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## COMPARATIVE ANALYSIS OF THE RESULTS OF GENERAL TRAFFIC MEASUREMENTS FOR THE SILESIAN VOIVODESHIP AND POLAND

**Summary.** General traffic measurements are carried out to determine basic traffic characteristics on voivodeship roads and national roads. The basic measure obtained during these measurements is annual average daily traffic. This is the number of vehicles that have passed over a specified point of a road section within a 24-h period on average within one year. For voivodeship roads, average daily traffic, average daily evening traffic and average daily night traffic are also determined. In the case of national roads, average daily summer traffic and average daily winter traffic are determined. The article presents a comparison of the characteristics for national roads in the Silesian Voivodeship and for national roads in Poland in the period 2000-2015.

**Keywords:** general traffic measurements; annual average daily traffic; road traffic engineering.

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## 1. INTRODUCTION

General traffic measurements (GTM) are carried out to determine basic traffic characteristics on voivodeship roads and national roads. It should not be forgotten that traffic has a direct impact on the number of accidents and injured people, including pedestrians [1,2,9]. By determining basic characteristics, it is possible to assess the transport needs of residents of smaller or larger cities, as well as to determine their mobility rate in the road network [10]. GTM are carried out every five years, with the General Directorate of National Roads and Motorways responsible for them. The first measurements were made in 1926 on the then state road network. Subsequent measurements were made in 1954 and had a rather limited scope. In 1965, the GTM system was unified and the measurement cycle lasted 14 days. Research was then carried out every five years until 1985. In 1985, changes were made to shorten the measurement cycle from 14 to nine days and the survey itself concerned only national roads. The system operating today was introduced in 2000 and dictated by administrative changes in Poland. The basic measure obtained during the performance of GTM is annual average daily traffic (AADT). This refers to the number of vehicles that have passed over a chosen point of a given segment within 24 hours on average over the course of the year. The GTM also determine average daily traffic, average evening traffic and average night traffic for voivodeship roads. In the case of national roads, average daily summer traffic and average daily winter traffic are also determined. Another important measure determined during the GTM is the load of the road during average daily traffic, which refers to the number of vehicles passing over 1 km of a chosen road in a given unit of time [3,8]. All tests carried out by the General Directorate of National Roads and Motorways in the period 2000-2015 contain data divided into individual groups of motor vehicle types. The article presents a comparative analysis of the results of GTM in the period 2000-2015, as carried out in the Silesian Voivodeship, and the results of the GTM for Poland [4-7].

## 2. COMPARATIVE ANALYSIS OF GENERAL TRAFFIC MEASUREMENTS

### 2.1. Annual average daily traffic

For national roads in Poland and in the Silesian Voivodeship, the course of changes in AADT for the period 2000-2015 is presented. Figure 1 shows a graph for the given course.

On the basis of the above figure, it can be noted that AADT growth tendencies are similar for national roads in Poland and in the Silesian Voivodeship. The exception is 2010, in which the increase in AADT is higher for the Silesian Voivodeship than for national roads in Poland. In addition, it can be observed that the value of AADT in the Silesian Voivodeship is significantly higher than in Poland. The highest difference was recorded in 2015 and amounted to around 9,000 vehicles/day, which means that the average daily traffic in this year was higher in Silesia by 80% compared to the indicator referring to the whole country.

### 2.2. Annual average daily traffic of individual generic groups of vehicles

The diagrams below show the AADT courses divided into individual groups of motor vehicles on national roads in the Silesian Voivodeship and in Poland for the period 2000-2015. Figure 2 shows the AADT courses for motorcycles.

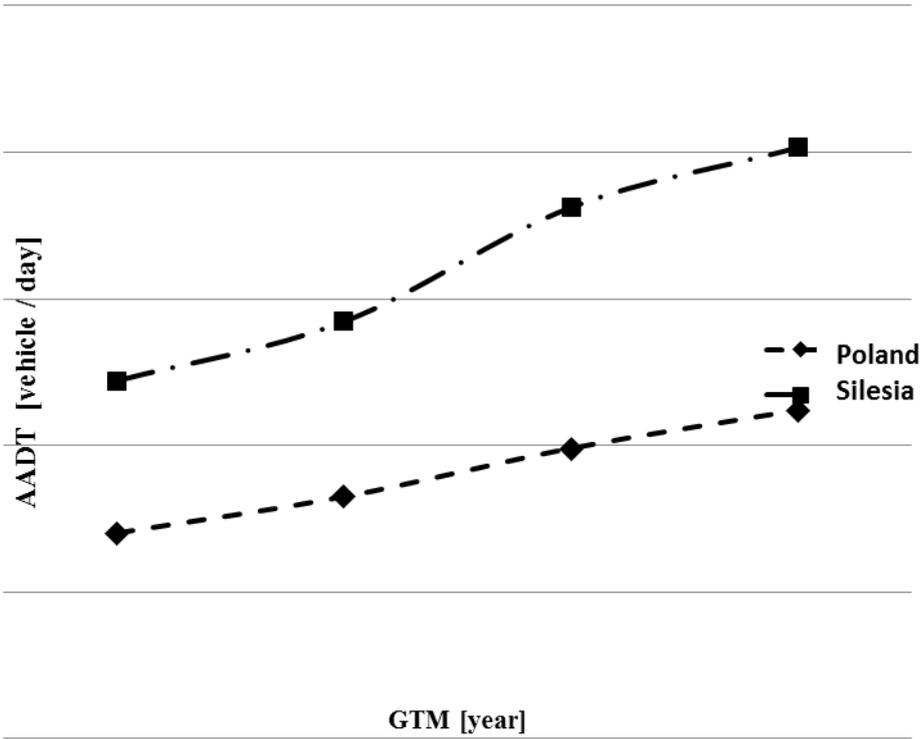


Fig. 1. Value of AADT for national roads in Poland and in the Silesia Voivodeship

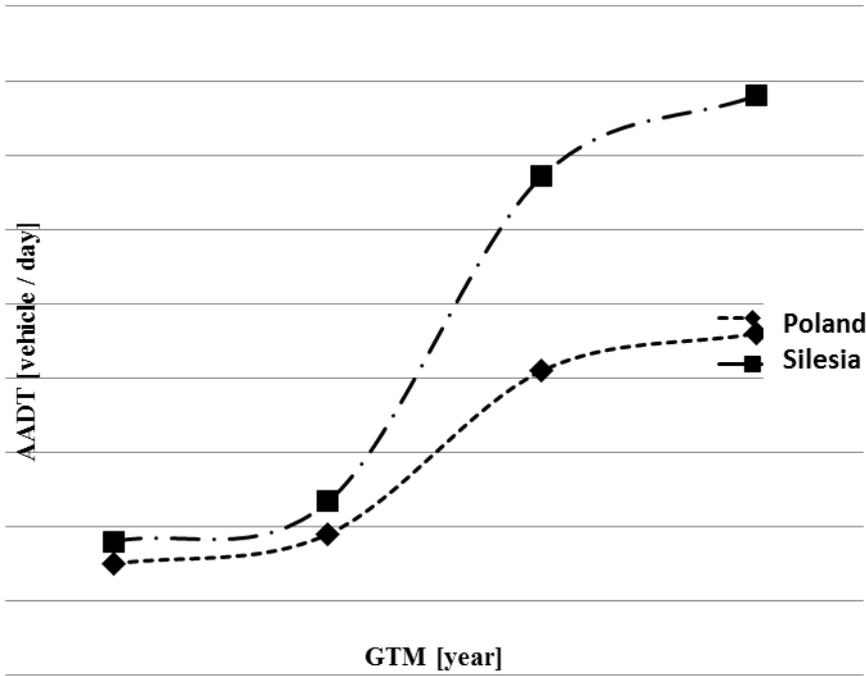


Fig. 2. Comparison of the AADT for motorcycles in the Silesian Voivodeship and in Poland

The graph shows that, in the period 2005-2010, there was a dynamic increase in the number of motorcycles on national roads in the Silesian Voivodeship and Poland. A large difference was recorded in the number of motorcycles between the Silesian Voivodeship and

the entire country. The highest difference occurred in 2015, when there was about 30 vehicles/day, which means that the AADT in the Silesian Voivodeship was greater by about 70% in relation to the same indicator designated for the country. Figure 3 shows the distribution of AADT for passenger cars.

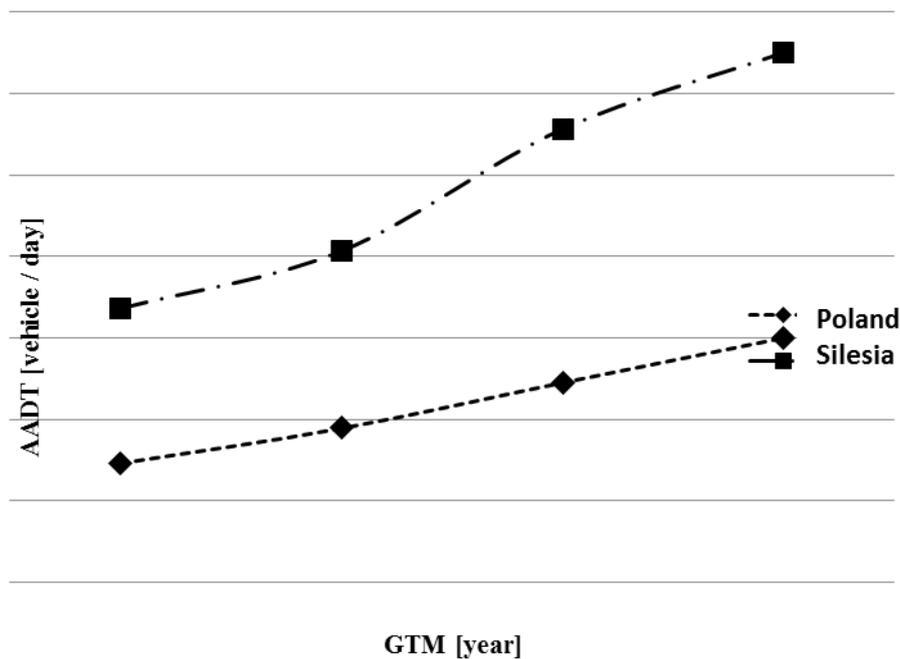


Fig. 3. Comparison of the AADT for cars in the Silesian Voivodeship and in Poland

The graph shows the AADT courses for passenger cars in two analysed areas. Passenger cars represent the major part of all motor vehicles in the analysed context. Thus, the courses of individual AADT are similar to those shown in Figure 1. In 2010, a significant increase in the indicator was observed. The largest difference between the analysed areas occurred in 2015, amounting to approximately 7,000 vehicles/day. Figure 4 shows the AADT courses for light trucks.

In 2005, the number of vehicles on national roads decreased in the Silesian Voivodeship. The dependence does not coincide with the indicator trend for the whole country. In 2015, the highest difference occurred between the indicators of the two analysed areas and amounted to approximately 70%. Figure 5 shows the AADT for trucks with a trailer.

The number of vehicles in a given generic group is constantly increasing. The difference between indicators for the analysed areas is also increasing. Higher values were recorded for the Silesian Voivodeship. The difference is around 65%. Figure 6 shows the AADT courses for trucks without a trailer.

In the whole analysed period, the number of trucks without trailers in individual areas decreased. In contrast to other generic groups of vehicles, the biggest difference occurred in 2000. This difference systematically decreased until 2015. Figure 7 shows the AADT for buses.

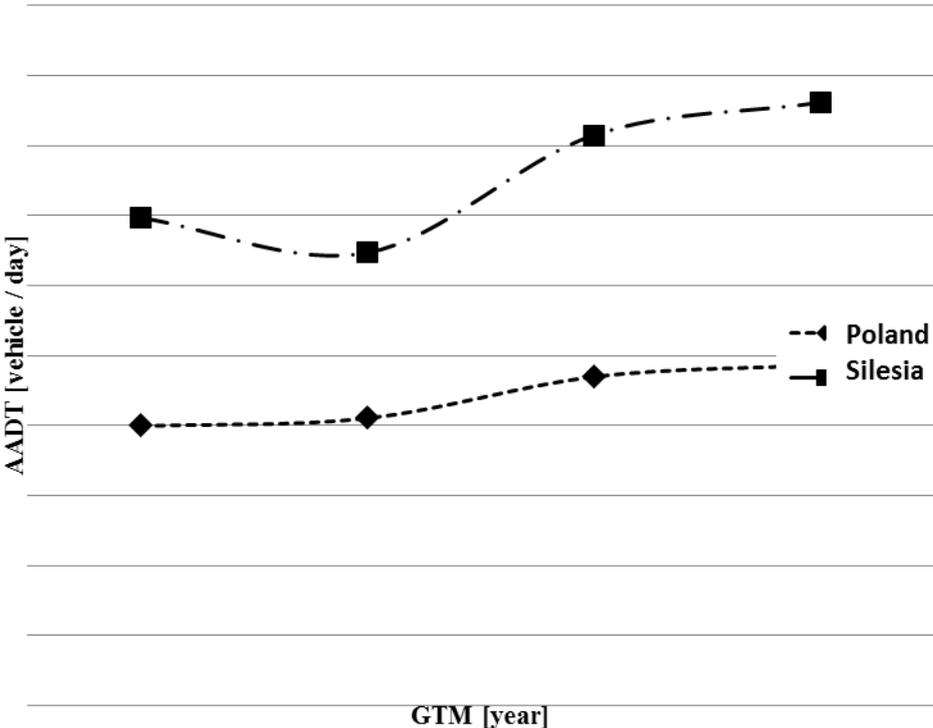


Fig. 4. Comparison of the AADT for light trucks in the Silesian Voivodeship and in Poland

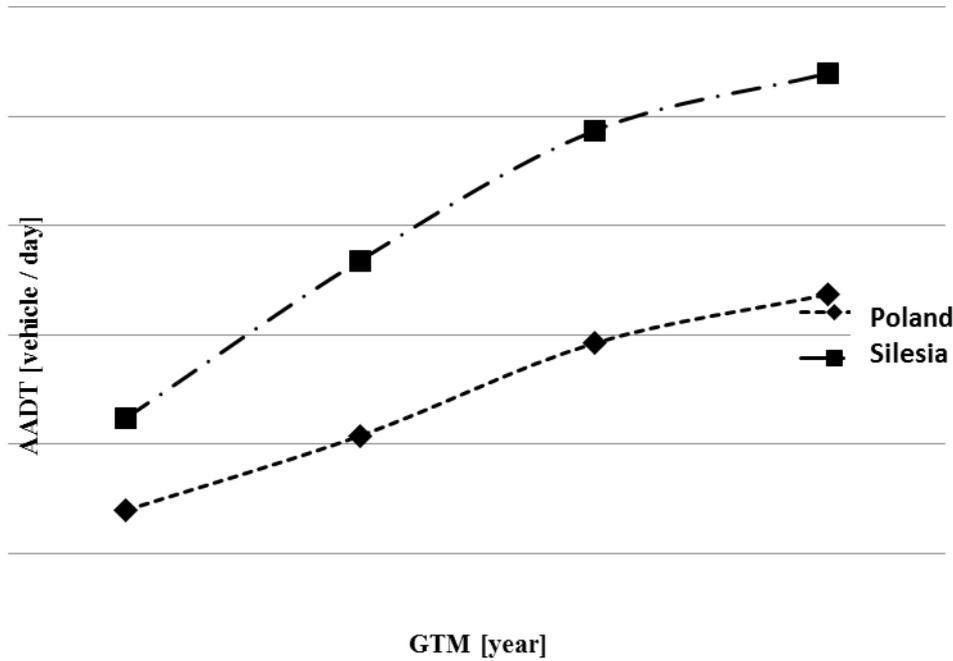


Fig. 5. Comparison of the AADT for trucks with a trailer in the Silesian Voivodeship and in Poland

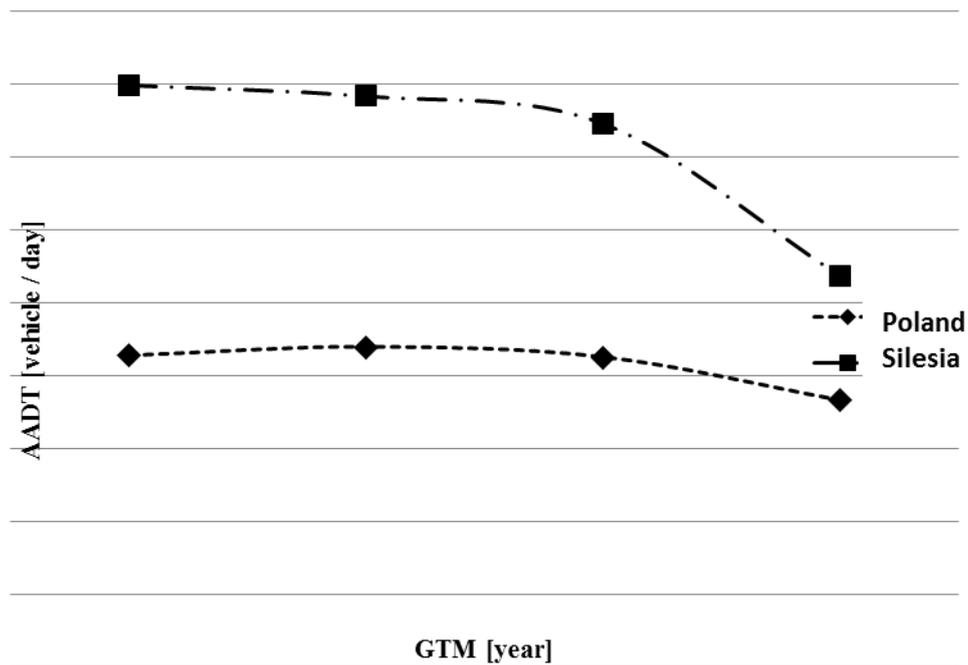


Fig. 6. Comparison of the AADT for trucks without a trailer in the Silesian Voivodeship and in Poland

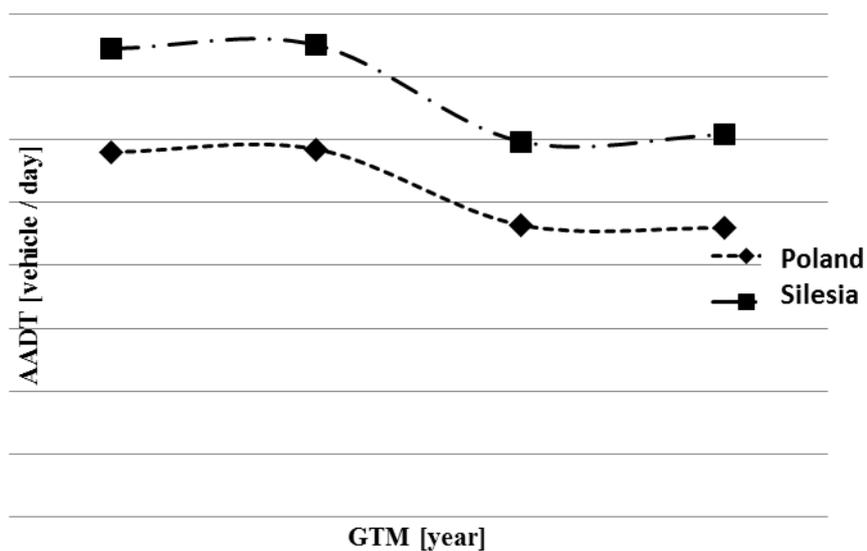


Fig. 7. Comparison of the AADT for buses in the Silesian Voivodeship and in Poland

In 2010, the number of vehicles in the discussed group dropped the most, both in the Silesian Voivodeship and in Poland. The difference between the indicators shows a constant tendency for the entire analysis period. Similar to the other generic groups of motor vehicles discussed, the group comprising buses shows higher AADT in Silesia than in Poland. Figure 8 shows the AADT courses for agricultural tractors.

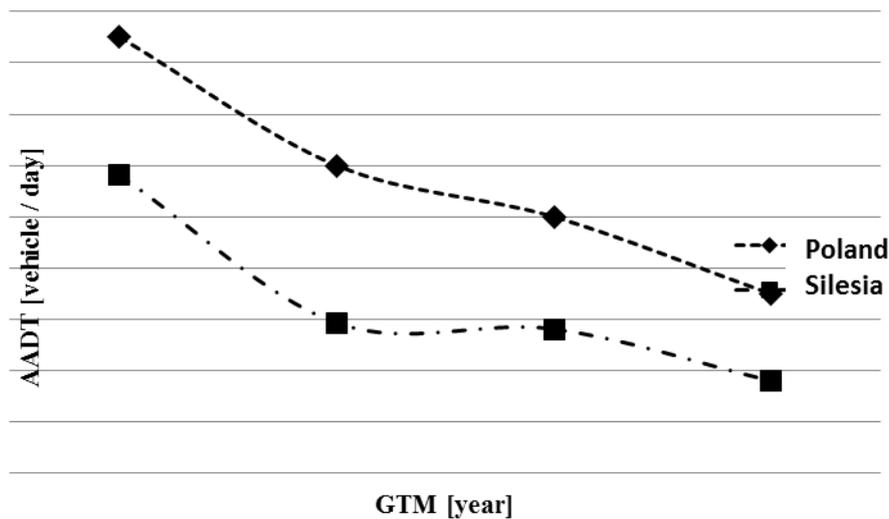


Fig. 8. Comparison of the AADT for agricultural tractors in the Silesian Voivodeship and in Poland

In the analysed period, there was a constant decreasing trend in the discussed indicators. In 2005, the largest indicator difference was found between the analysed areas. In addition, it was the only group of generic vehicles that showed lower values of the indicator in the Silesian Voivodeship compared to the rest of the country.

### 2.3. Load of road with annual average daily traffic

Figure 8 shows a road load group for AADT on national roads in the Silesian Voivodeship and Poland.

The graph shows a large difference in the AADT road load between the Silesian Voivodeship and the rest of the country. The difference is around 3,700%. In 2010, there was a significant variation in the increase in the AADT road load in the Silesian Voivodeship compared to the entire country. While, in Poland, the discussed indicator shows a relatively steady increase, in the Silesian Voivodeship, there was a dynamic increase in the number of vehicles per kilometre on a given road. In 2015, the road load AADT showed a decreased trend. This is due to the fact that new road sections had been build, which resulted in the spreading of traffic flows.

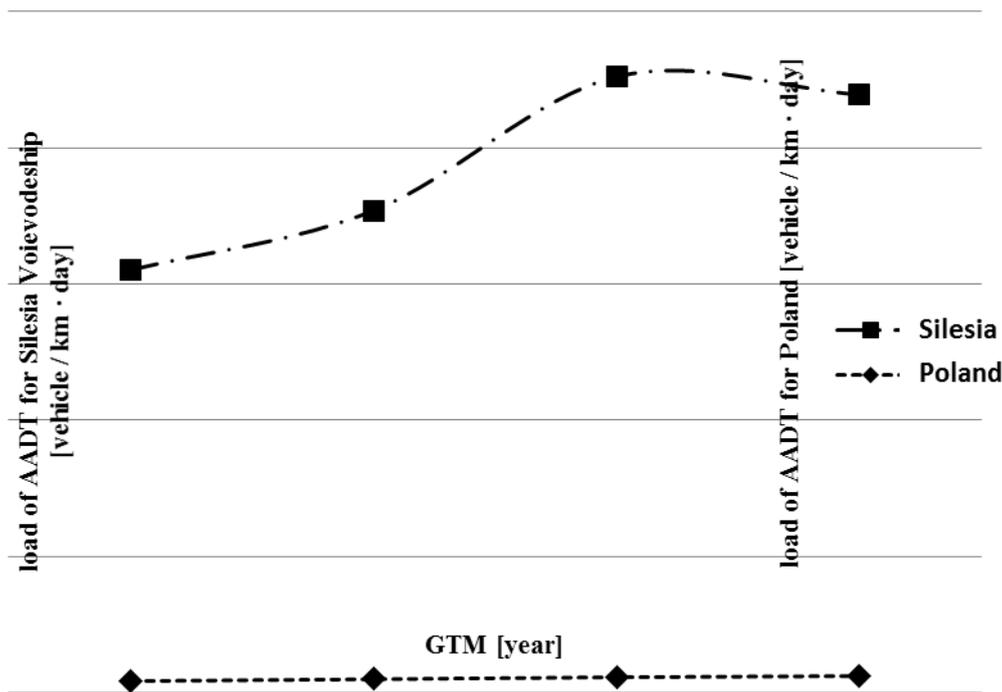


Fig.9. Comparison of the AADT road load in the Silesian Voivodeship and in Poland

### 3. CONCLUSIONS

The following conclusions were made on the basis of the presented analysis:

- The results were presented for the period 2000-2015.
- AADT comparison was presented in summary form for all vehicles and separately for each generic group of motor vehicles.
- AADT comparison for the Silesian Voivodeship and the entire country was presented in the first place for all groups of vehicles. In the Silesian Voivodeship, AADT shows much higher values in relation to the whole country.
- In most cases, AADT for the Silesian Voivodeship exceeds the values of the same indicator for Poland. AADT for agricultural tractors is an exception.
- In most cases, AADT values show an increased trend throughout the analysis period.
- Differences between the AADT for the Silesian Voivodeship and that for Poland show an increased trend. The only exception is AADT for trucks without a trailer, where the largest difference between the analysed areas occurred in 2000 and decreased in subsequent years.
- AADT road load increases in subsequent years of analysis in both areas.
- A significant difference was found between the AADT load in the Silesian Voivodeship and that in Poland.
- The trend of increasing values of AADT road load are similar in the two analysed areas. The exception is 2010, in which a sudden increase in the discussed indicator for the Silesian Voivodeship was observed.

## References

1. Czech Piotr. 2017. "Physically disabled pedestrians - road users in terms of road accidents". In Macioszek E., Sierpiński G. (eds.) *Contemporary Challenges of Transport Systems and Traffic Engineering. Lecture Notes in Network Systems* Vol. 2: 157-165. Cham, Switzerland: Springer. ISSN: 2367-3370. DOI: [https://doi.org/10.1007/978-3-319-43985-3\\_14](https://doi.org/10.1007/978-3-319-43985-3_14).
2. Czech Piotr. 2017. "Underage pedestrian road users in terms of road accidents". In Sierpiński G. (ed.) *Intelligent Transport Systems and Travel Behaviour. Advances in Intelligent Systems and Computing* Vol. 505: 75-85. Cham, Switzerland: Springer. ISSN: 2194-5357. DOI: [https://doi.org/10.1007/978-3-319-43991-4\\_4](https://doi.org/10.1007/978-3-319-43991-4_4).
3. Gaca Stanisław, Wojciech Sucharzewski, Marcin Tracz. 2008. *Inżynieria ruchu drogowego. Teoria i Praktyka*. [In Polish: *Traffic Engineering. Theory and Practice*.] Warsaw: WKiŁ.
4. Opoczyński Krzysztof. 2001. *Synteza wyników pomiaru ruchu na drogach krajowych w 2000 roku*. [In Polish: *Synthesis of Traffic Measurement Results on National Roads in 2000*.] Warsaw.
5. Opoczyński Krzysztof. 2005. *Synteza wyników pomiaru ruchu na drogach krajowych w 2005 roku*. [In Polish: *Synthesis of Traffic Measurement Results on National Roads in 2005*.] Warsaw.
6. Opoczyński Krzysztof. 2010. *Synteza wyników pomiaru ruchu na drogach krajowych w 2010 roku*. [In Polish: *Synthesis of Traffic Measurement Results on National Roads in 2010*.] Warsaw.
7. Opoczyński Krzysztof. 2015. *Synteza wyników pomiaru ruchu na drogach krajowych w 2015 roku*. [In Polish: *Synthesis of Traffic Measurement Results on National Roads in 2015*.] Warsaw.
8. Wasiak Mariusz, Marianna Jacyna, Konrad Lewczuk, Emilian Szczepański. 2017. "The method for evaluation of efficiency of the concept of centrally managed distribution in cities". *Transport* 32(4): 348-357. DOI: 10.3846/16484142.2017.1345005.
9. Topolšek Darja, Tina Cvahte Ojsteršek. 2017. "Do drivers behave differently when driving a car or riding a motorcycle?". *European Transport/Trasporti Europei* 66(7).
10. Makarova Irina, Rifat Khabibullin, Eduard Belyaev, Vadim Mavrin. 2016. "Improvement opportunities in commodity trucks delivery in globalized markets". *Naše More* 63(1). DOI: 10.17818/NM/2016/1.3.

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