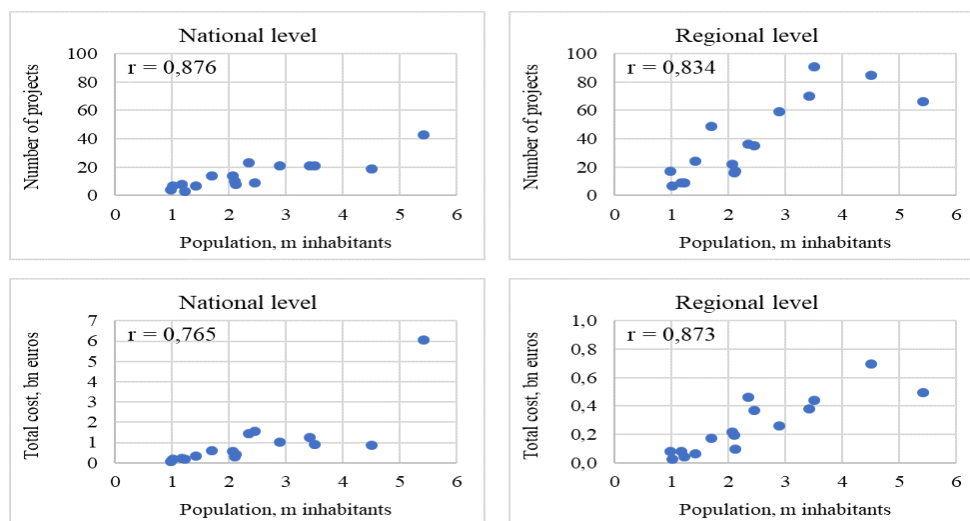


Fig. 6: Correlation of number and cost of EU-supported urban public transport projects with population of voivodeships

Sources: EC, 2015a; MFIPR, 2020, 2021; Mapa Dotacji UE, 2019; GUS, 2021b; ECB, 2022, own elaboration

Despite the growth of the number of cities and towns which were covered by urban public transport projects, the majority of these projects – 502 of 844

- are nevertheless concentrated in provincial capitals and their agglomerations (Table 5). In certain voivodeships such as Lower Silesian, Warmian-Mazurian,

Subcarpathian, Opole, and Holy Cross centres and their agglomerations gained less mass transit activities than towns outside of them combined. This fact should not be misleading: the total cost of projects in capitals and their environs was much higher than in other towns cumulatively in all provinces without exception (Table 6). For example, in Lower Silesia (31 projects in Wrocław agglomeration, 49 outside) project "Integrated tram system in Wrocław and agglomeration - Stage I" was carried out in 2007-2013 and included procurement of 39 low-floor trams and reconstruction of 37 km of rails was worth more than

rest of 49 activities in other parts of the voivodeship. In Warmia-Mazuria number of projects in the Olsztyn metropolitan area was almost two times less than externally, but these activities included the building of the Olsztyn tram system from scratch and are incomparable in monetary terms with the purchase of several buses for the small town. Only in Silesian voivodeship total expenditures on projects outside of major agglomeration exceeded one billion zlotys, and almost half of this amount was spent on the reconstruction of the tram system in Częstochowa.

Table 5: Number of EU-supported urban public transport projects in Poland in 2004-2020 by location within voivodeships

Voivodeship / Budget period	Number of projects								Total
	2004-2006		2007-2013		2014-2020		Total		
	Centre and aggl.	Other cities	Centre and aggl.	Other cities	Centre and aggl.	Other cities	Centre and aggl.	Other cities	
Greater Poland	4	0	13	13	51	31	68	44	112
Mazovian	8	1	21	10	55	14	84	25	109
Silesian	1	0	12	11	53	27	66	38	104
Lesser Poland	3	0	18	7	30	33	51	40	91
Lower Silesian	5	3	8	13	18	33	31	49	80
West Pomeranian	2	0	17	7	19	18	38	25	63
Pomeranian	3	0	15	3	27	11	45	14	59
Łódź	2	0	12	5	14	11	28	16	44
Kuyavian-Pomeranian	1	1	10	3	13	8	24	12	36
Warmian-Mazurian	1	3	1	0	9	17	11	20	31
Lublin	1	3	7	4	7	4	15	11	26
Subcarpathian	0	0	2	10	7	6	9	16	25
Opole	0	0	4	6	5	6	9	12	21
Podlaskie	1	2	3	3	5	3	9	8	17
Lubusz	2	0	2	1	7	2	11	3	14
Holy Cross	0	0	1	2	2	7	3	9	12
Total	34	13	146	98	322	231	502	342	844

Sources: EC, 2015a, MFiPR, 2020, 2021, Mapa Dotacji UE, 2019, own elaboration

Table 6: Cost of EU-supported urban public transport projects in Poland in 2004-2020 by location within voivodeships

Voivodeship / Budget period	Cost of projects, m euros								Total
	2004-2006		2007-2013		2014-2020		Total		
	Centre and aggl.	Other cities	Centre and aggl.	Other cities	Centre and aggl.	Other cities	Centre and aggl.	Other cities	
Mazovian	497	1	3 019	28	2 874	126	6 390	156	6 546
Łódź	96	0	925	5	846	40	1 868	46	1 914
Pomeranian	75	0	1 094	13	631	88	1 801	101	1 902
Lesser Poland	70	0	570	19	868	101	1 508	121	1 629
Silesian	18	0	369	63	917	189	1 303	253	1 556
Greater Poland	17	0	556	25	617	114	1 190	139	1 329
Lower Silesian	89	5	651	36	437	80	1 177	122	1 298
West Pomeranian	8	0	259	13	460	37	728	50	777
Kuyavian-Pomeranian	2	1	378	23	295	64	676	88	764
Subcarpathian	0	0	87	16	369	48	456	64	520
Lublin	2	5	169	15	261	20	432	41	473
Warmian-Mazurian	5	26	162	0	176	38	343	64	407
Podlaskie	16	4	94	14	154	19	264	37	301
Holy Cross	0	0	85	4	80	40	165	43	208
Lubusz	5	0	8	0,4	163	14	176	15	191
Opole	0	0	4	6	103	48	107	54	160
Total	900	43	8 431	282	9 251	1 067	18 583	1 392	19 975

Sources: EC, 2015a; MFiPR, 2020, 2021; Mapa Dotacji UE, 2019, ECB, 2022, own elaboration

It became possible to make an attempt at the evaluation of costs of development of each transport mode in 2004-2020 within EU co-funding. This calculation cannot be precise because certain projects in metropolitan areas included activities on several transport modes. For example, expenditures on the development of three Polish trolleybus systems in Lublin, Gdynia, and Tychy cannot be counted because activities there were usually combined with the development of bus systems. Besides, the installation of intelligent transport systems, as well as the construction of intermodal hubs, also covered several means of transport in major cities. All such projects are combined into the category "without main mode" which can be regarded as a likeness of "measurement bias" in the current context. Nevertheless, this calculation

provides an insight into the distribution of projects and their expenditures by specific modes. As appears in Figure 7, 12.16 billion euros, or almost 61% of all expenditures were spent on the development of trams and passenger railways, while bus transport was led by a number of projects. 13 tram systems in voivodeship centres (12 existed since XIX-XX centuries and one newly installed in Olsztyn) "accumulated" 5.76 billion euros, while less than 0.2 billion was invested into three systems in Częstochowa, Elbląg, and Grudziądz which are not provincial capitals. A similar situation is observed with buses, however, the disparity there is not so huge. 138 projects in provincial capitals accumulated more than 2.5 times more money than 333 projects in other towns.

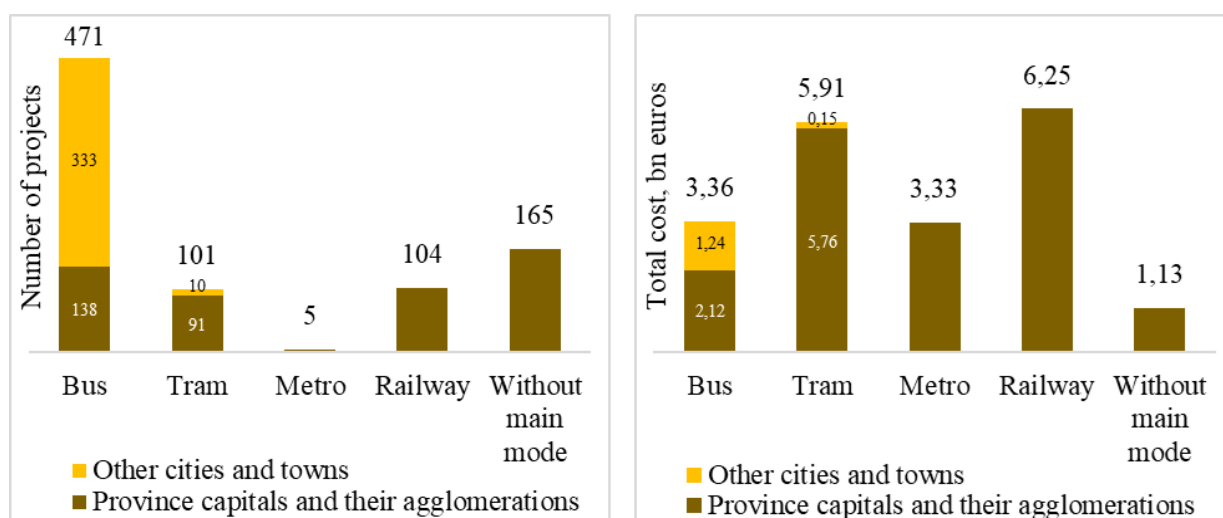


Fig. 7: Number and cost of EU-supported urban public transport projects in Poland in 2004-2020 by main transport mode

Sources: EC, 2015a; MFIPR, 2020, 2021; Mapa Dotacji UE, 2019; GUS, 2021b; ECB, 2022, own elaboration

It should be stated that conclusions about the influence of the implemented transport projects on the modal split in Polish cities could hardly be done. Modal split is the most important indicator that shows shares. The reason is that comprehensive traffic studies (KBR – "kompleksowe badania ruchu"), as well as auxiliary studies in Polish cities, are carried out irregularly and without a common methodology (Goras, 2019). The recent data on modal split in voivodeship capitals, if they are available, are provided in Table 7. If possible, the last complete data on modal split before Poland's joining the EU were presented too. In the case of Łódź, the total amount of shares exceeds 100 – for 1995 it could be a result of a misprint in the data source, while in 2014 respondents were allowed to name several transport modes.

Unambiguous conclusions about either the significant growth of the role of urban public transport in

Polish cities or its total inability to take over passengers from private vehicles cannot be made. The reason is also in the lack of data on modal split in the late 2010s when almost all projects of the budget period 2007-2013 had been finished yet, new projects began and the effects of the accelerated urban public transport development became evident for the observers. It could be only concluded that the potential of such an indicator as a modal split which should be used for regular monitoring of changes during the realisation of urban public transport development projects had not been sufficiently harnessed.

The most of time when programmes had been implemented the goals of sustainable development were in one or another way declared in strategic documents and legal acts. In the Act of 16 December 2010 on public transport sustainable public transport development was defined as "the process of transport de-

velopment taking into account social expectations regarding the provision of universal access to public transport services, aimed at the use of various means of transport, as well as promoting environmentally friendly means of transport equipped with modern technical solutions" (Sejm Rzeczypospolitej Polskiej, 2011). Communes with population more than 50 thousand people were obliged to work out plans of sustainable urban public transport development ("transport plans"). In the programming document

"Krajowa Polityka Miejska 2023" (Engl. "National urban policy") sustainable urban mobility was named as one of the priorities in the thematic axe "transport policy in cities". Besides, the development of low-emission transport was among the priorities in the axe "Low emission and energy efficiency" (MRR, 2015b). According to the Strategy for Responsible Development for the period up to 2020 that was adopted in 2017, "solutions supporting a larger share of ecological transport in cities, and, in particular, in public transport" (MR, 2017) should be created.

Table 7: Modal split in major Polish cities

City	Year	Transport mode				
		Pedestrian	Public transport	Private vehicle	Bicycle	Other
Warsaw	1998	20.5	52.5	25.8	0.4	0.8
	2005	21.6	54.6	22.6	0.9	0.3
	2015	17.9	46.8	31.7	3.1	0.5
Cracow	1994	29.2	48.6	19.2	1.6	1.4
	2003	25.9	42.6	27.1	1.5	2.9
	2013	28.4	36.3	33.7	1.2	0.4
Łódź	1995	24.0	55.0	23.0	no data	no data
	2014	39.0	40.0	30.0	3.0	0.3
Wrocław	2006	no data	56.2	43.8	no data	no data
	2010	18.7	35.3	41.6	3.5	0.9
	2017	21.0	31.0	41.0	6.0	1.0
Poznań	2000	10.0	36.1	52.0	1.9	no data
	2013	13.0	43.0	40.0	4.0	no data
Rzeszów	2000	23.6	40.2	36.2	no data	no data
	2009	22.5	31.8	43.7	1.9	0.1
Gdańsk	1994	27.9	39.2	27.5	no data	5.4
	2016	20.8	32.1	41.2	5.9	no data
Katowice	1998	37.5	33.0	29.0	0.2	0.3
	2015	30.8	24.5	43.3	1.4	2.1
Zielona Góra	2005	19.8	47.1	33.1	no data	no data
Szczecin	2010	19.0	35.0	43.0	1.0	2.0
Białystok	2000	23.6	40.2	36.2	no data	no data
	2007	20.0	35.0	45.0	no data	no data
Olsztyn	2000	45.0	23.0	32.0	no data	no data
	2009	21.5	37.4	41.1	no data	no data

Sources: Goras, 2019; SITK, 2016; UMP, 2013; ZDiT, 2018

In 2014-2020, in comparison with the previous budget period, a bigger emphasis on sustainable urban mobility was put. As evidence of that, more than two-time growth in the number of projects in the category of activities "Infrastructure for technical maintenance" which was provided with the installation of charging stations for e-buses, as well as growth in the category of activities "Intermodal hubs, P+R, B+R" (Table 2), which should, directly and indirectly, ensure the increase of use of transport modes with less emission per passenger, could be stated.

Conclusion

At the level of the whole country, it is possible to talk about the pattern of the compliance of expenditures per voivodeship and the population size of these provinces. Nevertheless, certain distortions such as incomparability of total cost of urban public transport projects in any voivodeship with Warsaw can be captured. Furthermore, territorial disproportions in the access to funding within different programmes were not eliminated. For

example, the growth of competitiveness was among the goals of programmes "Development of Eastern Poland" and "Eastern Poland", but concerning the urban public transport, it seemed that in reality rather "non-increase" of the gap between urban public transport in Eastern Poland and other voivodeships occurred. The only significant project of installation of the new transport system was carried out in Olsztyn which received a completely new tram network. Capitals of Eastern Polish voivodeships had access to the funds from programme "Infrastructure and environment" only concerning the commuter railway transportation. In the case of other urban public modes, programmes "Development of Eastern Poland" and "Eastern Poland" became replacements but not an addition to the "Infrastructure and environment".

A much stronger disparity can be observed between major agglomerations and smaller cities and towns. This disparity was initially embedded as unequal access for these two groups of settlements to funds within different operational programmes and their sub-measures corresponding to urban public transport. This resulted in the concentration of the most expensive and complicated projects in major metropolitan areas of Poland.

Concerning this concentration, one could speak about the "two-side causal link". On the one hand, voivodeship capitals are centres of population and human capital and growth points of the Polish economy. Consequently, higher requirements for the quality of urban public transport there in comparison with towns are applied. On the other hand, geographically large areas of voivodeship capitals and their environs predispose to the larger sizes of urban public transport networks and to the usage of such transport modes as tram or commuter railway which are costly in terms of the line (re)construction and their maintenance. Simply as a result of the larger number of deteriorated parts of these networks after the period of underinvestment in transport in the 1990s, these networks required much funding for renovation and further development.

Nevertheless, beyond the borders of agglomerations of voivodeship capitals urban public transport development mostly came down to the upgrade of the bus fleet and renovation of stops. Relatively expensive activities such as the installation of new transport modes passed these areas almost by. Currently existed tram networks in two cities outside of provincial central metropolitan areas (Grudziądz and Elbląg) stay underinvested because needs for the renovation of tracks and rolling stock could not be covered within ROPs of respective voivodeships while the nationwide programme "Infrastructure and environment" remained unavailable for them. It is undeniably the main paradox of the urban public transport development in

Poland in 2004-2020 within EU funding: the biggest cities such as Warsaw, Cracow, Wrocław, Gdańsk, and their environs could theoretically rely more on the internal financial resources in the advancement of mass transit. Small towns face permanent financial difficulties and only thanks to the EU support undertook transport renovation at least to some extent. Despite that, the biggest part of EU funding for urban public transport was deployed to the major centres instead of places where it was more indispensable.

However, the fact that during the programme period 2014-2020 cities and towns outside of metropolitan areas managed to approve and at least start to implement much more projects with higher total cost than in 2004-2013 cannot be questioned. This corresponds to the conclusion of Gorzelak & Smętkowski (2018) that after 2012 level of territorial disproportions in Poland at least did not grow. With regard to Poland the polar-diffusion regional development is frequently mentioned (Gorzelak & Smętkowski, 2018, Śleszyński, 2018, Herbst & Wójcik, 2013). According to MRR (2009), this way of development should combine the support of growth poles - major agglomerations in the case of Poland - with the creation of conditions for diffusion, i.e. alignment of socio-economic circumstances across the country. Despite the, in a sense, the declarative character of this definition, it can be assumed that "reinforcement" of ROPs in 2014-2020 concerning urban public transport development together with a still high concentration of projects in voivodeship capitals is consistent with this model of regional development to a certain extent.

The case of Poland shows that relatively rapid modernisation of urban public transport systems in a country with a population level higher than 30 million inhabitants can occur and cover not only bigger cities, but also small towns. The willingness of EU funds to support this development could be a "sign of hope" for the countries which aspire to become members of the EU. The existence of long-term climate target plans in the EU demonstrates that at least in the aspect of emission of carbon reduction urban public transport development will be more or less taken into account.

Based on the research results, the next recommendations could be given:

- 1) In the case of investments in the urban public transport development financial opportunities of cities and towns should be taken into account with more thorough differentiation. The additional assessment of the ability of the largest cities to resort to the EU funding to a lesser extent and rely on the local financial resources would be beneficial. Theoretically, it could release more financial resources for the less developed areas;

2) Greater emphasis should be put on the export of transport management practices. It could be particularly important in smaller towns and less developed areas, while the largest cities inherently faster attract the human capital and, as a result, can theoretically quicker "absorb" new practices without any external stimulation. However, the need for high-quality management of urban public transport does not depend on city size and its financial opportunities;

3) A system of methodologically unified, regular, and timely assessment of indicators that should reflect the effectiveness of urban public transport development, also in terms of sustainable mobility, should be created. Due to the high overall cost, it is impossible and unnecessary to carry out such investigations in each city and town, so panel monitoring in chosen areas that reflect certain groups of populated places could be beneficial.

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