The use of state-of-the-art transport models by policy makers – How worthwhile is it?

Prof. Moshe Givoni
Head, Transport Research Unit, Tel-Aviv University, Israel
Visiting Prof., Aalto University, Finland

Research in collaboration with Yoram Shifman and Eda Beyazit
\[ U_{P\_Car} = \beta_1 (TT) + \beta_2 (Tc) \]
\[ U_{S\_Taxi} = \text{constant} + \beta_1 (TT) + \beta_2 (Tc) \]
\[ U_{Taxi} = \text{constant} + \beta_1 (TT) + \beta_2 (Tc) + \beta_3 (FINC) \]
\[ U_{Motorcycle} = \text{constant} + \beta_1 (TT) + \beta_2 (Tc) + \beta_4 (FINC) \]
\[ U_{bicycle} = \text{constant} + \beta_1 (TT) + \beta_2 (Tc) + \beta_5 (FINC) \]
\[ U_{walking} = \text{constant} + \beta_1 (TT) + \beta_2 (Tc) + \beta_6 (FINC) + \beta_7 (DIST) \]
Quantitative models to support (transport) policy and its evaluation

Essential in the planning and policy making processes

Keeping in mind:

• "All models are wrong but some are useful“ (Box, 1978)

• A ‘guesstimate’ is better than just guessing

Source: Klöcker & Böbaum, 2010
The “Seven sins of large-scale models”  
(Lee, 1973)*

1. “Hypercomprehensiveness” – including too much detail or variables
2. “Grossness” – too wide in scope
3. “Hungriness” – for data
4. “Wrongheadedness” – explicit or implicit commitment to the status-quo in building and structuring the model (equations)
5. “Complicatedness” – which requires the model to be "massaged“ (constrained) in order to provide “reasonable” results
6. “Mechanicalness” – the risk of focusing on “solving” the problem on the computer instead of thinking the problem through
7. “Expensiveness” – the high cost of modelling efforts

The inevitable trade-off between Behavioral realism and (computational) Complexity

Source: Shiftan and Ben-Akiva, 2011
The inevitable trade-off between Behavioral realism and (computational) Complexity

Where are we today and what should be the way forward in “model development”?

Source: Shiftan and Ben-Akiva, 2011
The use of models by policy makers – evidence from the UK and Israel

Research questions:
• Do policy makers have access to state of the art models - Sometimes
• (if yes) Do policy makers use the modelling tools that are available to them? - YES!
• (if yes) How much ‘knowledge’ (understanding) do they gain from them
  - The focus of this presentation

Methodology:
Case study approach, In-depth interviews and Workshops

UK: Local Transport Plan 3 (regional planning in one County (Shire))

Israel: Mass Transit projects (three largest cities, MOT led through ‘sub-companies’)
The use of models by policy makers – evidence from the UK and Israel

In-depth interviews

<table>
<thead>
<tr>
<th>UK</th>
<th>Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of the Local Transport Plan Group (Transport planner)</td>
<td>High official at the Ministry of Transport (Decision maker)</td>
</tr>
<tr>
<td>Team leader of the local area transport team (Transport planner)</td>
<td>(Former) High official in the Ministry of Interior (Decision maker)</td>
</tr>
<tr>
<td>Cabinet member for Transport (Decision maker)</td>
<td>General manager of company responsible for project A (Project manager)</td>
</tr>
<tr>
<td>Consultant to the LTP3 (and an academic)</td>
<td>General manager of company responsible for project B (Project manager)</td>
</tr>
<tr>
<td></td>
<td>(Former) General manager of company responsible for project C (Project manager)</td>
</tr>
</tbody>
</table>

Workshops: University of Oxford, Technion – Israel Institute of Technology

Research period: 2010 - 2011
The use of models by policy makers – evidence from the UK and Israel

In-depth interviews

<table>
<thead>
<tr>
<th>UK</th>
<th>Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of the Local Transport Plan Group (Transport planner)</td>
<td>High official at the Ministry of Transport (Decision maker)</td>
</tr>
<tr>
<td>Team Leader and head of transport team (Transport planner)</td>
<td>(Former) High official in the Ministry of Interior (Decision maker)</td>
</tr>
<tr>
<td>Cabinet member for Transport (Decision maker)</td>
<td>General director and company responsible for project A (Project manager)</td>
</tr>
<tr>
<td>Consultant to the LTP3 (and an academic)</td>
<td>General director and company responsible for project B (Project manager)</td>
</tr>
<tr>
<td>Decision maker</td>
<td>(Former) General manager of company responsible for project C (Project manager)</td>
</tr>
<tr>
<td>Consultant and an Academic</td>
<td></td>
</tr>
</tbody>
</table>

Workshops: University of Oxford, Technion – Israel Institute of Technology

Research period: 2010 - 2011
The use of models in policy making – some evidence

“Without models you can’t do anything...Models help to say what will be in 30 years...so you need models.” [Although] “I’m not sure all the models really know to forecast the future ...[there is] no way to know if the model is a good model or bad model...We need to forecast so we need to use models”.

High official at the Ministry of Transport

“Transportation models are very significant and have great effect on the planning process... I think their [the models] effect is excessive... There are many problems in models and they need further development...”

He also further explained that:

“The models are ‘black box’ for some of the officials involved in decision making...[because of] their complexity, and the need of professional knowledge in their operation. They are not accessible to external intervention of policy makers and other unprofessional officials”.

(former) High official in the Ministry of Interior
The use of models in policy making – main findings and observations

• ‘Modelling’ work is done at arm’s length from the political level that needs to use it
  • Communications problems between ‘suppliers’ and ‘users’ of models’ knowledge
  • Information is diluted when arriving at the top decision making

• Planners and project managers thought that models give them confidence when explaining plans and decisions (even when the majority feel the models are difficult to comprehend)

• A gap between what can be considered a good/best model from a modelling perspective and what can be considered a useful model, from a policy perspective

• Usefulness of using the most advanced models in practice depends on “how much the ‘practice’ could understand to what extent such advances are helpful” (An academic at the Israeli workshop)
The use of models in policy making – main findings and observations

• Use of models for policy purposes does not necessarily depend on the model's level of complexity, but on how the modelling process is presented to decision makers => The ‘truth vs. beauty’ dilemma

• There is clear recognition that models cannot predict the future. But there is demand by decision makers to get prediction and unequivocal conclusion (from model results)

• Problems of “addiction to numbers” result in ignoring many of the model’s problems
  • Engineers and economists “love” numbers
  • Lawyers “love things that are objective, cannot be disputed and therefore also love numbers”

(Decision Maker, Israel)

• Those who should understand the model need to make more effort to do so
The use of models in policy making – main findings and observations

- The dominant view: we are right of the maximum benefits point

- Researchers are racing ahead to improve models while practitioners cannot catch up. Yet, practitioners are turning to academics to give them the best models (even if these cannot be useful for them)

- There is a difference between what is possible and what is comprehensible (Gudmundsson, 2011)

- Complex models contribute to increasing public scepticism with regard to the planning process and decisions made => are not helpful in building trust

Source: Shifman and Ben-Akiva, 2011
The use of models in policy making – Conclusions

• What models to use? “Those that policymakers understand”
  (An academic, UK workshop)

• Models should be understandable, reliable, user-friendly, efficient and flexible to better support decision making
  • Such a model might never be developed but progress towards such a model can be made (but is it even under development?)

• Developing models that policy makers understand DOES NOT mean going back to old(er) models - since they were also not ‘understandable’

• There is a need to find better ways for models to be more beneficial for planning
The use of models in policy making – Conclusions

- Need to adopt the KISS principle (Keep It Simple, S…) – systems perform best when they have simple designs rather than complex ones

“Simple” from the modelers perspective ≠ “Simple” as in understandable and useful for policy makers
The use of state-of-the-art transport models by policymakers – beauty in simplicity?

Moshe Givoni, Eda Beyazit and Yoram Shiftan


Thank you!
givonim@post.tau.ac.il

Acknowledgment:
We would like to thank the British Council’s Britain–Israel Research and Academic Exchange Partnership (BIRAX) programme for making this research possible by funding it.