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MANAGING THE SAFETY OF TRANSPORT IN SWEDEN

The article shows the effectiveness of the Swedish safety systems in transport. The introduction of new methods of transport management has made it one of the safest in Europe. In the article shown to minimize the risk of a hazardous event and thus a significant reduction in the number of deaths due to effective management methods.

INTRODUCTION

Sweden is the third largest country in Europe. The most important is safety, which is one of the most strongly felt needs in that country. This state is described as- Trygghet.

Trygghet is understood not only as security, but also well-being, and self-confidence. These values are the basis for the functioning of the entire country, which is the best shown in management of transport security.

Sweden, like other Scandinavian countries is an example of the increasing problem of "culture," the risks that every day we have to deal with.

Sweden is the best example of a country where the security is on high level. In road accidents dying about 550 people a year, while in Poland, this number is about 5500, but there's no more people or cars.

The whole security and is widespread "culture" of risk in Sweden, become from very high technical culture. This gives you the opportunity to develop global enterprises. Among such companies we can be mentioned: Nokia, Volvo etc. In Sweden, a very important fact is that firms are involved in shaping security. The transport in Sweden supervised by the Ministry of Enterprise, Energy and Communications which managing transportation of people and goods as well as road infrastructure (road, rail), international cooperation, TEN-T (Transeuropean Transport Network). Additionally, is involved into long-term projects in transport. Deal with all concepts and capabilities, starting with good accessibility, quality and safety to the environment. Efficiency and sustainability is the goal of a nationwide transport services¹. Swedish transport policy by actions leads to economic efficiency and sustainable benefits of transport services for people and businesses². Proper design and operation of the transport system leads to provide basic availability of good quality, functionality across the country.

1. PUBLIC TRANSPORT

In Swedish transport the most important in access for all people, especially for people with disabilities and improve the safety and mobility of children.

In short it can be concluded that the Swedish transport policy is a triad of features: health, safety and environmental protection. According to this assumption all actions lead to a reduction in the number of fatalities and accidents. In addition, it is striving to

achieve, the quality of the environment and better health. One of the main objectives of Sweden until 2030 year, is the independent fleet of cars on fossil fuels. In the national report for the United Nations, Sweden postulates that, in order to achieve the best possible outcomes transport, both public transport and private must be adapted to changes in society. For the Swedish transport and its liquidity safety equivalent to many organs. The government is responsible for meeting the basic needs and creating the appropriate conditions for the coordination and development of transport. Another institution taking part in the shaping of transport is Trafikverk - Swedish Transport Administration, which started its operations on 1 April 2010. It is a public administration that deals with long-term planning of the transport system; road, rail, sea or air.

Local and regional public transport is under the Government of the public transport authority. Public transport authorities (PTA Public Transport Authority) in each council politically and financially coordinate local and regional transportation. In the local transport most common form of transport services is a contract since about 95% of public transport services are purchased in the framework of competitions by the PTA. Public transport have about 24% in domestic market. Taking into account the daily use of transport in Sweden, the situation is: the greatest share belong to road transport 87.4%, next is rail transport 9.7% and air transport 2.2%. If we consider the long distances still on first place is road transport about 70% and then 17% air transport, rail 16%, bus 6% and only 1% sea transport. On short distances road transport 74%, buses 10%, rail and pedestrian traffic 5%, 3% for bikes, and motorbikes, tram/metro 2% and 1% for taxi³.

2. RAIL TRANSPORT

Rail transport in Sweden increasing each year as a transport, and because of that government see their need for the further development of security and increased competition, which would be an essential element of modernization. The Swedish government believes that competition will lead to faster innovation, and pressure on prices and the possibility of more efficient use of social resources. Given the Swedish development in transport, we can conclude that they are pioneers of changes in Europe. There are also authority, for other countries. Sweden was the first country which separated management of railway infrastructure from rail used it. This change was made in 1988 with Law on transport policy-Transport Policy Act of 1988. This reform has assumed the inequality in the cost of other modes of transport enterprises. This is most evident between the carrier and the carrier rail car, "who share

¹ Public Transport and its Users: the Passenger's Perspective in Planning and Customer Care, eds. M. Schiefelbusch, H. Diene, Ashgate Publishing Limited 2009, s. 211 f

² www.sweden.gov.pl

³ Pocket Facts 2010. The Swedish Transport Administration, railways, roads, traffic and transports. Swedish Transport Administration, June 2010

in the costs of maintenance and development of the infrastructure was much smaller. Increasing the competitiveness of rail would lead to the conditions of transport operations by rail to the way they are in road transport ". Mainly it was about the abolition of duty railway infrastructure and adapting it to load, what are the infrastructure of the car. The separation of infrastructure management no adverse effects on the contrary. With this reform, infrastructure rates in Sweden are among the lowest in the Community. A comprehensive reform plan has led to ensure that all the safe and environmentally friendly transport, with the least possible cost to the economy and society. The best example is the number of passengers that from 1991 to 2010 increased by 100%.

Sweden in the interests of public transportation is also implementing a project called Doubling Project, which is part of a global project - Ptx2. This project showing that doubling of public transport will bring benefits to all citizens . The main objectives of project are: saving 170 million tons of oil and 550 tons of equivalent CO2, reducing urban victims of fatal accidents by 15% and doubling the number of employees-operators of public transport, reducing the adiposity risk and heart disease by 50%, by implementation role of walking, cycling and public transport. Sweden is one of the safest countries in Europe. Since 1997 he has realized the vision of zero (Vision Zero), which means 100% safety on the roads. The last phase of the project is to take place in 2020. There is a risk of accidents, but not fatal. The aim VZI is the maxim "do not accept any fatalities in traffic". This sentence is the essence of the action of the Swedish vision of a zero which blames the responsibility for the safety of not only road users but also those responsible for construction, maintenance and modernization of transport systems and car manufacturers. The following figure (Figure 1) shows the density of the road network in selected European countries in 2009.

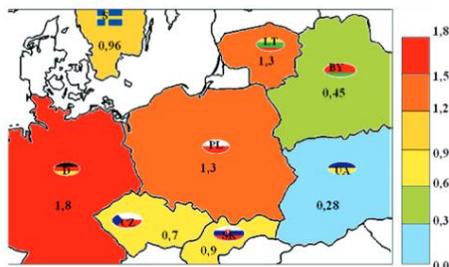


Fig. 1. The total road network density in selected European countries.

Source: P. Szczesny, "Correlation of selected indicators of road safety on the example of Polish and neighboring countries", *Journal of Technical Ed. Cracow University of Technology*, 2009.

3. ROAD TRANSPORT

Determination to improve the safety is first and foremost focus on improving road surfaces. For this purpose they are monitored all paved roads by vehicles equipped with devices that collect data on the state of the surface. There were also changes in energy-intensive barriers that have been replaced by steel cables clamped to the steel posts. These solutions turned out to be cheaper to buy and maintain, and more practical and safer than traditional solutions. They are mounted in areas exposed to the danger of leaving the lane as well as to prevent overtaking in places unfit. This project also introduces changes at intersections and stretches prior to a pedestrian crossing. Intersections began to be built usually in a circular motion with a characteristic hump occurs before entering the crosswalk. It is worth noting that the environment is undeveloped intersections, which enables a much better view of the road. Sweden is supported by other nongovernment organizations and corpo-

rations. As good example is, among others, Swedish campaigning on the streets and in media "foot off the gas".

Because Sweden want to take care of road safety in their own country also presenting on ferry and terminals posters and short videos showing road manners in Sweden.

The program's vision of zero success both in theory and in practice. Sweden today is perceived as a country with one of the lowest rates of accidents and road deaths in the world. Linear barriers, roundabouts with different size, speed cameras, variable message signs, LED lighting at pedestrian crossings and cycle paths. Among them are distinguished LED-Mark and LED-Guide. LED-Mark is powered by electricity and the LED-Guide Solar, both products effectively operate on drivers by giving them already know that moving in this space. An important element that Sweden contributes to road safety is the ECO DRIVING. It is a popular training in Swedish companies. The company train employees mainly by the benefits that rise on this account among others, improving traffic safety on the roads, additional theoretical and practical knowledge of the correct drive, taking care of the technical condition of the car, rational planning of routes and fastening and transportation of cargo. The training is short, 2 hours theoretical and 1.5 hours in a vehicle simulator. A major role in road safety in Sweden plays a traffic light.

It fits into every human being. Because it is first of all voice traffic lights at the same time, this built-in microphone automatically measures the level of road noise and, on that basis adjusts the volume of the siren. Another undoubtedly an important element that appears in this signaling contrasting colors that allow you to locate them visually impaired persons, including all or not forgotten about people with disabilities. For the purposes of lights signaling devices are embossed arrow with the direction of movement, which indicate the exact direction of passage. In addition, the arrows are vibrating elements that give a disabled person a sign that the signal is turned on, and can safely go through a transition.

Speed cameras also contributes to the effect of high security on Swedish roads. Their implementation were taken into account several important actions: pictures from those cameras need the be in high resolution, solid informing the public and gaining social acceptance for these solutions, the cameras must exist on an integrated network in accordance with the law. It must be also taken into account the low cost, easy installation, safe monitoring process and weather resistance. In Sweden, speed cameras are set only on the roads where technical conditions are fulfilled. Speed cameras helped to reduce the number of accidents by 20-30 people a year. Profit obtained from speed cameras for the government is a secondary factor because the most important thing is safety. Speed Cameras for the state is a benefit to both social and economic.

Another important role in road safety in Sweden, have Traffic Management Centre(TMC) –called also Trafik Stockholm. It was established on the basis of cooperation between the authorities of Stockholm and the Swedish Road Administration. TMC is primarily management and information management, feg .: management traffic in tunnels, collecting and sending information's about traffic in capital and provinces of central Sweden. TMC also collecting weather reports, which are presenting after that in radio, television, mobile network operators, etc.

The specific non-governmental organization, which is involved in the expansion of road safety in Sweden Saker Trafic. The guiding activities are organized competitions for companies involving cars and prize awards the company whose employees show the best

results in driving under the rules of the road. Award's and competitions will inform both the company and the drivers that safe driving is safe for everyone: for the driver, passengers and other road users at the same time cost-effective for the company and environmentally friendly.

The Swedish Transport Ministry pays special attention to the safety of children. Swedish regulations require the use of children up to 6 years of age protective devices which have appropriate certificates allowing them to use. NTF- national organization promote road safety recommends that children 4-5 years of age in reverse seats facing backwards. Traffic regulations in Sweden are very detailed and restrictive to their plans and projects were fully implemented gradually. Anyone choosing to Sweden, the driver should unconditionally obey traffic laws. Failure to comply with them may cause a high penalty in specific cases, loss of license or even prison. Sweden is a country that consistently strives to build a perfect security system.

4. AIR TRANSPORT

In all modes of transport measures are taken to avoid dangerous situations and improve safety. The level of safety in civil aviation, maritime and rail in Sweden is at a very high level. The Swedish aviation - Aviation Administration (CAA) is collectively responsible for the movement of aviation. Just as in road transport management also it aims to allow the operation of a safe, effective and financially responsible for the aviation system environment. The CAA agrees policies, controls and issue licenses. Also has the task of supervising the movement of aviation with special emphasis on safety. He is also all kinds of studies and observations concerning the development of the aviation market. It works internationally on issues related to air transport. The Swedish air transport and its security is at a very high level. The last accident with Sweden citizen took place 2001 years in Italy. There was then a collision with another aircraft. The last incident in work services in transport was in 2006- 4 peoples died. Average number of accidents involving machinery is around 5 people per year. It is worth noting that the largest number of fatalities involving private aircraft. For the Swedish air transport safety and the safety of passengers is a priority factor.

5. MARITIME TRANSPORT

The safety of maritime transport in Sweden is on very high level. The unit is watching over the Swedish Maritime Safety Inspectorate (SMSI), which promotes safety at sea and protection of the environment. SMSI issues regulations on maritime safety in the safety of ships, prevention of pollution from ships maritime traffic and maritime security. The Board SMSI in the international arena is an active participant in maritime safety, in particular the International Maritime Organization IMO. After the terrorist bombing in the United States September 11, 2001 he contributed to the IMO annex "ISPS Code", which is designed to protect against external threat.

ISPS Code prevents most of all:

- damage or destruction port facility
- carry away or intercept ships
- smuggle weapons
- using vessel as a weapon, etc.

This code is used by passenger ships in international traffic, cargo vessels, mobile offshore drilling.

Apart from the laws and regulations of the EU maritime transport, Sweden performs consistently three basic requirements in ports. First : duty to carry out regular security controls at ports.

Another constant requirement is that the security plan must always be prepared for three levels of security. They always have to be approved by the Swedish Transport agencies. Level I is a standard situation, Level II means an increased level of safety, level III is likely and imminent threat. Then the Swedish National Police Board decided in agreement with the Swedish Transport Agency, which level applies to the Swedish ports. This plan must always specify how work is organized and that the safety measures are applied to protect themselves from danger. Vehicles must always be presented to the three levels of protection where higher levels include increased degree of control and supervision.

The last important element is the training of port security officer PFSO. In Sweden it must be attributed for each port facility. PFSO is responsible for ensuring that security plans are developed and applied that employees are trained and in constant contact with the person or people who have equivalent positions on board ships.

Regularly research reports are prepared to find out first of all what happened and what led to the accident and try to prevent them in the future.

Because 95% of the Swedish trading done using sea transport as in this field are stored all safety methods.

Railways in Sweden is also high, here is supervised railway safety and subway. It also controls the expenses and fees associated with the use of infrastructure. It is also monitored infrastructure capacity and allocations. They also investigate whether the activity is in turn provided in an appropriate way. An important role is also to ensure that adequate records were carried out rolling stock and infrastructure in Sweden.

Rail safety is first people safety. Rail transport is also very often used, as ideal place for suicide and it's a problem encountered around the world in the field of transport. Construction safety always turn must also take this aspect into account. We can distinguish 5 categories :

- passengers
- rail workers
- persons killed on crossing / railway crossings (at the track)
- persons killed in the place where being is not allowed
- other people.

6. RAILWAY SECURITY SYSTEM

In Swedish railways security system is highly integrated and each accidents need to be reported to the relevant institutions. In the event of a major accident or the possibility of its occurrence Swedish Transport Agency is obliged to report this to the Swedish Accident Investigation Institute. Reported accidents or exposure to risk is used for risk assessment. All proceeds of risk assessment are the basis to take action and decisions, which companies and areas of the department of roads and railways should focus its supervision.

The Swedish railways a very important factor shaping security is also a market surveillance. It was created in order to secure and continuous monitoring of compliance with the essential requirements, among others, health, safety, reliability, availability, compliance, and environmental protection. This surveillance activity takes the form of control or creates a subsystem that is used for some time.

Sweden also have regulatory functions and monitoring of the market.

It was created mainly because of the need standing over patterning and checking whether the current market requirements are met on an ongoing basis. Monitoring the development and operation

of the market in relation to the political expectations and the dispute is a top priority of rail transport in Sweden.

This feature leads to an effective railway market in a healthy competition and a level playing field. The table below presents the scope of activity of this function.

Tab. 1. Monitoring of railway system

Market monitoring	Control function	Arguments and Conditions
Sector analysis: -railways companies -infrastructure manager	Risk-based on supervision - allocation of ability -prices -services	
Competition restrictions	Separate accounts	

Keeping, improving and advancement current Swedish security system in turn are the three main objectives of safety oversight. The main aim is to continue to control the security system and risk management system is working properly and that the company can discover and making corrections of errors and shortcomings.

The Swedish state is a country that wants to build an integrated system of transport safety. In 2007, the Swedish Parliament presented project which connect existing inspectorates aerospace, rail, sea and road in one Inspectorate for Transport. According to Swedish experts unite all modes of transport in one will lead to intensification of activities for the security and give it a higher profile. This decision is undoubtedly of utmost importance for road transport, which each year brings the greatest losses measured by the number of accident victims. Today the project is approved. Date of commencement of work by the new inspectorate is 1 January 2009. The decision to adopt the draft is a result of the "vision zero", the aforementioned policy with respect to all modes of transport resulting from the lack of social acceptance for fatal accidents in transport.

Swedes believe that an integrated inspectorate will contribute to a better exchange of information and experience between the four sectors and all kinds of work on development of a safe transport system will be easier. The aspirations of the new structure is primarily to accelerate work on developing common throughout the transport sector safety culture. So that, as in aviation security was adopted as a prerequisite to use the system. Any action aimed

at increasing the capacity and reduce travel time, it was always done under the strict safety regulations.

SUMMARY

Activity which take Sweden, proved to be a success. Developed safety management systems are effective. Thanks to the efforts that have been presented in the article conclude that Sweden in terms of accidents is one of the safest countries in Europe.

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Zarządzanie systemami bezpieczeństwa w transporcie w Szwecji

Artykuł ukazuje skuteczność zastosowanych w Szwecji systemów bezpieczeństwa w transporcie. Wprowadzenie nowych metod zarządzania transportem uczyniło go jednym z najbezpieczniejszych w Europie. W artykule ukazano minimalizację ryzyka wystąpienia niebezpiecznych zdarzeń a co za tym idzie znaczne zmniejszenie liczby ofiar śmiertelnych dzięki skutecznym metodom zarządzania.

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