Portuguese Key Performance Indicators for speed and distraction

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Abstract

Within the European Commission's efforts to reduce the number of road fatalities, a Programme Support Action was promoted to support Member States in collecting Key Performance Indicators (KPIs) for road safety. These indicators contribute to the understanding of selected issues that influence overall road safety performance and can be used to measure the progress and effectiveness of planned road safety initiatives.

Several KPIs are being collected by the 19 participating EU Member States, namely on: speed, safety belt use, wearing protective equipment, alcohol, distraction, vehicle safety, post-crash care and infrastructure. LNEC has committed to the collection and analysis of two of the Portuguese KPIs: Speed (percentage of vehicles travelling within the speed limit); and Distraction (percentage of drivers NOT using a handheld mobile device). This paper presents the main challenges faced in measuring the indicators and the results obtained are discussed, especially in what concerns differences between road categories.

Keywords
Road safety; Key performance Indicators; Speed; Distraction; Portugal

Introduction

The European Commission has formulated the goal to halve the number of road fatalities by 2020 and a long term-goal to move close to zero fatalities by 2050. To achieve these goals, the European Commission recommended the implementation of the Safe System principles, where deaths and serious injuries resulting from road crashes are not acceptable; an approach that is acknowledged in several EU Member States.

Road safety KPIs (Key Performance Indicators) are an integral part of the 'Safe System' approach to road safety. They contribute to the understanding of the different issues that influence overall road safety performance and can be used to measure the progress and effectiveness of road safety initiatives.

The use of KPIs in safety management through *a posteriori* assessments allows relating the progress towards the goals of the killed and serious injuries with the level of implementation of related interventions, facilitating the comprehension of why and how progress was achieved (Wegman et al., 2013). This is essential for the development of new effective interventions, for the continuous improvement of successful interventions and to assess their transferability from one context to another. Furthermore, the benefits of using KPI are not limited to operational effectiveness. The concept of shared responsibility is a fundamental principle of the Safe System approach (ITF, 2008),

involving in the process of improving safety conditions those responsible for the design and construction of the roads and vehicles, road users and other transport actors, including municipalities, police forces, road authorities, training and examination bodies for drivers, and the private sector. When the contributions of the various participants in a road safety strategy are properly identified, and a regular monitoring of progress is made, a KPI is an effective way to assess whether each of these participants is meeting their commitments and whether these are appropriate for the pursued objectives.

Having this in mind, the European Commission promoted a Programme Support Action (PSA) to support Member States in collecting Key Performance Indicators (KPIs) for road safety. The winning proposal, named BASELINE, is a joint tender by a consortium consisting of 19 EU Member States, and coordinated by the Vias Institute, from Belgium. Its main objectives rely not only on the provision of the KPI values, but also on the development of methodological guidelines for its harmonized collection, processing and analysis. Additionally, the creation and maintenance of a database with national KPIs and its use for regional and EU wide benchmarking was foreseen by the EC.

Several KPIs are being collected by the 19 participating EU Member States, namely on: speed, safety belt, protective equipment, alcohol, distraction, vehicle safety, post-crash care; in a few MS infrastructure is also being addressed. LNEC has committed to the collection and analysis of two of the Portuguese KPIs: Speed (percentage of vehicles travelling within the speed limit); and Distraction (percentage of drivers NOT using a handheld mobile device).

Methodology

The methodology used for data collection follows the FERSI guidelines, which covers several aspects namely consideration on the sampling individuals, the sample size in total and per road type, the sampling and selection of locations, different stratifications (by time period or by region), practical organisation of the observations, fieldwork set-up and procedure, observations at urban and rural roads and on motorways, traffic counting, and time of the year.

Speed KPI

The speed KPI was defined as the percentage of vehicle drivers in compliance with speed limits (Commission Staff Working Document, 2019).

This indicator is obtained by measuring the instantaneous speed of a predefined minimum set of free speed vehicles, using automatic or manual devices, in an inconspicuous way.

The KPI was disaggregated in three road categories (motorways, rural roads and urban roads), and the results are presented separately for each category. The KPI must be evaluated at least for passenger vehicles and for the total number of vehicles, and it is recommended that buses and freight vehicles (light, under 3.5t, and heavy, with more than 3.5t) and two-wheeled motor vehicles are distinguished.

Distraction KPI

The distraction KPI corresponds to the percentage of drivers who do not use a handheld mobile device while driving (Boets *et al.*, 2021).

This indicator was obtained by direct observation of a set of drivers in the same three categories mentioned above (motorways, rural roads and urban roads). The same potential collection sites used for the speed KPI have been selected, since the road categories were identical. The observations were made considering the three types of vehicles: passenger cars, light goods vehicles and buses.

Different collection processes were used depending on the overall drivers' speed. This decision derived from the difficulties in identifying the actions of drivers in situations of very high speeds. It was thus considered:

- On motorways, observations were made using a moving observer method, in which the observer rides a moving vehicle, inserted in the traffic flow, making it easier to identify the actions of the drivers of vehicles are passing or are being overtaken by the observer's vehicle;
- On rural roads and urban streets, observations were carried out from static stations located on the side of the road.

RESULTS OBTAINED

For each of the road categories considered, a set of 15 to 29 potential stretches was identified for measuring speeds or observing distraction, distributed throughout the country.

The 10 speed measurement locations for each road category were randomly chosen within their set of potential locations, which included motorways, rural roads with and without access control, urban streets (Level II and Level III) and stretches of rural roads through small villages.

On rural roads, motorways and through roads, measurements were performed using automatic traffic analysis stations with magnetic field sensors placed on the axis of each lane. On urban roads speeds were measured manually using a portable Lidar transmitter-receiver, from parked vehicles. The automatic stations worked for approximate periods of 24 hours, except for a few through roads, where the periods were only four hours. The results for the Portuguese speed KPI are presented in Table 1, where it is possible to observe that the percentage of drivers complying with the speed limit doesn't go above 50% on high-speed roads and is above 50% on secondary roads and on urban streets.

Table 1. Portuguese speed KPI

	Motorways		Rural roads with access control		Rural roads without access control		Urban streets	
	Total	Passenger cars	Total	Passenger cars	Total	Passenger cars	Total	Passenger cars
Percentages of vehicles within the speed limit	49%	44%	34%	29%	61%	55%	74%	73%

Comparing the values now measured with the ones obtained in a similar analysis performed in 2004 (Cardoso and Andrade, 2005), it was found that the proportion of car drivers complying with the limit in 2022 is lower (-3%) on motorways than in 2004. On rural roads, the percentage of drivers within the speed limit is higher in 2022 than in 2004, with the largest increase (+26%) on roads without access control.

In what concerns the distraction KPI, measurements were made in 11 sites on motorways, 12 sites on rural roads and 15 sites on urban roads, considering a stratification per vehicle type for passenger cars, light goods vehicles and buses. Table 2 presents the values obtained in the KPI observations on distraction on motorways, rural roads and urban streets.

Table 2. Statistics on the hand use of a mobile device while driving

Type of road	Type of vehicle	Percentages of drivers who do not use a handheld mobile device in driving
Motorways	Passenger cars	98%
	Light goods vehicles	95%
	Bus	100%
	Total	98%
Rural	Passenger cars	97%
	Light goods vehicles	95%
	Bus	100%
	Total	97%
Urban	Passenger cars	97%
	Light goods vehicles	95%
	Bus	98%
	Total	97%

It was found that the percentage of drivers using a mobile device in hand while driving was generally less than 5%, regardless of the type of road or type of vehicle in which the driver was driving. In any case, although with slight differences, it is found that the percentage of compliance with the law is higher on motorways and that drivers of light goods vehicles use mobile devices more often while driving. The mobile phone handling observed in bus drivers was residual.

CONCLUSIONS

The results obtained show low compliance with speed limits on roads outside the urban areas, higher on roads without access control and minimum on motorways; and higher speed limit compliance on urban Level II and Level III streets. Generally, it was found that the average speed of passenger vehicles is equal to or slightly higher than their legal maximum speed limit, as is the case for heavy vehicles.

Concerning distraction, it was also found that the percentage of drivers handling a mobile device while driving was generally less than 5%, with the lowest values on motorways and higher in light goods vehicles.

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