Monitoring of Traffic Behaviour in Finland

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MONITORING OF TRAFFIC BEHAVIOUR IN FINLAND

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What is the traffic behaviour monitoring system?

The main objective of monitoring of traffic behaviour is to find out possible changes or trends of behaving that take place in traffic. The measurements do not show how common the observed phenomenon is in all regards. For example, the drivers’ speed, running of the red light or use of signal varies a great deal depending on the measurement location. Therefore the results do not depict the studied phenomena in general, but due to standardized measurement methods they relate information about the changes in traffic behaviour. The monitoring data is used to augment the picture of traffic safety development provided by accident statistics.

In Finland the monitoring information is maintained by Liikenneturva. The monitoring data is in many cases collected as a collaborative effort involving many organizations as for example police, Finnish Transport Agency (former Road Administration) or National Institute for Health and Welfare (THL). Liikenneturva is responsible for regular publicity and dissemination of the results.

Traffic behaviour data is collected annually using the same methods and the same measuring points. The following measurements are made:

- vehicle driving speeds (Finnish Transport Agency)
- driving under the influence of alcohol (THL, police)
- safety belt usage by drivers and front-seat passengers in passenger cars and vans
- safety belt usage in the rear seats of passenger cars
- use of vehicle direction indicators when turning
- use of cycling helmets
- pedestrian compliance with the rules of light-controlled crossings
- use of reflectors by pedestrians
- driver compliance with traffic lights

These constituent studies differ from one another in terms of the size of the data sets, the measuring points and measuring times. Some of the data sets are collected from all over the country, some from just a few provinces. The observation tasks are characteristically different. Observing cycling helmet usage (being worn - not being worn, age, gender) is relatively simple compared with, for instance, observing safety belt usage in the rear seats of passenger cars. In the latter case, the observer has to estimate the age and gender of the passengers through the side window of the car. In large sets of observation data this phenomenon has hardly any effect on the reliability of the results.
Vehicle speeds
Changes occurring in driving speeds are described monthly with the aid of data obtained from the Finnish Transport Agency’s system of automatic measuring points. The FTA has followed vehicle speed development on Finnish state roads since 1961. In the beginning the vehicle speeds were measured by radar. Since 1992 vehicle speeds on main roads have been automatically measured by a traffic monitoring system (TMS).

![Figure 1. Average driving speeds (Finnish Transport Agency)](http://www2.liikennevirasto.fi/julkaisut/pdf8/lts_2014-30_autojen_nopeudet_web.pdf)

To keep data simple and stable, it is selected only few measuring points to represent speed changes on road network. Altogether this huge database gives possibilities to much wider analyses.

Drunken driving as proportion in total traffic flow (THL)

Police conducts a follow-up roadside testing study yearly, where about 100 000 drivers are tested for alcohol with a breathalyzer. The testing is carried out twice a year on locations comparable on different parts of the country. In year 2014 a total of 104 910 were tested of whom 145 (0.14 %) were drunken drivers and in addition 706 drivers had some alcohol, but below 0.5 per mille, in their breath. So, it means, that one out of about every 725 drivers in the traffic flow was a drunken driver. This road side testing method has been executed since 1979.
Figure 2. Drunken driving as proportion in total traffic flow (police, THL)

**Seat belt use in the front seats of passenger cars and vans**

The use of seat belts by drivers and front-seat passengers in cars and vans is observed by Liikenneturva.

The data was collected in May 2014 on working days. At total more than 65 thousand observations were made. The percentage usage rate for the country as a whole has been calculated by proportioning the numbers of observations to the populations of the 17 provinces in which they were made.

Liikenneturva collected the data from all over the country. For the observations outside built-up areas, the measuring points were selected so that there was as little urban traffic as possible on the highway. In built-up areas the data was collected on streets and roads which did not carry a significant volume of through traffic.
Figure 3. Seat belt usage in the front seats of cars.

Figure 4. Seat belt usage in the seats of vans
Seat belt usage in the rear seats of cars

Seat belt usage in the rear seats of cars has been examined in selected Finnish cities and towns. Liikenneturva is responsible for the data collection. The observations are made on Friday afternoons and Saturdays by looking through the side window of vehicles moving at low speeds into the car parks of shopping centres. In addition to safety belt usage, the observers also assess the age and gender. Taxis and passengers sitting in the middle of the rear seat are excluded from observations. For year 2014 the sample size were 3243 observations. Of these, about one-third were assumed to be under-six-year-olds.

Of the back-seat passengers 88 % were wearing their seat belts. In 2014, 98 per cent of under-six-year-olds and 90 per cent of 6-14 year-olds were strapped into safety devices. In the over-fourteen-year-old age group, safety belt usage in the rear seats of passenger cars was 77 per cent in 2014.

Figure 5. Safety belt usage in the rear seats of passenger cars
Use of bicycle helmets

The aim is to determine what percentage of cyclists wear bicycle helmets when cycling. The material is collected from all over the country during the first two weeks of June. The percentage usage for the country as a whole has been calculated by proportioning the number of observations to the populations of the provinces in which they were made. In 2014 totally 31 946 observations were collected.

In 2014, 41 per cent of cyclists wore safety helmets. It was a slight decrease compared to previous year. Variations in the use of cycling helmets from one province to another were still great. The highest usage rate was in the Province of Uusimaa (64%).

Figure 6. Use of bicycle helmet
Pedestrians’ use of reflectors in built-up areas

The use of reflectors by pedestrians was studied in built-up areas in November. The material was collected on lit streets in built-up areas during the hours of darkness. The observations were made using the headlights of a stationary or moving vehicle. The task of the observers was to record on a form whether a reflector was being used by any pedestrian walking in an illuminated street zone, what type of reflector if any was being used, and an assessment of the pedestrian’s age and gender. In 2013 more than 5 000 observations were collected and 51 per cent of pedestrians used reflectors.

![Figure 7. The use of reflectors by pedestrians in built-up areas](image)

Pedestrians’ use of reflectors outside built-up areas

Monitoring pedestrians during the time of darkness has shown to be difficult because of its rareness. In this case monitoring has been replaced by questionnaire survey executed by National Public Health Institute. This is a broad, annually repeated study which looks at the health behaviour of the adult population. One of the observed items in the study is reflector usage. In past years about a bit more than every other of respondents answered “nearly always” to use reflector when walking in dark outside urban area after dark.
Driver compliance with traffic lights

Since 2002 Liikenneturva has monitored how often one or more car drivers run a red light (stale green) as the traffic lights are changing from green to red. For the purposes of the monitoring, 1-2 traffic light junctions (which are known for high traffic activity) are selected in 10 selected Finnish cities. The monitoring is conducted during the rush hours in the morning (7-9 am) or in the afternoon (3-5 pm). Situated along a road or a street, the monitor makes observations on the vehicles which are approaching the junction and marks down whether the car stops at the red light or not. If there is a line of cars, only the behaviour of the first car is registered.
Pedestrian compliance with the rules of light-controlled crossings

The compliance with traffic lights by pedestrians is monitored annually. The aim of the study was to determine what percentage of pedestrians approaching a light-controlled crossing complied with the red "do not walk" light. The monitoring locations are selected in such a manner that almost all pedestrians have the opportunity to walk against the red light since the traffic is not too intense. Therefore the junction must not feature a large volume of cars.

The task of the monitors is to count the number of those pedestrians waiting for the light to turn green and the number of those pedestrians who walk against the red light. In the monitoring, only those pedestrians who arrive at the traffic lights junction during a red phase are included in the study. A pedestrian is interpreted to have arrived at the traffic light junction during a red phase, if he/she has the opportunity to cross the zebra crossing on red. The pedestrian must make it to the edge of the zebra crossing with time to spare (about 5 seconds) before the lights turn green. The monitors count also the vehicles which cross the zebra crossing during the pedestrians’ red phase. Pedestrians’ traffic light behaviour has been measured since 1993. The mutual comparison of the results on an annual level has been proven to be problematic due to various factors. The difficulties have been caused by, for instance, changing traffic arrangements in some cities which have forced changes in the monitoring locations as well. In addition, the amount of cities involved in the monitoring has varied from year to year.

A total of 15,043 observations were made in May 2014 in 11 cities. The percentage compliance rates have been calculated by weighting each measuring city equally. Of the pedestrians arriving at the curb while the red light was on, eighty-six per cent waited until it turned green. There were large variations in the observations made at different measuring points. The dependence of the compliance rate on the traffic environment and on the volume of pedestrian and vehicular traffic impedes the comparison of results.
from different measuring points. Women complied with the rules of light-controlled crossings more often than men.

Figure 10. Pedestrians compliance of red lights

**Use of vehicle direction indicators when turning**

The aim was to determine what percentage of drivers used direction indicators when turning. The driver is interpreted to have given a signal even if it does not take place in due time before the actual turn. The signalling must, however, occur while turning, and not while changing lanes before committing to a turn, for instance.

In 2014, 81 per cent of the drivers used their indicators when turning at the measuring points. In region of Uusimaa, where the density of traffic is highest in Finland, the use of direction indicator seems to be lower than elsewhere in Finland. A total of 6 067 observations were made in 2014.
Use of mobile phone without handsfree during driving

The observation of drivers who use mobile phone so that they use phone in hand and do not use handsfree system has not executed every year. Any how it has executed often enough that results can be taken into account as part of monitoring system. The ban of use mobile phone without handsfree came into force in the beginning of year 2003. And since 1st of June 2011 using mobile phone has been in the list of sanctions which are included in demerit point system.

In year 2014, every tenth driver used mobile phone so that phone was visible by observer. Comparable samples of observations were gathered in and around four cities and they included about 8300 drivers.
Figure 12. The use of mobile phone without handsfree

On the dependability of the test results

In planning measurements for traffic behaviour, the main objective is to monitor the changes taking place in traffic behaviour. Looking at individual parts, the measurements do not give a proper picture of the frequency of the measured phenomenon, and neither do they depict regional variation accurately. For instance, compliance with traffic lights and signalling vary greatly depending on the measuring location. There are only a few traffic lights and junctions which have been selected for monitoring purposes and data is gathered only for a short time. Therefore changes do not depict the studied phenomena in general, but due to standardised measurement methods they can provide information on changes regarding traffic behaviour.

The system, in its current form, includes several sub-studies. The segments vary with regards to the size of the study material, measurement locations and measurement times. Some materials are gathered nationally; some only in a few regions. In speed and safety distance measurements, errors are caused by those cars which change lanes upon inductive loops. In large observation materials, this phenomenon has very limited effect on the reliability of the results.

The measurements do not give an accurate picture of the prevalence of the phenomenon being measured, nor do they describe regional variation. For example, pedestrian compliance with the rules of light-controlled crossings and the usage of vehicle direction indicators vary greatly from one measuring point to another. Only a few selected crossings and road junctions have been monitored, and data is collected from them over a short period of time. That being the case, the changes do not describe the studied phenomena generally, but thanks to the standardized measuring methods they can, when repeated, describe changes in traffic behaviour.