Changes in accessibility and mobility – impact on regional and local labour markets and public services

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Aims of the presentation

• To examine the impact of accessibility and mobility changes on the local labour markets and the services of general interests distribution
• To discuss the results from the BSR urbanization trends point of view

Agenda

• Accessibility as a measure of territorial cohesion
• European examples
• Polish examples
  • Accessibility
  • Mobility
• Local examples
  • Labour market impact
  • Sedge impact
• Conclusions for BSR
Projects used in the presentation

- **Accessibility of the Baltic Sea Region, Dynamics during 2006-2011-2016**, Spiekermann & Wegener for VASAB
- **TRansport ACCessibility at regional/local scale and patterns in Europe** (TRACC), Projekt Programu Uinii Europejskiej ESPON II; partner wiodący: Spiekermann & Wegener Urban and Regional Research (S&W),
- The project financed by the Polish National Science Centre “*Concept of the territorial cohesion in cohesion policy. Implications for Economic Growth*”(no. 2012/05/B/HS4/04212); leader Jacek Zaucha
- GRINCOH EU FP7 Project (Leader: Euroreg Warsaw University)
- Studies on the changes in road and railway accessibility in Poland after the accession to the EU structures, in the years 2004-2023 (for Polish Ministry of Investment and Development)
- Projects concerning delimitation of the Areas of Strategic Intervention for the Strategy of the Responsible Development (2016-2018)
- Polish Ministry of Science and Higher Education “*Multi-criteria evaluation of the impact of selected road corridors on the environment and socio-economic development of adjacent areas*”.
- Complex modelling of road traffic in Poland with the identification of local socio-economic determinants*. The project was financed by funds of the National Science Centre on the basis of the number: decision DEC-2012/05 / B / HS4 / 04147.
ACCESSIBILITY AS A MEASURE OF TERRITORIAL COHESION
Polish EU Presidency (2011) „Territorial keys“:

**TA 2020 versus EU 2020**

<table>
<thead>
<tr>
<th>Territorial keys</th>
<th>Linking issues</th>
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| **Accessibility** | • Global accessibility  
• European and trans-border accessibility  
• National accessibility and daily accessibility between metropolises  
• Accessibility of the main, and secondary, centres (regional accessibility including services of general economic interest)  
• Modal split, public transport, intermodal transport change  
• E-connectivity  
• Access to energy networks |
| **Service of general economic interest** | • Services of general economic interest (sparsely populated areas)  
• Access to services of general economic interest  
• Investing in education |
| **Territorial capacities/endowments/assets** | • Territory-bound factors (local *milieu* etc.)  
• Local innovation systems & networks  
• Wise management of cultural and natural assets  
• Renewable and local energy production  
• Territorially-related characteristics for energy production  
• Revitalisation of cities |
| **City networking** | • Interactions between metropolises at the EU scale  
• Interactions between the main national growth poles,  
• Territory-bound factors (local *milieu* etc.)  
• Accessibility of metropolises and between metropolises |
| **Functional regions** | • Enlargement of local labour markets,  
• Critical mass of means through territorial cooperation,  
• Accessibility of secondary growth poles and regional centres  
• Public transport connections to regional centres.  
• Compact cities (sustainable cities) |

**Correspondence between priorities of “Europe 2020” and TA 2020**

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*European priorities/headline targets*

- **Smart growth:** 3% GDP in R&D
- **Sustainable growth:** 20/20/20 climate/energy targets
- **Inclusive growth:** 75% of pop. aged 20-64 employed  
  Share of early school leavers < 10%; more than 40% of younger generation with a tertiary degree  
  20m: less people at risk of poverty

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**TA 2020 priorities**

1. Polycentric and balanced territorial development  
2. Integrated development in cities, rural and specific regions  
3. Territorial integration in cross-border, transnational functional regions  
4. Global competitiveness of the regions based on strong local economies  
5. Improving territorial connectivity for individuals, communities and enterprises  
6. Managing and connecting ecological, landscape and cultural values of regions

<table>
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Why accessibility?

• It is difficult to find the statistical correlation between infrastructure construction and economic development (including trade development); Rodriguez-Pose 2012

• It is possible to measure the „chances” for development using accessibility indicators

• On the local level accessibility is also the live quality measure

• Accessibility indicators proposed:
  • accessibility understood as the transport infrastructure (expressed, for instance, in road and railway network density);  
  • time (isochronal) accessibility, frequently equated to cumulative accessibility;  
  • potential accessibility, which includes all relations within a given set of regions (matrix approach), as well as their mass and time distance;  
  • person-based accessibility, including daily accessibility in the particular mode of transport.

• Potential accessibility has an important components from the TC point of view: population or GDP migration, infrastructure development, possibility to compare different geographical level of marginalization.
Potential accessibility indicator

\[ A_i = \sum_j g(M_j) f(c_{ij}) \]

where \( A_i \) is the accessibility of unit \( i \), \( g(M_j) \) is the function determining the attractiveness of ‘mass’ measured e.g. in terms of the population of unit \( j \), and \( f(c_{ij}) \) is a distance decay function representing the generalised cost (distance, time, cost or effort) needed to reach this ‘mass’.

\[ A_i = M_i f(t_{ii}) + \sum_j M_j f(t_{ij}) + \sum_k M_k f(t_{ik}) \]

International potential – including the travel time, including border waiting time, between municipality \( i \) and one of the transport units encompassing the territory of the whole European continent outside of Poland

Intranational potential – including the travel time between two Polish municipalities \( i \) and \( j \)

Selfpotential of municipality \( i \)

The more locally we look, the shorter the trip length and sharper is the distance decay (with higher \( \beta \) values). This procedure results in the use of:

- \( \beta = 0.02 \) for short trips (intranational level)
- \( \beta = 0.005 \) for long trips (international level).
Potential Accessibility Dispersion index

- Consequences of changes in accessibility for territorial cohesion - Potential Accessibility Dispersion (PAD) index.

- PAD takes into account the standard deviation of potential accessibility values across municipalities using population as the weighting variable (López et al., 2008; Ortega et al., 2012; Stępniak and Rosik, 2013; Rosik et al., 2015).

\[
PAD = \frac{SD_{A_i}}{\sum A_i \cdot P_i} / \sum P_i
\]

- $A_i$ is the value of the potential accessibility indicator calculated for unit $i$, $P_i$ is the population of unit $i$, $SD_{A_i}$ is the standard deviation of $A_i$ values weighted by population.

The higher the PAD values, the greater the diversity of accessibility within the country.
EUROPEAN EXAMPLES
BSR road and rail accessibility changes – demographic component

Figure 2.8 Accessibility potential, road, relative change 2006-2016.

Figure 2.13 Accessibility potential, rail, relative change 2006-2016.
Changes in travel time for 100 km roads and rail.
Changes in travel time – main nodes

roads

rail
Example of the North-South project: Via Carpatia corridor ex ante evaluation (potential accessibility changes simulation)
POLISH EXAMPLES – ACCESIBILITY
Accessibility 2015

• Peripheries:
  • European
  • National
  • Regional
Relative road accessibility changes at the municipal level

2007-2015

2013-2023
Relative rail accessibility changes at the municipal level

2007-2015

2013-2023
The role of demography - road accessibility monitoring
2000-2005

Procentowa zmiana dostępności potencjałowej
(2000 = 100%)

150 - 160
140 - 150
130 - 140
120 - 130
115 - 120
110 - 115
105 - 110
100 - 105
98 - 100

źródło: Monitoring spójności terytorialnej...., 2012, autorzy: Rosik P., Komornicki T., Stępniak M., Pomianowski W.
Accessibility polarisation

Results – road accessibility and cohesion until 2023

After the accession to the EU the regional disparities in accessibility have increased.

Trend break and the situation started to slightly improve after 2012.

Freight accessibility is getting more polarized pattern due to:

- GDP concentration,
- Lower HGV speeds (relative to individual) on motorways (smaller impact on periphery)
Accessibility in public transport

bus

rail

Źródło: projekt NCN Multimodac; kierownik dr hab. Piotr Rosik
Accessibility: individual versus public transport

Źródło: projekt NCN Multimodal; kierownik dr hab. Piotr Rosik
POLISH EXAMPLES - MOBILITY
Migration: Warszawa, Kraków
Migration: Lublin, Białystok
Commuting: Warszawa, Kraków
Commuting: Wrocław, Lublin
Commuting traffic model (COM) $R^2 = 0.65$
Migration model (visiting relatives or friends)

$R^2 = 0.66$
LOCAL EXAMPLES – LABOUR MARKET
Accessibility to jobs

Figure 3.3 Accessibility to jobs at municipal level in Finland, Estonia, Latvia, Lithuania and Iceland, road (Source: Spiekermann et al., 2015).

Figure 3.4 Accessibility to jobs in Poland, road (Source: Stepniak et al., 2013).

Figure 3.5 Accessibility to jobs in Poland, public transport (Source: Stepniak et al., 2013).
### Labour markets – isochrones 60 minutes

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<td>Białystok</td>
<td>692</td>
<td>691</td>
<td>753</td>
<td>-1</td>
<td>62</td>
<td>61</td>
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<tr>
<td>Bydgoszcz</td>
<td>1 285</td>
<td>1 285</td>
<td>1 568</td>
<td>0</td>
<td>283</td>
<td>283</td>
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<tr>
<td>Gdańsk</td>
<td>1 732</td>
<td>1 746</td>
<td>1 910</td>
<td>14</td>
<td>164</td>
<td>178</td>
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<tr>
<td>Gorzów Wielkopolski</td>
<td>704</td>
<td>807</td>
<td>869</td>
<td>103</td>
<td>62</td>
<td>165</td>
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<tr>
<td>Katowice</td>
<td>5 526</td>
<td>5 581</td>
<td>5 806</td>
<td>55</td>
<td>225</td>
<td>280</td>
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<tr>
<td>Kielce</td>
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<td>947</td>
<td>1 193</td>
<td>-5</td>
<td>246</td>
<td>241</td>
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<td>Kraków</td>
<td>3 822</td>
<td>3 833</td>
<td>3 962</td>
<td>11</td>
<td>129</td>
<td>140</td>
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<td>Lublin</td>
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<td>1 245</td>
<td>1 316</td>
<td>15</td>
<td>71</td>
<td>86</td>
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<td>Łódź</td>
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<td>2 084</td>
<td>2 045</td>
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<td>-39</td>
<td>-5</td>
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<tr>
<td>Olsztyn</td>
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<td>675</td>
<td>749</td>
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<td>75</td>
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<td>Opole</td>
<td>1 487</td>
<td>1 475</td>
<td>1 496</td>
<td>-12</td>
<td>21</td>
<td>9</td>
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<tr>
<td>Poznań</td>
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<td>1 799</td>
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<td>Rzeszów</td>
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<td>1 504</td>
<td>1 635</td>
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<td>312</td>
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<td>Szczecin</td>
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<td>821</td>
<td>862</td>
<td>0</td>
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<tr>
<td>Toruń</td>
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<td>1 742</td>
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<tr>
<td>Warszawa</td>
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<td>3 930</td>
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<td>356</td>
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<tr>
<td>Wrocław</td>
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<td>2 070</td>
<td>24</td>
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<td>184</td>
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<tr>
<td>Zielona Góra</td>
<td>834</td>
<td>836</td>
<td>972</td>
<td>2</td>
<td>136</td>
<td>138</td>
</tr>
</tbody>
</table>

Population inside 60 minutes isochrone to the regional centres - 69% in 2013 and 74,6% in 2023
LOCAL EXAMPLE – SEGI
Accessibility to SEGI hospitals

swimming pools (all seasons)
Poland (ESPON TRACC) – Accessibility to SeGI: secondary schools and medical doctors

Poland Case Study
Higher secondary schools within 30 minutes travel time by car

Potential accessibility to medical doctors by car ($b = 0.04621$)

- 3.9 - 25.0
- 25.1 - 50.0
- 50.1 - 75.0
- 75.1 - 100.0
- 100.1 - 125.0
- 125.1 - 150.0
- 150.1 - 175.0
- 175.1 - 200.0
- 200.1 - 454.2

100 (population weighted average) = 1 109

Minimum: 43
Maximum: 5 036
Travel motivation - A1/DK91

- **gm. Pelplin**
  - **DK91-81.8%**
  - **A1-18.2%**

- **gm. Smętowo Graniczne**
  - **A1-41.4%**

- **gm. Warlubie**
  - **DK91-58.6%**
  - **A1-0%**
  - **DK91-100%**

Commuting
Travel motivation - A1/DK91

Shopping – największa liczba odpowiedzi na daną częstotliwość przejazdów: A1 - raz w miesiącu lub rzadziej, DK91 - kilka razy w miesiącu
Local dimension – SeGI travel time changes

1 – commuting, 2 – school/university, 3 – children school / kinder garden transport, 4 – shopping, 5 – culture, recreation, 6 – family meetings, 7 – institutions, 8 – others

Green – shorter travel time
Yellow – no changes
Red – longer travel time
Tunnel effect

• Scale of tunnel effects
  • regional
  • local
  • Properties access

• Survey: evaluation of the possibility to move across motorway (in the rural communities)

• The lowest score – local entrepreneurs
Travel behaviour - Travel frequency changes (survey in the communes neighboring the new motorways)

1. Shopping malls
2. Summer holiday
3. Weekend holiday
4. Cinemas
5. Banks
6. Pharmacies
7. Doctors
8. County administration
9. Posts
10. Regional administration
11. Small services
12. Rail stations

(evaluation: -3 to +3)

Taking into account the quality of life of the inhabitants, motorways and expressways seem to improve the access to services located at bigger distances from the peripheral areas (at the subregional and regional levels), not exerting positive influence on servicing of population at the local scale.
CONCLUSIONS FOR BSR
Impact on the BSR urbanization

• Fast development of the transport network has increased the disparities in spatial accessibility and in economic competitiveness between various areas (mainly on the southern Baltic rim)

• Accessibility growth is supporting policentricity on the BSR level, but probably not on the national or regional levels.

• Medium size cities could be both winners or losers of the accessibility and mobility changes

• Better accessibility could balance demographic losses (in terms of the labour force availability)

• Labour markets are growing territorially. Long commuting is a challenge for transport development

• Smaller cities are at risk of transport exclusion (even if the infrastructure is developed)

• Taking into account the quality of life of the inhabitants, new investment seem to improve the access to services located at bigger distances from the peripheral areas (at the subregional and regional levels), not exerting positive influence on servicing of population at the local scale.
Recommendations

• If we stop the transport modernisation program (TEN-T after 2023?), the disparities in spatial accessibility would be higher than 20 years ago.

• At the regional level the fundamental problem is constituted by proper integration of the large projects with the second order road system.

• When planning the European networks (TEN-T) we should take into account the possible positive regional effects.

• Public transport should be treated multimodally. EU should support also bus transport development.

• Public services (SeGI) development are fundamental to keep the network of small cities.

• Integration of transport policy with other territorial policies (health care, demographic, education,....)
Thank you for your attention,

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