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THE ANALYSIS OF TRAFFIC SAFETY AND TRAFFIC ACCIDENTS ON THE EXAMPLE OF THE SELECTED VOIVODSHIP

In this article the Poland's traffic safety condition was described, as well as the condition of the road network in Lublin's voivodeship. Factors which have impact on the condition of traffic safety were submitted for analysis which in fact are a human, vehicle and environment and also statistics charting the structure and quantity of traffic accidents in Lublin's voivodeship were shown. This article contains the comparison of traffic accidents reasons caused by drivers and their actual effects. In summary were shown potential problems for analysis in discussed field.

INTRODUCTION

Progression of road infrastructure and automotive market evolution holds both, positive effects and the negative ones. Traffic safety consists of three factors which are vehicle, road and human. Incorrect acting of one of them might become a danger in road traffic and can lead to traffic accidents. Preventing traffic accidents is not an easy task because it relates not only to active safety issues but the passive safety as well. It contains improvement of the road network condition and its lengthening, for that matter. There should be considered level of importance which human factor makes in this case and the way we can act so that we could decrease its importance.

1. TRAFFIC SAFETY

The amount of fatalities and casualties of traffic accidents shows that the road transport is the most dangerous among the other types of transport. Approximately 90% of all types of transportation fatalities are these who dies in traffic accidents caused by cars.

The countries of European Union converted the expenses committed on treatments, rehabilitation and removing general effects made by traffic accidents came to the conclusion that preventing the traffic accidents would be more economic. It is proved not only by the number of vehicles equipped in many qualities that can prevent a collision or traffic accident but also the number of acts that are aimed to create social awareness of danger being generated by reckless and inexperienced drivers.

There are many reasons of degradation of Poland's roads condition, such as:

- low level of drive culture,
- wholesale export of non-application to the road traffic regulations,
- large amount of old and unequipped cars or not enough equipped in active and passive safety systems cars,
- poor condition of road infrastructure [5, p.62].

1.1. The factors that influence traffic safety

Traffic safety consists of three factors: human – vehicle – road. As the statistics shows the human factor plays the major part in the

road transport system. However today's progression of technology might prevent the errors made by humans.

Human

Three factors have the major impact on driving style and the way of driving, such as:

- athleticism,
- mental agility,
- knowledge, abilities and attitude of driver.

Drivers attitude is influenced by other drivers and remaining road users behaviour and road condition as well. Therefore the most important reason of traffic accidents are the decisions made by drivers who decides to drive the vehicle based on the observation of the environment condition, taking into consideration only the small margin of safety level [6, p.49].

Vehicle

The factor which has the important influence on traffic safety is vehicle. In modern vehicles we can feel much more safer and have more reliance on it. The progression of technology significantly fostered active and passive safety quality.

The active safety is a set of car properties which decrease the possibilities of causing traffic accidents and let the driver starting the preventing actions. The factors which take part in active traffic safety have to ease the process of making the decision in situations that precede the traffic accident.

The passive safety is aimed at decreasing the effects of already made collision. Their activity is being exposed in the moment when the driver cannot control a car. The passive safety can be divided into:

- inside safety,
- outside safety.

The inside safety relates to decreasing the possibility of causing wounds or death to the driver and the passengers and it increases the safety of transported goods.

On the other hand the outside safety is aimed at decreasing the possibility of causing wounds and damages to the other road users.

Environment

In regard to road transportation road / environment means its form, road surface attributes, road infrastructure, condition of road environment, system of traffic signs and their visibility, strength of

road traffic, remained road users behaving, time of day, lighting level, temperature, level of noise, motion and air clearness.

Referring to the active safety notion which was mentioned above in regard to road traffic, the active safety element would be also the device which is made to channelize vehicles flow in road traffic zone. These are the safety barriers on roads and also bridges. The passive safety consists of traffic lights, road stanchions, traffic signs which can take part of car's kinetic energy in case of collision.

2. THE TRAFFIC ROAD SYSTEM IN LUBLIN'S VOIVODESHIP

Lublin's voivodeship is situated on the east part of Poland and it borders with Belarus and Ukraine. The Poland's border shared with Belarus amounts to 230 kilometres, and that with Ukraine amounts to 150 kilometres. In the voivodeship are crossing 77 country and voivodeship roads which amount to 1095,271 kilometres, voivodeship roads amounts to 2174,5 kilometres, county roads amount to 10621 kilometres and borough roads amount to over 21000 kilometres. The graph number one shows that the second trans-European transport corridor is being located in that voivodeship which joins Berlin – Warsaw – Vilnius – Moscow [9].



Fig. 1. Trans-European transportation corridor [10].



Fig. 2. The road network in Lublin's voivodeship [11].

The location of Lublin's voivodeship on the map of Europe has its advantages and disadvantages. Among the advantages it should be highlighted that it has very good geopolitical situation, because it marks out the border of European Union with Belrus and Ukraine. It has also a great potential in invest places. Among the disadvantages of Lublin's voivodeship are poor connection with the west of the country, underdeveloped technical infrastructure and scant throughput of border crossings.

The system of roads in Lublin's voivodeship are 1095,271 kilometres in total. Country roads connects capital city with voivodeship cities, voivodeship cities in between and run through the main board crossings. The second graph shows country roads in Lublin's voivodeship. It shows also main agglomerations such as Lublin, Zamość, Biała Podlaska, Puławy, Chełm and Hrubieszów.

Voivodeship roads connects the capital city of voivodeship with county cities. In Lublin's voivodeship its length is amount to 2174,508 kilometres.

3. THE ROAD SAFETY IN LUBLIN'S VOIVODESHIP

In the first table are statistic data which shows that the most tragic year was 2001 and 2004 when the number of fatalities was 358 people in total. These years however were not the ones that contained the largest number of traffic accidents in total. The most dominating year in traffic accidents was 2000 when the number of them exceeded 3500 accidents.

Tab. 1. The number of traffic accidents and their effects on Lublin's voivodeship in 1999-2004 [2]

Year	Number of fatalities	Number of injured people	Number of harmed people	Number of traffic accidents
1999	286	3523	3809	2886
2000	299↓	4188↑	4487↑	3534
2001	358↑	3459↑	3817↓	2705
2002	354↑	3954↓	4308↑	3043
2003	336↓	3372↓	3708↓	2644
2004	358↓	3287↑	3645↓	2586

Starting from 2005 there is visible decreasing tendency in number of traffic accidents in Lublin's voivodeship which the graph number 3 shows. The biggest decline took place in 2010 in order to the previous year and it amounted to 14,5%.



Fig. 3. Number of traffic accidents and their effects on Lublin's voivodeship in 2005-2015 [2].

Comparing the statistic data based on table number 2, it can be noticed that traffic accidents which took place in Lublin's voivodeship in 2000 exceeded the number of traffic accidents which were caused in other voivodeships. Over the course of years 1999 – 2015 it can be stated that general tendency of the traffic accidents

taking place in Lublin's voivodeship is decreasing in comparison to number of traffic accidents taking place in Poland (in total).

However many of traffic accidents in which fatalities also occurred were caused by certain factors.

Tab. 2. The comparison of traffic accidents number in Lublin's voivodeship against the background of Poland [2]

Year	Number of traffic accidents caused in Lublin's voivodeship	Number of traffic accidents caused in Poland	Percentage of traffic accidents number caused in Lublin's voivodeship against the background of Poland
1999	2886	55106	5,2
2000	3534	57331	6,2
2001	2705	53799	5,0
2002	3043	53559	5,7
2003	2644	51078	5,2
2004	2586	51069	5,1
2005	2446	48100	5,1
2006	2211	46876	4,7
2007	2419	49536	4,9
2008	2358	49054	4,8
2009	2083	44196	4,7
2010	1820	38832	4,7
2011	1798	40065	4,5
2012	1623	37046	4,4
2013	1297	35847	4,2
2014	1408	34970	4,0
2015	1252	32967	3,8

The factor which is the main reason of traffic accidents occurrence is the number of driven cars. Analysis of the data gathered by Polish Automotive Industry Federation shown on the fig. 4., it can be noticed that from 1999 up to the present moment the number of cars in Poland increased almost three times. It can be related to the social status which brighten over the years and also to the progression of technology which works dynamically making new places.

Joining to the European Union in May 2004 had large impact on the increasing number of cars in Poland. The Pole willingly started to import already used cars from other countries what fig. 5 shows. These cars were often better equipped than these offered on the polish vehicle market.

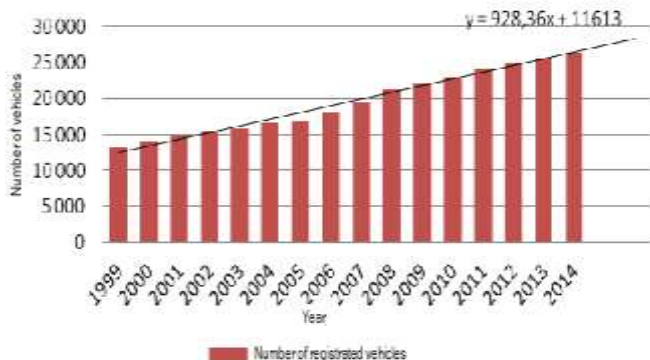


Fig. 4. Number of registered vehicles in Poland in 1999–2014 [4].

That is how the number of cars with more electronic systems of active and passive safety was increased.

However many traffic accidents where fatalities also occurred were caused by the factors related to driver's distraction or disturbance of environment which is shown on the graph number 6.

The graph number 6 shows that factors which caused the highest number of traffic accidents was the ones involving the pedestrians which were 33% in total.

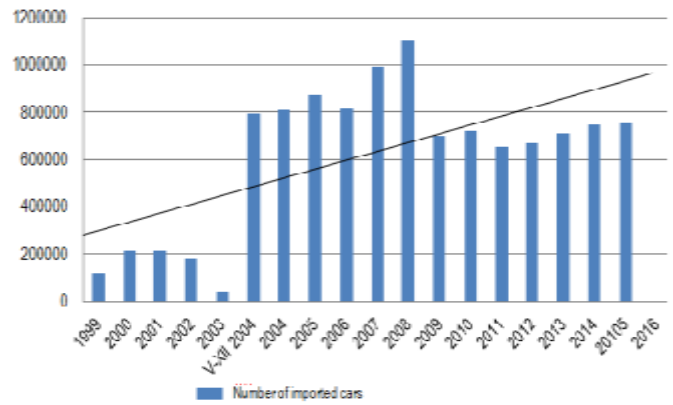


Fig. 5. Number of used cars imported to Poland in 1999–2015 [4, 8].

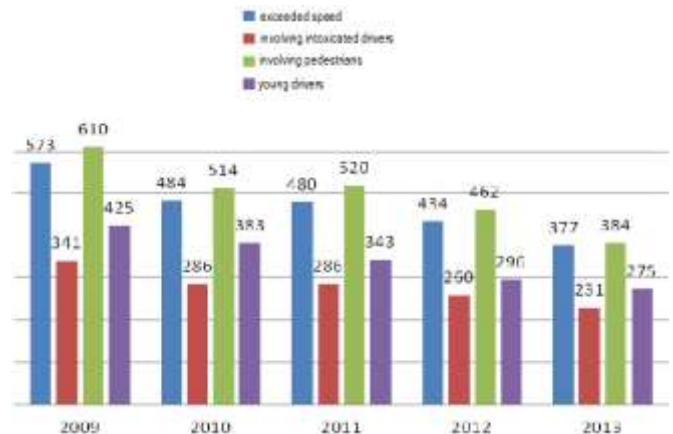


Fig. 6. Selected factors which cause traffic accidents in 2009–2013 [3].

Another significant problem which generate danger on the roads are drivers who excessive the speed limits. Recklessness during the driving caused over 33% of the traffic accidents in which 445 people died.

SUMMARY

Both, in Poland and in Lublin's voivodeship, road infrastructure is still not developed enough and considerably differ from western Europe standards.

Comparing the data contained in this article it can be stated that increased number of cars on the roads did not contribute to the raise of danger on the roads in Lublin's voivodeship. Apparently the number of traffic accidents is decreasing. However number of traffic accidents caused by young drivers is disturbing. Eligible institutions ought to lay emphasis on the fact that young drivers should gain qualifications and experience in driving first.

There is visible decrease of number of fatalities. The important thing may be improvement of cars condition and better equipping in active and passive safety systems which are the priority factors in increasing the safety level on roads.

Appearing revelations referring to traction control system or laneway stabilization and usage of other systems helping to avoid collisions and also decrease of effects that already had been made are crucial for increasing the road users safety.

What statistics shows is that factors such as human- vehicle – environment are inseparable in case of road safety issue. In the moment when one of them would fail the other two cannot provide complete safety to the people who take part in collision or traffic

accident. However taking into consideration progression of technology vehicles are equipped with many amenities and also with active and passive safety systems which can better protect drivers from death or disability.

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Analiza bezpieczeństwa ruchu drogowego i wypadków na przykładzie wybranego województwa

W artykule omówiony został stan bezpieczeństwa w ruchu drogowym w Polsce. Omówiony został również stan sieci dróg w województwie lubelskim. Analizie poddano czynniki mające wpływ na stan bezpieczeństwa ruchu drogowego, czyli człowiek – pojazd – otoczenie, jak również przedstawione zostały statystyki obrazujące strukturę i ilość wypadków na drogach na przykładzie województwa lubelskiego. Porównane zostały zarówno przyczyny wypadków zależne od kierowcy, jak również skutki które za sobą niosą. W podsumowaniu wskazano potencjalne problemy do analizowania w omawianym obszarze.

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