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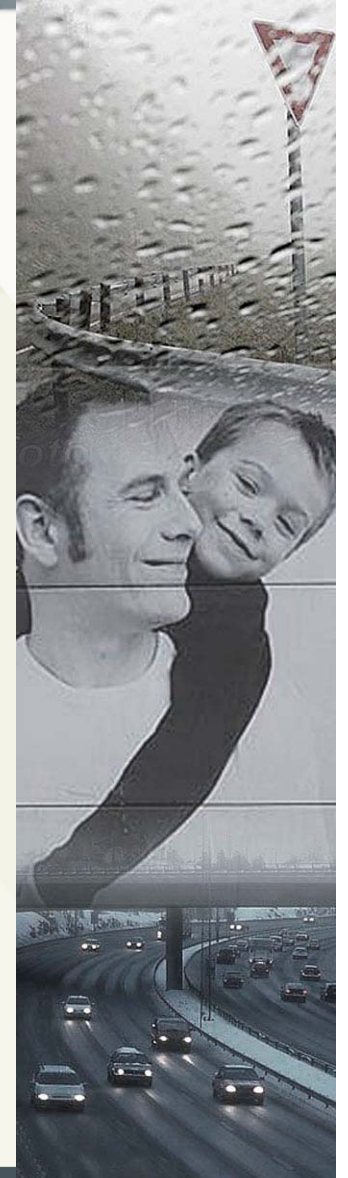
*Quantifying the benefits of ITS in socio economic terms - the case of electronic payment systems in Norway*

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## Objectives

- To demonstrate that ITS projects can and should be evaluated from economic point view
- To prove, using recently introduced electronic payment systems, that ITS based solutions are profitable from a socio economic point of view
- To encourage the proponents of ITS solutions to use economic evaluations



## Presentation outline

1. Why ITS?
2. CBA of electronic payment systems
3. General lessons: socio economic evaluation of electronic payment systems
4. Conclusions



## Why ITS?

- ITS based projects are an asset to the transport sector for various reasons:
  - Enhances mobility
  - Improves accessibility
  - Improves traffic safety
- However, the merits of other types of projects are gauged using economic frameworks such as cost benefit analysis (CBA), but not ITS
- **ITS based projects stand to loose in competition for funds unless merits can be demonstrated in economic terms!**



## Society relies on ITS

- ITS is not just new and experimental technology that will have an impact in the future
- Electronic toll collection systems and smart card systems for public transport ensures that roads and public transport can be financed and operated efficiently without creating unnecessary congestion, emissions or accidents
- But have ITS systems such as these provided a social surplus, i.e. a positive net present value, to society?



## The Economic approach - cost benefit analysis

- Computes both the **benefits** and **costs** of ITS based electronic charging systems over 10 years (the life period of the project)
- Economic worthiness is judged by:

Discounted( Benefit -cost) > 0; profitable

Discounted( Benefit -cost) < 0; not profitable



## Example: Smart cards in Trondheim, affected groups

<i>Passengers</i>	<i>Bus company</i>	<i>Authorities</i>	<i>Wider community</i>
Reduced boarding times	Reduced delays	Improved passenger statistics	Marginal cost of public funds
Reduced waiting time at bus stops	Increased reliability	Project costs	
Reduced need for cash	Increased customer contact		
	Reduced or increased operating costs?		
	Equipment and software costs		
	Improved working environment for drivers		
+	+/-	+/-	-

Most of these effects can be quantified and included in a benefit cost analysis



## Cost benefit analysis: smart cards in Trondheim

	<b>Present value costs</b>	<b>Present value benefits</b>	<b>Net Present Value</b>
Equipment costs	€ (1.500.000)		
Project costs	€ (1.000.000)		
Operating costs	€ (8.000.000)		
Marginal cost public funds	€ (500.000)		
Time savings t:card users		€ 750.000	
Time savings others		€ 12.500.000	
Time savings bus company		€ 9.000.000	
Net present value			€ 11.250.000





## Cost benefit analysis: the Oslo toll cordon

	Present value costs	Present value benefits	Net Present Value
Equipment costs	€ (6.250.000)		
Construction costs	€ (4.750.000)		
Time savings existing ETC users		€ 20.500.000	
Time savings new ETC users		€ 28.500.000	
Reduced operating costs		€ 24.500.000	
Reduced reinvestment costs		€ 250.000	
Reduced emissions		€ 2.500.000	
Reduced fuel consumption		€ 1.000.000	
Reduced accident costs		N/A	
Net present value			€ 66.250.000



## Cost benefit analysis: ETC for ferries

	<b>Present value costs</b>	<b>Present value benefits</b>	<b>Net Present Value</b>
Equipment costs	€ (1.000.000)		
Marginal cost public funds	€ (200.000)		
Reduced operating costs		€ 4.200.000	
Time savings		€ 2.000.000	
Net present value			€ 5.000.000



## Socio economic evaluation of electronic payment systems

- Most costs and benefits can be quantified
- Impacts are distributed throughout the system - commercial appraisal is insufficient
- Quality improvements can pave the way for increased usage
- Potential for more sophisticated pricing schemes
- Improved passenger statistics
- Positive externalities and user economies of scale



## Quality improvements will often generate positive externalities

- Time savings for one smart card user will generate time savings for all other bus passengers
- Improved traffic flow through toll stations will reduce overall congestion
- A non linear relationship between individual benefits and total benefits
- For scheduled transport, operator time savings could enable increased frequency and thus reducing average user costs even further



## Conclusions: quantifying the benefits of ITS

1. Evaluating ITS projects using economic principles is desirable and possible if ITS is to compete for funds with other forms of project
2. Many benefits from ITS are measurable in monetary terms and therefore enables cost benefit analysis
3. Proponents for ITS are urged therefore to use economic assessments to demonstrate the merits of their projects
4. Finally, three newly implemented Norwegian electronic payments systems is economically profitable



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Thank you!

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