

Monitoring performance indicators in order to reach Sweden's new road safety target-a progress towards Vision Zero

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The fundament of Swedish road safety work is Vision Zero, a strategic approach towards a safe system where no one is at risk of getting fatally or severely injured while using the road transport system. In order to implement the vision and to maintain progress, an interim target has been set up for the year 2020 by the Swedish parliament. The interim target states an ambition to reduce fatalities by 50 % and the number of severely injured by 25 % between 2007 and 2020.

This article will describe how these objectives were obtained and how this interim target is a part of a new management approach to road safety in Sweden.

1. Lessons learnt from the past

It is not the first time an interim target has been used to try to fasten the reduction of road fatalities in Sweden. Sweden had a target of maximum 270 in 2007, a number that was significantly exceeded. The failure to reach the target was examined in an evaluation made in 2007. The evaluation stated that the interim target for 2007 was 1) not agreed upon among the most important stakeholders, but only a goal for the state agency SRA. It also stated that 2) the target itself was not enough in order stimulate stakeholders to take action and first and foremost 3) the target was not monitored as it should during the target period; follow-ups were not made regularly or systematic. As a response to this critique the new interim target is the result of stakeholder collaboration. A group of stakeholder representatives has been involved in drawing up the new road safety work. It contains of systematic follow-up on performance indicators and a management by objective approach.

2. Obtaining a new interim target

There are various conditions indicating how safe the traffic system is. Road safety analysis and research has over the years come to the conclusion that the level of safety in a modern traffic system can be described by looking at the state of the infrastructure, the vehicles and the traffic users' compliance to rules and recommendations.

When calculating the possible reductions in road traffic the SRA started by defining such indicators. By selecting indicators with known effect on road fatalities, an interim target can be obtained by calculations. A team of analysts and scientists from Sweden and Norway put together a proposal. The following 6 indicators were selected, with the following known (approximate) effects on fatalities:

Indicator	Exact measurement	Objective	Starting point	Effect on fatalities
Speed	Proportion of traffic volume complying speed limit	100 %	43 %	150
Seat belt	Proportion of traffic volume wearing seat belt	99-100 %	96 %	40
Car safety	Proportion of cars sold with the highest EuroNCAP score	100 %	60 %	40
Rural roads	Proportion of roads with one of the highest EuroRAP scores		Undefined	50
Urban roads	Proportion of urban roads with maximum speed limit at 30 km/h	100 %	Undefined	30
Drink-driving	Proportion of traffic volume with a driver DUI	0 %	0, 24 %	50
Bicycle helmet	Proportion of cyclists wearing helmet	100 %	25 %	10

With these indicators and their effects as a starting point, collaboration started with relevant national stakeholders. Reasonable objectives for each of these indicators were formulated and some new indicators were created. Some data were updated as well. The result of the collaboration can be seen in the table below. The calculated effects are approximate. For references, see TOI report 930/2007.

Indicator	Exact measurement	Objective	Starting point	Effect on fatalities
1. Speed (state roads)	Proportion of traffic volume complying speed limit	80 %	43 %	88
2. Speed (municipal roads)		Increase of 86 %	Undefined	29
3. Drink-driving	Proportion of traffic volume with a driver DUI	99,9 %	99,76 %	30
4. Seat belt	Proportion of traffic volume wearing seat belt	99 %	96 %	40
5. Bicycle helmet	Proportion of cyclists wearing helmet	70 %	25 %	10
6. Car safety	Proportion of cars sold with the highest EuroNCAP score	100 %	60 %	90
7. Safe heavy vehicles	Proportion of heavy vehicles sold with emergency breaking system	100 %	0 %	25
8. Rural roads	Proportion of traffic volume on roads with minimum 90 km/ h that are divided	75 %	52 %	50 (+12 for other measures on rural roads)
9. Urban roads (crossings for pedestrians and cyclists)	Proportion of urban roads with maximum speed limit at 30 km/h	Not defined	25 %	
10. Urban roads (crossings for cars)	Proportion of urban roads with maximum speed limit at 30 km/h	Not defined	50 %	
Urban roads, sum				30
11. Rapid and qualitative emergency care	Time from alarm to care	Not defined	-	-
12. Non-fatigue	Share of responding car drivers who claim they've almost fell asleep behind the wheel in the past 12 months	6 %	12 %	
13. Valuing of road safety				
Indicator 11, 12, 13, sum				20

Some indicators were in the mix due to more political and symbolic concerns, and not for the reason of known effects.

The new proposal was reviewed by the analysts and scientists and they accepted the construction. The sum of the calculated effects on deaths for all indicators is 424. However, the combined effects of these indicators are less than the sum of the effects due to the fact that some indicators count the same kind of accidents. A factor of 0,6 were used to adjust for this (Elvik, 2009). This leads to the following:

Combined effect: $424 \cdot 0,6 = 254$

Starting point 460 (average number of deaths 2005-2007): 460

Possible target: $460 - 254 = 206$

Recommended target: 220

When using the average number of deaths for 2006-2008, 440, it leads to a predicted possible outcome of a reduction of fatalities by 50 %. This was also the adopted road safety interim target by the Swedish parliament: cut the number of deaths in traffic by half between the year 2007 and 2020.

An interim target for severely injured was also adopted, a reduction by 25 % is required until the year 2020. However, this objective is more of an estimate. No calculations were made in order to obtain this number.

3. Making the target enable progress

Monitoring these indicators is the core of the new road safety work in Sweden. To guarantee a qualitative follow-up an international panel of experts evaluates the work annually. There is also two years (2012 and 2016) were the mix of indicators and their objectives will be up for special evaluation.

2.1 Analysis

Monitoring these indicators allows us to have a more holistic and systematic approach to all parts of the road safety work. The whole "machinery" of measurements and analysis will benefit from this approach. Analyzing the indicators enables us to see the whole chain of effects more clearly on a theoretic level:

Road safety measures and external effects → performance indicators → fatalities and severe injuries

The analysis task is to continually try to answer the two questions illustrated by the arrows in the picture above:

What is causing changes in the performance indicators?

Changes in the performance indicators can derive from both external effects and road safety measurements. It is of course the latter that is interesting to be able to distinguish. In order to do so, there has to be knowledge about the external effects. Such effects is mainly originated from economics or/ and demographics.

By gathering and develop knowledge on the effects of economy and demography the effects of measurements can be more easily obtained. As time goes by, and new measurements are being introduced they'll be systematically tested and evaluated by the regular monitoring.

How do changes in performance indicators affect the outcome of fatalities and injuries in traffic?

Traditionally it is the outcome in fatalities and severe injuries that is the object of analysis in road safety research. The number of deaths in traffic and its shifting over the years is relevant to monitor for any country with roads. However, the link between the number of deaths and the state of the indicators is crucial in order to steer the road safety measurements in the right directions. The elaboration of these links is a major part of the analysis task.

By analyzing performance indicators the traditional analysis of the number of deaths and injuries may broaden. The number of deaths and injuries can be divided into groups corresponding to the performance indicators.

2.2 Measurements

Monitoring and analyzing the indicators and the outcome (fatalities and injuries) regularly along with the measures and external effects serves two main purposes. They overlap to some extent but is better understood when described separately, steering purposes and evaluating purposes.

Measurement for steering

Instant measurements on the development are a direct feedback on stakeholders' efforts. These measurements have to be up to date and rapid and they have to be communicated directly to relevant stakeholders. The purpose with these measurements is to stimulate the stakeholders to take action.

Measurement for evaluation

Rapid measurements are not always the most accurate ones. The measurements for steering are not always sufficient for long term evaluation of the safety. The new road safety work in Sweden includes follow-ups of the indicators on national level. These follow-ups take place annually on so called Result conferences. At these conferences valid and correct measurements and a solid analysis of the road safety development will be presented. For this, more than just "rapid" measurements have to be the fundament.

Measurements of some indicators serve these two purposes sufficiently. Other indicators have to be measured in several ways in order to see to that the measurements are both stimulating and accurate enough. An example of such a solution is the measurements of the indicator speed. The measurement for steering is a speed index (measured monthly) monitoring changes in speed at 83 places around Sweden. These places are not exactly statistically representative and therefore assumptions cannot be made about the general mean speed. But it gives information on changes in speed on these 83 spots and the data can be divided into different transport modes (for example heavy traffic). Along with these rapid measurements we monitor mean speed more exact by doing vast speed measurements 3 times during the target period (2010, 2015 and 2019). This measurement are more expensive and serves as an exact evaluation of speed and as a calibrator to the speed indexes that only measure changes in speed at specific locations.

Development of measurements and analysis and the establishment of a "measurement machinery" is currently being completed. Road safety analysts from several agencies and organizations are taking an active part in the effort.

4. Challenges for the future Swedish road safety work

The main challenge of this kind of management by objectives is to make sure that the objectives stimulate the stakeholders to take action. Monitoring development at an indicator level and communicating the status for road safety regularly is a condition - but unfortunately not a guarantee - for the stakeholders' involvement. It is yet to be seen whether this management set up is enough to create the progress needed and achieve the interim targets for the year 2020.

References:

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