

Comparative assessment of speed characteristics in the European Union

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Introduction

The European Commission has put forward a new approach to road safety policy for the decade 2021-2030, highlighting the need of establishing a range of Key Performance Indicators (KPIs) for road safety at European level, are directly related to the prevention of road fatalities and serious injuries. To measure progress on road safety, the most basic – and important – indicators are the outcomes indicators on deaths and serious injuries. In cooperation with Member State experts, a first set of KPIs that relate to main road safety challenges were selected, namely: (1) infrastructure safety, (2) vehicle safety, (3) safe road use including speed, alcohol, distraction and the use of protective equipment, and (4) emergency response. The aim of the KPIs is connected to the EC target outcomes as they provide a much clearer understanding of the different issues that influence overall safety performance.

Within this context, the Trendline project brought together 25 EU Member States and 4 other European countries as observers, for data collection, data analysis, delivery of road safety KPIs and for using these within road safety policies. Trendline was co-funded by the European Union and built on the experience gained in the Baseline project. The objective of this study is the analysis of speed characteristics in the EU countries based on the results of the KPI Speed calculated within Trendline.

KPI Speed

In Trendline, the minimum requirement for KPI Speed was to estimate the percentage of vehicles travelling within the speed limit. Besides this, it was requested to also measure the speed below which 85% of drivers are driving (V85), and the average speed (including standard deviation). The theoretical population for this KPI refers to the percentage of vehicles travelling within the speed limit over the national territory on sections of roads that allow free flowing traffic.

Methodology

The methodological guidelines for the KPI Speed were developed by a group of eight road safety experts that were assigned with the review and adaptation of the respective guidelines developed within the Baseline project. The final methodological requirements were the following:

- KPIs should be presented separately **per road type**:
 - motorways
 - rural non-motorway roads
 - urban roads
- **Vehicle types** to be considered:
 - passenger cars (minimum requirement)

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- buses, goods vehicles (light [less than 3.5t] and heavy [more than 3.5t]) and powered two wheelers are optional
- **Time periods** to be considered:
 - during daytime on weekdays (minimum requirement)
 - daytime at weekends, night-time on weekdays and at weekends are optional
- Absolute minimum for the sample size: observation of **2000 vehicles**
- Minimum 500 per road type or another stratum considered
- Min. 10 locations per stratum, and 2 locations for each strata combination (e.g. road type and time period)
- Need for weighting the results at the observation locations within the stratum but also across the strata; traffic volume data needed.
- Methods allowed within Trendline
 - Any method allowing the measurement of momentaneous speed in **free-flowing traffic** conditions.

Speed data were collected in twenty Member States (MS). It is noted that key results for Denmark and Luxembourg are not taken into account in the results presented in the following section, due to deviations from the methodological guidelines.

Results

All indicators were provided by almost all MS: percentage driving within speed limit and average speed were calculated in all MS; V85 was provided by all MS except Sweden which also provided results for mixed speed limits per road type.

Overall, KPIs on urban roads were found to be lower than those on the other road types. Speed behaviour appears to depend on speed limits by road type, with lower KPIs observed on roads with lower speed limits.

Specifically, on **motorways**, KPI speed varies from 34% to 94%. Among MS with speed limit 130km/h, KPI varies between 45% (Croatia) and 94% (Italy) while for speed limit of 120km/h, KPI is a bit lower varying between 36% (Poland) and 89% (Ireland).

The average speed is between 99 km/h and 135 km/h. Among MS with speed limit 130km/h, average speed varies between 99 km/h (Greece) and 133 km/h (Croatia).

V85 varies between 112 km/h and 152 km/h. Among MS with speed limit 130km/h, V85 varies between 123 km/h (Italy) and 152 km/h (Croatia). Generally, V85 lies between 10 km/h to 21 km/h higher than the average speed.

On **rural roads** KPI speed varies from 29% to 96%. Among MS with speed limit 90km/h, KPI varies from 29% (Latvia) to 96% (Bulgaria). KPIs for speed limit 80km/h are lower.

Average speed of MS with 90km/h speed limit varies between 61.3 km/h (Bulgaria) and 95.5 km/h (Spain).

V85 varies between 75 km/h (Greece and Bulgaria) and 111 km/h (Hungary). In MS with 90km/h speed limit V85 varies between 75.2 km/h (Bulgaria) and 111 km/h (Hungary). In MS with 80km/h speed limit V85 is a little lower varying from 74.9 km/h (Cyprus) to 91 km/h (Netherlands). In general, V85 lies between 7 km/h to 18 km/h higher than the average speed.

KPI speed **for urban roads** varies from 23% (Poland) to 76% (Portugal). Average speed varies between 43 km/h (Greece and Portugal) and 58.7 km/h (Poland). V85 varies between 50 km/h (Greece and Portugal) and 71 km/h (Poland). Again V85 is about 6 km/h to 16 km/h higher than the average speed.

All MS results are considered **comparable** for the minimum requested indicators since only minor methodological differences were found. However, differences in speed limits per road type between MS make comparisons more complex.

Speed behaviour depends also on **time period**, however, statistically significant differences were observed only in few countries.

KPIs on **motorways** do not differentiate significantly among different time periods for almost all MS; the same applies for average speed and V85.

KPIs during **daytime** at **weekends** are lower than on weekdays in 5 MS (BE, CY, CZ, EL, FI).

KPIs on **rural roads** are lower during **night-time** (weekday/weekend); though there are not statistically significant differences in some MS.

Average speed and V85 do not differentiate significantly by time period on rural roads. However, in few MS, they are somehow higher during night-time.

KPIs on **urban roads** are lower during **night-time** on **weekdays** in most MS; though not statistically significant differences exist for all MS.

Average speed and V85 do not differentiate significantly among time periods on urban roads in almost all MS.

Concerning **vehicle type**, KPIs on **motorways** are lower for trucks and HGVs, followed by motorcycles in most MS.

Average speed of **trucks** and **HGVs** on motorways varies from 84km/h to 95km/h and V85 from 89km/h to 101km/h.

Average speed of **motorcycles** on motorways varies from 104km/h to 129km/h and V85 from 124km/h to 152km/h.

On **rural roads**, no common pattern by vehicle type is observed among MS; in most MS, KPIs are lower for trucks and HGVs and KPIs for motorcycles are lower than KPIs for passenger cars.

Average speed of **motorcycles** varies from 71km/h to 89km/h and V85 from 100km/h to 115km/h. For **vans** and **LGVs** average speed varies from 62km/h to 90km/h and V85 from 73km/h to 107km/h.

Similarly, no common pattern by vehicle type on **urban roads** is observed. In most MS, KPIs for **passenger cars** are lower compared to the remaining transport modes; though not statistically differences are observed in all cases.

Average speed of **motorcycles** on urban roads varies from 32km/h to 53km/h and V85 from 52km/h to 73km/h. Average speed of **vans** and **LGVs** on urban roads varies from 44km/h to 60km/h and V85 from 47km/h to 71km/h.

In few MS KPIs were recorded **per speed limit** by road type. Lower KPIs are observed on roads with lower speed limits by road type in each MS. Specifically, KPIs observed on roads with 30km/h are considerably lower than the KPIs on roads with 50 km/h speed limit.

Comparison with Baseline

For all types of road, in most MS, an improvement is observed, which is reflected to an increase in the KPI values and a decrease in average speed and V85.

KPIs are almost stable in 4 MS for motorways, 5 MS for rural roads and 6 MS for urban roads. An exception is motorways in Poland, where KPIs have decreased between the two periods.

It is noted that in some MS there were methodological differences in Baseline and Trendline data collection and calculation of KPIs.

Confidence intervals were calculated differently in almost all MS, thus no statistically reliable conclusions can be drawn about the trend of all indicators.

Recommendations

It is recommended that the KPI Speed is collected systematically using the same methodology to ensure the comparability of results and better assessment of performance progress at national and European level. Average speed and 85th percentile of speed provide additional insight, as they complement the standard KPI. Alternative speed indicators (e.g. speed variation) should also be collected to supplement the KPI Speed, average speed and V85 to provide additional insight of speeding behaviour and performance level in each MS. Further analysis of the speed indicators in combination with crash and injury data (as well as time series data) could be considered in the future.

Concerning the methodology used, breakdowns by road type and speed limit are useful in order to compare MS. Behaviour appears to depend on speed limits by road type, with lower KPIs being observed on roads with lower speed limits (based on data of few MS). Therefore, breakdown by speed limit by road type is preferred for comparison among MS. Moreover, speed limits differ per vehicle type. Therefore, distinction between vehicle types is also recommended. Behaviour also seems to depend on time period, with, statistically significant differences being observed in few MS. Differences between daytime and night-time and between weekdays and weekends show that breakdown by time period should be kept for future comparisons.

The safe system approach is based on ensuring as clearly as possible the various issues affecting the overall safety performance and taking early action to reduce road crashes and injuries. In this context, the use of KPI Speed and other complementary speed indicators causally related to road crashes and fatal or serious injuries,

in policy making process can lead to this direction. Speed indicators included in the national road safety strategies can serve as a useful tool to monitor progress towards road safety targets and to prioritize problems. The systematic collection of Speed indicators, disaggregated by road type, time period and vehicle type, is recommended in order to assess the road safety performance level in each MS and progress over time.

Concluding, the collection of representative and comparable KPIs on speed among the EU Member States constitutes the basis for monitoring and evaluating the road safety progress at national and EU level.

Keywords: Key Performance Indicators, Speeding, European Union, Trendline