



Horyzonty Polityki
2018, Vol. 9, N° 29



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DOI: 10.17399/HP.2018.092905

Swedish Policy of Road Safety

Abstract

RESEARCH OBJECTIVE: The scientific goal of the article is to analyze traffic safety policy, in a problem-chronological perspective, as part of the Swedish “welfare state” model, with particular emphasis on internal political and social factors.

THE RESEARCH PROBLEM AND METHODS: In exploring the issues of road safety in Sweden, the author used a functionalist approach to examine the relationship of political forces affecting their shape. The genetic method has allowed to mention qualitative factors that are the foundations of Swedish policy. Institutional and normative approach with regard to the characteristics of decision-making processes, law-making processes resulted in a system analysis in line with the theoretical model proposed by David Easton. Each stage of the legislative process has been followed – from the change initiative to the entry into force of the “Vision Zero”. The method of content analysis and the institutional and legal method served to illustrate the role that it has for Sweden for 20 years.

THE PROCESS OF ARGUMENTATION: Ensuring broadly understood, multi-tasked road traffic safety is today a prerequisite for harmonious economic and social development of the country (for example, due to the cost of treatment of accident victims, but also the legitimacy of authority, whose task is to ensure safety).

Suggested citation: Lieder, W. (2018). Swedish Policy of Road Safety. *Horizons of Politics*, 9(29), 79-96. DOI: 10.17399/HP.2018.092905.

RESEARCH RESULTS: The necessity of introducing a nationwide road safety strategy was convinced by all the groups that sat in the Swedish parliament in 1997 (as evidenced by its voting through acclamation). The consolidation attitude of many social groups, institutions and individual road users, promoted by the Vision Zero, resulted in considerable successes. First of all, the number of fatalities in road accidents in 1997-2012 dropped by 48%. At the same time, the number of people who suffered minor injuries in the same period as a result of road accidents has increased. This testifies to the correct decisions of Swedish strategists who were already well aware in 1997 that it is impossible to eliminate accidents as such (which is why they focused on reducing the most tragic effects).

CONCLUSIONS, INNOVATIONS, AND RECOMMENDATIONS: The Vision of Zero, which is now a general philosophy of approach to road safety issues in Sweden, thanks to its efficiency and effectiveness has become not only a source of pride on the part of the Swedes themselves. Few (Sweden's population for the first time reached a ceiling of 10 million inhabitants in January 2017), although the very innovative Swedish society developed an innovative model of cooperation between private and public sector entities as well as every single user of transport infrastructure that contributed to the radical decline the number of accidents resulting in death or serious injury. Thus, once again, the descendants of the Vikings became a role model for other nations – both among European Union countries and on a global scale.

KEYWORDS:

Sweden, safety, transport, Welfare State, Vision Zero

INTRODUCTION

The main principle implemented since 1997 “Vision Zero” (“Noll-vision”) is to prevent the most tragic events with fatal consequences and serious health detriment. The target of the “Vision” is just “zero” of such tragedies.

The rapid growth in wealth of Scandinavian societies in the long period of post-war prosperity meant that more and more people could afford not only to travel by rail, but to buy their own car. This boom for owning cars (chart 1) resulted also in an increase in an intensity of the road traffic.

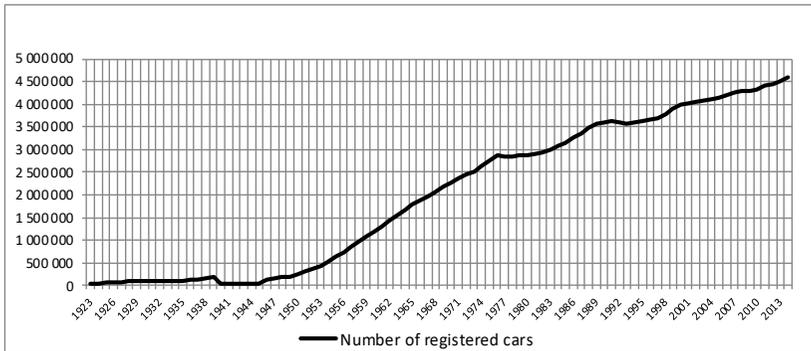


Chart 1. Number of registered passenger cars in Sweden during the years 1923-2014.

Source: Statistiska centralbyrån.

As shown on the Chart 1 after the end of World War II the number of cars on Swedish roads was rapidly increasing. A momentary halt or a slight decrease occurred only twice. In both cases the effects of economic crises were to blame. The first slowdown: 1976-1982 was caused by the oil crisis of 1973 and second was caused by the crisis that occurred in the first half of 1990s in Sweden.

On May 10, 1963, the Riksdag (Swedish Parliament) decided that Sweden will change the organization of traffic to right-handed (Kincaid, 1986, p. 160). In Europe only in Sweden, Cyprus, Iceland, Ireland and the United Kingdom cars moved on the left side of the road at that time. As the decision was very unpopular, it was also decided to appoint the State Committee of right-hand traffic (Statenshögertrafikkommision, HTK), which task was to prepare, conduct and continue the changes related to the introduction of the new traffic organization. The governor of Skaraborg region Bertille Fallenius was the head of this commission. The commission received four years for the implementation of interdisciplinary solutions aimed at alleviating the social resistance in relation to changes in traffic rules and for technical procedures related to this changes. It was agreed that the change of traffic organization would be held on September 3 (Sunday), 1967.

In the years 1963-1967 Statenshögertrafikkommision together with the nationwide and local media conducted an intensive information campaign on road safety. Hundreds of television and radio

programs as well as newspaper articles were created to help the public understand the consequences of insufficient care in traffic and results of accidents. Some of the messages were even directed to children. This choice was explained by the big impact children have on their guardians (especially in the case of remembering to fasten seat belts) (Nygren, 2013, pp. 66-67). The idea of improving safety on Swedish roads also became a very frequently raised topic in the election campaigns of that period. Some joked at the time that the Social Democrats, hoping to improve the results of the polls, “twist sharply to the right.”

Also in 1968 the Swedish authorities, not wanting to lose the experienced and effective experts in the field of road safety, set up the National Highway Traffic Safety Administration (Statenstrafiksäkerhetsverk, TSV). The creation of TSV was a direct result of dividing the Management Board of the Royal Institute of Civil Engineering (Royal väg – ochvattenbyggnadsstyrelsen; existed between 1883-1967). In 1967 the Royal väg – ochvattenbyggnadsstyrelsen was divided into two new organizations. The responsibility for creating an effective and economically sustainable transport system was placed on the State Highway Administration – Statensvägverk, while issues of road safety, training and examination of candidates for drivers were given to the Statenstrafiksäkerhetsverk (merged part of the Royal väg – ochvattenbyggnadsstyrelsen and Statenshögertrafikkommission). Thus, Swedes gained the first state institution whose main aim was to study and focus on the implementation of measures to increase road safety.

Of course, institutions that have been investigating road safety issues and contributing to their implementation over the years have undergone a reorganization, often changing their names. One of the most powerful and effective projects ever implemented by the Swedish institutions is the Vision Zero Initiative and related concepts.

“VISION ZERO” (NOLLVISIONEN)

In 1993 the government agency responsible for the maintenance and construction of new sections of roads (Swedish Road Administration or Vägverket) was incorporated into the Trafiksäkerhetsverket

(National Traffic Safety Administration). One year later in Sweden, after a 3-year break, the Swedish Social Democratic Labor Party again came to power. The Ministry of Transport and Communications was taken over by Ines Uusmann, who repeatedly stated that during her term of office she would pay special attention to increasing safety on Swedish roads.¹

Thanks to the international exchange of experiences and a number of researches conducted in Sweden, the prevailing view that universal striving to eliminate accidents altogether (widespread in most countries) is ineffective and unattainable. Existence of too many factors contributing to the occurrence of an accident or collision (from technical through atmospheric to human) has shaped the first and most important of the paradigms of the Zero Vision Initiative – focusing efforts primarily on successively reducing the number of fatalities and serious injuries in road events. In turn, the meaning of the name itself summarizes the purpose to which this initiative strives – to completely eliminate just such effects of road events.

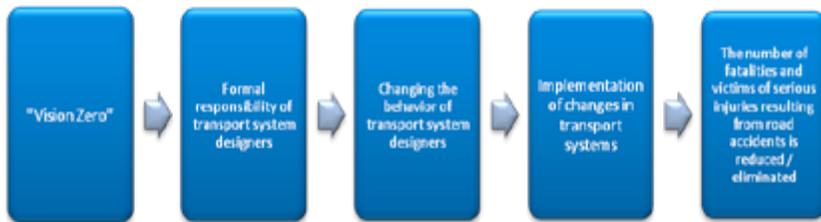
The “Vision Zero” initiative was welcomed by the Swedish Parliament, which on 9 October 1997 established a foundation for the initiative to increase safety on Swedish roads. An important task of the foundation was the interest of a wide range of experts, entrepreneurs, architects, road users and other people involved in traffic safety issues through a platform for exchanging views and interactions. The Riksdag summarized the resolution, which was adopted by acclamation:

The long-term goal for road traffic safety is that nobody is to be killed or seriously injured as a result of traffic accidents in the road transport system. To achieve this goal, the design and performance of the road transport system is to be adapted to the requirements of Vision Zero. Responsibility for road safety should be shared between road users and system designers, including road managers, vehicle manufacturers and people responsible for commercial road transport (OECD, 2006, s. 231).

1 This can be seen, for example, by its patronage over a major event such as “the Transportation Conference, traffic safety and health: the new mobility” (Göteborg 1995), which launched an international network of meetings (later in Brussels and Washington).

Since then, “Vision Zero” has also become a long-distance plan to improve safety on Swedish roads.

In the decision-making process related to the implementation of transport systems, the Zero Vision planners determined the responsibility of the designers; the intentions of the Zero Vision Strategists became formal regulations that affected the behaviour and decisions of designers that ultimately contributed to increased safety (Belin, 2012, p. 85) (Graph 1).



Graph 1. Stages of road safety policy implementation in Sweden.
Source: Belin & Tillgren, 2012, p. 85.

Of course, the effectiveness of this process is conditioned by a multitude of external factors. These include: the political situation in the parliament (ability to get proposed changes accepted), conflicts of interest (some solutions can be very expensive and therefore it is very important to base them on solid and convincing arguments; interfering with already existing regulations – e.g. environmental protection), flexibility of government and parliamentary activities (the legally defined responsibilities of transport system designers can often limit the possibility of implementing large complex projects – the role of the executive and the legislature to improve their actions is very important) (Belin, 2012, p. 85).

In 2003, the Swedish government established the Road Traffic Inspection (Vägrafikinspektionen), the first such institution in Europe. The tasks of the Inspection included:

- Monitoring and analyzing conditions that could significantly affect the layout and functioning of the road transport system by adopting a holistic perspective on road safety objectives by authorities, local authorities and other stakeholders.

- In the dialogue with the above mentioned organizations, to ensure that they apply systematic procedures to prevent road accidents leading to death or serious injury.
- Collaboration with other bodies to improve road safety.
- Initiate research and development in the road safety sector and monitor relevant research for inspection activities (Bergfalk, 2008, pp. 81-85).

Inspection was also required to visit companies employing drivers (both fleet and transport) and advise managers on the best, most effective, best-engaged driving practices (Cunningham, 2008, p. 162).

As the “Vision Zero” became a common long-distance destination for all modes of transport, based on the 2007 decision, as of January 1, 2009, Vägtrafikinspektionen was incorporated into the newly established Swedish Transport Agency (Transportstyrelsen). Transportstyrelsen is responsible for the preparation and enforcement of the “Zero Vision” principles common to the authorities, companies, organizations and the citizens themselves. The agency consists of former control bodies for road, rail, air and sea transport (Vagland, 2011, p. 226).

In 2009, the Parliament decided to merge Vägverket, Banverket (Swedish Railway Administration) and parts of the Statensinstitut-förkommunikationsanalys (Swedish Institute for Transport Analysis and Communications) and created the Trafikverket (Swedish Transport Administration). The decision entered into force in 2010.

Trafikverket is a partially independent, state-funded agency. Long-term planning of maintenance, construction and modernization of road, rail, air and water infrastructure is its long-term task. In addition, it is also responsible for implementing security systems. At the request of the government, Trafikverket provides ready-made solutions in a highly liberal way – e.g. in cooperation with private companies or foreign partners (Great Britain: Department for Transport, 2013, p. 23).

What solutions have so far been proposed by “Vision Zero” experts? How have they changed the transport systems?

First and foremost, the issue of speed and its impact on road events was of concern. Experts using data from the research conducted over a very wide time span (1958-2007) developed models focusing on the risk of fatalities in the event of pedestrian overtaking.

According to the Finnish researcher Eero Pasanen, pedestrians have a 90% chance of survival if the hitting vehicle moves at speeds of up to 30 km/h, but if the speed is 45 km/h the chances are dropped to only 50% (WHO). One of the latest research by Erik Rosen and Ulrich Sander, published in 2009, concerns 490 people who were hit on German roads between 1999 and 2007. The results of the study were used to create a graph to illustrate the risk of death as a result of the deduction in relation to the speed at which the car travels (Rosén, 2009, pp. 536-542) (chart 3).

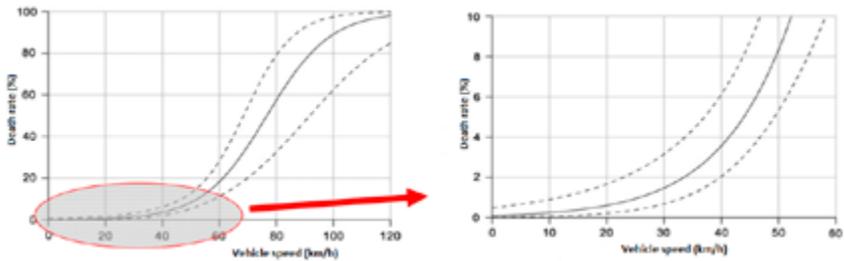


Chart 3. Speed of vehicle movement and probability of pedestrian death.
 Source: Rosén, *Pedestrian Fatality Risk*. Retrieved from: http://nacto.org/docs/usd/pedestrian_fatality_risk_rosen.pdf (access: 01.07.2018).

In order to force the drivers to reduce speed, a number of small and large investments were used. Release thresholds, islets, and roundabouts arising from intersections are used to reduce speed and increase driver attention. Roads, pylons and other elements that could pose a danger to vehicles that are out of the carriageway for some reason (such as falling out of the road) disappear from the surrounding environment.

Traditional energy-consuming barriers are replaced by steel ropes unbuckled on the posts. They are much safer, more efficiently absorbing kinetic energy and cheaper to buy and operate. Frequent sight on the Swedish roads is also the line separating the opposite lanes. This is ideal for 2 + 1 roads (alternately, alternating in two-lane traffic). The rope, which is designed to prevent overtaking (and practically eliminate the most traumatic accidents – frontal collisions), does not cause traffic problems, as every few kilometers the road splits and allows for safe overtake of a slower vehicle (eg agricultural machinery).

One of the most important engineering principles implemented by the “Vision Zero” experts is “merge through separation.” Planners are pressured to create compact transport systems that will separate users from two speed ranges – up to 30 km/h and over 30 km/h. Therefore, pedestrians and cyclists are traveling on pavements and cycling paths adjacent to roads, but separated from the roadway, for example by the aforementioned steel ropes. The same goal is also to build pedestrian and cyclist crossings – costly, but non-collision tunnels, footbridges guaranteeing a safe crossing (Johansson, 2009, pp. 828-829).

A number of technical innovations over the years have also been presented by the Swedish automotive group Volvo. The point here is primarily three-point seat belts patented and distributed since 1958 by Swedish engineer Nils Bohlin (Hutchinson, 2009, p. 147). Among the most technologically advanced solutions are the City Safety system, which detects other vehicles, pedestrians, bicyclists, and automatically activates the brakes when necessary (in the case of speeds up to 50 km/h, the vehicle decelerates at 50 km/h in the event of a collision. With another vehicle also activates the braking system, but only to reduce the damage), Blind Spot Information System (BLIS) – informing about finding a vehicle in the so-called. “Dead box,” Active High Beam – active traffic lights not dazzling other drivers, pedestrian airbag – activated in the event of pedestrian overrun (mounted on the mask face with front glass, also bars A; The system detects the edges of the roadway – prevents the driver from falling asleep, emitting a beep when approaching the lanes, approaching the barriers (if the driver does not correct the track – the car will do so by itself). Also, systems that facilitate difficult maneuvers (eg parking assist), such as an active cruise control system connected to City Safety or a road marking system (including speed limitation), are also noteworthy.

Some of the Volvo models also feature a large animal detection system. And it’s not just an ecological issue, but above all a great danger in the case of cutting off animals whose torso is relatively high (eg elk). The mass of such an animal is large enough to easily penetrate the front window, landing in the cabin and becoming a lethal threat to the occupants.

As Volvo’s chief safety engineer, Lotta Jakobsson, said on the occasion of the launch of the second generation of the XC90 in 2014:

“Volvo’s ambition is to make no one else dead or be seriously injured in a new Volvo car by 2020” (Volvo Car Group). It appears that the Swedish concern is on the right track. At Volvo Safety Center in Gothenburg (operating since 2000), more than 400 crash tests are performed annually (Volvo Car Group), exploring the effectiveness and strength of the car structure. Currently, the second generation XC90 remains the vehicle with the highest overall safety rating in Euro NCAP testing history.

THE EFFECTS OF SWEDISH POLICY OF ROAD SAFETY

The “Zero Vision” experts have contributed to the beginning of the perception of victims of road accidents in public discourse as a public health problem. The transport systems have changed radically – they are not designed from now on for maximum efficiency, but above all, the emphasis is on the safety of users (human life and health of the highest value). Therefore, architects, planners, road engineers must adapt them to the human factor – the infrastructure must eliminate human error and assist the driver at the moment the fault is committed (OECD, 2002, p. 22).

“Zero” strategists did not specify exactly when no Swedish road user would die or experience serious injury on the road. However, this is expected to happen by 2050 (Thurston, 2014, p. 11) (though “Vision Zero” positively avoids submitting any dates). In the years 1997-2014, the number of fatalities in road accidents has fallen by 50%, so it is no longer possible to treat these announcements as “promises of promise.”

Between the 1950s and the mid-60s the number of fatalities in road accidents in Sweden increased drastically. In 1967 suddenly their number dropped to 1077 (compared to 1966 there were 1313). This can be explained by the fact that fewer people chose to ride their vehicles in fear of a new, still integrated right-hand drive. On the other hand, the four-year information campaign by Statenshögtrafikkommission was undoubtedly positive. However, the ever-increasing number of vehicles registered as early as 1968 contributed again to the high number of road tragedies – 1262 fatalities.

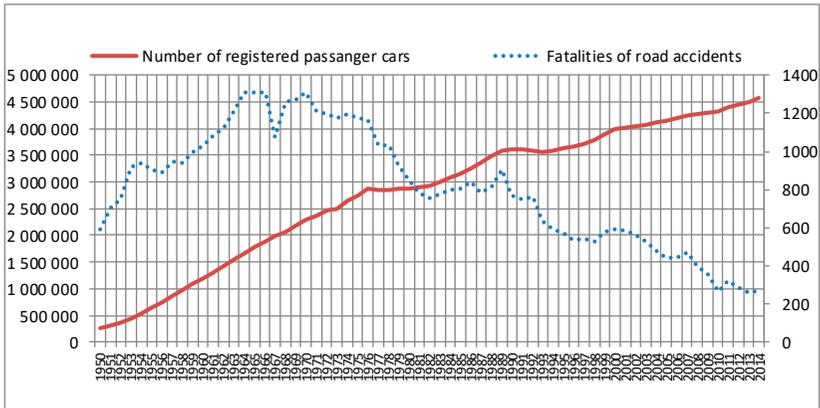


Chart 4. Fatalities of road accidents and number of registered cars in Sweden in the years 1950-2013.

Source: own study based on Road traffic injuries 2013, Transport analysis, access: <http://www.trafa.se/en/Statistics/Road-traffic/Road-traffic-injuries/> [01.07.2018] and Fordon på väg, access: <http://trafa.se/en/road-traffic/vehicle-statistics/> [01.07.2018].

With the speed limits introduced in the 1960s, the number of fatalities diminished until the mid-1980s. In 1970 there were 1307 and in 1983 it fell to 758. The situation worsened in the late 1980s with the onset of the economic crisis. Since 1990, however, a relatively steady downward trend has been observed. How has this tendency been influenced by the implementation of solutions in the concept of “Vision Zero”?

There is a visible further downward trend in the number of victims, of which there were 547 in 1997 and 285 in 2012. Thus it decreased by 48%. With the decline in the number of fatalities, the number of accidents alone has decreased as a result. The number of fatalities per accident was slightly increased, but in 1997, 1.097 deaths per accident occurred in 1997; In 2012 not much more, because 1.105.

Chart 5 shows the decrease in the number of victims who suffered serious injuries as a result of traffic accidents.

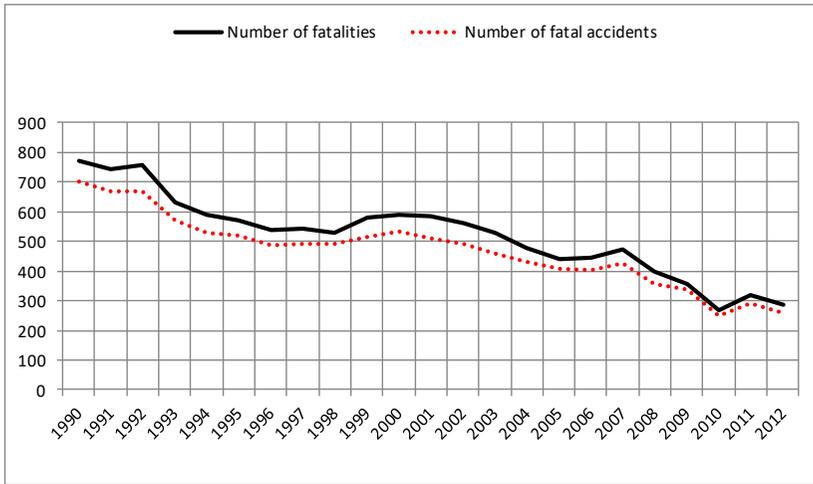


Chart 5. Number of fatal accidents and fatalities in road accidents in 1990-2012.
Source: own study based on Statistisk årsbok för Sverige 1990-2014.

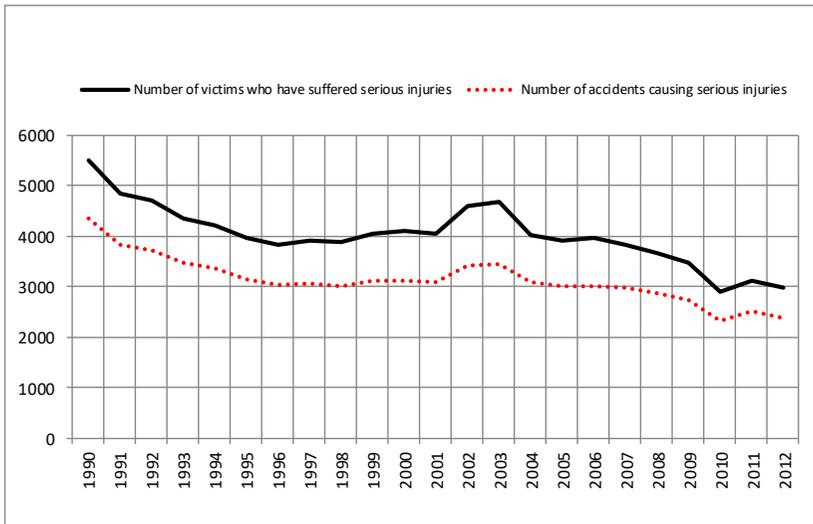


Chart 6. Number of accidents causing serious injury and number of people who suffered serious injuries in the years 1990-2012.
Source: own study based on Statistisk årsbok för Sverige 1990-2014.

As with the number of fatal accidents, the accident resulting in serious injury to road users rate has also been reduced. The number of casualties has fallen by 24% (from 3917 victims in 1997 to 2979 in 2012). The number of people affected by a significant health impairment also fell in one accident – in 1997, 1,277 were injured; in 2012 – 1.25.

The above charts clearly show the effectiveness of the strategies and the executives of the “Vision Zero” assumptions. However, victims of accidents do not share only fatal and serious injuries. Gradually, the next category of accidental consequences is little harm to the health of the victims. While every damage to health is absolutely pejorative, the increase in accident victims listed in chart 6 paradoxically... can be enjoyed. Why? Because it proves a particular downward trend in the number of victims in terms of the severity of the effects of traffic accidents and thus confirms the “visionaries” in convincing the appropriateness of the shape of the implemented policy.

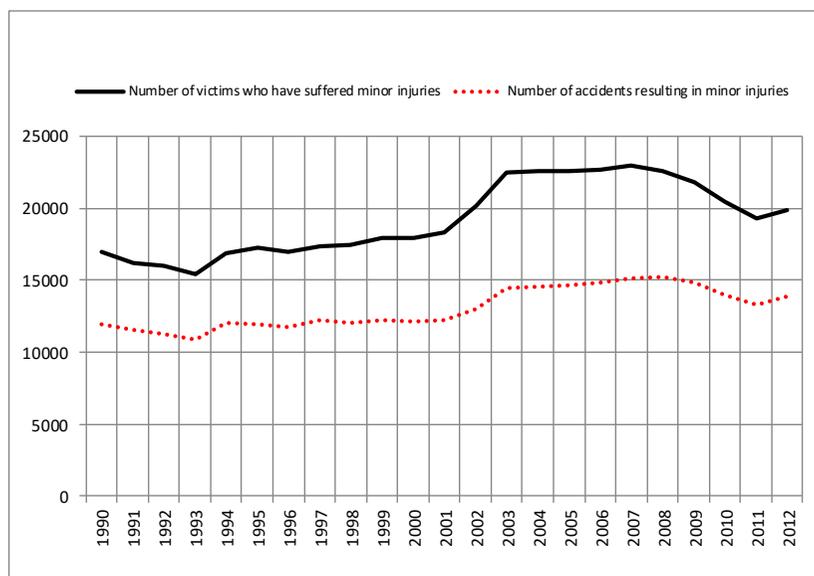


Chart 7. Number of accidents resulting in minor injuries and number of people who suffered minor injuries in accidents in the years 1990-2012.

Source: own study based on Statistisk årsbok för Sverige 1990-2014.

Since 2000, accurate statistics on the impact of speed on the number of deaths and the degree of injury to health in road accidents have been conducted (charts 8, 9). The data contained in the charts only relate to confirmed cases of specific effects on the life and health of the participants.

Chart 8 shows the decrease in casualties in virtually all speed ranges (except for the relatively high number of fatalities that have been lost as a result of speeding at 30km/h). In the individual compartments, the number of deaths was 31-50 km/h – 47%, 51-70 km/h – 62%, 71-90 km/h – 66%, 91-120 km/h – 49%. Thus, the 12 years of “Vision Zero” activities have undoubtedly contributed to a greater awareness of the lethal threat of excessive speed.

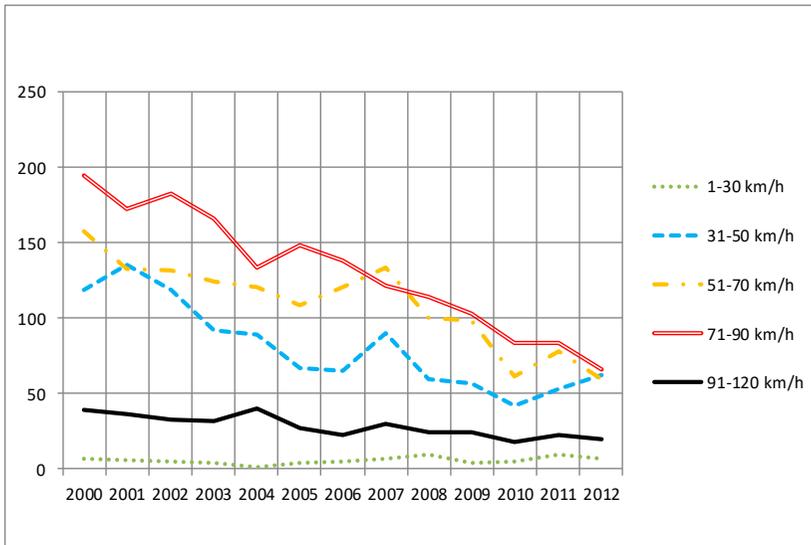


Chart 8. Number of fatalities of road traffic accidents depending on the speed of vehicle movement in 2000-2012.

Source: own study based on Statistisk årsbok för Sverige 2001-2014.

On the other hand, it fell in the case of users travelling at speeds in the range of 31-90 km/h in turn: 45% for the range of 31-50 km/h, 36% – 51-70 km/h and 39% – 71-90 km/h.

The data in chart 9 on the number of casualties resulting in minor injuries is even more varied. The apparent fall in the number of

victims ranges from 31-50 km/h and is 22%. The second downward trend is observed at 71-90 km/h – 16%.

Of the increase apparently ranges from 91-120 km/h – 111%. Also the number of victims travelling at speeds up to 30km/h – by 129% and 51-70km/h – by 5% has also increased.

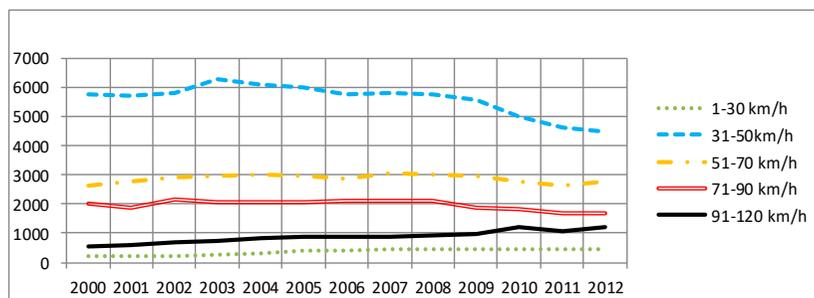


Chart 9. Number of victims of traffic accidents resulting in minor injuries, depending on the speed of the vehicle in the years 2000-2012.

Source: own study based on Statistisk årsbok för Sverige 2001-2014.

All of the above-described effects of “Vision Zero” have resulted in the annual decline in traffic in Sweden of 100,000 people (2.36).²

As Käre Rumar writes: “The road safety efforts are to be anchored in the local community through direct dialogue with and influence of its citizens” (Rumar, 1995, p. 76). Therefore, the general national road safety strategy must reach every region of the country. Discussions on local strategies in line with the principles adopted at government level are enriched with guidelines presented by local governments and communities. A very important role is also played by local police, which not only enforces the law, but also collects data on accidents and indicates and gives opinions on potential solutions aimed at increasing safety.

2 For the sake of accuracy, according to statistics, the Maldives took the first place in this ranking, but due to the incomparably smaller area of the island country and thus the less traffic, the length of the roads, Sweden was considered the leader of this compilation (Road traffic accidents. Death Rate Per 100.000. Retrieved from: <http://www.worldlifeexpectancy.com/cause-of-death/road-traffic-accidents/by-country> (access:15.07.2017).

The tradition of a collective approach to the problems of road safety at the local level manifests itself today in a multifaceted way. It is accompanied by synergy of public and private entities, commitment from local authorities, but also entire communities. And although depending on the population density, climate characteristics in given regions, communication accessibility, and infrastructure development, these solutions may differ – the invariably main principle of each of them is to eliminate the most tragic events and to bring the “Vision Zero” to effect. The only way to achieve this goal is the holistic cooperation of all road traffic entities, both at the central and local level.

The Swedish security policy can be defined in two words – “Vision Zero.” Today’s shape is a reflection of the concept that has been implemented since 1997, which today is a way to change the collective image of the approach to transport policy. Its main principle – the pursuit of zero deaths and victims of serious injuries and the transfer of responsibility for road safety (now largely occupied by road users) to politicians, architects, planners, and designers – these factors contributed to a significant decrease in the number of road accident victims.

“Vision Zero” is today a general philosophy of road safety in Sweden (OECD, 2006, p. 231). Its performance, efficiency and very positive response from politicians and Swedish society itself makes the Vision Zero also adapted in other countries (including the United States, Norway, Finland, Australia, China, Malaysia, Netherlands, Japan).

Is “Zero Vision” an effective policy? Between 1997 and 2012 the number of fatalities fell by 48%. However, the full victory or failure of this policy will be known when retrospectively we can say whether the number of fatalities and seriously injured on the Swedish roads will be equal to zero.

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