IMPACT OF INFORMATION ON TRAVELER DECISIONS

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System performance and user response under real-time information in a congested traffic corridor

HS Mahmassani, R Jayakrishnan - Transportation Research Part A: ..., 1991 - Elsevier
... performance, thereby precluding general conclusions and clarifying possible misconceptions that information will automatically lead to improvements in traffic conditions. Several factors determine the impact of information, as illustrated in the results shown in this ...
Cited by 206 - Related articles - All 2 versions

Commuter response to traffic information on an incident

R Koo... - Transportation Research Record: Journal of the ..., 1998 - Trans Res Board
... the general effects of traffic information on changes in commuter behavior, they have not focused on the impact of traffic information on a ... The present study looks at travel decisions based on a specific incident and how commuters made travel decisions based on incident ...
Cited by 12 - Related articles - Library Search - BL Direct - All 12 versions

Modeling the impact of pre-trip information on commuter departure time and route choice

RC Jou - Transportation Research Part B: Methodological, 2001 - Elsevier
... The objective of this paper is to investigate the impact of pre-trip information on urban auto commuters' choice behavior. ... Polak and Jones (1992) developed a stated preference (SP) approach to investigate the effects of pre-trip information on travel behavior. ...
Cited by 13 - Related articles - BL Direct - All 7 versions

Dynamic network traffic assignment and simulation methodology for advanced system management

HS Mahmassani - Networks and Spatial Economics, 2001 - Springer
... For off-line operational planning applications, such as ITS deployment planning and impact evaluation, the above simulation-assignment logic has ... from the end of subpath to destination j. It can be calculated by extrapolating the local travel time, historical information, or it ...
Cited by 88 - Related articles - All 4 versions

Dynamic aspects of commuter decisions under advanced traveler information systems: modeling framework and experimental results

YH Liu... - Transportation Research Record: ..., 1998 - Trans Res Board
• We’ve come a long way since the early days of ATIS
  – From clunky static web sites to handset-delivered mobile apps
  – Explosion of GPS-enabled devices, both in-vehicle and mobile, stand-alone or increasingly with smartphones
  – Major private sector players entering the market
• ...but not far enough, given the technological capabilities
  – Prediction still in early stages
  – Consideration of external events limited
  – Reliability information non-existent
  – Routing “advice” in most commercial systems rudimentary
  – Limited interaction with traffic control
• On the cusp of a major new explosion in information capabilities and use— driven by two big trends and entry into the field by technology giants (Google, MS....)
TWO BIG TRENDS IN INFORMATION SUPPLY

• PERSONALIZATION/CUSTOMIZATION:
  – Customized information specifically for user location and preferences ("where is my bus?")
  – My information, My preferences, My route, My location...
  – My experience, tracked for me
  – Special offers, just for me and my friends

• SOCIALIZATION:
  – Growing role of social media, and location-based apps (e.g. Google Latitude) ("Where are my friends?")
  – I trust information I receive from my friends
  – I go where my friends are (or tell me to go)
  – Peer-to-peer will accelerate trend, and possibilities (M2M; “THE INTERNET OF THINGS”)

Major impacts on travel behavior beyond short-term route and departure time, still largely undocumented though evolving fast.
Example: Sense Networks Inc.

**Citysense**

Tracking cell phone signals for social networking

Example: Google Inc.

**Google Latitude**

Share your location with friends
KEY DEVELOPMENT
Handset Capabilities, Wireless Internet

Precise Location Enables Wide Variety of LBS Apps

**GAMING**
Interactive Gaming
GeoCaching
Location aware games for individuals/groups

**PERSONAL SECURITY**
Roadside Assistance
Weather Warning
Child Finders
GeoFencing

**ENTERPRISE**
Fleet Management
Asset Monitoring
Personnel Productivity

**e-logistics**
**m-logistics**

**POINTS OF INTEREST**
City Guides
Mobile Yellow Pages
Navigation
Traffic reroute

**PEER-TO-PEER**
Buddy Groups
Dating
Geo-marked photo sharing
Mobile Blogging

**COMMERCE**
m-commerce
BY THE NUMBERS:
SURVEY OF WHAT CTA TRAIN USERS DO WHILE RIDING

How they use cell phones

67% Used cell phone

47% Text/E-mail for personal use
21% Text/E-mail for business
20% Make voice calls for personal use
5% Make calls for business
26% Read news
27% Surf web
10% Get directions on phone

43.8% Used audio/video electronics
PERSONAL INFORMATION FOR GREEN TRAVEL CHOICES

I-Phone App

Personalized information on handset

to assist commuters in understanding implications of different travel choices and provide advice for greener choices
USER RESPONSES TO REAL-TIME MULTIMODAL ATIS

• **SHORT-TERM** *(Trip decisions: within day and day-to-day)*
  – Route changes
  – Departure times (advance, delay or postpone trip)
  – Destination (for non-work trips, e.g. shopping)
  – Mode
  – Chain activities
  – Cancel activity

• **MEDIUM TERM** *(Activity decisions)*
  – Route changes
  – Departure times
  – Destinations
  – Mode shifts and travel blending (includes carpooling)
  – Activity changes

• **LONG TERM** *(Mobility decisions)*
  – Mode shifts
  – Auto ownership
  – Location changes
Considerable research on short term responses, especially route, in both en-route and pre-trip settings
- Much more on commuter work trips by auto than other trip purposes
- Very little in-field research with advanced forms of information provision (which are only now in early stages of deployment, e.g. predictive information)

Some work, on departure time and mode choice
- Most based on stated preference
- A couple of studies on destination adjustment in response to real-time information for discretionary (shopping) travel

Response to traffic control information – VMS, weather-related management – limited to aggregate observation

Much less research on impact of travel information on activity engagement on long-term mobility and location choices
**METHODOLOGICAL CHALLENGES**

- Impact of information on travel decisions poses considerable challenges in terms of measurement/observation and modeling
  - Difficulty of measuring both traffic conditions, information actually supplied and consulted, and user responses
  - Learning effects and feedback: adaptive behavior, moving target
  - Elusive steady-state: critical role of dynamics

- Revealed preferences vs. stated preferences
  - Difficult to obtain revealed preferences (*what people actually do*)
  - Several studies relied on recall (*what people say they did*)—do people really remember relevant details for such decision situations?
  - Stated preferences (*what people say they would do* under hypothetical scenarios) primary means for studying impact of information—concern about reliability of responses

- Role of laboratory and virtual experiments; experimental economics

- Personal devices and GPS tracking to collect information
INFORMATION DIMENSIONS

- Recency
- Relevance
- “Accuracy” – objective vs. perceived
- Static vs. dynamically updated
- Generic vs. personalized
- Prevailing vs. predictive
- Action-oriented (guidance) vs. state-descriptive
- Mandatory vs. discretionary actions
- Final vs. amenable to query
- Free vs. paying (subscription vs. per-use)
Studies of these traveler choice dimensions, in response to traffic information, are generally missing from literature, for both theoretical and applied aspects.

However, new social science and marketing contributions on role of mobile information (in general) and connectivity on various aspects of activity engagement.
what is seamless mobility?

Empowering the “mobile me” -- anywhere, anytime, connected to anything
Telemobility and Activity Engagement

• Internet as end activity in its own right

• Internet with wireless as enabler of wide realm of activities and social engagement

• Internet + mobility → TELEMOBILITY

  May entail changes in:
  – Nature of the activities themselves (doing what?)
  – Location/spatial characteristics of the activities
  – Social dimensions of the activities (with whom and where they might be?)
  – Process of activity generation and scheduling: more dynamic (real-time) activity generation and scheduling; less pre-planning, more spontaneous (e.g. through SMS)
Implications of pervasive wireless mobility:

- Location-specificity of services, delivered at place of query, including navigation, ATIS, marketing, ...

- Location-independence of activity patterns, as work, entertainment, virtual communities constantly accessible remotely
FROM STATUS INFORMATION TO TRAFFIC MANAGEMENT

**ROLE OF PREDICTION**

- Requires predictive capability for travel time information: Anticipatory information

**Provision of reliability information increases information effectiveness for both users and system management objectives**

**Need to combine traffic prediction with forecasts of external factors (such weather)**

- Primarily in response to unexpected disruptions
- In case of severe weather, where trip may be altogether cancelled on given day
- Studies based primarily on stated preferences
Impact of Travel Time Information on System Performance

Simulation results conducted on Irvine, CA network

(Dong and Mahmassani, 2009)

- Provision of anticipatory travel time information improves overall network performance
- Solve the overreaction problem caused by providing prevailing (instantaneous) information

![Graph showing impact of travel time information on system performance](image-url)
Scenarios:
- only anticipatory travel time information is provided
- both anticipatory travel time and reliability information is available

Significant time savings are observed when travel reliability information is provided in addition to travel time information
• Providing travel reliability information contributes to delaying the onset of breakdown and alleviating its extent
• Higher and more stable flow is observed under the reliability scenario, indicating higher throughput
GAPS and OPPORTUNITIES

Here, Now and in the Future
- Role of information on wider range of trip-types
- Role of broader range of information types and characteristics (including peer-to-peer and socially-network information)
- Information consultation and user acceptance
- Effect of information on activity engagement and travel patterns

For Traffic Management
- Multimodal information and cross-mode effects: Parking availability and pricing information in ICM context
- Combining information supply with traffic management: pricing, special events, weather-related

For Third-party Suppliers
- How to provide 'good' predicted information
- How to measure, predict and incorporate travel time reliability in route advice
- Feedback systems and collective logic

For Planners and Researchers
- Potential for new data collection opportunities, e.g. smartphones and connected devices
Thank you

Q & A