NZTA research summary June 2024

The potential for intelligent speed adaptation (ISA) to assist with road safety

Intelligent speed adaptation (ISA) is one technology in the family of intelligent transport systems. These use advanced information, electronic communications and other technologies for the management and operation of transport networks.

The objective of ISA is to keep vehicle speeds within appropriate limits in the interests of safety, including reducing deaths and serious injuries by 40% by 2030 (from a 2018 baseline).

There are three categories of ISA determined by the level of intervention involved:

- Advisory – the speed limit is displayed within the vehicle and/or verbally articulated to remind the driver of changes in the speed limit.
- Voluntary – the driver can enable and disable control of the maximum speed of the vehicle.
- Mandatory – the maximum speed of the vehicle is always limited.

NZ TRANSPORT AGENCY WAKA KOTAHI

Te Kāwanatanga o Aotearoa
New Zealand Government

The research

This research builds on a 2013 NZ Transport Agency Waka Kotahi report on deployment of an advisory ISA system in Aotearoa New Zealand, which found in field trials that advisory ISA made journey times more consistent and uniform between participants and driver speeds significantly reduced across a range of road types. It concluded that variable ISA offers a proactive and potentially cost-effective solution to a key accident risk in New Zealand.

The research objectives for this project were to develop understanding of:

- the likely effectiveness and efficacy of different types of ISA to assist with and encourage safe driving behaviour
- wider costs and safety benefits of ISA based on existing data sources
- the uptake of ISA and associated barriers in other jurisdictions
- current take-up of ISA, barriers and motivations in New Zealand
- current usage and performance of ISA in New Zealand
- the impact of ISA on key driving behaviours
- the level of market penetration to realise the safety benefits of ISA
- in-service maintenance requirements of ISA.

Literature review

A literature review covered material published since the 2013 report. The review found:

- recent studies have found that users were generally positive about advisory ISA and there was enough compliance to make a useful difference
- properly configured ISA apps have a demonstrable safety benefit and do not produce adverse distractive effects
- drivers prefer less-mandatory forms of ISA, but conversely, mandatory ISA was more effective in reducing speeds
- 80–97% of drivers perceived ISA as beneficial for all drivers
- ISA systems assist older drivers with speed moderation and lane keeping
- ISA improves the behaviour of recidivist offenders when used in conjunction with rewards and as a control mechanism.

User interviews

Interviews were conducted with five individual users who have ISA systems in their personal vehicles, two individuals who use vehicles that have fleet monitoring systems installed and one ISA maintenance expert. The aim was to understand current usage and performance of ISA, barriers and motivations, impacts on key driving behaviours and in-service maintenance requirements of ISA in New Zealand.

Individual interviewees believed the ISA system was useful in helping reduce the risk of speeding tickets and to a lesser extent mentioned road safety. However, they reported that systems can be unreliable. This impacts trust in the system and use of the system, with some turning it off or not using it during parts of their drive when it was incorrectly giving speeding alerts.

Individuals and fleet users stated that updating, giving feedback and making corrections on systems is difficult, while other car features such as adaptive cruise control were highly regarded and used to help manage speed.

For fleet management systems, data being sent to workplaces impacts driver behaviour more so than in their personal vehicle. There was concern that the fleet monitoring system may increase attention to the vehicle's speed thus reducing the driver's attention to other aspects of the road environment.

Benefits and costs

Identifying the costs associated with advisory ISA in the New Zealand light vehicle fleet was possibly the most difficult task within this research because there is a wide range of systems and many are commercially sensitive. At one end of the scale are map-based systems that can be operated on mobile phones or similar in-vehicle devices that are essentially independent. At the other end are systems that combine cameras with traffic sign recognition with speed limit databases either held in onboard hard storage and manually updated or where ISA data for the local area of interest is downloaded over the cellular network (over the air).

An economic assessment of ISA was undertaken for two scenarios:

- A natural market-driven implementation of ISA.
- Once ISA is present in 75% of new vehicles entering the fleet, mandating ISA for all vehicles entering the fleet, new or used.

The resulting analysis found the benefit-cost ratio for both scenarios was positive. However, there seemed to be essentially no benefit from mandating ISA at such a late stage of adoption, although further work is recommended to investigate alternative mandate scenarios.

Conclusions

The provision of ISA in the New Zealand light vehicle fleet is increasingly driven by overseas mandates – for example, a 2019 European Union regulation paves the way for ISA systems along with other advanced crash avoidance systems to become compulsory equipment on cars sold in the EU.

While the costs associated with ISA are assumed to be small, when distributed over the fleet, these mount up. Nevertheless, in a New Zealand context, the provision of ISA has a positive benefit-cost ratio (around 1.7) and the potential to save a total of 5,298 deaths and serious injuries over the next 40 years from 2023 to 2063.

There seems to be no compelling argument to mandate ISA once 75% of new vehicles entering the fleet are fitted with ISA, but benefits may accrue from mandating earlier.

Recommendations

To encourage uptake of advisory ISA:

- Develop a standard or system to ensure that speed limit information displayed to drivers is accurate.
- Identify implications for over-the-air updates in the used import second-hand market and the impact of these on ISA adoption.

For fleet managers and providers of ISA systems used in fleet management:

- Evaluate the impact of additional in-vehicle displays and the role of fleet monitoring and associated protocols on ISA compliance.
- Provide users with information regarding how their driving data is used and a means to access their personal driving data.
- Investigate use of fleet systems to increase exposure to ISA – for example, retrofitting of ISA in fleet vehicles for organisations with more than a specified number of employees.

For future ISA research:

- Further field trials or analysis of data for a wider range of safe and appropriate speeds.
- Assess the impact of human-machine interface design on compliance.
- As more post-COVID-19 data becomes available on the proportion of used imported vehicles with ISA, the penetration rate assumptions for used imports should be revisited.
- A range of alternative mandated scenarios should be investigated.
- Investigate the potential broader use of the National Speed Limit Register data and the development of data sets that reduce repeated processing of the entire data set.

RR 716: The potential for intelligent speed adaptation (ISA) to assist with road safety.
NZ Transport Agency Waka Kotahi research report.
Available at **www.nzta.govt.nz/resources/research/reports/716**