Planning and evaluation of sustainability in transport

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Planning and evaluation of sustainability in transport

Henrik Gudmundsson, DTU Transport
Joint DTU Transport/DCE Seminar, November 23, 2012
Overview

1. Introduction and general approaches

2. Brief overview of some projects related to sustainability

3. Examples from research
   - Decision analysis and support
   - Policy Influence of indicators
   - National Sustainable Transport Planning

4. Some perspectives
1. Introduction and general approaches

- Sustainability or sustainable transport is not a designated research theme at DTU transport, but considered in many research projects/activities.

- Emphasis in this presentation on sustainability related work within the research theme ‘Governance and appraisal’ (ca 10 members).

- No agreement on if and how ‘sustainable transport’ should be defined.

- Broadly two approaches:
  
  - Planning for ‘green’ transport modes, land use patterns, or alternative mobility behaviours.
  
  - A performance based approach with focus on the operationalization and application of sustainability principles, criteria, indicators for assessment, monitoring, evaluation, etc.
Some overall research questions

• How can transport appraisal be valid, non-biased, and lead to transparant results rather than seem to emerge from a ‘block box’?

• How to ensure that project appraisals cover all relevant items in the best way in a particular context (= comprehensive assessment)?

• How to operationalize and integrate sustainability into indicators, tools and institutions for policy making and planning?

• How do information, knowledge tools, and indicators actually influence governance and implementation of transport policies?

• How do the institutional and organisational frameworks affect the implementation and sustainability of transport policies and plans?
Key dimensions of decision making for sustainable development

- **Time**: Consideration of long term impacts (concern for future generations; sustainability), as well as present development

- **Space**: Consideration of large scale impacts as well as local ones

- **Multi-functionality**: Preserving economic, social and environmental pillars for sustainability and development

- **Risks**: Attention to potential irreversible impacts

- **Ambiguity**: Ambivalent goals, Uncertain knowledge, Distributed power

- **Institutions**: Challenge of integrated decision making

- **Governance**: Promotion of participation of major social groups in the development processes

=> **Complexity** as a key condition
### General principles for sustainable development

<table>
<thead>
<tr>
<th>Institutional Dimension</th>
<th>Economic Pillar</th>
<th>Social Pillar</th>
<th>Environment Pillar</th>
</tr>
</thead>
</table>
| Present Generation      | • Ensure rising income level for the present generation  
                          • Ensure fair distribution | • Ensure human well-being and development;  
                          • Ensure fair distribution and eliminate poverty | • Ensure environmental quality for the present;  
                          • Ensure environmental justice |
| Future Generations      | • Safeguard income opportunities for future generations (economic capital) | • Maintain capacity for interaction and stability of social systems (social capital) | • Protect nature’s life-support systems and resources (Ecosystems, Climate, Biodiversity)… |
Evaluation frameworks

- **Substantial** aspect: *What to evaluate?*
  (what problem, which impacts, what system...?)

- **Intentional** aspect: *Why to evaluate?*
  (what purpose, which applications, which users...?)

- **Procedural** aspect: *How to evaluate?*
  (how to collect and present data; how to aggregate, how and when to report...)

YY  ZZ  XX
Evaluation methods

- **Understanding the influence and roles of methods**

  - Money values or weights?
  - Money value
  - A single figure
  - No unit
  - Only values
  - Only weights
  - Degree of monetisation
  - Degree of weighting
  - No aggregation

- **Development and application of methods**
**Comprehensive**

**Overarching Concepts**
- Sustainable Development (economic, social, environmental)
- Transport Systems
- Integrated governance

**Aggregate assessment tools**
- Cost/Benefit analysis
- Multi-criteria assessment
- GIS systems

**Specific measurement tools**
- Traffic/transport models
- Air quality Models
- Noise models
- Accident models

**Data Indicators**
- Variables

**Technical aspects**

**Institutional aspects**

**Formal assessment frameworks**
- Environmental impact assessment
- Strategic Environmental Impact assessment

**Detailed**
Transport Planning Process  (Meyer & Miller 2000)
2. Brief overview of some projects related to sustainability

<table>
<thead>
<tr>
<th>Project</th>
<th>Funding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Øresund Ecomobility</td>
<td>INTERREG 2010-12</td>
<td>Decision models about green logistics chains and urban consolidation centres</td>
</tr>
<tr>
<td>UNITE</td>
<td>Strategic Research Council 2009-13</td>
<td>Uncertainties in transport decision making</td>
</tr>
<tr>
<td>Optimising Transport Decision Making</td>
<td>PhD</td>
<td>Multicriteria analysis and decision conferences</td>
</tr>
<tr>
<td>Assessing robustness</td>
<td>PhD</td>
<td>Combining socio economy with political acceptability</td>
</tr>
<tr>
<td>Impact</td>
<td>MISTRA Foundation 2005-08</td>
<td>Barriers for implementing sustainable solutions</td>
</tr>
<tr>
<td>COST 356</td>
<td>COST 2006-10</td>
<td>Environmental sustainability indicators for transport</td>
</tr>
<tr>
<td>POINT</td>
<td>EU FP7 2008-2011</td>
<td>Policy Influence of Indicators</td>
</tr>
<tr>
<td>OPTIC</td>
<td>EU FP7 2009-11</td>
<td>Designing optimal policy packages</td>
</tr>
<tr>
<td>SUNRA; SBAKPI</td>
<td>ERANET 2011-2014</td>
<td>Sustainability for road administrations</td>
</tr>
<tr>
<td>SUSTAIN</td>
<td>Strategic Research Council 2012-2016</td>
<td>National Sustainable Transport Planning – new framework</td>
</tr>
</tbody>
</table>
3. Examples: Decision analysis

2007-2012 the Decision Modelling Group (Leleur et al) has developed the **Decision Conference** (DC) approach

Involves adjusting and optimising the interplay of
- I: decision analysis (DA) techniques,
- II: group processes and
- III: interactive IT
Further developed in PhD ‘Optimising Transport Decision Making...’

• Based on practical cases the thesis recommends a framework consisting of *process* and *techniques* for optimising transport decision making.

• The combination of these approaches is useful for structuring and appraising large and complex decision problems with participation of relevant stakeholders and decision-makers.

• Regarding *decision analysis techniques*, distinction is recommended:
  – Basic-user mode
  – Expert-user mode

<table>
<thead>
<tr>
<th>Basic-user mode</th>
<th>Expert-user mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria weights</td>
<td>SMARTER</td>
</tr>
<tr>
<td>Alternative scores</td>
<td>REMBRANDT</td>
</tr>
<tr>
<td></td>
<td>Swing weights</td>
</tr>
<tr>
<td></td>
<td>SMART / REMBRANDT</td>
</tr>
</tbody>
</table>

*Source: Michael Bruhn Barfod 2012*
Findings relating to examination process

The preliminary problem structuring phase

1. Identify the problem
   - Focus on the problem
   - Focus on the alternatives
   - Problem formulation

2. Select an appropriate analytic approach
   - Generate relevant criteria (workshops etc.)
   - Select one or more assessment techniques

3. Develop a detailed analytic structure
   - Division of problem into simple judgments
   - Division of criteria if defined too broad

The five steps of the decision conference

Step 1
- Introduction to the concepts and techniques to be used in the process

Step 2
- Definition of the criteria/impacts that are to be assessed (possibility to include more or omit some)

Step 3
- Scoring of alternatives within each criterion/impact

Step 4
- Weighting of criteria - Trade-off considerations

Step 5
- Results - Sensitivity analysis - Validation

Possibility for revising assessments in order to accomplish shared understanding

Possible decision

Source: Michael Bruhn Barfod 2012
Example: Policy influence of indicators

Overall aims were to,
- Explore if and how indicators are used in policy making
- If the use of indicators has influence on policy
- What role the information plays

Use:
- Indicators are observed processed and referred to

Influence:
- Indicators affect policy content (goals, measures), or processes

Roles:
- Instrumental: Indicators have direct influence on decisions
- Conceptual: Indicators increase knowledge or create new ideas
- Symbolic: Indicators justify existing decisions
Two transport cases studied

- **Sweden**: Indicators in annual reports that *Follow-up on the Swedish Transport Policy Objectives* (Focus on 2008-report)

- **European Union**: Indicators developed for the Mid-term Review of a transport white paper, *Keep Europe Moving*, 2006, in the so-called ASSESS study
Some conclusions

- Influence is more evident in the EU case than Sweden case

- Indicators attached to quantitative, political objectives obtain more attention than indicators not attached to objectives

- A regime of management by objectives and results increases use, but does not necessarily produce more influence

- Indicators attached to (future) policy alternatives could be more influential than backward-looking indicators

- Engagement of policy makers in indicator design and development increases use and influence
Example: SUSTAIN

National Sustainable Transport Planning (NSTP)

Normative
Sustainability principles and performance measures

Strategic
Institutional conditions and rationales for governance

Analytic
Tools, models and procedures for decision support

Knowledge framework

Practices

Transport systems
National Sustainable Transport Planning

Working definition (?):  
- Frameworks and procedures for integration of sustainability into the design and implementation of comprehensive national transport policies and plans

- What is role of central government plans compared to for example
  - public-private partnerships?
  - ‘soft’ governance frameworks?
Indicators and performance measurement

Need of indicators for decision support

Provide indicator sets

Indicator sets adequate for different institutional settings

Analyses of organisational framework

Analyses of organisational framework

Flexible tools for planning and evaluation

New organisational forms and transport planning processes

Tools adjusted to different institutional settings
Input to develop the a framework for performance measurement for NSTP...

Basic definitions of sustainability and transport sustainability

Existing policy frameworks (global, EU, national)

Existing indicator frameworks (global, EU, national)

Research on sustainability assessment

Research on indicator systems (sucesses, failures, non-uses, misuses..)
4. Some Perspectives:

*Important outside relations today*

**Organizations in the transport sector**
- Danish Ministry of Transport
- Danish Road Directorate
- Trafikanalys, Sweden
- European Environment Agency
- Intergovernmental Panel on Climate Change (IPCC)

**Research Communities**
- Institute of Transport Studies, Leeds
- Oxford University, Oxford
- Transport Economics Institute, Oslo
- VTI, Swedish National Road and Transport Research Institute, Linkoping
- Aalto University, Helsinki
- Copenhagen Business School
- Texas Transportation Institute, College Station
- Aalborg University
Where to? – Some possible developments

- to establish and develop comprehensive assessment methodology, incorporating sustainability

- to produce international scientific publications on national transport policy frameworks, sustainability performance measures, and modes of knowledge use in transport policy

- to establish a definition and typology of transport governance institutions and mechanisms

- to produce a textbook on sustainable transport performance measures

- to develop teaching with regard to sustainable transport assessment and possibly transport policy and climate change

- to initiate another major joint project to further unite and consolidate the research theme on governance and appraisal