TMIP Agency Needs Assessment Survey: Summary of Survey Results

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JUNE 2014

U.S. Department of Transportation
Federal Highway Administration

TMIP
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

TMIP Agency Needs Assessment Survey: Summary of Survey Results

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1.0 Survey Overview

1.1 Survey Purpose

The purpose of this survey was to help the Federal Highway Administration (FHWA) and the FHWA Travel Model Improvement Program (TMIP) understand the analytical needs of agencies responsible for transportation planning so that TMIP can focus its resources on areas of greatest need to the agencies it serves.

FHWA/TMIP particularly hoped to learn more about the analytical tools/methods agencies use and the challenges that limit agencies' ability to conduct analysis. The survey sought to assist TMIP in understanding more about the following four questions:

1.1.1 What questions are agencies most interested in answering with analysis?

Some of the shortcomings stated in the TRB Special Report 288 were that demands on travel forecasting models have grown and the existing models are inadequate to address many newer policy concerns. These policy concerns include estimating motor vehicle emissions based on speeds and time of day; estimating new travel generated by new capacity – induced travel; and evaluating alternative land use policies. It is important that FHWA/TMIP understand the most frequently asked questions motivating analyses in order to ensure that it focuses on methods that provide answers to these questions.

1.1.2 What analytical tools/methods do you currently use to answer these questions?

One of the major findings from TRB Special Report 288 is that there is no single approach that is "correct" for all applications or all MPOs. Travel forecasting tools should be appropriate for the questions being posed and the analysis being conducted. FHWA/ TMIP wanted to know what transportation planning analysis tools and methods (beyond travel forecasting models) agencies are currently using to answer these most frequently asked questions.

1.1.3 What challenges most critically limit agencies' ability to answer these questions?

There are many reasons that agencies sometimes struggle with analysis. Some of the obstacles to change cited in TRB Special Report 288 were resource limitations; uncertainty about if new models will be better than the models they replace; and whether advanced models can be implemented for reasonable costs and provide significant improvements. It is known that all agencies face limited fiscal and staffing resources and deadlines associated with more or less rigid planning cycles. Data limitations hinder agencies' ability to answer many questions and fundamental uncertainties about the future limit the precision of any forecasts. As powerful as modern computers are, computing resources and runtime considerations can sometimes still be a limiting factor for analysis in a world that expects answers fast. Agencies also face limited choices of tools and methods to serve their analytical needs and limited opportunities to develop staff to use these methods and tools. TMIP hopes this survey effort will help them to better target resources to agencies' needs by better understanding the challenges they face. At

minimum, TMIP hopes to avoid focusing on methods that are ultimately irrelevant because they are too costly, slow, data-intensive, or require unavailable staff time or skills.

1.1.4 How can TMIP best assist agencies in improving their travel models and related analytical tools?

With this survey, TMIP wanted to take advantage of the many professionals in the field who, over the course of their work, have given much thought to how their tools and methods might be improved and have ideas for how to advance the state of the practice. TMIP was interested both in garnering new ideas and in gauging interest in some already being considered. TMIP also wants to understand what related planning analysis tools and methods, beyond travel models, are in most need of attention and support from FHWA.

TMIP plans to use these survey results to help focus outreach activities in areas agencies need most and to better provide information about resources required to develop, use, and maintain various types of analysis tools. The remainder of this report summarizes the TMIP Agency Needs Assessment Survey's focus, methodology, and results.

1.2 Overview Results

As detailed in Section 1.1 the four focus areas of the TMIP Agency Needs Assessment Survey focused on the answers to the following four questions:

1. What questions are agencies most interested in answering with analysis?
2. What analytical tools/methods are currently used to answer these questions?
3. What challenges most critically limit agencies' ability to answer these questions?
4. How can TMIP best assist agencies in improving their travel models and related analytical tools?

The following four sub-sections include a broad summarization of the results to each of these questions. More detailed results to specific survey questions are located in Section 3.0

1.2.1 What is of most interest to the agencies?

Agencies were asked to rate their interest in several transportation issues from 'extremely important' to 'not at all important.' Safety was rated 'extremely important' or 'very important' by 91% of responding agencies. Other results included

- 75% ranked economic development/cost effectiveness as extremely or very important;
- 68% ranked congestion issues as extremely or very important;
- 68% ranked walking/biking/active transportation as extremely or very important; and
- 68% ranked transit issues as extremely or very important.

1.2.2 What analytical tools/methods are currently used?

A series of questions was asked about what analytical tools and methods agencies are using. The results showed that both activity-based and trip-based models are being used by agencies. Roughly 10% of agencies currently have activity-based models and additional one-quarter of agencies are at a minimum planning to develop an AB model in the future. About one-third of

agencies have decided not to develop an AB model and about a quarter of agencies are undecided.

Another finding was that land use models/planning tools are rapidly being adopted. Five years ago less than 15% of agencies used such tools, and in the last five years that number has more than doubled to over 25%. Of the agencies that are not currently using land use models/planning tools, over half are considering such tools.

1.2.3 What challenges/limitations are agencies facing?

The most consistent challenges/limitations reported by agencies in the survey were limited staff and/or limited staff time. Of particular concern were a lack of trained staff, and limited budgets. High analysis costs and a lack of the data needed to answer key questions were also cited as challenges. A few agencies also reported that politically motivated, rather than data driven decisions, routinely created challenges.

The most consistently reported technical challenges were a lack of available tools or methods to do the following:

- To produce accurate land use/socioeconomic forecasts
- To produce accurate travel forecasts by market segment/mode
- To produce accurate freight/truck forecasts
- To reflect/respond to the built environment, walkability, etc.
- To accurately predict travel times, reliability or delays
- To deal with small scale project phenomena

Another issue was poor or limited understanding of the tools, or uncertainty related to the precision of the tools available.

1.2.4 How can TMIP best assist agencies?

A series of questions were asked about what TMIP can do to best assist agencies. A summary of the responses is provided below.

- Provide data consistency checking tools
- Provide examples of visualization of results
- Provide examples and methods of using new probe vehicle data (for both travel times and origin-destination information)
- Develop “How-to” guides
- Review/illustrate methods for quantifying uncertainty in forecasts
- Share information on post-processing tools for
    - economic impacts/user benefits
    - safety
    - accessibility
    - travel time reliability
    - public health
- Provide, or help to secure, funding

2.0 Survey Methodology

The survey emailed to agencies was titled "Survey to Support the Development of the TMIP Planning Analysis Toolbox." The survey introduction explained that with the emphasis on performance measurement and prediction under MAP-21, the Federal Highway Administration (FHWA) Travel Model Improvement Program (TMIP) has undertaken to understand state, regional, and local needs through web-based surveys. The web-based survey consisted of five sections and 52 questions.

The survey was tested and reviewed by TMIP prior to the pretest, although there were restrictions on what could be changed based on the OMB approval process.

2.1 Survey Administration

A pretest was conducted in early November 2013. The pre-test was completed by 5 of the 14 agencies emailed. The pretest was limited to a maximum of nine participants due to OMB/IRB requirements. Once results of the pre-test were reviewed, the main survey effort was launched on December 6, 2013. This consisted of a 'soft launch', with invitations mailed to 101 agencies. A soft launch was implemented to ensure that all aspects of the survey were working seamlessly prior to the 'full launch' start date of December 10, 2013. The survey effort was conducted for four weeks between December 10, 2013 and January 7, 2014. Table 1 shows the timeline and quantities mailed for survey invitations.

Table 1. Invitation timeline and quantity.

Invitation type	Date	Unique Invitations
Soft launch invitation email	December 6, 2013	101
Full launch invitation email	December 10, 2013	897
Additional requests for invitation (after the survey launched)	December 10, 2013 – January 7, 2014	39
Total unique invitations		**1,037**

2.2 Survey Response

The overall survey response rate was 20%. Of the 551 agencies invited, 203 agencies responded. Over 45% of responding agencies were either Metropolitan Planning Organizations (MPO's) or Department of Transportation agencies (DOTs). The final dataset includes responses for 203 agencies. All responses are included in the dataset, regardless of whether the agencies completed the survey, or responded to every question. In total, 165 agencies completed the entire survey. Another 39 agencies partially completed the survey. Detailed results, including response rates by agency, are shown in Table 2. Figure 1 is a map showing the approximate location of all responding agencies.

Table 2. Survey response by agency type.

Agency type*	Invited to Survey	Took the Survey*	Response Rate
MPO	551	129	23%
Transit Agency	252	33	13%
DOT	173	38	22%
Toll Authority	61	3	5%
Total	**1,037**	**203**	**20%**

**Agency type shown is based upon the known type of agency from the invitation list. The survey response has slight variation with 25 agencies identifying as an "other" type of agency in the survey.*

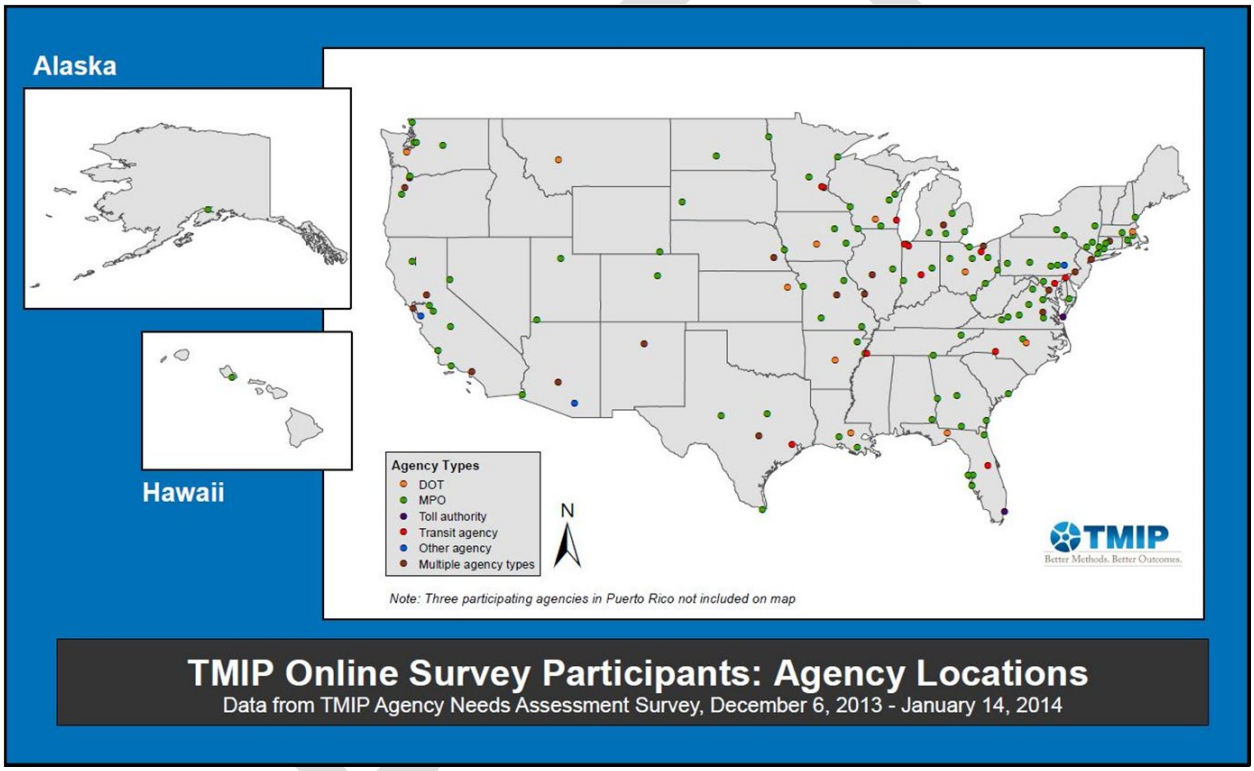

Figure 1. Survey response by location.

2.3 Survey Content

The survey consisted of five sections: agency background; planning issues of interest; existing analytical data; tools and methods; and critical challenges for planning analysis and focusing TMIP properties. The survey was conducted via the web. All survey questions can be viewed in Appendix A.

Figure 2, is an example of a survey question on the web interface. Appendix B contains additional examples of survey question displays.

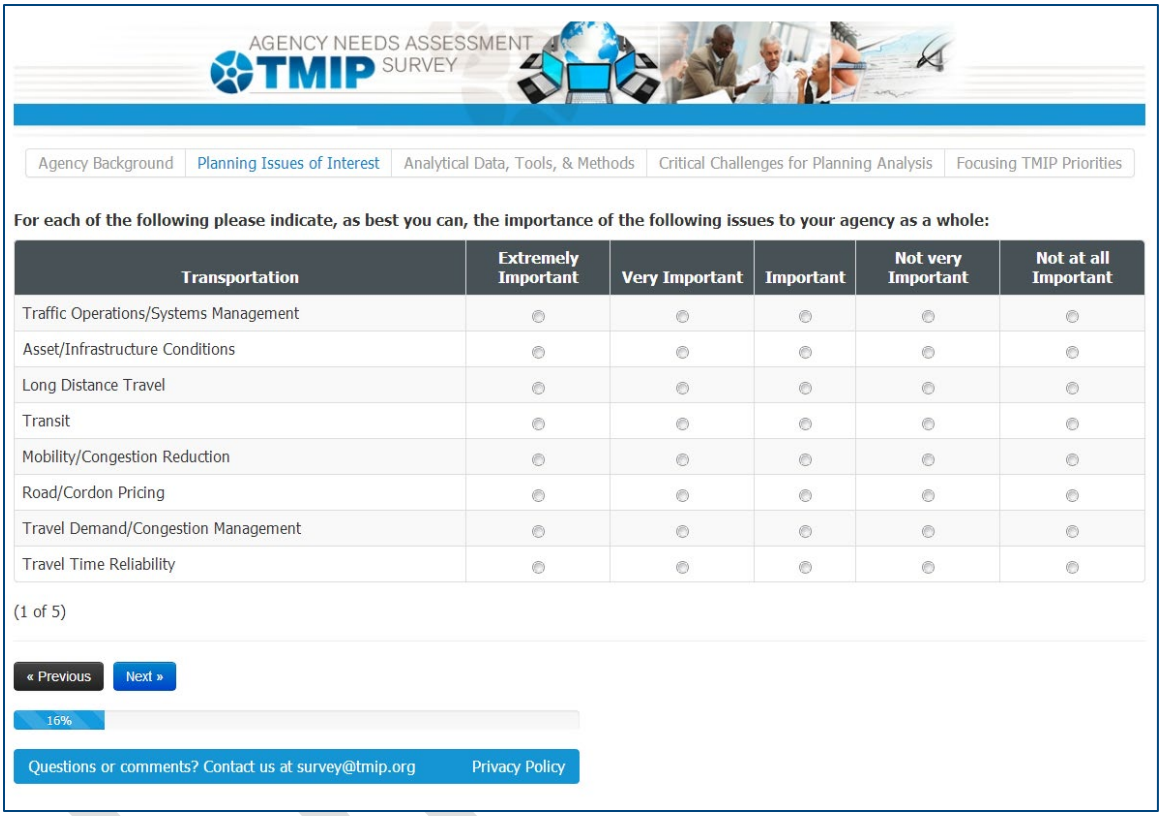

Figure 2. Example question - which planning issues were of interest to the agency.

A real time reporting website was also provided so that TMIP could track survey results at any time, by agency type. This tracking website included how many surveys were in progress, how many had been completed, and what agency types were participating.

3.0 Survey Results

A total of 203 surveys were collected. All responses were recorded, regardless of whether the agency answered all of the questions, or completed the survey. Not requiring answers to all questions resulted in varying answer counts for survey questions.

3.1 Agency Background

Seven questions were asked in this section of the survey. These questions included asking information about agency name, type, and documents/studies the agency produces. Figure 3 shows that over 80% of responding agencies were state DOTs or MPOs.

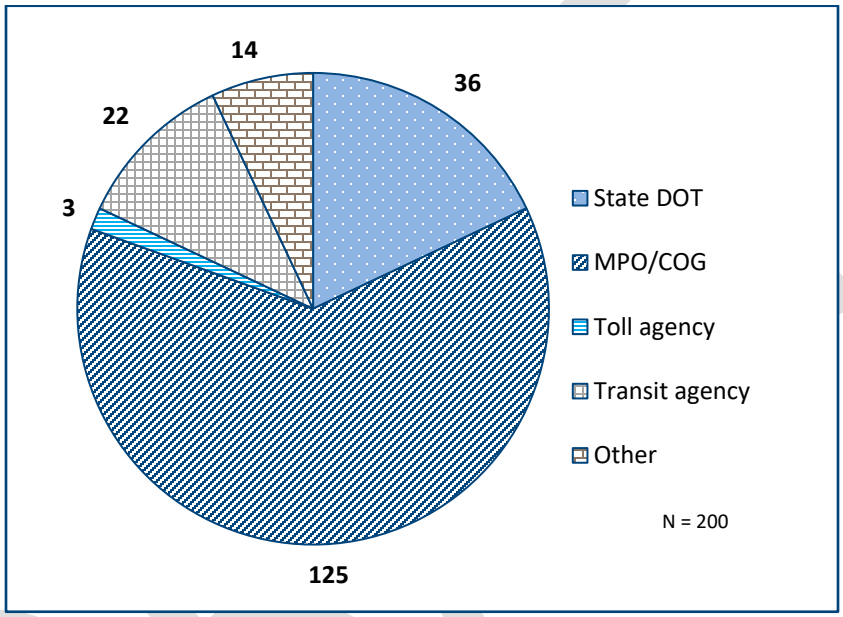

Figure 3. Responding agencies.

Agencies were to select which documents/studies their agency was responsible for producing. As shown in Figure 4, Long Range Transportation Plans and Transportation Improvement Plans (TIPs) were most common.

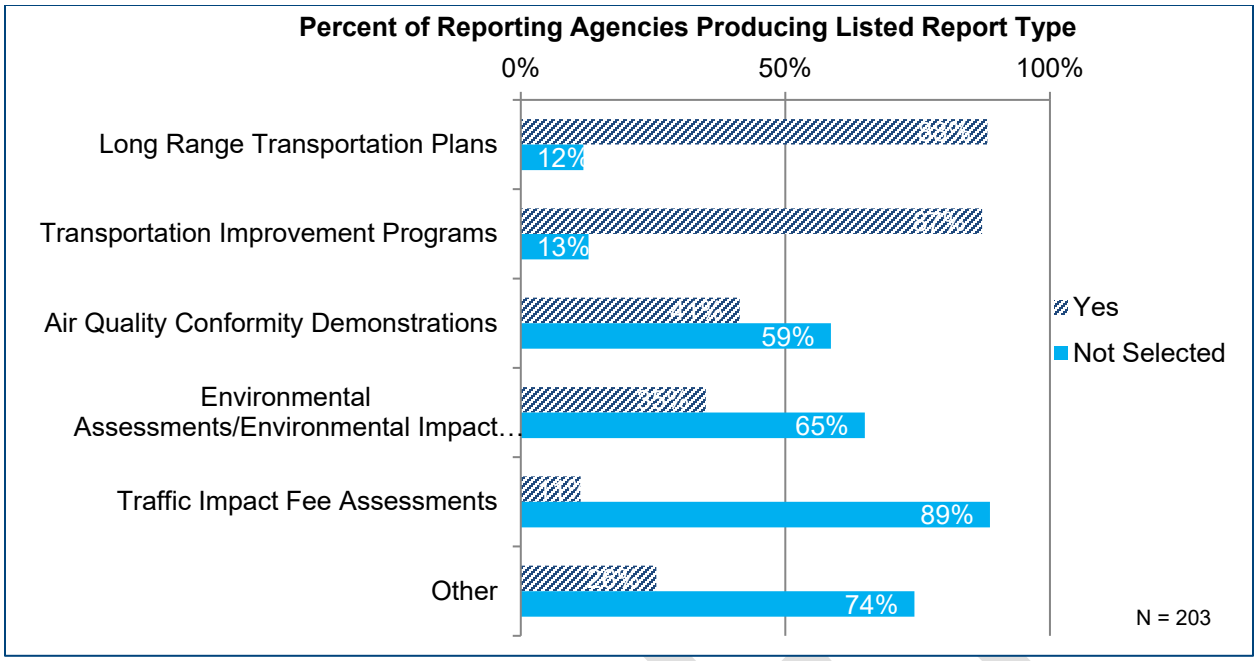

Figure 4. Most common reports produced by surveyed agencies.

3.2 Planning Issues of Interest

The Planning Issues of Interest questions included asking information about the degree of importance ("not important" to "extremely important") of various transportation, economic, environmental, growth, and quality of life issues. Beginning in this section of the survey, some open-ended questions were asked. Most agencies reported safety as extremely or very important, followed by the importance of economic development. Below are some overview results for the Planning Issues of Interest questions.

- 91% ranked "safety" as extremely or very important
- 75% ranked economic development as extremely or very important
- 68% ranked congestion issues as extremely or very important
- Long distance travel, school transportation, migration, seasonal residents received the fewest very/extremely important ratings

The most important Transportation Planning Issues to agencies included congestion reduction, transit related issues, and issues related to asset and infrastructure conditions (see Figure 5). Figure 6 shows the results of the economic development planning issues that were reported.

With the exception of safety, issues related to quality of life and the importance of growth, including Smart Growth, walking and biking, senior and school transportation, changing demographics and migration were ranked as less important (or not important) than issues related to transportation planning and economic development. The results for quality of life planning issues are shown in Figure 7.

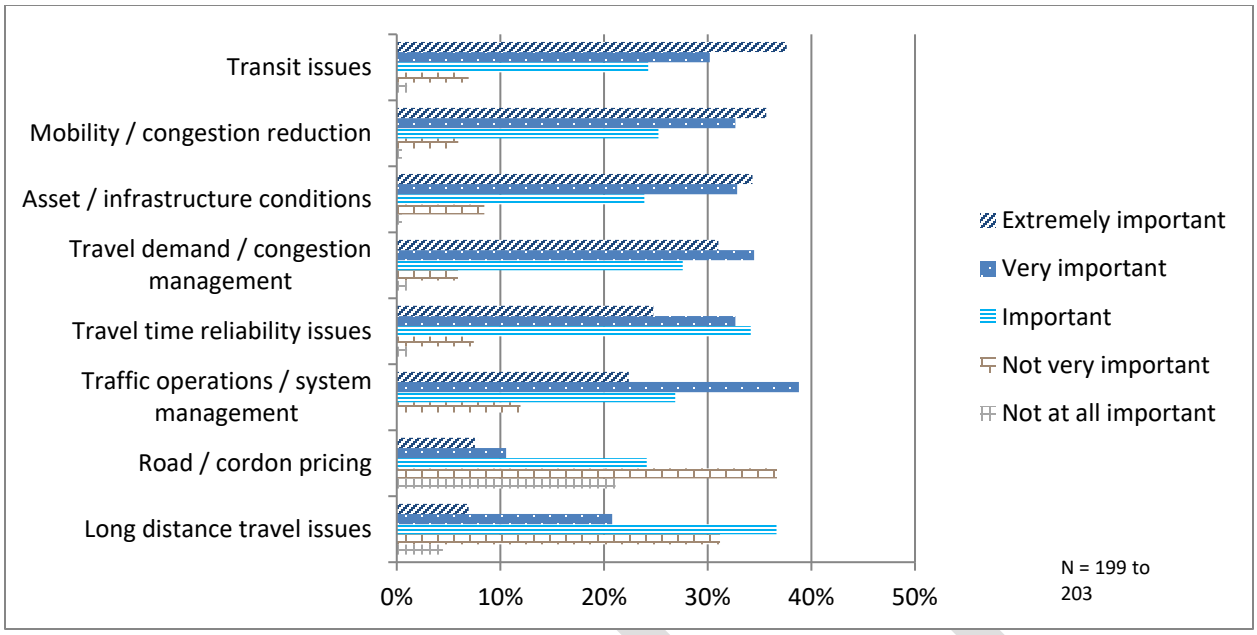

Figure 5. Importance of transportation planning issues.

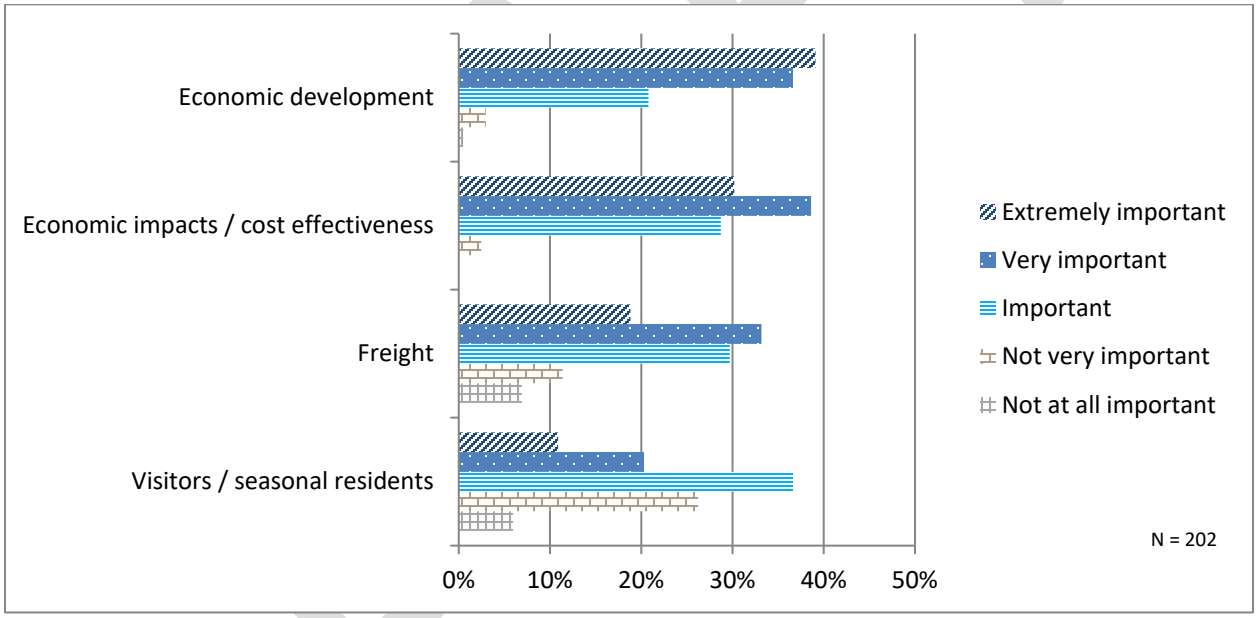

Figure 6. Importance of economic planning issues.

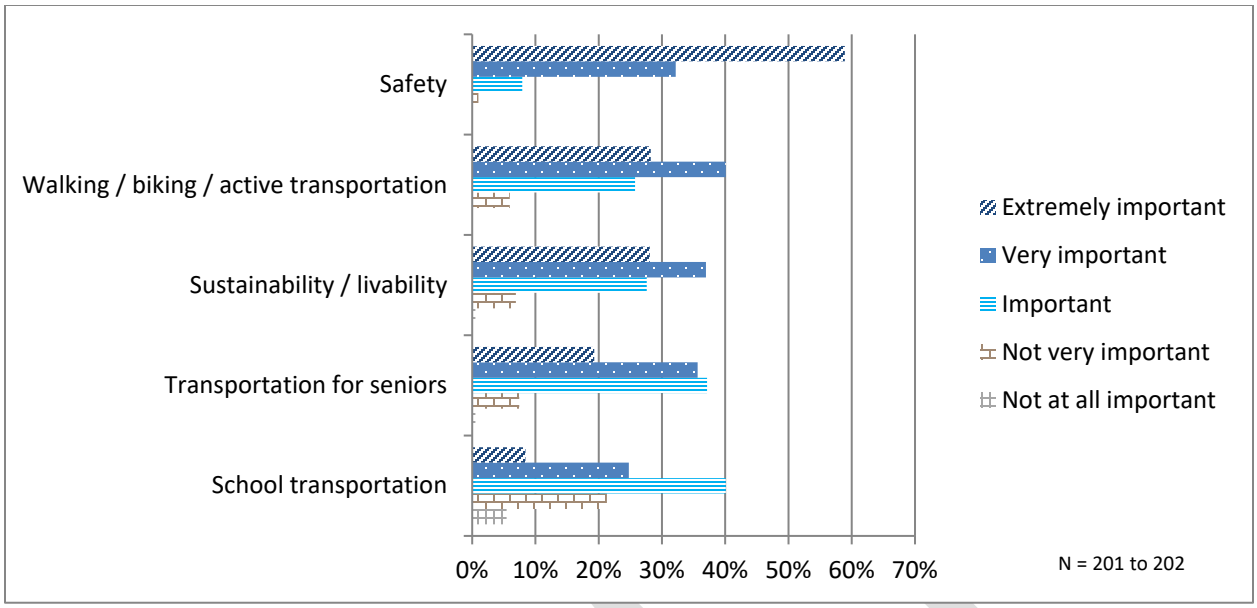

Figure 7. Importance of quality of life planning issues.

Fifty agencies reported 'other' planning issues of importance. These issues included

- Goods Movement (port, freight and rail);
- Passenger Rail;
- System Preservation Challenges (divestment);
- Public Health Concerns; and
- Project Alternative Evaluations.

Some agencies used this question to provide additional suggestions for TMIP:

- Public transit should not be lumped with active transportation;
- Environmental Justice (EJ) and equity of funding issues should be explored more thoroughly; and
- Quantifiable analysis of alternative fuel options and costs should also be explored.

3.3 Existing Analytical Data, Tools, and Methods

3.3.1 Travel Models

The third and largest section of the survey included 25 questions about analytical data, tools, and methods available and in use at agencies. These included questions about databases, data sources, land use planning tools, travel demand models, etc. Only 15% of responding agencies reported not having a travel demand

model. Ninety percent of agencies that reported having a travel demand model reported having a trip-based travel model.

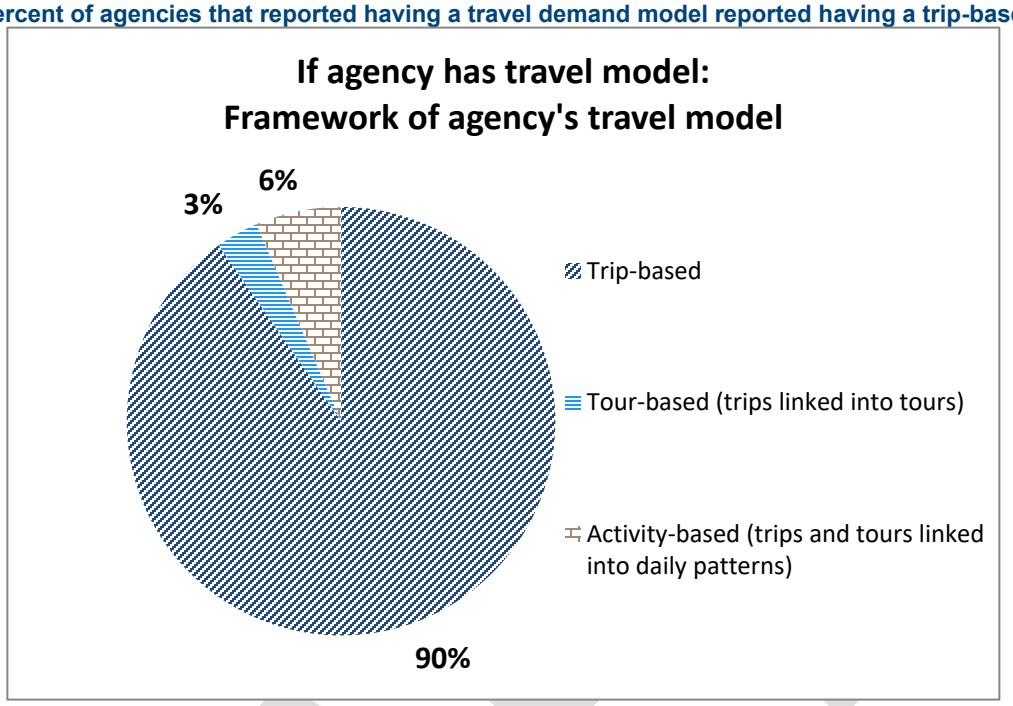

Figure 8Figure 8 shows the reported travel model by model type. Figure 9 shows the results of a follow-up question about whether agencies plan to move towards tour or activity-based models in the future. Of note, State DOT respondents were more likely to report using dynamic traffic assignment and traffic microsim models compared to MPOs/COGs.

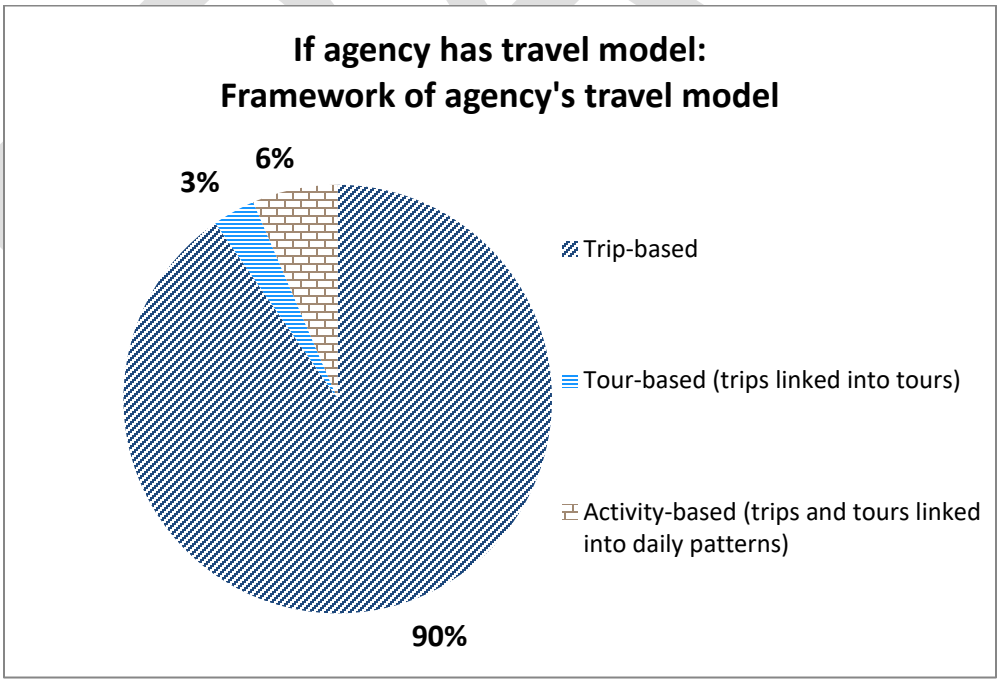

Figure 8. Travel model types reported.

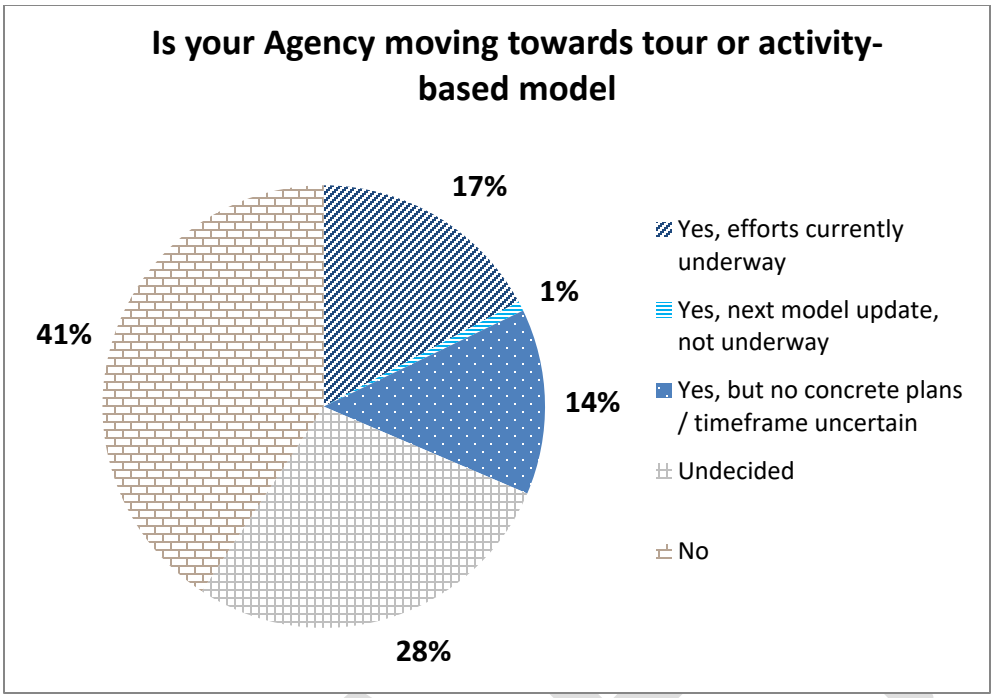

Figure 9. Activity-based model considerations.

Agencies were also asked to rank the uses of their travel demand model in order of importance where "1" was most important and "10" was least important to the agency. The average and median results are shown in Table 3.

Table 3. Travel demand model uses.

Travel Demand Model Uses	Average	Median
Long Range Plan development	2.40	1
Transportation Improvement Program (TIP) development	3.99	3
Design forecasts	4.87	4
Air quality conformity demonstrations	5.27	5
Traffic operational planning/travel demand management	4.91	5
Traffic impact studies	5.37	5
Transit studies	6.01	6
Traffic operational studies	5.83	6
NEPA alternatives analysis	6.12	7
Freight studies	7.01	8

3.3.2 Land Use Planning Tool/Forecasting Models

Most agencies reported that they are either currently using or are planning to start using a land use planning tool, and those 34 agencies that are currently using a land use planning tool have been using the tool for at least three years. Figure 10 displays the percentage of agencies planning to develop or purchase a land use tool in the future.

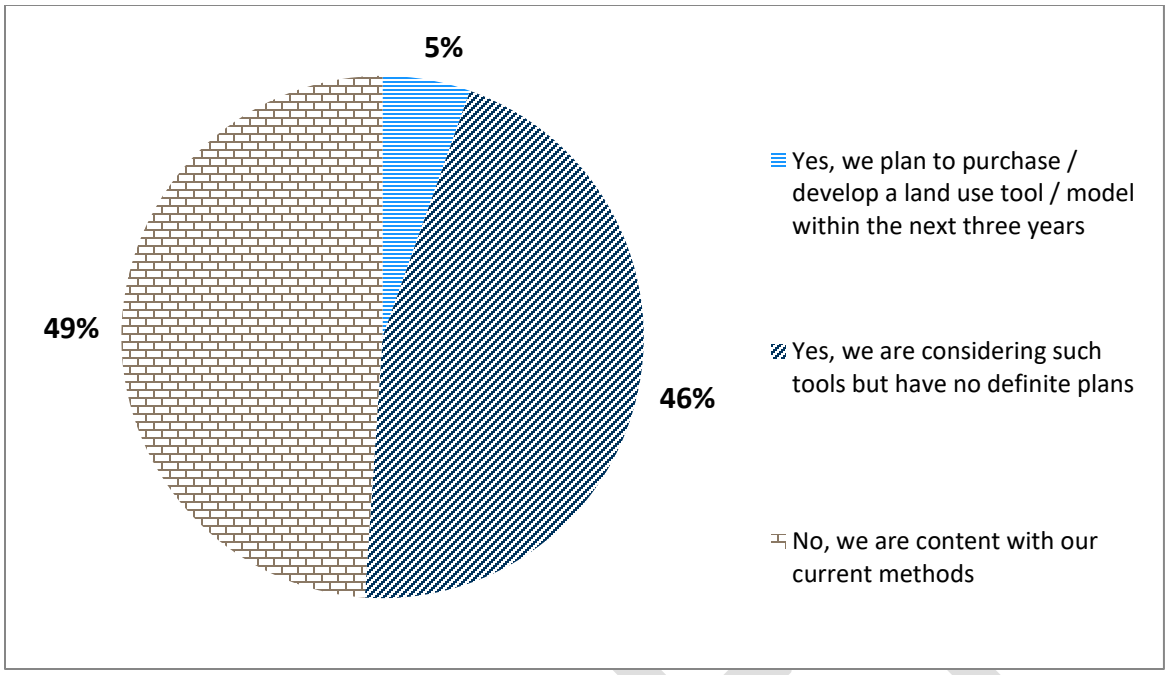

Figure 10. Plans to develop/purchase land-use planning tool.

3.3.3 Data Access

Many agencies reported lacking the survey data needed for decision making. Agencies were asked to report when different surveys were last conducted in their region. The surveys included were:

- Household travel survey
- Establishment travel survey
- Transit on-board survey
- Visitor survey
- External cordon line origin-destination survey
- Corridor or other special origin-destination survey
- Freight survey
- Stated preference survey
- Parking survey
- Longitudinal panel survey
- Customer satisfaction/public opinion survey

Figure 11 shows the survey results.

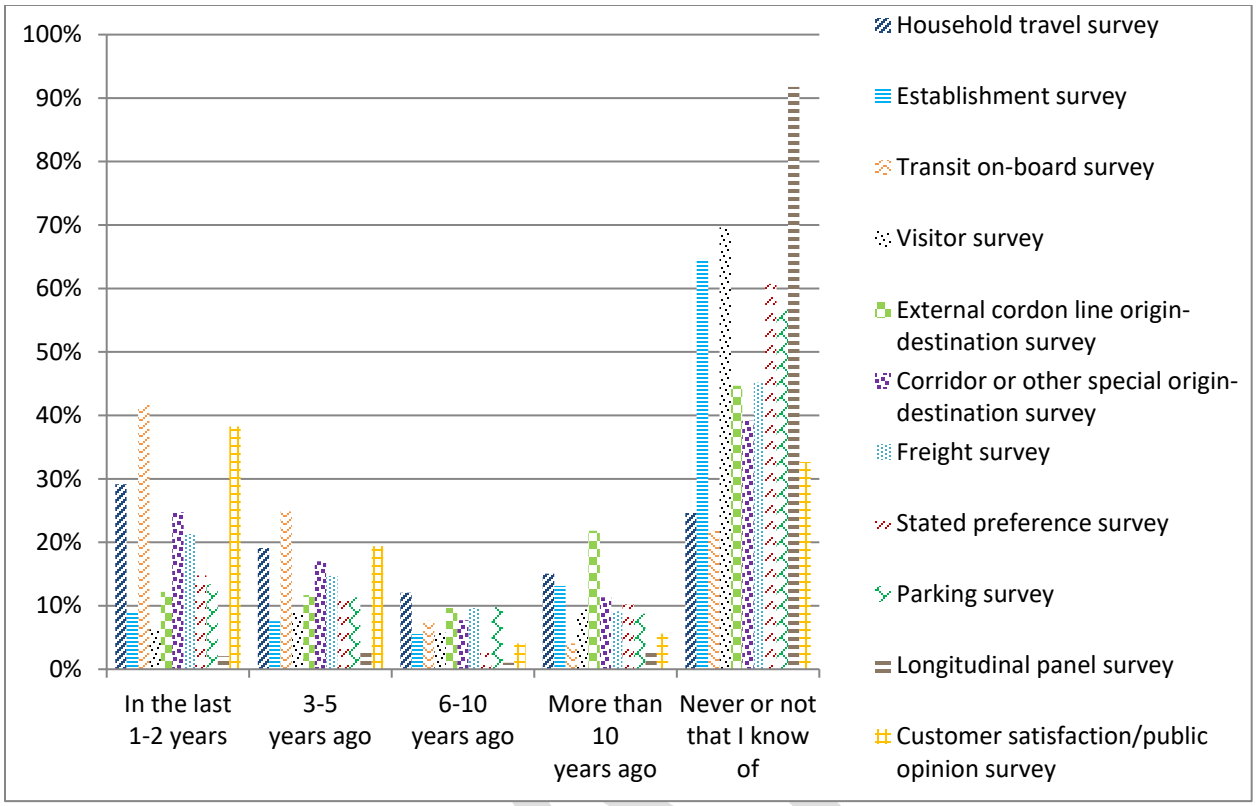

Figure 11. Access to survey data.

3.3.4 Agency Interest in New Technologies/Different Data Types

The survey included several questions about agencies' use or interest in using several data sources and new technologies. Figure 12 shows the results of the question about data sources. The questions were randomized when displayed for agencies.

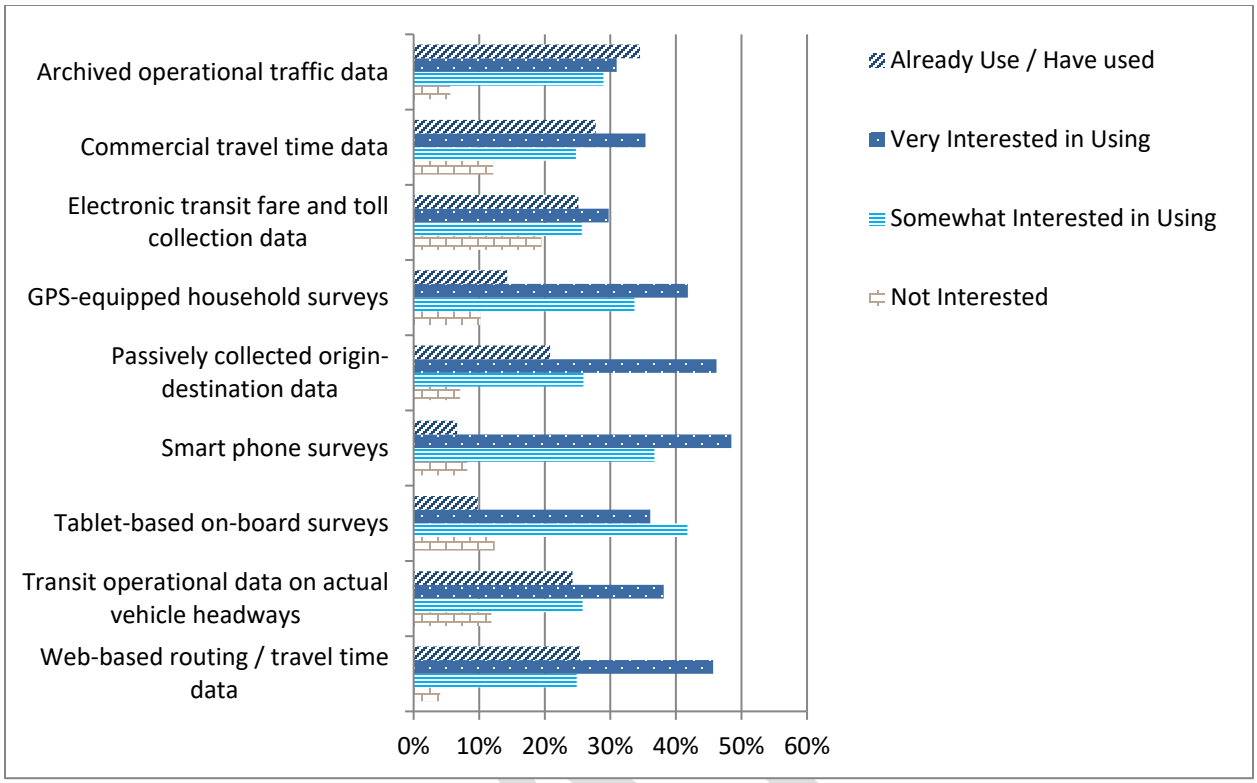

Figure 12. Agencies' use of/interest in using different data sources.

If agencies answered yes to a question asking about their use of passive origin-destination data collection technology, they were asked a follow-up question about what type of technology was used. The results can be seen in Table 4.

Table 4. What type of passive technology was used to collect origin and destination data.

Response	GPS based data collection technology	Cell phone based data collection technology	Bluetooth based data collection technology
Used	17	17	20
Not Selected	24	24	21
Total	**41**	**41**	**41**

3.4 Critical Challenges for Planning Analysis

These questions included asking about the helpfulness of tools TMIP might provide, a wish list for tools/data not currently used or available, and ideas for ways that TMIP can help agencies. The challenges were grouped into General Challenges and Technical Challenges. General Challenges included

- Limited staff and staff time, particularly trained staff;
- Limited budgets/high analysis costs;
- Lack of data; and
- Politically motivated decisions.

Table 5 *"Please rank the importance of the following general challenges according to how they affect your agency's ability to conduct analyses to further its planning mission, where 1 is most important and 9 is least important to your agency" (N=166)*

Table 5. Rank general challenges for planning analysis.

Challenge	Average	Median
Limited staff/staff time for planning analysis	3.25	2
Limited budgets for planning analysis/high costs of planning analysis	3.83	3
Lack of data or poor data quality	4.18	4
Limited staff training/training opportunities	5.07	5
Limited ability of existing/available analysis tools/methods to provide needed information	4.66	5
Cost/time required by existing/available analysis tools/methods	4.55	5
Inherent uncertainties about the future	5.12	5
Planning cycles/deadlines	5.60	6
Limited computing resources/runtime considerations	6.96	8

Reported Technical Challenges included

- Inaccurate/uncertain land use or socioeconomic forecasts;
- Inability of available tools to
  - Produce accurate forecasts by market segment/mode,
  - Produce accurate freight/truck forecasts,
  - Reflect/respond to built environment, walkability, etc.,
  - Produce accurate travel times, reliability or delay,
  - Deal with small scale project/phenomenon; and
- Poor or limited understanding of the uncertainty/precision of tools.

Agencies were asked several questions about threats to their credibility, threats to their ability to provide accurate information, and opportunities to improve agency credibility. Below is a summary of responses to these questions.

Threats to Credibility: Common themes: Limited Funding and Outdated Tools/Data

- Several transit agencies reported that **politically motivated decisions** contrary to available data was a leading threat to credibility.
- Many State DOTs cited outdated tools and models as a significant issue impacting credibility.
- MPO's, which responded in the greatest numbers, listed the following as their most pervasive credibility issues:
  - Inadequate resources (e.g. funding, staff and data),
  - Inaccurate and insufficient data,
  - Communication challenges, specifically to decision makers.

  - Better and more data visualization tools and use (charts, graphs, etc.) are listed as a need that could lead to improvements.

Threats to Ability to Provide Accurate Information:

- All agency types listed data challenges as the primary reason they are unable to provide accurate information. These include:
  - Lack of available data,
  - Poor quality data, and
  - Timeliness of data available (data is out of date).
- Staffing related issues were also listed including:
  - Understaffed; and
  - Insufficient technical skills and training.
- Lack of funding for staff and tools.
- Technical Issues, such as
  - Outdated hardware, software and tools, specifically outdated models;
  - Limited or non-existent funding for needed software;
  - Lack of data (local and spatial data included);
  - Lack of funding; and
  - Lack of expertise.

Opportunities to Improve Agency Credibility

- The most common needs are additional:
  - Funding, specifically dependable funding source(s);
  - Staff;
  - Training;
  - Data; and
  - Software/Tools.
- Better communication with decision makers and other agencies.
- The utilization of new technologies (including cellular, Bluetooth, GPS, smartphone technology and crowdsourcing).

3.5 Focusing TMIP Priorities

These questions included asking information on the helpfulness of tools TMIP might provide, wish list for tools/data not currently used or available, and ideas for ways TMIP can help agencies. Suggestions included

- Provide data consistency checking tools;
- Provide examples of visualization of results;
- Provide examples and methods of using new probe vehicle data (for both travel times and origin-destination information);
- Develop “How-to” guides;
- Review/illustrate methods for quantifying uncertainty in forecasts;
- Share information on post-processing tools for economic impacts, user benefits, safety, accessibility, travel time reliability and public health; and

- Provide or help to secure funding.

Agencies were asked to allocate 100 points among 20 tools/information that TMIP may provide according to how helpful they would be. Table 6 displays the average and median results to this question.

Table 6. Which tools/information would be most helpful.

Challenge	Average	Median
Data consistency checking tool	8.23	5
Examples of best practices in visualization of travel analysis results	7.93	5
Examples of how to expand samples of passively collected origin-destination data	6.57	5
New methods to incorporate observed speed/travel time data in models	6.46	5
How-to Guides for developing standard practice model components	5.78	5
Review/illustrations of techniques for quantifying uncertainty in forecasts	5.67	5
Summary of uncertainty in regional growth forecasts	5.45	5
Sharing methods for calculating accessibility measures to report impacts of transportation projects	5.44	5
Examples of new methods for estimating public health impacts of physically active modes of transportation	5.03	5
Documenting standard sensitivity/dynamic validation tests and ranges of reasonable results	4.68	5
Examples of data driven approaches to modeling travel demand	4.57	5
Helpful insights on the nuts & bolts of models	4.52	5
Retrospective (predicted vs. actual) studies of traffic forecasting accuracy	4.44	5
Comparisons of activity-based and four-step models	4.36	5
Peak-spreading spreadsheet based tool for estimating effects of pricing or congestion on highway traffic	4.30	4
Examples of methods to improve the handling of non-home-based trips in trip-based models	4.26	5
Managed lane feasibility spreadsheet based tool	3.67	3
Comparisons of various methods of representing intersection delays in static assignments	3.50	4
Comparisons of gravity and destination choice models	3.40	4
Comparison of various methods and criteria for feedback convergence	3.04	3
Other	0.78	0

3.5.1 Impact if Federal Data Sources Discontinued

A series of questions were asked about the impact on agencies if certain Federal data sources were discontinued. The following six pie charts display the results for these questions. In general, there would be at least some impact if any Federal data sources were discontinued, specifically the Census American Communities Survey (ACS) Journey to Work Data and the Census Transportation Planning Package (CTTP).

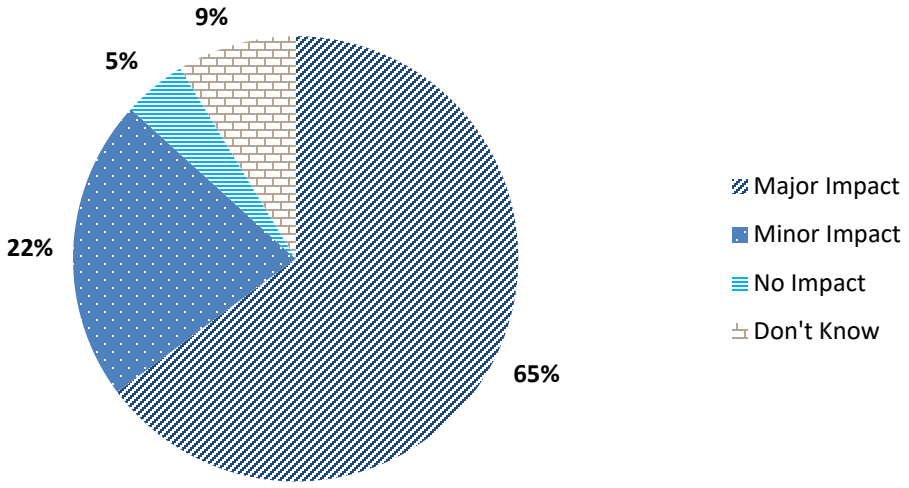

Figure 13. Census Transportation Planning Package (CTPP).

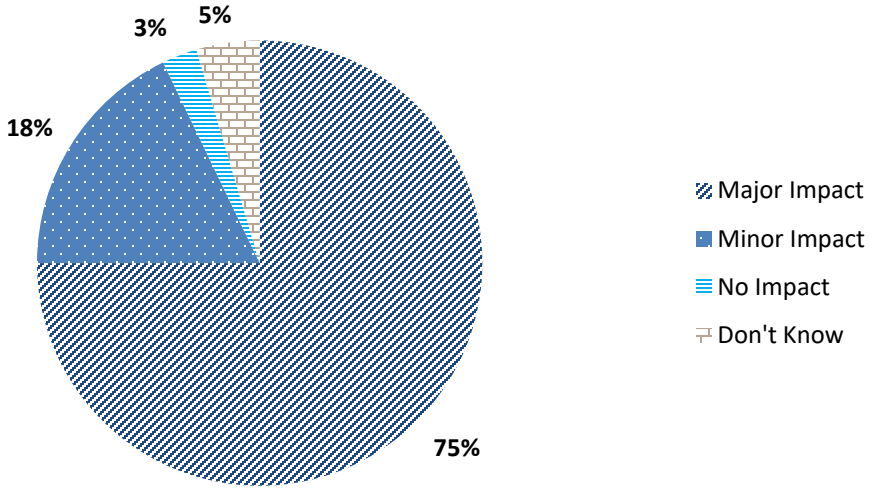

Figure 14. Census Bureau's American Community Survey (ACS) journey-to-work data.

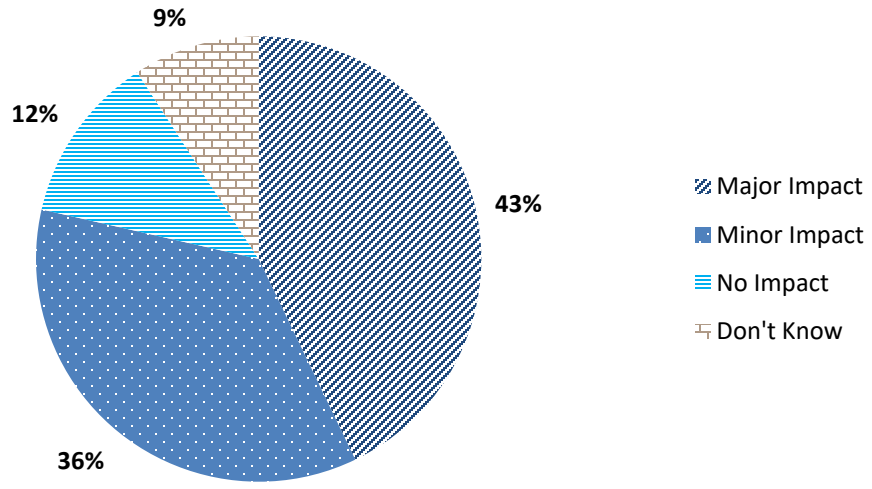

Figure 15. Federal Highway Administration's National Household Travel Survey.

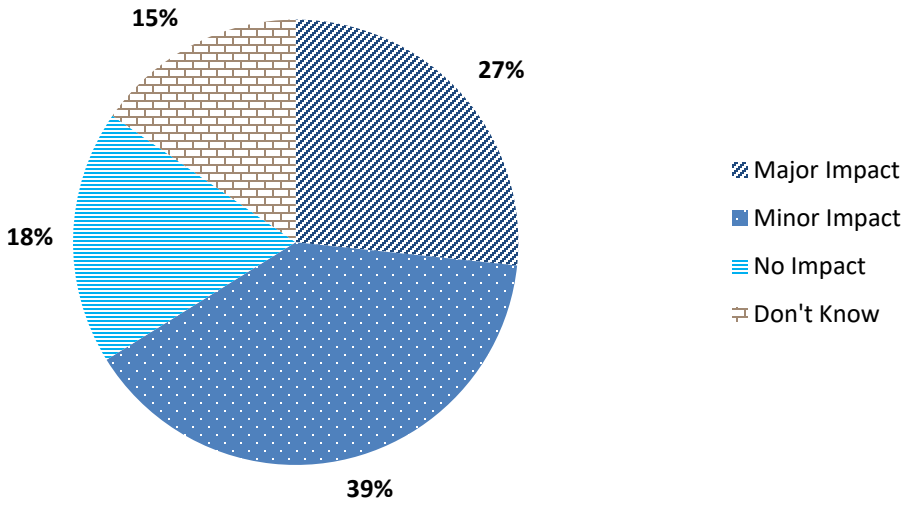

Figure 16. Census Bureau's county business patterns.

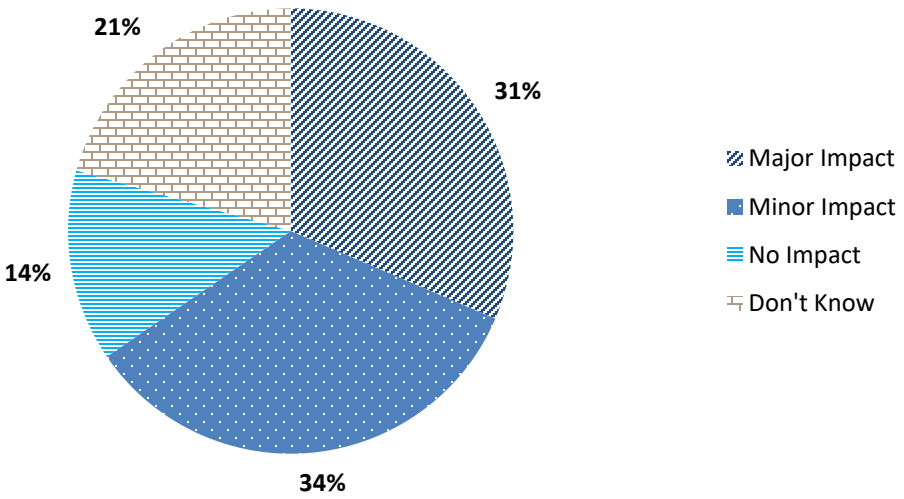

Figure 17. Census Bureau's Longitudinal employer-household dynamics.

4.0 Summary

TMIP gained valuable knowledge about agency needs through the results of the TMIP Agency Needs Assessment Survey. TMIP plans to use these survey results to help focus outreach activities in areas agencies need most and to better provide information about resources required to develop, use, and maintain various types of analysis tools.

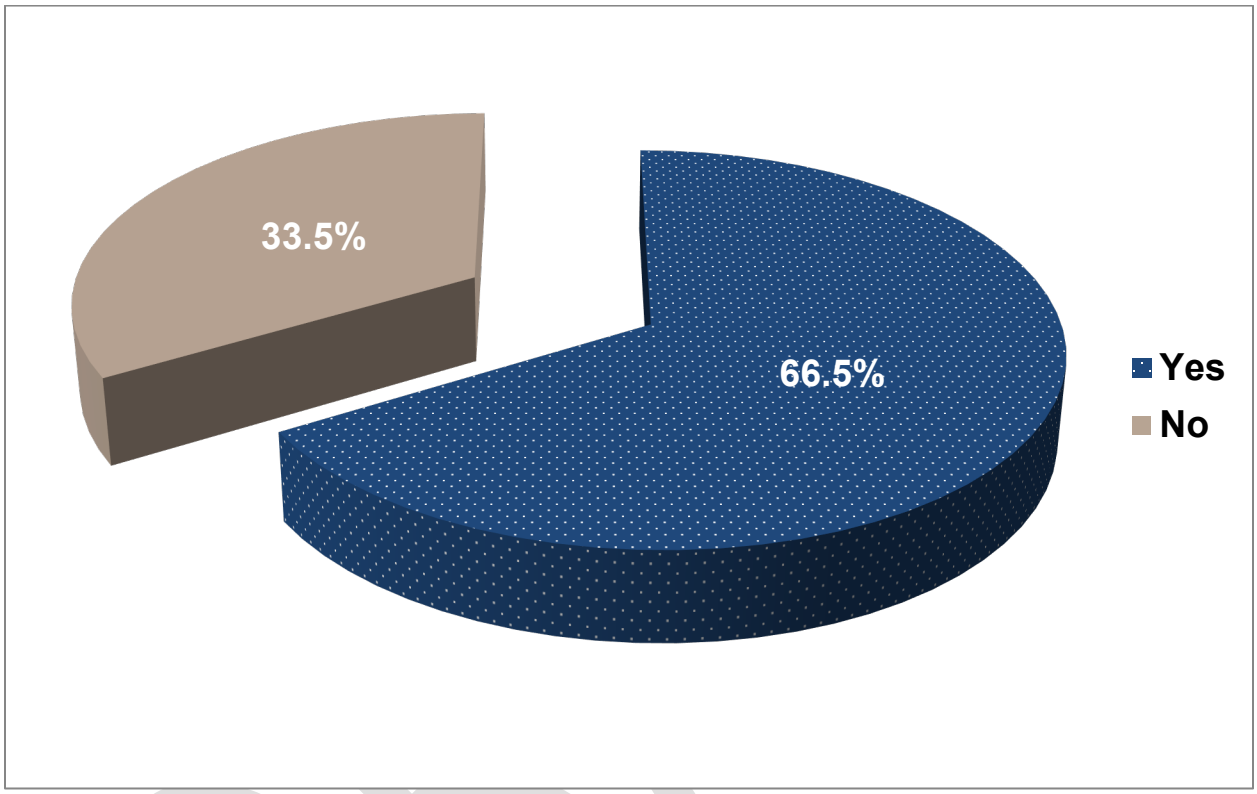

Figure 18. Agency reported willingness to be re-contacted for future TMIP surveys.

Appendix A TMIP Toolbox Survey Instrument

Survey Introduction

Welcome and thank you for participating!

With the emphasis on performance measurement and prediction under MAP-21, the Federal Highway Administration (FHWA) Travel Model Improvement Program (TMIP) has undertaken to understand state, regional, and local needs through web-based surveys.

The purpose of this survey is to help FHWA/TMIP understand the analytical needs of agencies responsible for transportation planning so that TMIP can focus its resources on areas of greatest need to the agencies it serves. In particular, through this survey, TMIP hopes to learn more about the analytical tools/methods your agency uses and the challenges that limit your agency's ability to conduct analyses.

TMIP will use this survey to focus outreach activities in areas agencies need most and to better provide information about resources required to develop, use and maintain various types of analysis tools. RSG is conducting this survey on behalf of TMIP.

Your response represents the goals, experiences and needs of your agency and agencies like yours. Thank you again for your participation.

Please email survey@tmip.org with any questions or concerns.\

Agency Background

1. What is your agency's name?
2. What type of agency are you?
    a) State DOT
    b) MPO (Metropolitan Planning Organization)/COG (Council of Governments)/RTPO (Regional Transportation Planning Organization)
    c) Toll agency
    d) Transit agency
    e) Other (please specify):
3. Which of the following documents/studies is your agency responsible for producing? Please select all that apply.
    a) Long Range Transportation Plans
    b) Transportation Improvement Programs
    c) Air Quality Conformity Demonstrations
    d) Environmental Assessments/Environmental Impact Statements
    e) Traffic Impact Fee Assessments
    f) Other (please specify): _____
4. What is the status of tolling within your agency's jurisdiction?
    a) Existing toll facilities
    b) No existing, but planning for toll facilities
    c) No existing or currently planned toll facilities
5. What fixed route transit services are available within (all or a portion of) your planning jurisdiction? Please select all that apply.
    a) Conventional local or local/express bus service
    b) Bus Rapid Transit (BRT)
    c) Rail transit
6. Which of the following data/analysis products does your agency produce in the course of its mission? Please select all that apply.
    a) Population/Employment Growth Projections (state/regional/county control totals)
    b) Future Land Use Patterns (TAZ or parcel level)
    c) Regional Emissions Estimates
    d) Hot-spot Emissions Analyses
    e) Transit Ridership Forecasts for FTA
    f) Traffic Forecasts for Roadway Design Projects
    g) Traffic and Toll Revenue Forecasts
    h) Freight or Truck Forecasts
    i) Benefit-Cost Analyses of Transportation Projects
    j) Economic Impact Analyses of Transportation Projects
    k) Environmental Justice Analyses of Transportation Projects
    l) Pedestrian/Cyclist Activity Forecast
    m) Other (please specify): _____

7. How important are quantitative analysis/performance measures to your agency's decision makers (e.g. Policy Board, Commissioner, etc.)?
    a) Extremely Important
    b) Very important
    c) Somewhat Important
    d) Not very important
    e) Not at all important

Planning Issues of Interest

8. If you could improve your agency's analysis capabilities for only one planning issue, what would it be? Please provide as much detail as you can.

9. For each of the following please indicate, as best you can, the importance of the following issues to your agency as a whole: *Randomize list of answer choices with each topic area.*

Issue	Extremely Important	Very Important	Important	Not very Important	Not at all Important
Transportation					
Road/Cordon Pricing					
Mobility/Congestion Reduction					
Transit					
Travel Demand/Congestion Management					
Long Distance Travel					
Traffic Operations/Systems Management					
Travel Time Reliability					
Asset/Infrastructure Conditions					
Economics					
Economic Impacts/ Cost Effectiveness					
Freight					
Visitors/Seasonal Residents					
Economic Development					
Environmental					
Environmental Impacts					
Air Quality/Climate Change					
Environmental Justice/Equity					
Quality of Life					
Sustainability/Livability					
Walking/Biking/Active Transportation					
Safety					
School Transportation					

Issue	Extremely Important	Very Important	Important	Not very Important	Not at all Important
Transportation for Seniors					
Growth					
Smart Growth/Transit-Oriented Design/Built Environment					
Demographics/Evolution					
Migration					

Optional: Please provide a short description of any other issues not listed on the previous pages that are important to your agency.

Existing Analytical Data, Tools and Methods

10. Does your agency have or have access to a GIS database of all land parcels within your planning jurisdiction?
    a) Yes
    b) No
    c) I don't know
11. When was the last time your agency conducted (or participated in) the following types of surveys?

Survey Type	In the last 1-2 years	3-5 years ago	6-10 years ago	More than 10 years ago	Never or not that I know of
Household travel survey					
Establishment travel survey					
Transit on-board survey					
Visitor survey					
External cordon line origin-destination survey					
Corridor or other special origin-destination survey					
Freight survey					
Stated preference survey					
Parking survey					
Longitudinal panel survey					
Customer satisfaction/public opinion survey					

12. Please describe your agency's use or interest in using the following data sources. *Randomize list of answer choices*

Data Source	Already Use/Have used	Very Interested in Using	Somewhat Interested in Using	Not Interested
Archived operational traffic data				
Commercial travel time data (INRIX, NavTeq, TomTom, AirSage, etc.)				
Web-based routing/travel time data (Google, MapQuest, etc.)				
Transit operational data on actual vehicle headways				
Electronic transit fare and toll collection data				
Tablet-based on-board surveys				
Smart phone surveys				
GPS-equipped household surveys				
Passively collected origin-destination data (ATRI, AirSage, TomTom, Bluetooth, etc.)				

13. [If already used passive origin-destination data] Which passive origin-destination data collection technology have you used? Please select all that apply.
    a) GPS based
    b) Cell phone based
    c) Bluetooth based
14. If your agency purchases propriety data when a free alternative is available, (e.g., InfoGroup employment data rather than Census LEHD, IHS Global Insight Transearch Data rather than FHWA FAF, etc.) what motivates this decision? Please provide as much detail as you can.

    Also show checkbox for: My agency doesn't purchase proprietary data when a free alternative is available
15. How would it impact your agency if the following federal data sources were discontinued? Please note this is a hypothetical question only. *Randomize list of answer choices*

Data Source	Major Impact	Minor Impact	No Impact	Don't Know
Census Bureau's Longitudinal Employer-Household Dynamics (LEHD)				
Census Bureau's American Communities Survey (ACS) Journey to Work Data				
Census Transportation Planning Package (CTPP)				
Census Bureau's County Business Patterns				

Data Source	Major Impact	Minor Impact	No Impact	Don't Know
Bureau of Economic Analysis's Regional Economic Accounts				
Federal Highway Administration's National Household Travel Survey (NHTS)				
Bureau of Transportation Statistics' Commodity Flow Survey (CFS)/Federal Highway Administration's Freight Analysis Framework (FAF)				

16. Does your agency document its decision process to develop or acquire analysis tools/methods?
    a) Yes
    b) No
17. Does your agency document its decision process to use an analysis tool/method for a particular project or program?
    a) Yes
    b) No
18. [If agency produces Future Land Use Patterns (6b)] You responded that your agency develops future land use allocations. How does your agency allocate growth in population and employment to traffic analysis zones (parcels or other detailed unit of geography)? Please select any that play a major role in your process.
    a) Based on Current Distribution
    b) Based on Recent Growth
    c) According to Master Plan/Zoning
    d) Delphi Panel/Expert Process/Negotiation
    e) Public Visioning Process
    f) Land Use Planning Tool (CommunityViz, i-PLACE3S, EnvisionTomorrow, etc.)
    g) Land Use Forecasting Model (UrbanSim, PECAS, DRAM/EMPAL, CubeLand, etc.)
    h) Home-grown land use allocation tool
    i) Other (please specify) _____
19. [If Yes to Land Use Planning Tool and/or Land Use Forecasting Model (18f and/or g)] How long has your agency been using this tool?
    a) Still under development
    b) 1 year or less
    c) 2 years
    d) 3-5 years
    e) 5-10 years
    f) More than 10 years
    g) I don't know
20. [If NO to Land Use Planning Tool and/or Land Use Forecasting Model (18f and/or g)] Is your agency considering use of a land use model/visioning tool?
    a) No, we are content with our current methods
    b) Yes, we are considering such tools but have no definite plans
    c) Yes, we plan to purchase/develop a land use tool/model within the next three years

21. What role do travel demand models play in your agency in developing traffic/transit/freight forecasts?
    a) We do not have a travel demand model. We rely entirely on other methods (sketch planning models, growth factoring, diversion curves, etc.).
    b) We have a travel demand model but use it in conjunction with other independent methods (sketch planning models, growth factoring, diversion curves, etc.).
    c) We have a travel demand model and generally rely exclusively on its direct outputs.
    d) We have a travel demand model, but typically post-process or otherwise adjust its outputs to produce forecasts.
22. [If agency has a travel model (21b,c,d)]Please rank the following uses of your agency's travel demand model in order of importance where 1 is most important and 10 is least important to your agency. Note that you can only use each number once.
    a) Long Range Plan Development
    b) Transportation Improvement Program (TIP) Development
    c) Air Quality Conformity Demonstrations
    d) NEPA Alternatives Analysis
    e) Design Forecasts
    f) Traffic Operational Planning/Travel Demand Management
    g) Transit Studies
    h) Freight Studies
    i) Traffic Impact Studies
    j) Traffic Operational Studies
23. [If agency has a travel model (21b,c,d)] Which of the following modes does your travel model forecast? Please select all that apply.
    a) Transit
    b) Walk/bike
    c) Trucks
    d) Other freight mode(s) (e.g., rail, barge, etc.) (please specify)
24. [If agency has a travel model (21b,c,d)] Which framework is your current travel model?
    a) Trip-based
    b) Tour-based (trips linked into tours)
    c) Activity-based (trips and tours linked into daily patterns)
    d) Other (e.g. Tour for work trips only)
25. [If agency has trip-based travel model (24a)] Is your agency moving towards a tour or activity-based model?
    a) No
    b) Undecided
    c) Yes, but no concrete plans/timeframe uncertain
    d) Yes, next model update, not underway
    e) Yes, efforts currently underway

26. [If agency has a travel model (21b,c,d)] Do you know the precision of your agency's travel model? For example, can you specify a confidence interval around your model's forecasts (e.g., plus or minus X)?
    a) Yes
    b) No
27. [If agency has a travel model (21b,c,d)] Do your travel model's forecasts reflect the following? *Randomize list of answer choices*

Variable	Yes, adequately reflects	Yes, but maybe not adequately	No, it does not consider	I Don't Know
Age of Travelers				
Different built environments (e.g., Mixed Use Developments)				
Walk/bike suitability of neighborhoods				
Roadway tolls				
Parking costs				
Fuel prices				
Accessibility [to jobs, to shopping, etc.]				
Service characteristics other than time/cost, such as reliability, real-time information, comfort, safety, etc.				
Employer policies such as flex-time, free parking for carpooling, subsidized transit passes, etc.				
ITS policies such as ramp metering, speed harmonization, incident management, etc.				

28. Besides land use/travel demand models, which of the following tools has your agency used (directly or through consultant assistance) within the past three years? Please select all that apply for tools that your agency uses regardless of whether they were developed in-house or by outside consultants.
    a) Sketch planning tools (IDAS, SPASM, SMITE, etc.)
    b) Strategic models (SmartGAP, GreenSTEP, EERPAT, etc.)
    c) Dynamic traffic assignment (DTA) (CUBE Avenue, TransModeler, TRANSIMS, VISTA, DynaSmart, DynusT, DynaMIT, etc.)
    d) Traffic microsimulation model (VISSIM, TransModeler, Paramics, CORSIM, etc.)
    e) Analytic/deterministic/optimization traffic tool (McTrans HCS/HCM, Synchro, TEAPAC, TRAFFIX, etc.)
    f) General decision support tools (Decision Lens, Expert Choice, etc.)

g) Economic impact/Benefit-cost tool (TREDIS, REMI, STEAM, T-PICS, HERS, Cal-B/C, NET-BC, MicroBENCOST, HDM4, etc.)
h) Crash forecasting tool (HSM/IHSDM, SafetyAnalyst, etc.)
i) Project (lifecycle) costing tool (RealCost, etc.)
j) Vehicle emissions models (MOVES, EMFAC, MOBILE)
k) Air dispersion model (AERMOD, CAL3QHC or similar)
l) Noise impact model (FHWA's TNM or similar)
n) Data visualization/visual analytics (ESRI, CADD, Adobe, etc.)
o) Other (please specify)

29. [If Sketch Planning Tools or Strategic Models (28 a or b)] Has your agency developed any in-house strategic models or sketch planning tools in the past three years? Please select all that apply.
    a) Yes, custom scripts (please describe)
    b) Yes, custom software (please describe)
    c) Yes, other tool(s) (please describe)
    d) No
30. [Did NOT select dynamic traffic assignment (NOT 28c)] Is your agency moving towards a dynamic traffic assignment?
    a) No
    b) Undecided
    c) Yes, but no concrete plans/timeframe uncertain
    d) Yes, next model update or planning cycle, not underway
    e) Yes, efforts currently underway
31. Does your agency summarize and present uncertainty in your analyses and forecasts to senior decision-makers (e.g. Executive Director, Policy Board, etc.)?
    a) Yes
    b) No
32. [If agency summarizes/presents uncertainty (31a)] How does your agency summarize and present uncertainty in your analyses and forecasts to senior decision-makers (e.g. Executive Director, Policy Board, etc.)? Please provide any detail around the format or structure used to present uncertainty and risk.

33. Does your agency conduct "before and after" comparisons of forecasts and other analyses?
    a) Yes, on a regular/planned basis
    b) Yes, at least once, but irregularly
    c) No
34. Does your agency have a formal risk management process/program?
    a) Yes
    b) No
    c) I don't know
35. Does your agency have a formal quality control or quality assurance process/program?

a) Yes, and it is applied effectively to planning analyses
b) Yes, but the process may not adequately ensure the quality of planning analyses
c) No
d) I don't know

Critical Challenges for Planning Analysis

36. What is the greatest threat to your agency's credibility with senior decision-makers or the public?

37. What is the greatest threat to your agency's ability to provide accurate information to support transportation decision-making?

38. What is the greatest opportunity to improve your agency's credibility or ability to provide accurate information to support transportation decision-making?

39. What technical issue has caused the greatest difficulty for your planning analyses? If able, please describe an example of the problem encountered.

40. Please rank the importance of the following general challenges according to how they affect your agency's ability to conduct analyses to further its planning mission, where 1 is most important and 9 is least important to your agency. Note that you can only use each number once: *Randomize list of answer choices*
    a) Limited budgets for planning analysis/high costs of planning analysis
    b) Limited staff/staff time for planning analysis
    c) Limited staff training/training opportunities
    d) Planning cycles/deadlines
    e) Lack of data or poor data quality
    f) Limited ability of existing/available analysis tools/methods to provide needed information
    g) Cost/time required by existing/available analysis tools/methods
    h) Inherent uncertainties about the future
    i) Limited computing resources/runtime considerations
41. Please allocate **150 points among the following 15 technical challenges** according to how important addressing them is to improving <u>your</u> agency's ability to conduct analyses to further its planning mission. (More points = More important) Your thoughtful response is appreciated as your allocations will help TMIP prioritize its efforts.

Note: randomize statements within each category (fundamental tool limitations, etc.)

Note: if easy, randomize categories of statements, but always keeping "Other" anchored at the bottom

Note: If reasonable, still show the tally/total at the bottom of the page, but don't require exactly 50 points. Also if reasonable, don't allow to put negative numbers or more than 150 points in a given box.

a) *Fundamental Tool Limitations*
   i. Slow models/tools with long run times that limit their usefulness
   ii. Inability of available tools/methods to produce accurate estimates of travel times, travel time reliability and/or delay
   iii. Inability of available tools/methods to produce accurate estimates of passenger travel/volumes by origin/destination location, mode, and socioeconomic characteristics of the traveler
   iv. Inability of available tools/methods to produce accurate estimates of freight demand, truck movements/volumes, etc.
   v. Poor or limited understanding of the uncertainty/precision associated with tools/methods

b) *Poor or Uncertain Quality of Inputs*
   i. Inaccurate or uncertain land use forecasts or problems with forecasts of socioeconomic variables such as income and automobile ownership
   ii. Poor representation of transportation supply including free flow travel times and capacities (for intersections as well as road segments)

c) *Poor Model Resolution*
   i. Poor spatial resolution: Inability of available tools/methods to deal with small scale projects and phenomenon (e.g., walking, biking)
   ii. Poor temporal resolution: Inability of available tools/methods to produce results with enough temporal detail (e.g., need for hourly or peak 15 minute traffic, poor handling or peak spreading, etc.)
   iii. Poor demographic/market resolution: Inability to identify who benefits or is impacted or to conduct equity or environmental justice analyses
   iv. Poor representation of special, high value or high impact travel (e.g., long distance travel, business-related travel, tourism/visitor travel)

d) *Lack of Sensitivity to Policies or Other Factors Affecting Transportation*
   i. Lack of sensitivity to built environment, walkability, etc., in available tools/methods
   ii. Lack of sensitivity to supply characteristics in available tools/methods (e.g., parking costs, comfort, traveler information, etc.)
   iii. Inability of available tools/methods to evaluate employer policies such as flex-time, free parking for carpooling, subsidized transit passes, etc.
   iv. Inability of available tools/methods to evaluate ITS policies such as ramp metering, speed harmonization, incident management, etc.

e) *Other*
   i. Other (please specify) _____

42. On the previous question you assigned points to an "other" category. Please provide any detail around what you had in mind for "other".

Focusing TMIP Priorities

43. If your agency could acquire one type of data it currently does not have, what would it be?
44. If you could do one thing to improve your agency's existing analysis tools/methods, what would it be?
45. If you could acquire one new tool for your agency, what would it be? You can name an actual existing tool or describe a tool that may not exist but you would like to see.
46. How could TMIP best help your agency improve its travel modeling and related analyses?
47. Do you have any novel ideas (or new tools/methods your agency has developed) for advancing the state of the practice that you would like to share with TMIP?
48. How interested would you be in seeing TMIP present information on post-processing tools/methods for the following variables? *Randomize list of answer choices*

Variable	Very Interested	Somewhat Interested	Not Interested
Accessibility (To jobs, etc., by various modes)			
Travel Time Reliability			
User Benefits (Time & cost savings, etc.)			
Economic Impacts (Jobs, Income, etc.)			
Emissions (for criteria pollutants: PM, ozone, etc.)			
Greenhouse gases			
Health - Physical Activity			
Environmental Justice/Equity			
Safety (crashes, crash rates)			

49. Please allocate 100 points among the following 20 tools/information that TMIP might provide according to how helpful they would be for your agency. (More points = more helpful) Your thoughtful response is appreciated as your allocations will help TMIP prioritize its efforts.

Note: randomize statements within each category (fundamental tool limitations, etc.)

Note: if easy, randomize categories of statements, but always keeping "Other" anchored at the bottom

Note: If reasonable, still show the tally/total at the bottom of the page, but don't require exactly 100 points. Also if reasonable, don't allow to put negative numbers or more than 100 points in a given box.

a) *Data*
   i. Data (TAZ data, counts, etc.) consistency checking tools
   ii. Summary of uncertainty in regional socioeconomic growth forecasts
   iii. New methods to incorporate observed speed/travel time data in models
   iv. Examples of how to expand samples of passively collected origin-destination data

b) *Simplified Modeling Tools/Techniques*
   i. Managed lane feasibility spreadsheet based tool for estimating hourly volumes on managed lanes based on regional travel model data, time-of-day distributions and toll rates
   ii. Peak-spreading spreadsheet based tool for estimating the effects of pricing or congestion on the time-of-day of highway traffic

c) *Modeling Fundamentals & Basic Structural Improvements*
   i. How-to Guides for developing standard practice model components (How-to Guide to Trip Generation, etc.)
   ii. Helpful insights on the "nuts & bolts" of models (options for balancing, single vs. double constraints, etc.)
   iii. Examples of data driven approaches to modeling travel demand (data-based trip tables)
   iv. Examples of methods to improve the handling of non-home-based trips in trip-based models

d) *Comparisons of Alternative Methods*
   i. Comparisons of various methods of representing intersection delays in static assignments
   ii. Comparisons of activity-based and four-step models
   iii. Comparisons of gravity and destination choice models
   iv. Comparison of various methods and criteria for feedback convergence

e) *Accuracy, Sensitivity and Uncertainty in Forecasting*
   i. Review/illustrations of techniques for quantifying uncertainty in forecasts and communicating it to decision-makers
   ii. Retrospective (predicted vs. actual) studies of traffic forecasting accuracy
   iii. Documenting standard sensitivity/dynamic validation tests and ranges of reasonable results

f) *Examples of Good Practice in Communicating Results*
   i. Sharing methods for calculating accessibility measures to report the impacts of transportation projects/plans
   ii. Examples of new methods for estimating public health impacts of physically active modes of transportation

iii. Examples of best practices in visualization of travel analysis results

g) Other

i. Other (please specify) _____

50. On the previous question you assigned points to an "other" category. Please provide any detail around what you had in mind for "other".

51. Person responsible for providing this information
    a) Name
    b) Position
    c) Email
    d) Phone Number
52. Would you be willing to be contacted for follow-up interviews?
    a) Yes
    b) No

Thank you for your participation. Your answers will help TMIP focus its resources on areas of greatest need to the agencies it serves. To learn more about TMIP please go to our website here [http://tmiponline.org/].

Appendix B Example Survey Questions – Web Interface

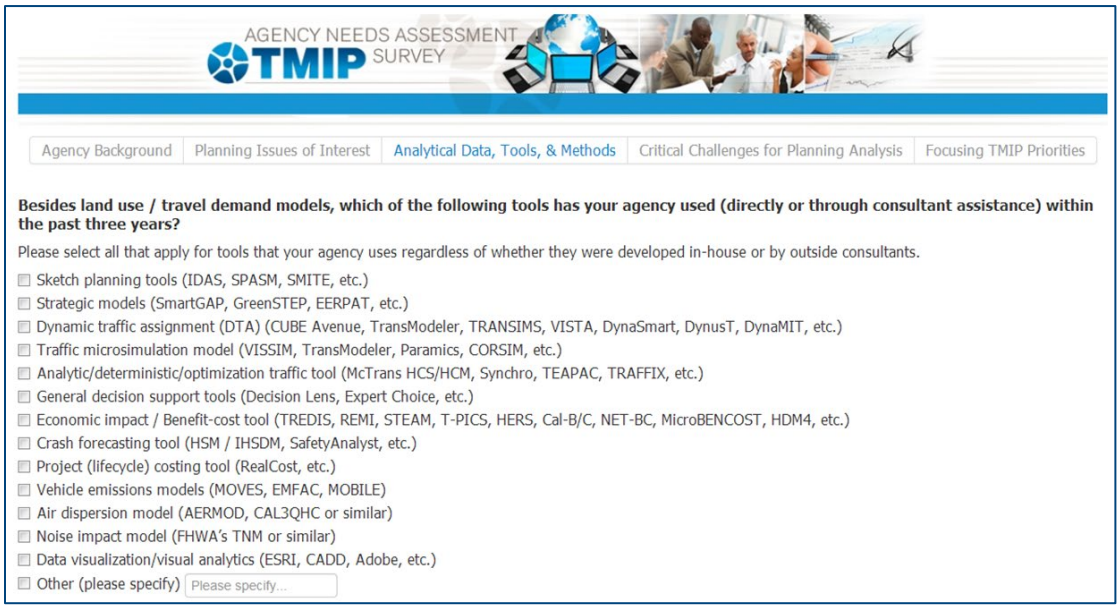

Figure 19. Example question - agencies' existing tools.

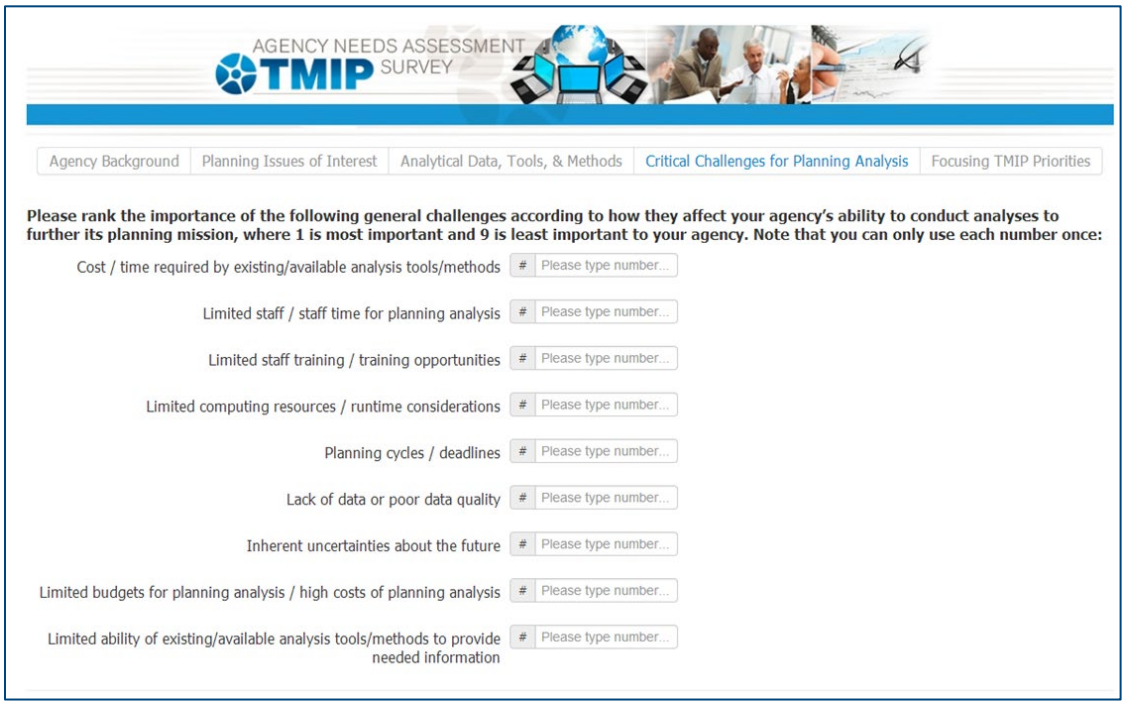

Figure 20. Example question - critical challenges agencies face.

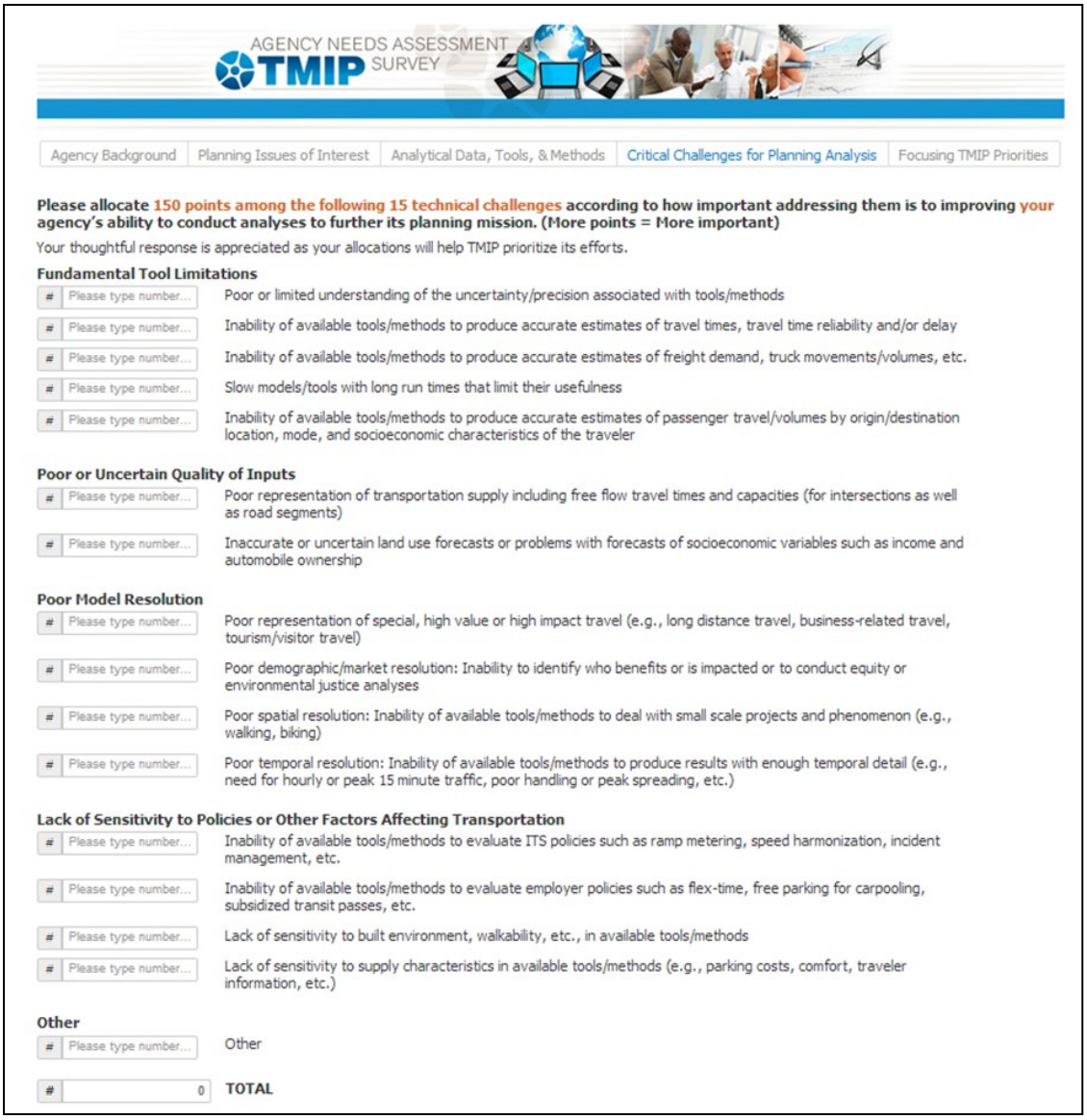

Figure 21. Example question - technical challenges agencies face.

Appendix C Additional Charts and Graphs

Administrative Questions

Only 31.3% of responding agencies currently have toll facilities in their region.

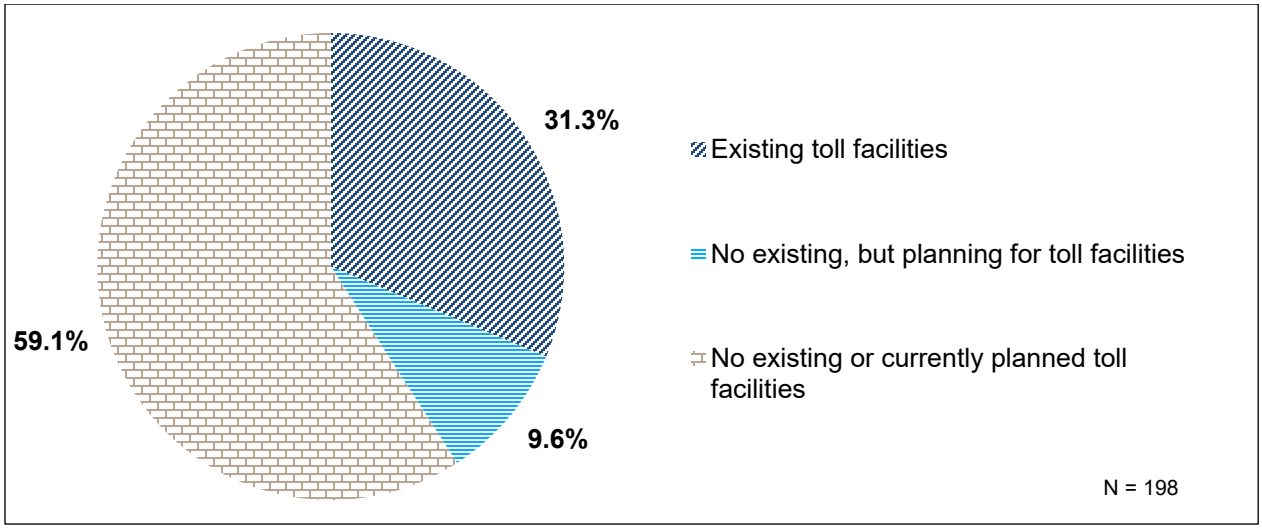

Figure 22. Agencies with toll facilities in their region.

Existing Analytical Data, Tools and Methods Questions

What is the importance of Quantitative Analysis?

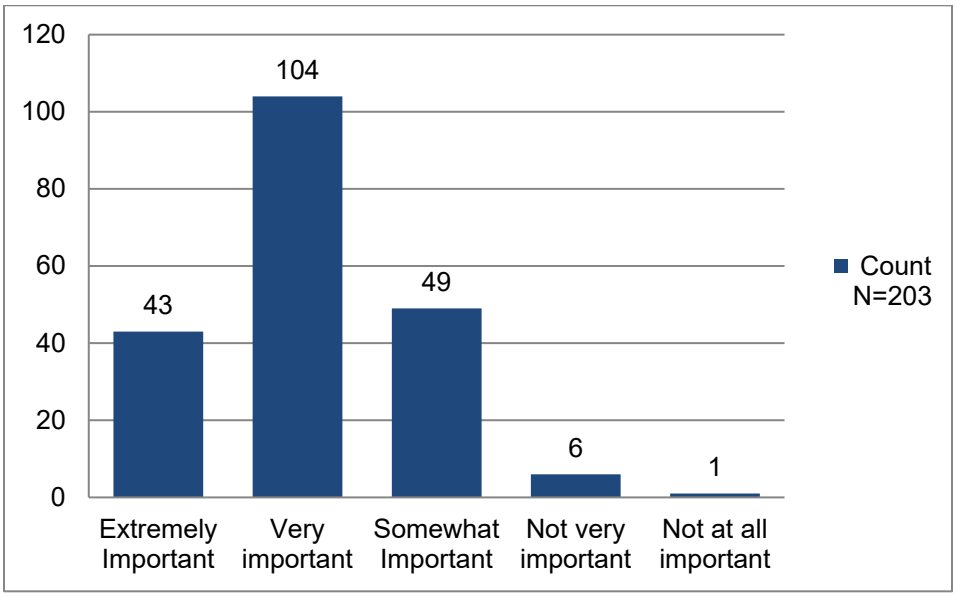

Figure 23. Importance of quantitative analysis/performance measures as ranked by agencies.

What travel modes are forecasted

Transit and truck forecast are most common. Five agencies also reported forecasting some type of rail.

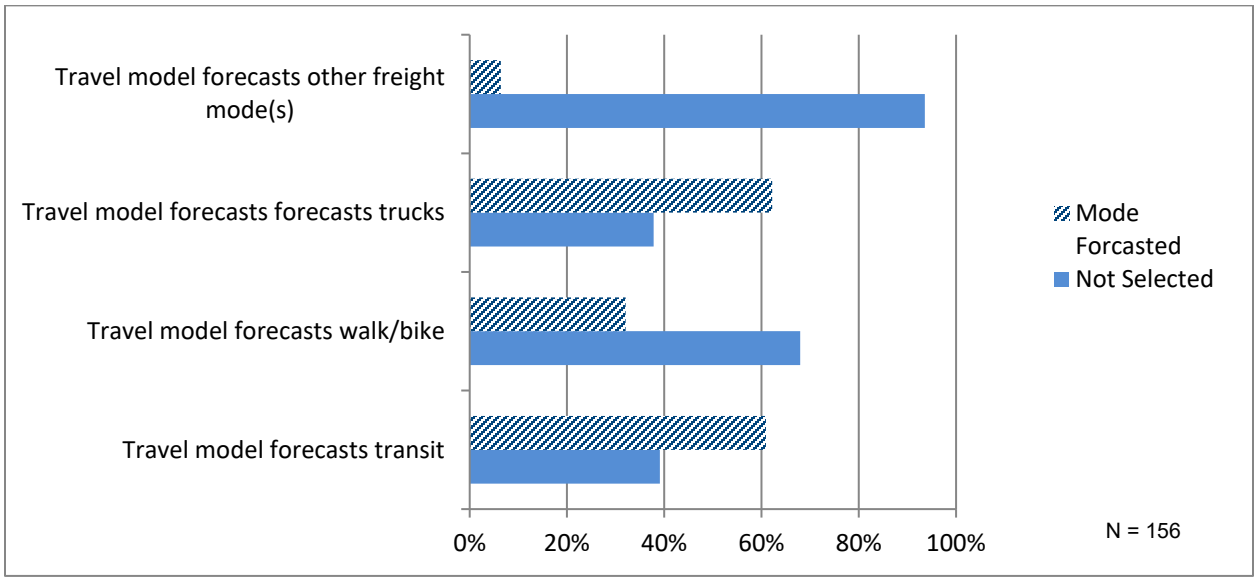

Figure 24. Modes of travel forecasted by agencies.

Table 7. Technical challenges faced by agency.

Challenge	Average	Median
Inaccurate or uncertain land use forecasts or problems with forecasts of socioeconomic variables	13.99	10
Inability of available tools/methods to produce accurate estimates of passenger travel/volumes by OD characteristics	13.40	10
Poor or limited understanding of the uncertainty/precision associated with tools/methods	11.99	10
Inability of available tools/methods to produce accurate estimates of freight demand, truck movements/volumes, etc.	11.42	10
Lack of sensitivity to built environment, walkability, etc., in available tools/methods	10.43	10
Inability of available tools/methods to produce accurate estimates of travel times, travel time reliability and/or delay	10.41	10
Poor spatial resolution: Inability of available tools/methods to deal with small scale projects and phenomenon	10.36	10
Poor temporal resolution: Inability of available tools/methods to produce results with enough temporal detail	9.28	10
Inability of available tools/methods to evaluate employer policies	8.98	10
Poor representation of transportation supply including free flow travel times and capacities	8.41	10
Poor representation of special, high value or high impact travel	7.87	7
Poor demographic/market resolution: Inability to identify who benefits or is impacted or to conduct equity analyses	7.81	9
Lack of sensitivity to supply characteristics in available tools/methods	7.64	6
Inability of available tools/methods to evaluate ITS policies	7.53	6.5
Slow models/tools with long run times that limit their usefulness	5.86	5
Other	4.03	0

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