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Economic and Environmental Benefits Achieved with Intelligent Transport Systems

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Introduction

Intelligent Transport Systems ï ITS ï are the use of information and communications technologies for surface transport applications. Familiar examples are smart card public transport ticketing such as Londonôs Oyster, satnav systems, computer controlled traffic lights, digital information signs on motorways, speed cameras and digital tachographs in lorries.

The Eddington Report (2006) acknowledged that transport is vital to the economy. While basic connectivity is good, the main problem reported was localised but acute congestion, leading to journey time unreliability. The report estimated that national road pricing could bring benefits up to £28bn per year.

In 2011 the UK House of Commons (HC) Environmental Audit Committee Report highlighted that, poor air quality reduces life expectancy in UK by 7- 8 months on average and that air pollution causes approximately 30,000 to 50,000 premature deaths in UK every year with a cost implication of up to £20 billion a year to society. 90% of Air Quality Management Areas have been declared due to road transport related pollution.

The Benefits of ITS - Smart Motorways

Smart Motorways (SM) (formerly known as Managed Motorways) use variable speed limits to smooth traffic speed and flow, and allow the use of the hard shoulder as a running lane during congested periods. This increases the capacity of the motorway and allows more traffic to travel along the motorway during peak periods. It also reduces the amount of queuing traffic, and results in less stop-start driving. Benefits of SM arise from a reduction in accidents, improvements in journey times and journey time reliability, plus environmental benefits via reductions in noise and vehicle emissions.

A detailed analysis of the first implementation of SM on the M42 J3a-7 showed that:

- There was a 56% reduction in injury accidents.
- Journey times in congested conditions were reduced (during weekday evening peak periods, by 16%).
- Journey time variability reduced by 22%, making journey times more predictable.
- Noise levels reduced by 2.1 dB(A).
- Carbon monoxide and carbon dioxide emissions were both reduced by 4%, as was fuel consumption.

Subsidiary effects were a reduction in driver stress and an improvement in speed compliance. There were also high levels of driver satisfaction with the scheme.

The Benefits of ITS - Point to point speed enforcement

Average speed cameras are now a widely used and well understood ITS solution. Whilst there is a vociferous anti-camera minority who dislike them, Highways and Road Safety professionals design them in to schemes where their benefits deliver tangible improvements through casualty reductions, congestion improvements and improved environmental factors. Fifty UK sites benefit from SPECS cameras, covering limits from 20mph to 70mph. Safety improvements are measured through the reduction in Killed or Seriously Injured (KSI), comparing three years before with three years after. On average, these reductions are greater than 70% at SPECS sites. The DfT calculates the ósaving to societyôif a fatality or serious injury is prevented; using these figures, a typical SPECS installation prevents three KSIs, which has a calculated value of £1million, every single year.

When traffic flows uniformly, there is much more efficient use of the highway capacity and journeys are more

reliable. This is a key benefit seen with average speed control and part of the justification for its use on strategic roads. The DfT uses a figure of £11.28 as the ôVehicle Hour Delayô cost to the economy. On a busy road (50,000 journeys/day), if 10% of vehicles save 2 minutes per day due to reduced congestion, this saves the economy over £600k per year on just one road.

Engines become increasingly inefficient at higher speeds, meaning that more fuel is burned and emissions increase. Data from a SPECS controlled motorway was compared with a similar, unenforced route; because most drivers travelled at an optimum speed for fuel economy, fuel savings (and emissions reductions) of 11.3% were seen.

The Benefits of ITS - German lorry toll

The German truck tolling scheme began on 1 January 2005. Its objectives were to make foreign users pay to use German roads (the cross-roads of Europe), to finance the extension & operation of the motorway network, to charge real costs (the user-pays principle), and to promote efficient use of HGVs. The charged network included 13000 km of autobahns and 1000 km of four-lane national highways. It applies to 1.5 million HGVs greater than 12 tonnes in weight. Charges are based on distance travelled, number of axles and emission class. It is a tax, so VAT does not apply.

The in-vehicle technology used is satellite positioning, digital maps of the road network and cellular radio communications, with microwave short-range radio for enforcement and compatibility with charging schemes of other countries. Alternatively, journeys can be paid for at 3500 kiosks at entry points or via the Internet. Charges are from 14 to 29 eurocents/km.

Original investment costs were an estimated ú1500M. The scheme employs 750 operators and 650 enforcement staff. Annual revenue was ú3.4bn (2007) and ú4.4 billion (2009). Annual running costs (2007) of ú770m excluding enforcement were expected to fall to 12% of revenue in 2009. There were environmental benefits. Modern low-emission HGVs (categories S5 and EEV) accounted for 0.2% of the toll mileage in 2005, but 61% by September 2010. Conversely the mileage of higher emission HGVs (S1 and S2) dropped from 36.5% to 2.4%. The number of empty runs has fallen 11%.

The Benefits of ITS - Parking

In 2011, the Institute for Transportation & Development Policy report ñEuropeôs Parking U-Turn: From Accommodation to Regulationòmade the claim that across Europe as much as 50% of traffic congestion was caused by drivers cruising around in search of cheaper parking spaces. It also set out the fact that having the right parking policy in place can lead to impressive results: revitalised and thriving town centres; significant reductions in private car trips; reductions in air pollution; and generally improved quality of life.

Later in 2011 the Automotive Council UK paper ñIntelligent Mobility: A National Need?òmade it clear that they agree that ITS used to deliver parking policy can deliver major benefits. Clearly traditional ITS projects such as smart motorways or Urban Traffic Management Systems have benefits, but without a linked parking policy such schemes might not address or find the success they deserve.

Vienna - An introduction of parking fees led to a 66% drop in vehicle kilometres travelled (from 10million to 3million) resulting from searches for an available space. An increase in the price of parking in off-street municipal facilities led to a 30% dip in occupancy. At the same time, public transit and bike commuting increased, with 25% of car users switching mode.

UK - A study by the Transport Research Laboratory comparing the effect of parking restrictions and improved public transit on car use indicated that doubling parking fees reduced car usage by 20%, while an increase in public transit frequency was predicted to only decrease car use by a meagre 1 or 2%. Cutting the parking supply in half led to a 30% drop in car use.

These are only a few examples, mainly from the UK, of economic and environmental benefits achieved by using Intelligent Transport Systems. There are many more that could be quoted, both in the UK and overseas. If you have found this brief selection of interest, please contact us for more details.

More information:

For general enquiries, a list of references for the facts in this note, further reading and any other follow-on information, please email mailbox@its-uk.org.uk