A new look at planning and designing transportation systems: a decision-making model based on cognitive rationality, stakeholder engagement and quantitative methods

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Background

Decision-making in transportation

- Decision: why, who, where, what, when
- Components of public processes

Models of decision-making processes

Public Engagement

A mode for transportation decision-making and the role of quantitative methods
1. Background

Decision-making in transportation

- Decision: why, who, where, what, when
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2. Models of decision-making processes

3. Public Engagement

4. A mode for transportation decision-making and the role of quantitative methods
1. background

- Decisions related to transportation systems, made by both public and private subjects, often impacts on diverse and contrasting interests.

- Decision on transportation are time-consuming and non-efficient due to the complexity of the legal procedures and the fragmentation of the decision-makers system.

- Decision on transportation systems often capture the public eye interest.

- Often, decisions on transportation systems do not perform as expected (planning failures, time and costs overruns).
1. TAV Turin-Lyon

Protesters derail start of longest Alps tunnel

Richard Owen
The Times | Published: 02 December 2005 | European Football

...by its Italian initials as TAV. The focus of their protests...Venaus the slogan “No TAV” hangs in banners...Government claims that the TAV is vital if commercial traffic...protesters last year, to no avail. “Blocking...

Italy high-speed rail tunnel: Fresh clashes in Alps

Police have again clashed with demonstrators in the Italian Alps over the construction of a new high-speed rail link with France.

The government says it is determined to press ahead, despite the protests

Clash over new high-speed rail tunnel in Italian Alps

3 July 2011 Last updated at 16:06 GMT

27 June 2011 Last updated at 16:26 GMT
1. Congestion Charge in London

Go-slow protest over road charge

Hundreds of drivers have taken part in an anti-congestion charge protest in London in a last-ditch attempt to stop the western extension of the zone.

Organised by the West London Residents Association, the go-slow began at Addison Road, in Kensington.

Protesters argue the £8 charge, being introduced from Monday, will damage businesses and cost residents hundreds of pounds a year.

But Transport for London believes congestion will be cut by 15%.

TfL also claims the number of vehicles will be reduced by 10 to 15% once the charge is introduced.

The zone will expand west from central London on Monday to include Kensington and Chelsea.

Click to see new congestion charge area

The protest convoy and march travelled along the Earls Court Road, which will be the boundary of the new zone.

One resident said: "We're fighting [London Mayor Ken Livingstone]. At least we can show him that we care, even if he doesn't."

"Since the introduction of the charge in 2003, traffic levels have been reduced in the central zone by 20%", TfL spokesman.

Livingstone praises congestion zone extension

Matt Weaver and agencies

The Guardian, Monday 19 February 2007 14:47 GMT

An anti-congestion charge protestor in London. Photograph: Sang Tan/AP

Ken Livingstone today hailed as a success the westward extension of the congestion charge zone in London, despite angry protests from residents in west London.
1. background

**PLANNING FAILURES**

Striking difference between demand forecasts and actual value for rail and road projects (Flyvbjerg et al., 2007)

![Graph showing inaccuracy in traffic forecasts for rail and road projects.](image)

- **Actual Traffic < Forecasted Traffic**
  - Inaccuracy for rail projects (%)
  - Average traffic over-estimation of 50%
  - Acknowledged outliers

- **Actual Traffic > Forecasted Traffic**
  - Inaccuracy for road projects (%)
  - Average traffic over-estimation of 20%
1. background

PLANNING FAILURES
Cost overruns for transportation infrastructure projects (Flyvbjerg et al., 2002)

Average cost overrun of 28%
1. background

TRENDS IN TRANSPORTATION DECISION-MAKING

- **Stronger awareness** of the **impacts** of transport-related choices and their externalities (e.g. environment, welfare, territorial inequalities, etc.) and larger **opportunities to voice** different **opinions/interests**

- **Opening** of **transport markets** once directly managed or strictly controlled by public authorities (infrastructure building and management, air and railway services, urban public transportation) **to private operators**
1. background

TRADITIONAL APPROACHES TO TRANSPORTATION PLANNING AND DECISION-MAKING IN TRANSPORTATION LITERATURE

- A process aimed at defining plans, actions and operations at different temporal horizons for a *rational transport system* (Manheim, 1979)

- Urban transportation planning is the process of: (Meyer and Miller, 2001)
  a) Establishing a *vision of what a community wants* to be and how the transportation system fits into this vision, and understanding the types of decisions that need to be made to achieve this vision
  b) Assessing opportunities and limitations of the future in relationship to *goals* and desired system performance measures
  c) Identifying the *near- and long-term consequences* to the community and to transportation system users of alternative choices designed
  d) Relating *alternative decisions to the goals, objectives, or system performance measures* established for an urban area, agency, or firm
  e) *Presenting this information* to decision makers in an understandable and useful form
  f) Helping decision makers *establish priorities* and develop an investment program
1. background

TRADITIONAL APPROACHES TO TRANSPORTATION PLANNING AND DECISION-MAKING IN TRANSPORTATION LITERATURE

- Transportation planning is a decision-making process based on rationality, aimed at defining and implementing transport system operations (Ortuzar and Willumsen, 2001).

- A planning process results in a sequence of decisions (plans or projects) taken at different, not necessarily predefined, moments in time, with each decision accounting for the effects of previous decisions and exogenous factors (Cascetta, 2009).

  “Planning is seen mostly as a public-oriented activity, based on the simulation of alternative projects and the assessment of priorities”

  ...but this is often not the case
outline

1 Background

2 Decision-making in transportation
   ✷ Decision: why, who, where, what, when
   ✷ Components of public processes

3 Models of decision-making processes

4 Public Engagement

5 A mode for transportation decision-making and the role of quantitative methods
2. decision-making processes

Decisions:

Why? ... *perspectives*

Who? ... *decision makers*

Where? ... *markets*

What? ... *types of decision*

When? ... *temporal perspective*

Stakeholders involvement

Components of the process

Decision-making process

Models of decision-making

Quantitative methods
2A. decisions: why, who where, what, when

PERSPECTIVES, main objectives (why?)

- Mobility planning
- Business planning
- Environmental planning
- Land-use planning
- ...

A decision-making opportunity/need may refer to multiple perspectives
2A. decisions: why, who where, what, when

DECISION-MAKERS (who?)

- Public Administrations
  - European
  - National
  - Regional
  - Metropolitan/Urban

- Companies (private, public, mixed)
  - Construction and management of transport infrastructure (e.g. motorways, ports, airports)
  - Management of transport services (e.g. airlines, rail lines, containers lines)

The same decision-making (planning) process may involve several decision-makers at different scales and types
Natural Monopoly

There is only one possible/convenient subject for construction and/or management of a transport system (e.g. rail network, urban road network)
- direct management by the Public Administration
- competition for the market
  - concession contracts (including PPP and PF)
  - service contracts (e.g. subsidized Public Transportation Services)

Competitive market (competition in the market)

Several subjects compete for the same economic activity (e.g. rail services, air lines, etc.)
2A. decisions: why, who where, what, when

TYPES OF DECISION (what?)

- **Regulations**
  - Land use regulation
  - Location of activities (e.g. Public Facilities)
  - Market regulation
  - Air quality regulations, ...

- **Services**
  - Timetables
  - Fares, ...

- **Infrastructure**
  - Building
  - Upgrading, ...

- **Vehicles & technologies**
  - Fleet composition
  - ITS deployment, ...

Regulations:
- Land use regulation
- Location of activities (e.g. Public Facilities)
- Market regulation
- Air quality regulations, ...

Services:
- Timetables
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Infrastructure:
- Building
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Vehicles & technologies:
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- ITS deployment, ...
Decisions on Transportation System or impacting on it

2A. decisions: why, who where, what, when

Decisions on Transportation systems

Transportation System

Supply

Transportation facilities, services, prices, vehicles and technology

Transportation service performances (LOS)

Supply element capacities

Congestion

Demand

Travel demand by transportation mode

Level, spatial and time patterns of travel demand

Activity system

Accessibility

- active
- passive

Level and location of economic activities

Number and location of households by type

Space availability by area and type

Transportation service performances

Transportation facilities, services, prices, vehicles and technology

Suppliers

Congestion

Level and location of economic activities

Number and location of households by type

Space availability by area and type

Activity system

Accessibility

- active
- passive

Social impacts

Equity

Safety

Environmental impacts

Energy consumption

Pollutants

Visual intrusion

Decisions impacting on transportation system

Decisions on transportation systems
2A. decisions: why, who where, what, when

TYPES OF DECISION (what?)

Projects and plans

Decisions can be either:

- **finalized to their direct implementation**
  They can be termed as **projects** and have to contain the *adequate level of detail*, typically defined by the rules of the projects involving public interests.

- **or, require successive decisions to be implemented**
  Plans may *involve some or all elements requiring further decision making steps to be implemented*. They have longer perspectives, encompass a wider range of objectives and actions, and may include some options already implementable (projects), while other open to further decisions or design stages.
2A. decisions: why, who where, what, when

TEMPORAL PERSPECTIVE OF DECISIONS (when?)

- **strategic**
  - related to regulations, services and infrastructures,
  - taken by public administrations or by private companies,
  - involve significant investments and/or time to be implemented and to get their return released

- **tactical**
  - related to services, infrastructures and vehicles & technology,
  - taken by public administrations or by private companies,
  - involve limited investments and/or implementation and return times

- **operational**
  - related to services and vehicles & technology,
  - taken by public administrations or by private companies,
  - involve no or very limited investments and very short implementation and return times
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2A. decisions: why, who where, what, when

**TYPES OF DECISION**

Example: planning of a new Container Terminal

<table>
<thead>
<tr>
<th>WHY?</th>
<th>Business Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHEN?</td>
<td>Strategic decision</td>
</tr>
<tr>
<td>WHO?</td>
<td>Port Authority</td>
</tr>
<tr>
<td>WHERE?</td>
<td>Competition for the market</td>
</tr>
</tbody>
</table>

**WHAT?**  
*Design Variables*

- Terminal capacity and layout  
  *(e.g. berth length, type of storage area, etc.)*
- Equipment and Technology  
  *(e.g. Cranes, information system, etc.)*
- Maritime accessibility *(e.g. max draught, etc.)*
- Pricing policies *(e.g. concession fees, demurage, etc.)*
2A. decisions: why, who where, what, when

TYPES OF DECISION

Example planning container service lines

WHY? Business planning

WHEN? Tactical decision

WHO? Ocean carrier

WHERE? Competition in the market (alliances possible)

WHAT? Design Variables

- Structure of service (e.g. route, sequence of port calls, transhipment ports,)
- Service performances (e.g. transit time, frequency etc.)
- Pricing policies (e.g. freight rates, etc.)
- Assets (e.g. number of ships, bunker consumption)
2B. Components of decision-making processes

Decision-making processes impacting on several subjects both within and outside the organization (public or private) in charge of the decision

- **Decision-makers**
  Those who are formally in charge of the choice

- **Process coordination**
  People and procedures used to plan and manage each stage of the process

- **Stakeholders**
  Those who hold a stake in a particular issue, even though they have not a formal role in the decision-making process

- **Opportunities/problems**
  They stimulate the decision-making process

- **Objectives (stated/unstated)**
  Targets pursued by decision-makers and stakeholders

- **Contextual barriers**
  Anything restricting or causing the delay or cancellation of a project. They set constraints, such as institutional, legal and financial restrictions

- **Consensus barriers (see later)**

- **Coalitions**: Groups of actors whose objectives converge to one solution

- **Implementation**: Development of the project or part of it
### 2B. Components of decision-making processes

#### Stakeholders

<table>
<thead>
<tr>
<th>Institutions and Authorities</th>
<th>Users</th>
<th>Transport operators</th>
<th>Business and Unions</th>
<th>Local communities</th>
<th>Media</th>
<th>Financial institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union</td>
<td>Direct users (passengers)</td>
<td>Transport operators</td>
<td>National and local industry associations</td>
<td>Transport users associations</td>
<td>TV station</td>
<td>Banks</td>
</tr>
<tr>
<td>National government and authorities</td>
<td>Direct users (freights)</td>
<td>Transport operator associations</td>
<td>National and local trade unions</td>
<td>Local interest groups (e.g. borough associations)</td>
<td>Radio station</td>
<td>Funds</td>
</tr>
<tr>
<td>National parliament</td>
<td>Indirect users (passengers)</td>
<td>Consultants</td>
<td>National and local craft unions</td>
<td>Environmental associations</td>
<td>Newspapers</td>
<td>Insurances</td>
</tr>
<tr>
<td>Regional governments and Authorities</td>
<td>Indirect users (freights)</td>
<td>Retailers associations</td>
<td>Citizens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional transport authority</td>
<td>Industry in public works</td>
<td>Visitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local authorities (Provinces and Municipalities)</td>
<td>Industry in vehicles production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political parties and single members</td>
<td>Industry in technology production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### STAKEHOLDERS

#### INTEREST/POWER MATRIX

<table>
<thead>
<tr>
<th>POWER</th>
<th>INTEREST</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Keep satisfied</td>
<td>Key players</td>
</tr>
<tr>
<td>LOW</td>
<td>Minimal effort</td>
<td>Keep informed</td>
</tr>
</tbody>
</table>

#### DYNAMISM/POWER MATRIX

<table>
<thead>
<tr>
<th>POWER</th>
<th>DYNAMISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Powerful but predictable</td>
</tr>
<tr>
<td>LOW</td>
<td>Fewer problems</td>
</tr>
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</table>

2B. Components of decision-making processes

- **Decision-makers**
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- **Implementation**: Development of the project or part of it
MULTIPLE, CONFLICTING, OBJECTIVES

**Stated**
- To Improve **accessibility** (Activity participation)
- To Reduce **production costs** (Efficiency)
- To Reduce **users generalized costs** (Quality)
- To improve **public health** (i.e. reduce harmful pollutants, increase road safety, ...)
- To reduce **environmental impacts** (i.e. gas emissions, visual intrusion in the surrounding landscape, impact on the biosphere, ...)
- To reduce **territorial inequalities and group disparities** (Equity)
- To foster **territorial development** (re-development areas, new districts, ...)
- To promote **economic growth** (i.e. to increase firms productivity and competitiveness, ...)
- To maximize **company profit** and **market power**

**Unstated**
- To enlarge **public consensus / minimize conflicts** upon decisions
- To legitimate **public role**
- To maximize **personal profit**
- To weaken **competing companies**
2B. components of decision-making processes

- **Decision-makers**
  *Those who are formally in charge of the choice*

- **Process coordination**
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- **Stakeholders**
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- **Objectives (stated/unstated)**
  *Targets pursued by decision makers and stakeholders through the interventions*

- **Contextual barriers**
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- **Consensus barriers**

- **Coalitions**: *Groups of actors whose objectives converge to one solution*

- **Implementation**: *Development of the project or part of it*
CONSENSUS BARRIERS

Consensus: problems associated with achieving acceptance by stakeholders

Not only related to new infrastructures and plants but also to new traffic schemes (e.g. road pricing), new lines etc.

“There is no opinion, however absurd, which men will not readily embrace as soon as they can be brought to the conviction that it is generally adopted”

– Schopenhauer
2B. components of the process

TYPICAL CONSENSUS BARRIERS

NIMBY and other syndromes

- **NIMBY** Not In My Back Yard
- **NIABY** Not In Anyone's Back Yard
- **NAMBI** Not Against My Business or Industry
- **BANANA** Build Absolutely Nothing Anywhere Near Anything (or Anyone)
- **NIMTO** Not in My Term of Office
2B. components of decision-making processes

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3. models of decision-making processes

TRANSPORT-RELATED DECISION-MAKING PROCESS

A sequence of activities performed by several actors (including decision-makers and possibly stakeholders) in order to decide on options including projects, plans, and not deciding (delaying)

CLASSIFICATION

- RATIONAL models
- A-RATIONAL models
3. models of decision-making processes

RATIONAL MODELS

Rationality: Acting in the best possible way considering the aim (Elster, 1986)

Minimal Requirements of Rational decisions: (Cascetta et al., 2013)

• consistent
  - both internally w. r. t. the stated objectives and existing constraints, and externally with other decisions (plans, projects) taken in other interacting contexts or at different moments in time

• comparative
  - considering one or more alternatives (e.g. not deciding, one of the available options, searching for other possibilities)

• aware
  - based on unbiased information about the options (features), the context (physical and decisional) and their likely impacts (costs, benefits, risks and opportunities), for technical, economic and administrative feasibility

• flexible
  - open to changes due to new information on alternative options and their effects, to changes in the economic, physical, institutional contexts, and taking into account decision “opportunity costs” (i.e. postponing unnecessary decisions)
3. models of decision-making processes

RATIONAL MODELS

- **STRONG RATIONALITY**
  *Homo oeconomicus* is a utility maximizer relative to his/her choices

- **COGNITIVE OR BOUNDED RATIONALITY**
  Decision-makers have limited time, capacity and resources and therefore **choose an alternative which is satisfying, learning from previous choices**
3. models of decision-making processes

RATIONAL MODELS

- DECISION-MAKING CONTEXT IDENTIFICATION
- PRESENT SITUATION ANALYSIS
  - Activity system
  - Transportation system
- IDENTIFICATION OF OBJECTIVES, CONSTRAINTS AND PROJECT TYPOLOGIES
- FORMULATION OF ALTERNATIVE OPTIONS (PLANS/PROJECTS)
- SIMULATION AND TECHNICAL ASSESSMENT
- MONITORING AND EX-POST EVALUATION OF IMPLEMENTED OPTIONS
- OPTIMALITY TEST
- IMPLEMENTATION CHOICES (PHASES)
- PROJECT IMPLEMENTATION

The strongly rational approach
3. models of decision-making processes

RATIONAL MODELS

Limits of the strongly rational approach

1. **Problem complexity**, that is impossibility of evaluating all the alternatives and the related impacts

2. **Different and often contrasting objectives** among decision-makers and stakeholders

3. **Each option** brings a series of favourable or unfavourable consequences difficult to compare

4. **Cognitive limits** to the capacity of the decision makers of considering all the feasible options, and in the uncertainty of the results

5. **Limited times and resources** to assess and compare alternatives

6. **Presence of stakeholders** with a veto right
3. models of decision-making processes

RATIONAL MODELS
Application areas of the strongly rational approach

- **Simple objectives** (e.g. to minimize total travel time, production costs, with constraints expressed by quantitative variables)
- **Possibility to automatically generate alternative options** (Supply and Demand problems)
- **Limited or no impact on stakeholders**
- **Limited number of decision-makers**

*Examples*

**Public-oriented context:** the design of the optimal control scheme at road intersections, or the optimal frequencies for transit lines, etc.

**Private point of view:** the design or management of the personnel shifts, yields management, dispatching of ships in a container terminal, etc.
3. models of decision-making processes

RATIONAL MODELS

“The Fox and the Grapes”

MONITORING AND EX-POST EVALUATION OF IMPLEMENTED OPTIONS

COMPARISON OF ALTERNATIVE SOLUTIONS (ASSESSMENT/EVALUATION)

SATISFYING OBJECTIVES

IMPLEMENTATION CHOICES (PHASES)

IMPLEMENTATION 1ST PHASE

DECISION-MAKING CONTEXT IDENTIFICATION

PRESENT SITUATION ANALYSIS
- Activity system
- Transportation system

IDENTIFICATION OF OBJECTIVES, CONSTRAINTS AND PROJECT TYPOLOGIES

FORMULATION OF ALTERNATIVE OPTIONS (PLANS/PROJECTS)

SIMULATION AND TECHNICAL ASSESSMENT

SATISFYING OBJECTIVES

IMPLEMENTATION CHOICES (PHASES)

IMPLEMENTATION 2ND PHASE

DECISION-MAKING CONTEXT IDENTIFICATION

PRESENT SITUATION ANALYSIS
- Activity system
- Transportation system

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MONITORING AND EX-POST EVALUATION OF IMPLEMENTED OPTIONS

COMPARISON OF ALTERNATIVE SOLUTIONS (ASSESSMENT/EVALUATION)
3. models of decision-making processes

RATIONAL MODELS
Cognitive/Bounded Rational approach

It is loosely consistent with:

- Bounded Rationality Choice Theory (Simon 1957; Rubinstein, 1999; Kahneman, 2003) (*Behavioral Economics*)

- Learning Theory in Dynamic Decision-Making Models (Brehemer, 1992; Gonzalez et al., 2003) (*Management science/Psychology*)

3. models of decision-making processes

RATIONAL MODELS
Cognitive/Bounded Rational approach

- The actors are still goal-oriented but they implicitly take into account their cognitive limitations in attempting to achieve those goals.

- The decision-making model is intrinsically dynamic, with several feedback loops adapting the “solutions” to their ability to satisfy objectives and constraints until reaching a “satisfactory” level of compliance.

- The problem setting may be revised if solution satisfying previously set objectives and constraints are not found within reasonable time and resource budgets.

- The concept of satisfaction is necessary a fuzzy one, as no single value objective function can be referred to, and even non-quantitative objectives and constraints are included in the process.
RATIONAL MODELS

Application areas of the cognitive/bounded rationality approach

✓ Multiple (and possibly ill-posed) objectives, also related to non-quantitative variables
✓ Not exhaustive knowledge of the context variables/available solutions
✓ Impacts on multiple stakeholders
✓ Several decision-makers
✓ Significant uncertainty in the simulated impacts
A-RATIONAL MODELS
The garbage can model (Cohen et al., 1972; Daft, 2001; Lipson, 2007)
Originally proposed for describing organizational decision-making processes in companies

The variables
- Actors/participants (A)
- Problems (P)
- Solutions (S)
- Decision Opportunities (O)

O are the cans in which A throw P and S. The decision depends on the random coupling of P and S

Applications to public decision-making in transportation can be found in Cascetta and Cartenì (2012)
3. models of decision-making processes

A-RATIONAL MODELS
The garbage can model
3. models of decision-making processes

A-RATIONAL MODELS
The garbage can model

It deals with “organized anarchies”, i.e. organizations where there are three properties:

1) Choices are made on the basis of ill-posed and inconsistent ideas

2) A solution/an idea could be proposed even if there is not a problem or it could contribute to define it. On the contrary, a problem could exist without being able to find a solution

3) Participation changes: different actors are involved over time
3. models of decision-making processes

A-RATIONAL MODELS

An example: a-rational planning of an infrastructure (e.g. motorway)

- It is thought to solve congestion or accessibility problems
- It is proposed as part of a political program
- It possibly results from some stakeholders interests, not from any specific system analysis process
3. models of decision-making processes

A-RATIONAL MODELS
The garbage can model

Decisions based on an a-rational approach have some limitations:

✓ **Non-efficiency**: the “organized anarchy” often brings to projects that do not solve the problems or might solve them only partially

✓ **Instability**: decisions depends crucially on the actors (decision-makers and stakeholders) contributing to it, and are not retraceable if they change

✓ **Lack of legitimization**: the organization is able to survive without making its processes understandable by the members of the organization itself
3. models of decision-making processes

A-RATIONAL MODELS
Application areas of the garbage can model

✓ No regulations requiring formal assessment of projects, proposals, plans
✓ Strong interests for a specific solution rather than for solving the problem
✓ Limited public debate (see later)
3. models of decision-making processes

“Real-life decision-making process could be approximated by different models at different stages”
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4. Public Engagement

- Public Engagement (PE) is the process of identifying and incorporating stakeholders’ concerns, needs and values in the transport decision-making process.

- It is a two-way communication process that provides a mechanism for exchanging information and promoting stakeholder interaction with the formal decision-makers and the transport project team.

- The overall goal of engagement is to achieve a more transparent decision-making process with greater input from stakeholders and their support of the decisions (larger coalitions).

- Stakeholders management is also studied in organization and management sciences (Clarkson, 1999)
4. Public Engagement

THE FIVE LEVELS OF PE

1. **Stakeholders identification**: e.g. authorities, local communities, etc.

2. **Listening and stakeholders management**: systematic analysis of the current social, cultural and economic conditions with a direct impact on stakeholders.

3. **Information communication**: information relative to the project provided by the stakeholders.

4. **Consultation**: decision-makers listen to the different points of view and interact with the stakeholders.

5. **Participation**: extension of the consultation level where the groups, directly interested, become joint partners of the project and in the project implementation. They take part in making the final choice.
4. Public Engagement

THE ARCH-ENEMY OF PE: THE DAD (DECIDE, ANNOUNCE, DEFEND) SYNDROME
(e.g. Susskind et al., 1983; Walker, 2009)

Administration makes a DECISION (the best project/plan), it ANNOUNCES the project to the population and other stakeholders that have not been involved previously. This produces many oppositions and the Administration is obligated to DEFEND the decision against criticism, accusations and controversy without having the opportunity to improve the project (if only marginally)

Limits of the DAD
- It fosters barriers
- It increase costs
- It increases times
Outline

1. Background

2. Decision-making in transportation
   - Decision: why, who, where, what, when
   - Components of public processes

3. Models of decision-making processes

4. Public Engagement

5. A mode for transportation decision-making and the role of quantitative methods
5. A mode for transportation decision-making and the role of quantitative methods

- Public Engagement and rational decision-making do not necessarily imply each-others (e.g. DAD syndrome and PE based on “pure” negotiation)

- PE and the cognitive/bounded rational approach have a strong interaction potential
5. A mode for transportation decision-making and the role of quantitative methods

Schematic representation of the overall transportation decision-making model.

Fonte: Cascetta et alii, 2015
5. A mode for transportation decision-making and the role of quantitative methods

SOME SUGGESTIONS

1. Understanding and modeling mobility and transport related phenomena

2. To assist in the design, assessment and evaluation of transport-related decisions:
   - What If
   - What To

3. To contribute towards reaching larger consensus through Public Engagement (e.g. information-based PE)

4. To provide inputs for economic/financial plans of operators

5. To analyze new transport markets and their possible regulations
5. A mode for transportation decision-making and the role of quantitative methods

SOME INDICATIONS FROM THE NEW PERSPECTIVE

- To model the impacts relevant to stakeholders and decision-makers
- To present results in ways that can be understood by non-experts
- To increase the design (and modeling) effort for the preliminary stages
- To adopt assessment methods allowing the evaluation of both quantitative and qualitative impacts for different actors
- To highlight the (neglected) relevance of ex-post studies
- To quantify the uncertainty entailed in the simulation results and in the assessment methodology
- To improve the capability to capture users’ willingness to pay for transport services
5. A mode for transportation decision-making and the role of quantitative methods

Model the impacts relevant to stakeholders and decision-makers

---

**PROJECT/PLAN**

- **WELFARE**
- **SOCIAL AND ECONOMIC COHESION**
- **SAFETY**

**SOCIAL SYSTEM**

- **PERCEIVED BY THE USERS**
- **NOT-PERCEIVED BY THE USERS**

**USERS' IMPACTS**

- **REVENUES**
- **INVESTMENT COSTS**
- **OPERATION COSTS**
- **RISK ASSESSMENT**
- **MARKET SHARES**

**SYSTEM OPERATORS**

- **POLLUTANT EMISSIONS**
- **NOISE IMPACTS**
- **VISUAL INTRUSION**

**ENVIRONMENT**

- **POPULATION LEVELS**
- **RESIDENTS LOCATION**
- **ACTIVITY LOCATIONS**
- **ACTIVITY LEVELS**

**ECONOMIC AND TERRITORIAL SYSTEMS**
5. A mode for transportation decision-making and the role of quantitative methods

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Increase the design (and modeling) effort for the preliminary stages

<table>
<thead>
<tr>
<th>Design Stages</th>
<th>Fraction of total value of the project defined at each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility</td>
<td></td>
</tr>
<tr>
<td>Preliminary</td>
<td></td>
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<tr>
<td>Final</td>
<td></td>
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<tr>
<td>Working Plan</td>
<td></td>
</tr>
</tbody>
</table>

Fraction of total design cost of each design stage

Value vs. Costs
5. A mode for transportation decision-making and the role of quantitative methods

SOME INDICATIONS FROM THE NEW PERSPECTIVE

- To model the **impacts relevant to stakeholders** and decision-makers
- To present **results** in ways that can be understood by **non-experts**
- To **increase** the design (and modeling) effort for the **preliminary stages**
- To adopt assessment methods allowing the evaluation of both **quantitative and qualitative impacts for different actors**
- To highlight the (neglected) relevance of **ex-post studies**
- To quantify the **uncertainty** entailed in the simulation results and in the assessment methodology
- To improve the capability to capture users’ **willingness to pay** for transport services
5. A mode for transportation decision-making and the role of quantitative methods

Highlight the (neglected) relevance of ex-post studies

- To give **feedbacks** to stakeholders and decision-makers for further stages of the process
- To increase **credibility** and establish limits of quantitative methods
- To **fine tune** models
- To enrich the **stock of “narratives”** to be used for similar projects
- To shine light on **recurrent planning fallacies**
- To provide elements for “**outside views**” of similar projects
Basic references (1/3)

Reference paper

Planning failures
Decision-Making in Transportation and Models – RATIONAL MODELS

Decision-Making in Transportation and Models – A-RATIONAL MODELS

Decision-Making in Transportation and Models – PUBLIC ENGAGEMENT
basic references (3/3)

The role of quantitative methods in transportation decision-making


Thank you for your attention!