

European TeleFOT Project: Benefit-Cost Analysis SatNav and EcoDrive Technologies

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Abstract

Calculation of benefit-cost-ratios (BCRs) is a commonly used methodology by governments in determining the need for future regulation. This study was undertaken as part of the European Commission's field trial TeleFOT program provided new findings on the likely benefit-cost safety and environmental outcomes for satellite navigation (SatNav) and (EcoDrive) technologies in Europe. The findings showed that for a range of scenarios, the best benefit-cost-ratio for SatNav was markedly above its economic cost ($BCR > 1$). While a BCR for EcoDrive could not be calculated because of missing data, the fitment rates required to achieve a break-even outcome were quite achievable. The figures for the worst scenario outcomes were less impressive, generally failing to achieve break-even (BCRs less than one) or required higher fitment rates. BCRs for both technologies combined showed ratios between 3.16 and 2.78, assuming a 5% EcoDrive fitment rate.

Background

A major European Commission's Field Operational Trials research program (TeleFOT project) set out to assess the likely crash and environment benefits for a range of add-on technologies (devices used by drivers within their vehicle that come with their own mounting cradles). Two of these, the after-market Satellite Navigation devices (SatNav) and fuel and gas monitors (EcoDriving) were of special interest. SatNav devices are becoming increasingly popular among all drivers; useful for finding a location in an unfamiliar area for all drivers. EcoDriving technology was shown to improve driver performance from increased vehicle efficiencies in fuel economy and reductions in CO2 emissions in the TeleFOT trials.

The performance results of both these technologies were subjected to a benefit-cost-analysis (BCA) to show their likely benefits-to-cost ratios (BCRs) to identify the need for future regulatory action by governments. BCA is commonly used by governments and industries to show the likely safety and environmental reductions for new technologies in vehicles and is a necessary and important process in determining the need to introduce and mandate new technologies in today's vehicles.



Satellite Navigation (SatNav)



EcoDrive Technology

Method

TeleFOT (Field Operational Tests of Aftermarket and Nomadic Devices in Vehicles) project was a large scale collaborative project under the Seventh Framework Programme of the European Commission that run from 2008 to 2012. The project collect vehicle and driver on-road driving performance data comprising 100 man-years of travel data over 48 months, involving 3,000 drivers in seven European countries. From these data, assessments were made of the likely benefits of these two technologies, based on vehicle and mileage fleets, fitment rates of these devices, average distances used with these devices active, impact on distance travelled, and reductions in emissions. For both technologies, the BCRs were constrained to only passenger vehicles.

A number of assumptions based on field observations and published data were made in this analysis across all European countries for all passenger car vehicles. They included expected European annual mileage, SatNav usage rates, eco driving exposure, average trip length (km) saved per trip, costs per Km, CO₂ emission reductions, ecodrive fuel savings, monetary discount rates. Equipment costs were computed from a range of commercially available technologies, assuming a driver's likely willingness to pay for these devices.

Results

BCRs were only computed for SatNav as fitment rates could not be estimated for EcoDrive. In computing the potential BCRs for these two devices, the results were expressed in two ways; the best achievable outcome (BEST or most ambitious benefits) and the least or worst achievable outcome (WORST or minimal benefits), based on variations of the assumptions. Benefits for EcoDrive were expressed as the fitment rate required for break-even cost. The economic cost of SatNav was calculated to be €112.00 (A\$174).

Table 1: BCRs for SatNav, and fitment Rates for EcoDrive to achieve break by discount rate

Discount Rates**	Satellite Navigation (SatNav)		EcoDrive*	
	Best Case	Worst Case	Best Case	Worst Case
3% discount	2.5	0.5	11.8%	23.7%
5% discount	2.34	0.47	12.6%	25.2%
7% discount	2.15	0.44	13.4%	26.9%

*Fitment rates were unknown for Eco Driving but figures show what a fitment rate for breakeven BCR would need be for EcoDrive

**Discount rates assume future money is valued less than current due to inflationary effects.

These figures show a Best Case BCR for SatNav of between 2.5 and 2.15 depending on what discount rate is adopted. A best case break-even rate for EcoDrive where benefit=cost would require a fitment rate for the technology of between 11.8% and 13.4%. If both technologies were combined, a best case BCR would be between 3.16 and 2.78, assuming a modest 5% fitment rate for EcoDrive, as shown in Table 2.

Table 2: BEST and WORST Scenarios for SatNav and EcoDrive combined

Estimated Outcome	Best Case	Worst Case
3% discount	3.16	0.73
5% discount	2.97	0.68
7% discount	2.78	0.64

Combined Benefit-Cost-Rates assume a 5% fitment rate and a 10% fuel saving for EcoDrive

Conclusions

This study undertaken as part of the TeleFOT project provided new findings on the potential cost effectiveness for SatNav and EcoDrive in Europe, used both independently and in combination. At **best**, SatNav showed a BCR greater than 2:1 (Benefit:Cost). While fitment rates could not be estimated from the data provided, anything greater than a 12% rate would be cost-beneficial for EcoDrive. Assuming a modest 5% fitment rate for EcoDrive, combinations of these two technologies at **best** would have a BCR around 3:1. The figures for the **worst** outcome were less impressive and generally failed to break-even (BCR less than one).

A number of additional indirect benefits were also identified that, if costed, would show even greater benefits than claimed here. Moreover, it is expected that if the fitment rates for these technologies were to increase, or the costs were to reduce with increases in their use, the likely BCRs would also substantially improve. While this study focussed only on passenger vehicles, given their greater use in buses and commercial heavy goods vehicles, these BCRs are likely to be quite conservative.

References

- AA Motoring Costs (2012). Cost of Motoring, Diesel and Petrol; June 2012 Update, Automobile Association UK.
<http://www.theaa.com/resources/Documents/pdf/motoring-advice/running-costs/petrol2012.pdf>
- AA (2012). Eco-driving advice, Automobile Association, UK.
http://www.theaa.com/motoring_advice/fuels-and-environment/drive-smart.html
- ACEA (2012). Vehicle use in Europe, The European Automobile Manufacturers Association.
<http://www.acea.be/collection/statistics>
- City of Stockholm (2009). Green speed in Stockholm – saving fuel and the environment, ITS World Congress in Stockholm, 2009. www.stocholm-se/isa
- Energy Saving Trust (2008). Eco-driving top tips, www.energysavingtrust.org.uk/scotland/transport
- EU Transport (2006). The European Commission Statistical Pocket Book, ISBN 978-92-79-07082-2, European Communities, 2008; Printed in Belgium.
- EVA Europe (2012). Eco-driving in Europe: improves road safety, fuel efficiency and combats climate change. Published and produced by ENERGIEVERWERTUNGSAGENTUR – THE AUSTRIAN ENERGY AGENCY (E.V.A.), Otto-Bauer-Gasse 6, A-1060 Vienna
- ICCT (2012). European CO2 Emission Performance Standards for Passenger Cars and Light Commercial Vehicles, International Council on Clean Transportation. www.theicct.org
- Martin J. (2012). Vexia econav 480 UK and Ireland review, Expert Reviews website: <http://www.expertreviews.co.uk/gps/275734/vexia-econav-480-uk-ireland/specifications>
- The Green Car (2010). Eco driving could improve fuel economy by 20%, website: <http://www.thegreencarwebsite.co.uk/blog/index.php/2010/02/13/study>
- Travelfootprint (2012). Reduce your Travelfootprint – Eco-driving, website: <http://www.travelfootprint.org/ecodriving>
- Vexia (2012). Vexia ECONAV, the ecological SatNav: save fuel and reduce CO₂ emissions with your own car. Website <http://www.vexia.co.uk/>