Conclusions and recommendations

A brief summary of the research design and method

AVV Transport Research Centre, part of the Dutch Ministry of Transport, Public Works and Water Management, has commissioned TNS NIPO Consult to conduct a study in association with Leiden University. The aim of the study was to increase insight into the effect of freight traffic in general, and of long and heavy lorries (LHL's) in particular, on motorists' perception of road safety. The central issue was what civilians 'claim they would do' while interacting with other road users.

Besides obtaining insight into the effects of freight traffic on the perception of road safety, AVV wanted to *form a notion of the attitude towards and image of freight traffic in general and LHL's in particular*.

The precise objective of the study was as follows:
- Define which factors indicate danger in motorists' perception of road safety when they have to react to freight traffic. Determine in which way these factors ('*danger indicators*') differentiate themselves from each other in motorists' perception of safety.
- Indicate to what extent motorists respond differently to LHL's compared to regular freight traffic and if so, clarify how and why;
- Determine attitudes towards, image of and support for the presence of freight traffic on the road. Outline the arguments underlying these attitudes towards, image of and (lack of) support for LHL's. Supply possible starting-points for increasing support for LHL's.

In order to answer the research question and to realise the study's objectives, the research method was made up of several phases/parts:

Preliminary research
- Literature study.
- Qualitative preliminary research among ten lorry drivers in order to generate input for the quantitative main research.
- The development of stimulus material.
- Qualitative pre-testing of the questionnaires for the qualitative main research among twelve motorists.
- Quantitative pilot of n=100 for the quantitative conjoint research.

Main research
- Qualitative main research consisting of two samples and two different research methods in order to approach the research question from various angles (triangulation):
  - Quantitative conjoint research among 500 motorists using photo material.
  - Quantitative 'regular' research among 500 motorists using video material.

Phase 1 preliminary research: literature study
The purpose of the literature study was to find out what is already known about motorists' perception of road safety in relation to freight traffic, and to establish which 'danger indicators' play a part in this perception. The study focused specifically on various road situations, vehicle characteristics and external circumstances involved. Moreover, the literature study clarified how to interpret the phenomenon of 'feeling unsafe'.
The insights acquired through the literature study served as input to the video clips and the study's questionnaire. Several topics were determined, which were then included in the quantitative main research's questionnaire, such as:
- knowledge questions about LHL's vehicle characteristics;
- attitude towards and image of freight traffic in general and LHL's in particular;
- it was also determined that the dependent variable 'feeling unsafe' should be studied in relation to the perceived level of danger and controllability;
- the literature study also suggested that road types and gender might serve as 'danger indicators'.

Phase 2 preliminary research: qualitative interviews with lorry drivers
The second part of the preliminary research consisted of interviews with lorry and LHL drivers. Their experience on the road has provided them with a clear understanding of how motorists react when they interact with freight traffic. The interviews with the drivers have resulted in an additional inventory of danger indicators.

Factors potentially influencing the perception of danger

Traffic situations
→ overtaking
→ merging with taffic
→ turning right in an intersection

Background factors
→ situational factors (experience as a driver, mileage)
→ socio-demographics

Vehicle characteristics
→ length
→ colour
→ axle distribution
→ load

Local circumstances
→ traffic intensity
→ narrowing of the road

Attitude towards
→ freight traffic
→ LHL's

Knowledge

→ familiarity with LHL's
→ knowledge of LHL's

Atmospherical circumstances
→ weather circumstances

Road characteristics
→ road type

The quantitative main research consists of two independent studies, each with its own sample:

- *A regular quantitative questionnaire* (n=513*)*, concerning motorists' knowledge of and attitude (perception of safety) and behaviour towards freight traffic[2] in general and LHL's in particular. The study involved video material developed especially for this purpose, containing clips of three traffic manoeuvres: overtaking, merging, and turning right at a bend.

- *A quantitative conjoint questionnaire* (n=534). Besides the knowledge and attitude questions (as in the regular questionnaire), simulations were conducted in order to determine the relative contribution to the perception of road safety of the various danger indicators (which were identified through the literature study and the qualitative preliminary research). The following danger indicators were focused on specifically: manoeuvres, weather circumstances, road types, crowding on the road, narrowing of the road, types of load, axle distribution, length and colour.

The samples for both studies were taken from TNS NIPObase. This is a database of around 200,000 respondents who have indicated willingness to participate in research regularly. A great number of these respondents' background characteristics is available. The TNS NIPObase respondents were questioned via Capi@home (CASI). This means that respondents filled out the questionnaires on their own computer. This way, they were able to fill out the questionnaire at their own convenience, guaranteeing ample time to respond to the questions, which positively affects the quality of the outcomes. The respondents were also able to view the image material on their own computer.

Conclusions

Motorists' perception of road safety

- The purpose of this study was to determine which indicators of danger influence motorists' perception of safety when they interact with freight traffic. First of all, it was assessed to which extent motorists feel safe on the road. It appears that motorists generally feel safe while on the road.
- There appears to be no significant difference between the motorists' feeling of safety while interacting with LHL's and their feeling of safety while interacting with regular freight traffic. Four out of ten (41%) motorists claim to feel safe while interacting with a LHL, 38% feel neither safe nor unsafe, and 16% feel unsafe. On the other hand, 48% of motorists feel safe, 38% feel neither safe nor unsafe, and 15% feel unsafe when interacting with a lorry.

2 For the purposes of this study, 'freight traffic' is defined as: lorries, articulated lorries, central-axle trailers, exceptional transport. Vans are not considered freight traffic.

- A few differences appear when comparing interacting with regular freight traffic or LHL's to interacting with other passenger cars. Motorists claim different future behaviour for interaction with passenger cars than for interaction with freight traffic or LHL's. They choose less risky behaviour for interaction with freight traffic or LHL's than for interaction with passenger cars. This indicates a greater feeling of insecurity about freight traffic or LHL's compared to passenger cars. There are no differences when comparing freight traffic with LHL's in this regard.

- Differences can also be seen in the assessment of a situation's level of danger and controllability. The type of vehicle involved affects the assessment of danger and controllability (perception of road safety). This difference shows when comparing passenger cars to freight vehicles, but not when comparing regular lorries to LHL's.

- There is a small difference in perception in terms of danger and controllability between LHL's and regular lorries concerning a specific manoeuvre - turning right. Turning right is considered to be the most dangerous situation for LHL's. For cars and regular lorries, motorists consider merging with traffic to be the most dangerous act. Remarkably, motorists consistently assess the manoeuvre 'overtaking' as the least unsafe action for themselves, regardless of which vehicle type is to be overtaken. They also consider overtaking to be the most controllable act. A possible explanation for this could be a tendency of motorists to underestimate the danger of this manoeuvre. After all, it is all but impossible to estimate the length of a freight vehicle from the back. The fact that overtaking is considered the least unsafe and most controllable act is remarkable considering the fact that motorists generally do claim to want to overtake lorries as quickly as possible, rather than passenger cars. This finding indicates a difference in the perception of safety vis-à-vis these two vehicle types.

Indicators of danger influencing the perception of road safety

- The most important indicator of danger influencing the perception of traffic safety when interacting with freight traffic is vehicle length. The other indicators only have a small impact on the perception of safety. Perhaps the length of the LHL is perceived most clearly when the lorry is turning right since it then needs to swerve into the motorist's lane.

• The fact that motorists do not perceive road safety very differently when it comes to interacting with LHL's as opposed to regular lorries (subjective traffic safety) can be advantageous as well as disadvantageous.

• A disadvantage of these findings is that motorists might think they can anticipate to and interact with LHL's in traffic the same way as with regular lorries. This could be dangerous, also considering motorists' limited knowledge of LHL's characteristics. Feeling unsafe, within limits, helps to keep motorists attentive, thus making them interact with other road users more consciously and safely. In this framework it would not be desirable for motorists to feel completely safe on the road.

• Attitudes and behaviour are not always consistent. Even though rationally motorists might not oppose the introduction of LHL's, they have rarely actually encountered a LHL on the road. Such an encounter might cause sudden emotions (such as fear or agitation) which in turn might bring about behaviour inconsistent with their (rational) attitude. Motorists' future perception of and attitude towards LHL's might turn out differently than they currently are because they will be partly influenced by the motorists' personal experience with LHL's and the opinion of their frame of reference.

Motorists' attitudes towards the introduction of LHL's

• No real efforts need to be made to create support for the introduction of LHL's. There appears to be substantial support for a general allowance of LHL's. Motorists have a reasonably positive attitude towards LHL's and they are able to name a sufficient number of advantages of LHL's.

Recommendations

If the Dutch government decides to allow LHL's on its roads, it would be best to concentrate its efforts on a policy of measures accompanying the new legislation:

• Knowledge about LHL's has a negative impact on attitudes and perception of safety. Therefore, a government ('*Postbus 51*') campaign specifically about LHL's does not seem to be the most appropriate means of communication, even though motorists have indicated preferring to be informed through this channel.

• It would be more fruitful to increase the general level of knowledge and awareness regarding freight traffic and to remove a number of misperceptions. It is important to distinguish between LHL's and regular lorries only when strictly necessary (e.g. in case of large differences between regular lorries and LHL's such as when swerving). Stigmatising LHL's by paying them a disproportionate amount of attention should be avoided because this could actually promote feelings of insecurity.

• A campaign should include real traffic situations, thus allowing motorists to form an image that is as close to reality as possible.

• Motorists' awareness is mostly shaped by personal experience. It would therefore be useful to pay more attention to the 'dangers' of freight traffic in practice and not only during the theory exam. For instance by taking student drivers along in a lorry for at

least half an hour, enabling them to become aware of the interaction between motorists and freight traffic.
Apart from accompanying measures, the government could legislate. It is advisable to exclude certain combinations of danger indicators or to try to prevent them as much as possible, mainly to avoid perceptions of danger.

- It should be made mandatory for LHL's to occupy both lanes of a dual carriageway when turning right. Drivers of LHL's (and lorries) already tend to do this out of safety concerns. This is not always understood by other road users, who unjustly consider this rude behaviour. However, in this situation the behaviour actually promotes traffic safety and should therefore be made compulsory. It is equally important to clearly communicate new legislation and the motivation behind it to motorists, to remove a possible lack of understanding. The knife cuts both ways.

- Haulers should be encouraged to colour their LHL's in very light shades and to load them as evenly as possible.

- The text 'caution 25 meters', currently on the warning sign on the back of LHL's, should be replaced by a larger text clarifying what vehicle length entails in practice, for example 'caution, swerves X meters when turning'.