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THE IMPACT OF IMPLEMENTATION OF TELEMATICS
TOOLS AND ROAD INFRASTRUCTURE ON
SAFETY OF PARTICIPANTS IN ROAD TRAFFIC

IMPACT OF TELEMATICS TOOLS IMPLEMENTATION
AND OF ROAD INFRASTRUCTURE ON THE
SAFETY OF ROAD TRAFFIC PARTICIPANTS

s. 179-185

ABSTRACT

This paper will illustrate the impact of telematics tools on safety of participants in road traffic which is vital. The latest technology and ideas enable the construction of safe roads. The discussion in Poland about safety on roads is significant as this country has one of the highest rates of road accidents in the European Union. The paper considers safety issues of participants in road traffic and the influence of road infrastructure on safety as well as the use of telematics tools for improving safety. The analyses will make use of the data provided by the literature on safety in Europe, Poland and Lower Silesia which will illustrate the scale of the problem and indicate possible solutions and the use of telematics technologies. The research is based on the two cities: Wałbrzych i Toruń.

KEYWORDS

transport, a logistic process, telematics

INTRODUCTION

Nowadays, safety of participants in road traffic is a very important aspect. The latest technology and ideas enable the construction of safe roads. Safety on roads in Poland

is significant because our country has one of the highest rates of road accidents in the European Union. As far as the number of road casualties in 2017 is concerned, the number reaches over 80 persons per one million inhabitant which is the worst result in the entire European Union. The paper gives an example of Wałbrzych as a city whose road safety may be improved and was compared to Toruń. Its road safety has been compared to Toruń as one of the safest towns in Poland in terms of road safety. All these aspects have verified and conclusions have been drawn.

1. POLAND COMPARED TO OTHER EU STATES

Actions taken by Poland to research road traffic result in improvement of road safety. Comparing 2015 and 2016 we may draw a conclusion that safety on Polish roads is gradually improving. The number of fatal accidents has significantly gone down. Each year hundreds of people die and thousands are injured on Poland roads. Summarising the data provided by the Police Headquarters in Warsaw every year from 30 thousand to 40 thousand road accidents occur. These accidents take place on public roads, residence areas and traffic areas. Since 2011 the number of road accidents has been going down.

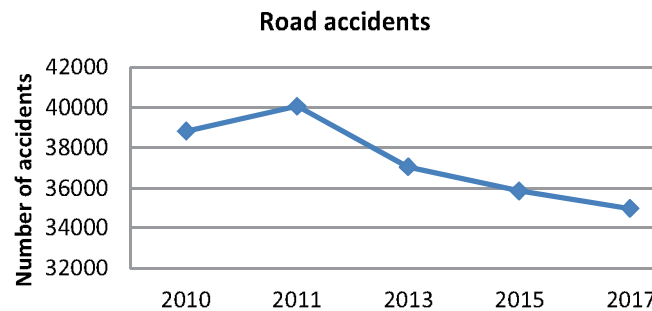


Fig. 1 Number of road accidents in Poland from 2010 to 2017 Source: Own established data based on [1,s 4; 2,s.6;3,s.8;4,s.6;5,s.11]

As we can see on Figure 1 the number is gradually decreasing since 2011 from 39 to 35 thousand.

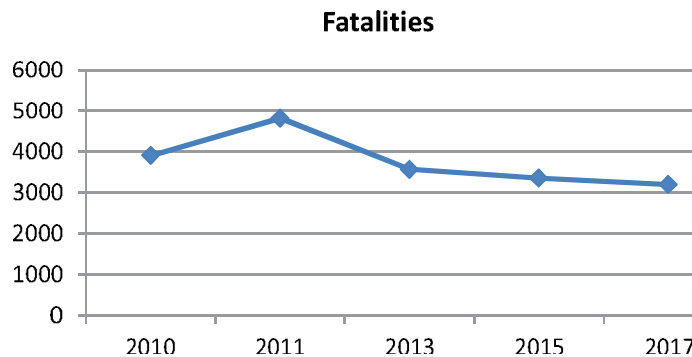


Fig. 2 Number of fatalities in Poland from 2010 to 2017 Source: Own established elaboration [1,s 4; 2,s.6;3,s.8;4,s.6;5,s.11]

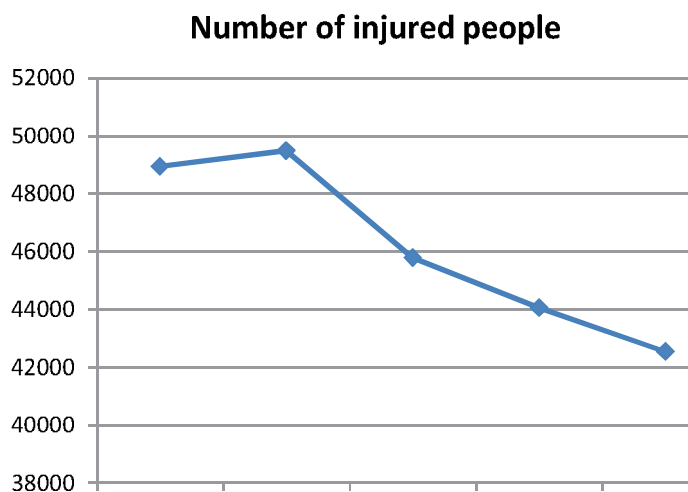


Fig. 3 Number of people injured in road accidents over the years 2010-2017, Source: Own established elaboration [1, s. 4; 2, s. 6; 3, s. 8; 4, s. 6; 5, s. 11]

The number of people injured in accidents similarly to fatalities has been decreasing. Safety on roads in Lower Silesia is conditioned by various factors. Table 1 below presents data regarding road incidents and related consequences.

Table 1 Number of road accidents and their consequences over the years 2010-2017

Number of road accidents and their consequences in Lower Silesian Voivodeship over the years 2010-2015			
Year	Accidents	Deaths	Injured
2010	2294	241	3098
2011	2948	258	3948
2013	3211	238	4263
2015	2586	223	4362
2017	2466	242	3154

Source: Own established elaboration [1, s. 9; 2, s. 8; 3, s. 10; 4, s. 8; 5, s. 28]

As you can see the number of accidents over 2010 and 2017 varies but is systematically decreasing. There are fewer and fewer accidents and thus the number of victims is going down.

In general, the level of safety on roads of Lower Silesia is improving however it could be better. A lot must be done to match the standards present in countries west of Poland. It is due to long-term negligence on the part of the state when it comes to investment in roads. Fortunately this difference is getting smaller and slowly we are catching up. There are fewer accidents and fewer victims.

Table 2 Road safety ratio in Lower Silesia according to the number of inhabitants

Road safety ratio according to the number of inhabitants				
Year	Population	Accident ratio per 100 000 inhabitants	Deaths ratio per 100 000 inhabitants	Road traffic injury rate per 100 000 inhabitants
2010	2 877 121	79.7	8.4	107.7
2011	2 877 840	102.4	9.0	137.2
2013	2 916 577	110.1	8.2	146.2
2015	2 914 400	88.7	7.7	116.1
2017	2 908 457	84.8	8.3	108.4

Source: Own established elaboration [1,s.12;2,s.12;3,s.14;4,s.12;5,s.28]

2. ROAD SAFETY AND ROAD INFRASTRUCTURE IN WAŁBRZYCH AND TORUŃ.

Wałbrzych should follow the pattern of Toruń when it comes to road safety as Toruń is ranked among top leading cities in Poland as far as road safety is concerned. It should be noted that Toruń is one of the cities in Poland where the number of casualties in road accidents is small.

According to the statistics comparing voivodeship cities in Poland in respect of the number of accidents on roads, Toruń looks best. This city overtakes inter alia Cracow, Warsaw, Poznań and Gdańsk. The statement that the bigger the city the more accidents is misleading. There is a list below comparing these cities. Łódź with a lot of inhabitants and a huge number of accidents remains on the first place. Nevertheless, Cracow and Warsaw moved to lower places (with a few places separating them – Cracow inhabitants are twice as more accidents prone than Warsaw inhabitants). Rzeszów and Kielce were ranked on infamous last places.

Wałbrzych is considered neglected and with low level of life. Every year, Wałbrzych is at the top of cities where satisfaction with life is very low and last year it was number one. This dissatisfaction results not only from level of living but also from the infrastructure in the town. Long-term negligence led to the lack of development so road safety was poor. A change in the city authorities accelerated investment in the road infrastructure. The figure below presents data concerning road traffic safety from 2010 to 2017.

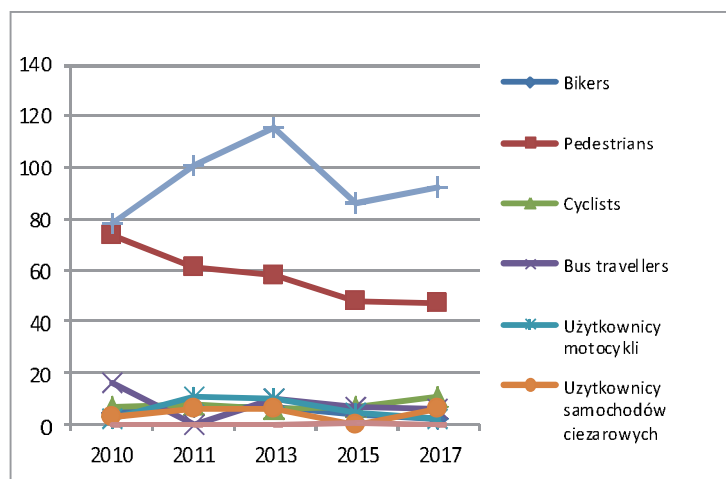


Fig. 2. Number of casualties broken down into user types from 2010 to 2014, Source: Own elaboration based on the data from the Police Headquarters in Wałbrzych

Toruń is a regional city with over 200 thousand inhabitants. It is ranked among top safest cities in Poland every year. The number of injured people as well as fatalities is one of the lowest in Poland.

The table below shows the data about accidents and their casualties from 2005 to 2017.

Table 3 The number of road traffic casualties in Toruń over the years 2005-2017

Number road traffic casualties over the years 2005-2014				
Year	Number of vehicles taking part in incidents	Minor injuries	Severely injured	Fatalities
2010	8242	150	77	10
2011	7781	213	69	6
2013	6941	201	72	5
2015	6622	217	34	5
2017	6899	243	59	9

Source: : Own established elaboration

Table 4 Number of road incidents in Toruń from 2005 to 2017

Number of road incidents in Toruń from 2005-2014						
Year	Road incidents in total	Road accidents	Collisions	Incidents with pedestrians	Incidents with cyclists	Incidents involving children
2010	4371	220	4151	138	70	17
2011	4135	265	3870	137	118	12
2012	3579	252	3327	120	121	12
2013	3460	239	3221	134	115	22
2014	3585	289	3296	125	150	19

Source: Own established elaboration

According to the previously mentioned data, Toruń is safer than Wałbrzych. A general trend in safety growth in both cities is improving. Toruń keeps on staying among top safest cities in Poland. Whereas Wałbrzych is beginning to catch up with the cities that used to be better. The table below shows results with ratios calculated.

Table 5 Number of injured people in relation the number of inhabitants

Number of injured people in relation the number of inhabitants				
Year	Toruń		Wałbrzych	
	Total	%	Total	%
2010	227	0.11 %	182	0.15 %
2011	282	0.14 %	192	0.16 %
2013	273	0.13 %	208	0.17 %
2015	251	0.12 %	155	0.12 %
2017	302	0.14 %	162	0.13 %

Source: : Own established elaboration

Improvement of road safety is affected for example by the construction of traffic lights at pedestrian crossings. Such a solution implemented in Toruń led to a drop in road accidents involving pedestrians. For instance the Hoffman Square in Toruń where after reorganization and construction of traffic lights the number of accidents declined.

A good solution would involve installation of a timer at the traffic lights informing drivers how much time is left to switch on red or green. This way, the number of accidents

at crossroads can be decreased. According from Toruń statistics, the construction of traffic lights at crossroads improves safety of pedestrians. For example the crossroads at Główna Street and Broniewskiego Street in Wałbrzych.

Installation of a countdown timer would involve decreasing the number of drivers going into the crossroads on the orange and red light.

As far as Toruń is concerned, the construction of dual carriage ways is believed to have reduced the risk of accidents. The so called "Średnicówka" and Staromostowa Way are examples of a good solution consisting in the construction of dual carriage ways to affect safety in the city. Since their construction and opening of a few sections, road safety in this town has improved. These roads are so called "fast" ways where cars go quite fast and the traffic is smooth without stoppages at the traffic lights for instance.

At present Wałbrzych is going to start the construction of the so called "Western Bypass" leading to smaller traffic in the town centre contributing to a decline in traffic accidents. These are some of solutions aiming to improve road safety in Wałbrzych. Certainly road infrastructure not got a main influence on road safety however its improvement will make it easier for drivers to drive and make decisions when travelling. Compliance with principles of road traffic and imagination of drivers and pedestrians will cause reduction of unfavourable statistics.

Implementation of Tristar is one of the solutions. Most importantly, this system is expected to secure safety by reducing the number of accidents. For these purposes a sub-system has been programmed aiming to manage safety in road traffic. One of its functions contributes to enforcement of offences like going on the red or speeding. Measurements are taken in particular points and sections. Additionally, all devices used for registering offences also measure the time spent on traveling on these sections [8].

CONCLUSIONS

According to the previously presented data, Toruń is safer than Wałbrzych. Typically, cities densely populated are more dangerous than cities with fewer inhabitants but Toruń proves on the contrary.

Toruń has bet on expansion of road infrastructure with improved capacity of roads going through the town centre resulting in enhanced road safety. Since the opening of express roads bypassing the town centre and modernization of the existing roads, the town is becoming safer and safer each year. The latest research shows that expansion of roads and related infrastructure improves safety on roads.

A lot of cities in Poland are safer and safer each year when it comes to roads. Wałbrzych is heading this direction. The research concludes that investment in roads enhances safety in road traffic. Wałbrzych should follow the pattern of towns like Toruń which made huge investments in the road infrastructure and is one of the safest cities in Poland.

In order to improve safety in road traffic in Wałbrzych, roads should be built in the future in the way it is done west of our border. UK, Holland, Germany are the countries where safety in road traffic is the better than the average in Europe. Solutions like better enforcement of traffic rules, new technologies affecting safety of traffic participants.

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