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REGIONAL IMPLEMENTATION OF A ROAD SAFETY OBSERVATORY IN POLAND

Joanna Żukowska
Gdańsk University of Technology, Faculty of Civil and Environmental Engineering, Gdańsk, Poland
e-mail: joanna.zukowska@wilis.pg.gda.pl

Abstract: *The paper outlines the background and goals of the Road Safety Observatory in the Polish region of Warmia and Mazury. While created it was Poland's first road safety Observatory, both at the regional and central level. Established in line with the methodology proposed in the European project SafetyNet, together with the planned National Road Safety Observatory it will form part of a Europe-wide network of observatories linked with the European Road Safety Observatory (ERSO). Commissioned by the Regional Road Safety Centre in Olsztyn, the idea for the Warmia-Mazury Road Safety Observatory was developed in 2010. The Observatory was completed in the autumn of 2012 and opened in November 2012.*

Key words: *safety information system, road safety monitoring, road safety observatory*

1. Introduction

Because road accidents are a complex process, preventive policies addressing them should be comprehensive, coordinated and orderly using a consistent set of methods and appropriate technical and organisational means. This calls for a road safety system which is capable of continuous improvement and ensures that any opportunity to improve road safety is identified and followed through (Hauer, 2001).

What we know today makes it absolutely clear that a continuous road safety improvement can only be achieved if based on a long-term approach. To that end we need the right organisational structures, forms and methods of road safety management and a sectoral approach. Key to this is a system of road safety information, including Road Safety Observatories set up at every level of management (national, regional, local).

The experience of EU countries makes it clear that the public needs to be informed and motivated to follow through on the specific measures which is also a task of road safety observatories. That way road users feel responsible for their safety and are willing to improve road safety continuously because they have their own safety in mind (Reason, 1990). Engaging the public requires good procedures for informing them about the current situation, problems and proposed actions and for understanding the public's expectations. What should happen is a dialogue rather than one sided communication about what the other side is expected to do (Wegman, 2001). This is why a road safety information system should draw on accident databases, road user behaviour and preventive measures databases, road safety projects and their lead organisations.

While the tasks and objectives of road safety observatories worldwide depend on the level at which they operate, i.e. European, national or regional, there are some features which they have in common. An observatory is a research body which carries out systematic road safety observations and studies and formulates draft guidelines and recommendations for the legislator and bodies responsible for implementing national, regional and local road safety programmes. The arrangements depend on the country's road safety management structure. There is a special focus on formulating and disseminating knowledge to ensure that it is easily available and comprehensible not only to scientists and experts but also to politicians and policymakers (OECD, 2000). One of the oldest and most experienced bodies of this type is the French Road Safety Observatory which works for the Inter-Ministerial Road Safety Committee (CISR). The mission of this Observatory is to gather scientific information in order to improve the quality of decisions, as well as to guide the activities of departmental road safety observatories (Chapelon and Lassarre, 2010).

Presented by the European Commission, the EU's transport policy is formulated in the White Paper on "European transport policy for 2010: time to decide"

(EU, 2001) and sets the goals to be achieved by national and regional road safety programmes and the solutions, which if implemented according to the local conditions and scale, will improve the structure of road safety management. One of these solutions was studied under the SafetyNET project which ran from 2004 to 2008 (Thomas, 2009). The end product of the project was the European Road Safety Observatory (ERSO), as a tool supporting road safety management thanks to uniform procedures and methods for analysing safety data across Europe and the provision of knowledge on effective road safety measures.

As recommended by SafetyNet each European Union member state should set up its National Road Safety Observatory linked with the ERSO and a network of regional observatories (Fig. 1). In Poland this idea was first taken up by the Motor Transport Institute. Commissioned by the National Road Safety Council, the Institute is developing the national observatory concept. The entire network of regional observatories in Poland will be made up of 16 units, one in each region. This paper describes the concept and experience from implementing the first and so far the only regional observatory in Poland.

2. Road safety situation in Poland

Despite having the National Road Safety Council and the National Road Safety Programme for the years 2014-2020 (NRSP, 2013), Poland is struggling to meet its casualty reduction targets. The current road safety indicators perform below expectations and as a result Poland ranks near the bottom of European rankings (Fig. 2) (Adminaite et al., 2015).

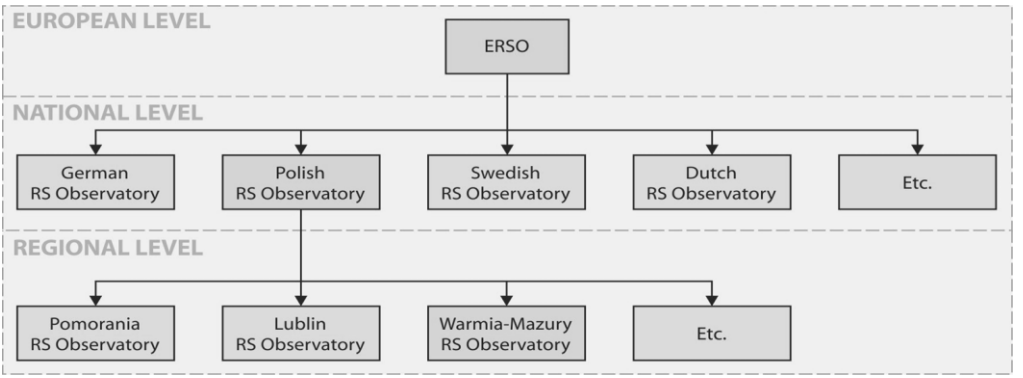

Fig. 1. Diagram of a proposed network of road safety observatories

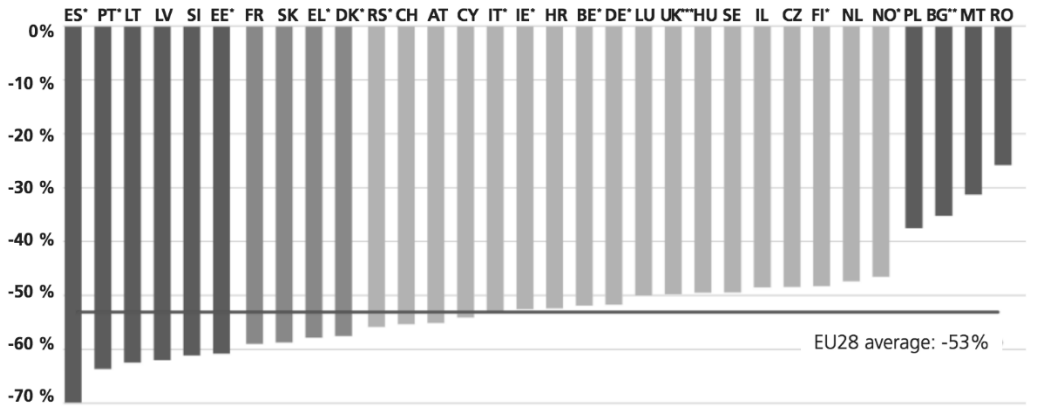

Fig. 2. Percentage change in road fatalities between 2001 and 2014 in EU28
Source: Adminaite et al. (2015).

In the years 2001-2014, the average annual decline in the number of fatalities in Poland was amounted to 4.3% with an average European level 6.2%. This means that during that period the number of fatalities has decreased in our country by 39%, while the average decrease recorded in Europe was 53% (Fig. 2). Currently (in 2014) we note almost 35 thousand accidents with 3202 people killed and more than 42 thousand injured.

The problem is that the poor performance of the last 15 years comes as the price to be paid for policy-making which for many years was more accidental rather than professional, coupled with a minimal level of monitoring and evaluation of the effectiveness of road safety policies. Things has changed in 2013 when a new road safety program (NRSP, 2013) has been introduced and it can be observed that Polish decision-makers started to learn from their past mistakes.

Warmia-Mazury is one of 16 Polish regions. It has an area of 24 thousand square meters and a population of almost 1,5 million. Thanks to its road safety institutional structures and management system it is recognised as a model region. Its road safety performance has earned it the status of the most dedicated toward road safety regions in Poland (Żukowska, 2014).

Since 2004 Warmia-Mazury has been running its road safety programmes (W-M GAMBIT, 2004), (W-MSBRD, 2014) with their strategic objectives to reduce fatalities by 50%. In case of the completed programme - Road Safety Programme Warmia-Mazury GAMBIT - the target was met. For some years in the last decade the region of Warmia-Mazury has featured a strong reduction in killed compared to other regions. For example in the period 2004-2011 the national average was 26% while the reduction in the region was as much as 43%. What is important is that accident severity in the region dropped by 31%, while the number of registered vehicles doubled. When the GAMBIT programme was first launched, the severity rate, which is the number of killed per 100 accidents was 15.8, but reached 11 in 2013, when the programme had finished.

These results could be achieved, first of all thanks to the provision of an adequate basis for a systemic and coordinated effort aligned with the programme, its goals, priorities and sources of funding. This was made possible through the establishment in 2003 of Poland's first Regional Road Safety Centre. It is part of the Regional Road Traffic Centre in Olsztyn which is also home to the secretariat of the Regional Road Safety Council. This paved the way for systemic road safety work in the region. In the initial phase the focus was on improving education and enforcement due to their high level of effectiveness and low levels of spending required.

A few years into the operation of the Centre, further areas in need of improvement have been identified. The selection is based on the current knowledge, worldwide trends and the experience from the Road Safety Programme Warmia-Mazury GAMBIT. Analyses were conducted which revealed that the road safety system and efforts to improve continue to be the "weakest link". While education, public communications, enforcement and road infrastructure efforts went relatively well and according to plan, what was clearly missing was an effective system of road safety management with all the necessary supporting tools.

The experience of the best performing countries shows that one of these tools should be a system of road safety information with a road safety observatory as part of it (Żukowska, 2009). Following up on this recommendation, the proposal was to establish the Warmia-Mazury Road Safety Observatory(www.obserwatorium.word.olsztyn.pl).

3. Assumptions of Warmia-Mazury Road Safety Observatory

The main goal of the Warmia-Mazury Road Safety Observatory was to support the road safety management system by providing a platform for exchanging information about road safety focussing on those road safety aspects that are characteristic for Warmia-Mazury region. The project is the first phase of building the region's *Road Safety Information System*, under the 3rd Operational Programme for Warmia-Mazury for the years 2010–2012 (OP W-M, 2010). Leading up to this will be the development, launch and uninterrupted operation of a website to be developed and managed by specialists. This action is in line with the national road safety programmes (GAMBIT, 2005) (NRSP, 2013) and the Warmia-Mazury road safety programes (W-M GAMBIT, 2004), (W-M SBRD, 2014). It also fits in with the project "Integrated System of Transport Safety ZEUS" conducted by the Gdansk University of Technology for the

National Research and Development Centre (Krystek et al, 2010).

The mission of the Warmia-Mazury Road Safety Observatory is to disseminate road safety information and analyses and provide knowledge about modern preventive measures based on research and the best national and international practice. To that end the website of the Observatory carries reports on regional road safety and details of county level performance (there are 21 counties in the region) and information about the region's main road safety problems. As a permanent feature, the Observatory will offer regular newsletters and annual conferences to promote road safety awareness in the region. It will be an opportunity to reward counties and local communities with the best results in improving road safety.

The effectiveness and continuity of operation of any observatory, including the Warmia-Mazury Observatory, will depend on its status and mandate. If properly formalised, the organisation can look forward to a long-term and uninterrupted operation. It is assumed that in Warmia-Mazury the regional observatory will form a permanent part of the Regional Road Safety Centre in Olsztyn. Two organisational forms are proposed: interim and final. In the interim phase the Observatory will operate under an existing department for road safety. In the final phase, the Regional Road Safety Centre will include an independent unit called the Warmia-Mazury Road Safety Observatory.

The Warmia-Mazury Observatory is funded from the budget of the Regional Road Safety Centre in Olsztyn using its statutory allocation for road safety work in the region. The level of funding should cover the current and future expenditure to ensure the continuity and availability of resources for the Observatory. To that end efforts are made to obtain funding from partner organisations as well as central and EU funds. In its final shape, the Warmia-Mazury Observatory will have three main functions. They will be to: collect road safety data, analyse road safety data and disseminate road safety information. Depending on the size of the observatory, the functions will be delivered by an appropriately sized team of employees and experts. An important part of the Observatory's functional structure will be a *data collection system*. Its design should ensure that it can be extended as the need arises. While the transition period will be mainly dedicated to an online information system, all the other functions should be developed at the same time, especially the *data analysis system* and road safety knowledge base. They will be the sources of up-to-date information on road safety, the mechanisms and causes of the trends observed. The best practices shows that the science-based road safety trends analysis are of a great importance in safety management process at each level (Holló, Eksler, 2010) (Bergel-Hayat, Żukowska, 2015). Finally, a well-designed information system will help to disseminate the knowledge effectively. This can be done in a number of ways, mainly through the website but also using regular reports, papers, informational materials and press releases (Fig.3).

Road accidents are a serious social problem and as such must be handled professionally and with the right partners. The same rules apply in the case of the Observatory. It is important for the main project partners to be assigned the right role when the observatory is first developed and then operated. With a clear division of roles, we can better identify the tasks and commitments of project partners and provide them with full knowledge about the goal, scope and potential of the project. Because the project is linked to other partner organisations, understanding who your strategic partners are is of utmost importance. They include data suppliers to keep the observatory content up-to-date, both for road safety statistics and road safety phenomena and trends. It should be emphasised that being part of the project by providing the technical or financial contribution can be an important element of PR strategy, especially for companies, and help them with creating an image of a responsible business (Corporate Social Responsibility) which adds to their competitive advantage. In the case of Warmia-Mazury the Observatory is being built with the support of many institutions and national and regional organisations. The national organisations include in particular the Motor Transport Institute, National Road Safety Council and the Gdansk University of Technology. The latter also helped develop a long-term road safety strategy for the region and a concept of the Observatory. The main long-standing partners at the regional level include:

- Regional Police and Municipal Police in Olsztyn,
- Regional Roads Authority in Olsztyn,
- Municipal and Regional Fire Service in Olsztyn,
- Michelin Polska.

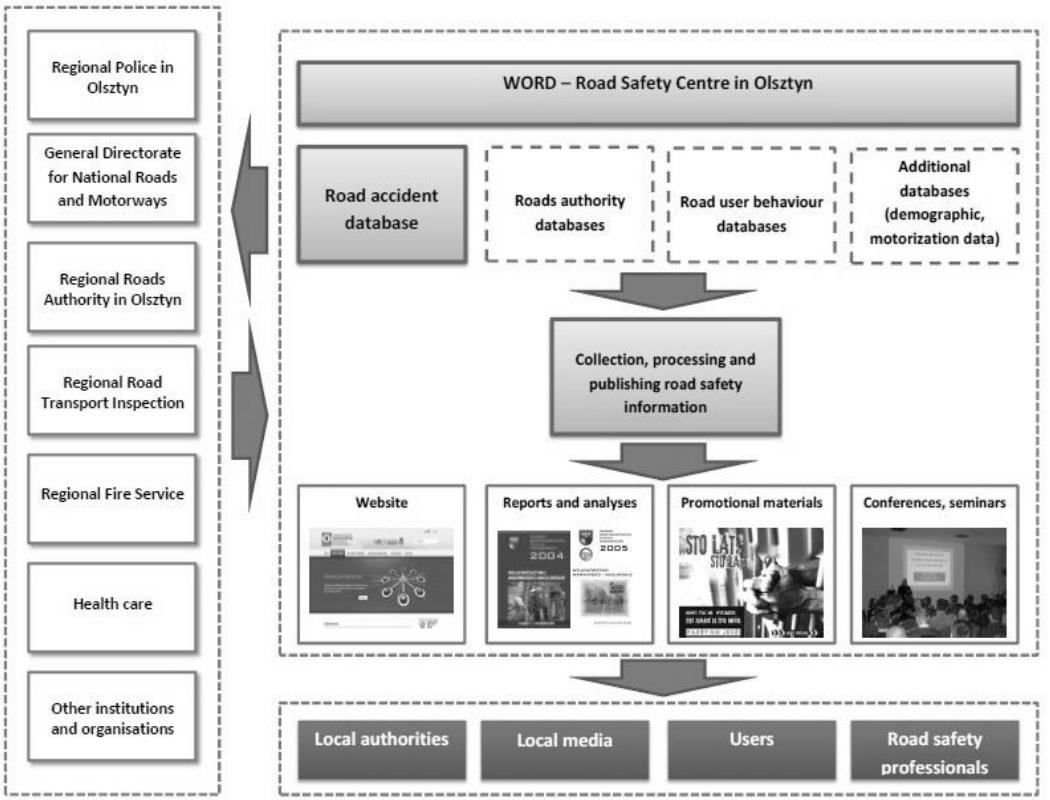

Fig. 3. Functional structure of the Warmia-Mazury Road Safety Observatory

In addition, the Observatory may also cooperate with:
- Polish Red Cross,
- Road Transport Inspection in Olsztyn,
- Olsztyn City Council,
- Warmia-Mazury University,
- Teacher Training Centre in Olsztyn,
- Polish Automobil Club,
- other non-governmental organisations.

The experience from implementation of the Road Safety Programme Warmia-Mazury GAMBIT makes it very clear that a well devised and functional road safety information system will improve the work of the "project team" involved in regional road safety programme delivery.

4. The pilot implementation of the observatory

Based on a needs analysis of regional partners and the capacity of the Regional Road Safety Centre it was agreed that the first element of the new Road Safety Information System in Warmia and Mazury will be a website accessible to the public with a broad range of information on the state of road safety and a road safety knowledge database built specifically for the website. Apart from the website, aided by experts the Observatory will conduct systematic analyses and monitoring of regional road safety. The results will be published as reports available from the Observatory website. Materials will be published to raise awareness of road safety problems. There will be conferences and seminars. This will help the Observatory to disseminate road safety information to the public and enable access to reliable data sources and regional road safety details (Fig. 3).

The website of the Observatory is divided into two main parts: data and information about the region and knowledge database designed as a universal

compendium of experience and best practice in the area of preventing and reducing road traffic risks.

The data in the statistics database are supplied by the police but there are plans to add more data in the future such as road traffic behaviour (seatbelts, alcohol, mobile phones), data from roads authorities or weather information (Fig. 3). What is important is that they are regional data, describing the current situation and factors affecting the regional safety indicators.

In addition, there will be a new knowledge database with information about the main road safety problems. It will draw on the best experience from Poland and abroad. Each road safety problem or issue will include a description of the size of the problem in the world or in the European Union, its significance and proposed effective and tried and tested ways to solve the problems. This tab will also include materials about key elements of an effective road safety system.

These two parts of the website will be supplemented with a tab for "News" with up-to-date information about all road safety events and activities in the region. The Observatory will also have a section on systemic and long-term road safety activities in the region. This will allow users to find out about the road safety system and the documents within it.

The Observatory puts emphasis on promoting safety and safe behaviour in road traffic. To that end it will work together with the regional media and a broad range of partners. This will help with disseminating the results of analyses and road safety information. The Observatory should become a well-known brand and considered a reliable source of information and a meeting place with potential partners, i.e. state and self-government bodies, NGOs and business.

In its role as a platform for exchange of road safety knowledge and experience the Observatory organises regular conferences and seminars to discuss the region's different road safety problems. Since 2011 an annual conference that rewards the best performing counties has been organised in Olsztyn. In 2015 the county of Bartoszyce was reworded. The idea is based on the PIN Conference which is organised once a year by the European Transport Safety Council w Brussels (ETSC, 2015). It is very popular among the member states and encourages positive competition between them for the best result in road safety improvement.

5. Road safety monitoring tools

An important part of an observatory is its cooperation with road safety experts tasked with the responsibility to develop analytical tools and monitor road safety in the region. Monitoring is crucial for:

- Understanding the past trends (which requires understanding the causes of traffic accidents)
- Forecasting the future (to be able to respond to changing situation on time)
- Tracking the achievement of the objectives of the regional (national) road safety programmes.

Road safety cumulative indicator

In case of the Warmia-Mazury region the first steps of the continuous, systemic monitoring have already been taken. A county road safety ranking was produced. It works as a tool used by the Warmia-Mazury Road Safety Observatory to indicate the best and the worst performing county. Road safety evaluation is based on a set of 4 safety indicators: number of killed per 100 thousand population, number of injured per 100 thousand population, number of killed per 100 accidents and number of accidents per 100 km. For each of the county the accident, demographic and road data are gathered and indicators calculated. Then a cumulative indicator is proposed.

The set of indicators is not chosen randomly. It reflects the actual level of safety. The methodology assumes that first the county is evaluated in terms of each of the four above-mentioned indicators, then the difference between the maximum and minimum of each of the indicators for all counties is divided into 5 equal intervals. Each interval is assigned an appropriate level of safety on a scale of 1 to 5, where 1 is the lowest level and 5 the highest. In the result the average of the four ratings gives the final result - the cumulative indicator. To better illustrate the results, the methodology used in analogy to the ranking system Euro NCAP car safety is used: 1 star - the lowest safety level, 5 stars - the highest safety level.

The analysis helps in preparing a risk map for all of the counties (Fig. 4). The dark colour shows the most dangerous counties while the safest ones are marked with the light colour. The purpose of the county ranking is to identify those sites where road users' lives are at the highest risk and which require intensified safety treatment. The counties are presented on a scale from 1 to 5 where 1 is the lowest

safety level (dark colour) and 5 is the top level (light colour).

This monitoring activity should be repeated at least every three months. An overall road safety report for the region is being published once and identifies the best performing counties and local communities. Since 2011 the ranking of the best performing counties in Warmia-Mazury has been issuing regularly, which means that the idea of continuous monitoring and dissemination of the information has been developing properly.

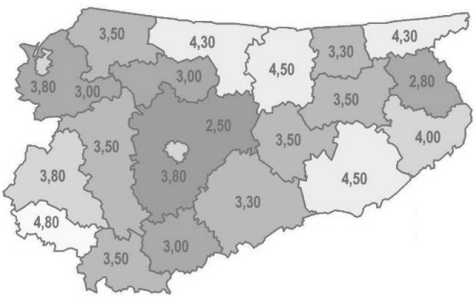

Fig. 4. Risk map for all of the Warmia-Mazury counties in 2011

Time-series analysis of accident statistics

Another tool appropriate for monitoring of road safety trends, explaining changes in the number of fatalities as well as for forecasting them is a technique called a structural times series modelling. Structural time-series models serve as one of the main tools for measuring road safety progress, exploring relationships between road accidents or injuries, road traffic exposure and other risk determinants and assessing impacts of road safety interventions. The application of time-series analyses for road safety purposes began several decades ago, where over time various methods were suggested to handle the data structure and interrelationships (Bergel-Hayat, Żukowska, 2015). An example of time-series analysis using explanatory and intervention variables performed for Warmia-Mazury Road Safety Observatory can be found in (Żukowska, 2015). The aim of the analysis was to identify the current trend and forecast its future development. The added value was to find a relation between economic factors represented by the unemployment rate and the risk (measured by the number of killed and severely injured in road accidents per year). The idea comes from a number of international studies which stated that there is a correlation between the number of traffic fatalities and the degree of public activity in the country: as unemployment grows, miles travelled fall, a factor known to affect road safety (and vice-versa) (Bergel-Hayat, Żukowska, 2015). The existence of this relationship was proved for Warmia-Mazury in Żukowska (2015).

The same model of structural time-series appear to be an appropriate tool to be used by the Observatory to forecast the future trends and numbers. In Fig. 5 the number of fatal and serious injuries for the Warmia-Mazury region is presented. Based on the data a model for a short-term prognosis of killed and seriously injured was performed under the assumption of fixed unemployment rate (18,9%) within the analyzed period.

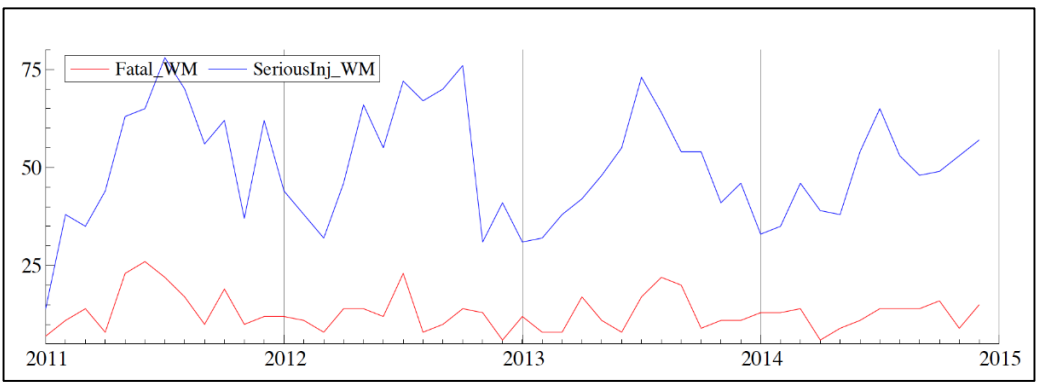

Fig. 5. Monthly number of fatal and serious injuries for Warmia-Mazury region between 2011-2015

Fig. 6. Prognosis of monthly number of fatalities and seriously injured (KSI) for Warmia-Mazury region

Table 1. Prognosis the number of fatalities and seriously injured in Warmia-Mazury region for the first half of 2015

Month	KSI	Stand. Err	Obs. KSI
Jan 2015	41,21	*14,59*	40
Feb 2015	31,94	*14,64*	31
Mar 2015	36,19	*14,59*	46
Apr 2015	43,18	*14,52*	42
May 2015	58,41	*14,39*	52
June 2015	64,32	*14,34*	56

The graphical results of the analysis are presented in the Fig. 6. They were compared with the real (Observed KSI) values for January-June 2015 and presented in Tab. 1. Almost all KSI values achieved within the prognosis appeared to be satisfactory (within the boundaries of 2 standard errors). The exception was the value for January 2015 in Pomorskie region, which slightly exceeded the boundary. This allows assuming that models achieved are correct and may be used for practical purposes (forecasting).

6. Conclusion and recommendations

Understanding the causes, circumstances and the location of a crash or collision is the precondition for targeted road safety measures. Data on road user behaviour must be collected regularly and include seatbelt wearing, drunk drivers, use of substances and speeding. In addition, data on preventive measures should also be collected. All data should be available in a single and generally accessible database on road accidents and preventive measures and used by the Road Safety Information System at each level of management. The data to feed the system should come from institutions involved in road safety at the national and regional level. With data provided by cooperating organisations, integrated road accident databases, the demographic database and road traffic and network database, we can generate sufficient information for analyses, papers and reports.

It is important to include a knowledge database. Many institutions and organisations need help with obtaining road safety knowledge and this interest should be used for disseminating and promoting road safety knowledge and practices. The information should be made available not only during incidental training but in a continual manner by providing access to websites offering good practice, publications and specialist materials as

well as brochures, reports and road safety papers. If organised within a road safety system, all of these tasks could be supported by Road Safety Observatories at each level of management. The Warmia-Mazury Road Safety Observatory project launched in autumn 2012 is a perfect opportunity to support systemic road safety work in the region of Warmia and Mazury. With a source of accessible, up-to-date and reliable knowledge about regional transport risks, this project fits in well with the long-term process adopted by the EU as a priority designed to reduce the external costs of transport, in particular the costs of road transport accidents.

The establishment of the Warmia-Mazury Observatory is the result of a systemic approach to road safety policy developed under the project SafetyNET. From the perspective of integrating transport safety, the observatories, although initially dedicated to specific modes, could become the start of a network of safety observatories for the entire transport system, from the regional to the European level.

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