A SHRP 2 Capacity Project Brief

New Tool for Estimating Economic Impacts of Transportation Projects:

Transportation Project Impact Case Studies (T-PICS)

MAY 2012

Strengthening the economic vitality of a region is one of the primary reasons for investing in highway capacity. Better access to markets and labor force, reduced cost of delay, less congestion, improved safety, lower pollution levels, and a better quality of life are all elements of improving economic vitality. However, the ways in which new and improved highway capacity influences economic vitality are complex and often indirect, which complicates decisions about transportation projects. Understanding what changes in productivity result from improvements in market accessibility, intermodal connectivity, scheduling, logistics, and international competitiveness helps communities and transportation agencies identify transportation options to meet their goals.

Excellent economic impact assessment tools for highway capacity planning are available, but they tend to be relatively time-consuming and expensive to use. Until now, this has meant that the economic impacts of potential projects often have not been considered in the early stages of planning and programming when many possible project alternatives are being considered. With a new web-based tool, Transportation Project Impact Case Studies, or T-PICS, economic impacts can more easily be considered during community visioning for transportation or during public and stakeholder involvement for long-range system planning or corridor planning.

The Capacity focus area of SHRP 2 is broadly based on the concept that systematically considering the social, environmental, and economic effects of highway projects as they are planned, programmed, and carried out will result in better projects that can be delivered faster. The T-PICS tool provides planners with a quick and easy way to match their project criteria to case studies of similar projects (including economic and land development data both before and after project completion) so the best options can be identified early.

Because not every proposed project will have the same results as the average observed from past projects of a similar type, local data are collected and models are developed in later stages of the planning process, to identify expected changes in local traffic characteristics and subsequent economic development. Thus, this project should be viewed as a complement to and not a replacement for local-specific transportation and economic impact analysis that may be necessary in later phases of the planning process.

T-PICS, its documentation, and the final report are resources for transportation planners and others interested in better understanding the long-term economic impacts of highway capacity projects. Although highway projects are the primary focus, a number of intermodal projects have been included in the database and web tool, e.g., transit-oriented development projects with a substantial highway component and freight terminals. The database and web tool have been designed so that additional highway case studies and, potentially, economic impact case studies involving other modes of transportation can be added as they are documented and become available.

The web tool and final report are based on a series of 100 detailed case studies that document the long-term, before-and-after economic impacts of a variety of highway capacity invest-

ments, mainly from around the United States. For this project, the long-term impacts on performance metrics such as employment, income, real estate values, and tax revenues have been documented. Temporary, construction-phase impacts were not considered in the report or the database.

Web Tool

T-PICS is a web-based viewing and analysis system for the case studies. This system includes three parts: (a) a *search function* that allows for user-defined screening and selection of relevant cases; (b) a *case study viewer* that provides user access to impact measures, discussion text, maps, and related documents; and (c) an *impact estimation calculator* that shows the average and expected range of impact associated with any user-defined project profile. By providing agency staff and interested stakeholders with a means for establishing the range of job, income, and development impacts typically associated with various types of transportation projects in different settings, the T-PICS system can assist transportation agencies in project planning and evaluation.

The T-PICS web tool provides transportation planners with a way to search for relevant case studies by type of project and type of location setting. Details of the projects, their impacts, and factors affecting those outcomes are all provided in the case studies. The web tool also provides users with an option to specify a given type of proposed project, and then see the range of impacts that would be expected based on case study experience to date. These features are most useful in the following phases of planning:

1. Early-stage policy or strategy development—T-PICS can identify the magnitude and types of impact tradeoffs to be considered;
2. Early-stage "sketch planning" processes—T-PICS can identify the types of local barrier and success factors that will need to be addressed in later, more detailed planning steps; and
3. Public hearings—the case studies provide a way of responding to the hopes of proponents and fears of opponents, with information on the range of impacts that have actually occurred in the real world.

The tool's user interface is structured around two different approaches to analyzing projects: *Case Search* and *My Project Tools*. Case Search lets users access the database of highway projects, allowing users to perform the following functions:

1. Filter the cases they want to see based on many factors (e.g., type, region, and cost);
2. Select cases to view separately or compare based on the user's criteria;
3. View pre- and post-project conditions, project area settings, project characteristics, intermodal volume (if applicable), and economic impacts for each case;
4. Read a short narrative on the case that provides background on how the project came to be built, its influence on the local area, and other non-transportation factors that enhanced or mitigated the economic impacts of the project; and
5. View a Google map image of where the project is located.

My Project Tools provides an estimate of economic impacts for a hypothetical project based on the following factors:

1. The type, length, and setting of the project chosen by the user;
2. The magnitude of average annual daily traffic, miles, and project cost—which are all estimated based on the type, length, and setting, but can be changed by the user; and
3. The extent to which there are supporting business climate, infrastructure, and land-use policies to encourage economic development.

Availability: T-PICS can be accessed through two URLS:

1. http://transportationforcommunities.com/t-pics/
2. http://www.tpics.us

Case Studies Database

The most notable accomplishment of this project was the development of 100 case studies of highway projects, which (a) compared pre- and post-project changes in economic and land development conditions, (b) contrasted them with corresponding conditions for a base of comparison, and (c) included both quantitative impact measures and qualitative assessments based on local interviews.

Completed in 2010, this collection of case studies was compiled with the goal of including all known pre- and post-highway impact studies in the United States, plus available English language studies from Canada and abroad. Additional quantitative and qualitative data collection and analysis brought all of the cases up to a similar standard of comparability.

The study sought to include all major project types, including intercity highways, urban beltways, and local access roads, as well as bridges, highway interchanges, and intermodal road/rail terminals. The projects spanned all regions of the continental United States—both urban and rural settings, and different economic distress levels. A small number of English language studies from Canada and abroad were also included in a format that would enable

TABLE 1. Number of Cases by Project Type

PROJECT TYPE	TOTAL CASES
Beltway	8
Bridge	10
Bypass	13
Connector	8
Interchange	12
Industrial Access Road	7
Major Highway (Limited Access Route)	14
Widening	9
Freight Intermodal Terminal	10
Passenger Intermodal Terminal	9
Total	**100**

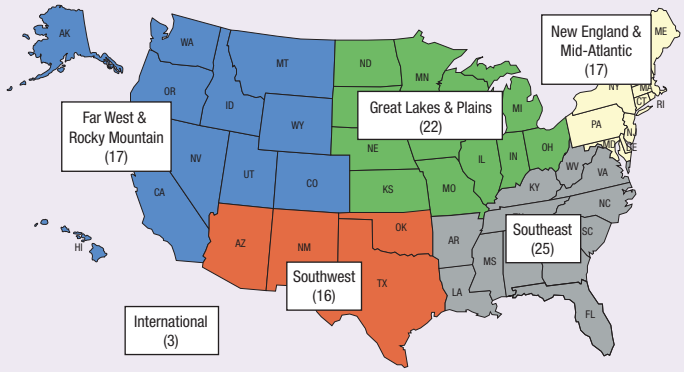
continuing expansion over time. Five categories of data were assembled for each case study:

1. *Project characteristics*—type of facility, years built, cost, and size and level of use;
2. *Project objectives*—congestion reduction and access enhancement;
3. *Impact metrics*—pre- and post-change in employment, income, business output, land values, building development, and tax revenues;
4. *Quantitative explanatory data*—location (region, metro/rural), topography, and economic distress level; and
5. *Qualitative explanatory data*—local interview findings on land use plans and policies, business climate and support programs, and other factors affecting outcomes.

Regional location is an important consideration in determining the comparability of projects. The region can affect the observed impact of a project due to differences in climate, topography, land-use patterns, highway network density, and travel distances in different parts of the United States. This factor can help users compare cases in similar areas or those with characteristics similar to their own. The regions are defined on the basis of the US Department of Commerce's Bureau of Economic Analysis regions, which classifies the country into eight regions. The number of regions used for this study was reduced to five, as three pairs of regions were combined together (Far West and Rocky Mountain, Great Lakes and Plains, Mid-Atlantic and New England). These regions are shown in Figure 1.

Availability: The case studies can be accessed through the T-PICS web tool.

FIGURE 1. Number of Cases by Geographic Region (total 100)



Final Report

The research report describes the background of the research project, documents how the case studies were selected and developed, introduces the accompanying web-based tool, and provides a meta analysis of the key relationships between factors such as project types, traffic volumes, project locations, and non-transportation policies put in place to help foster economic development. The findings

Table 2. Project Motivation, by Project Type

CATEGORY OF MOTIVATION	HIGHWAY PROJECTS	FREIGHT INTERMODAL	PASSENGER INTERMODAL	TOTAL
Enhance Access				
Improve Access to Airports	18	2	0	20
Improve Access to Rail	4	6	0	10
Improve Access to Int. Border	2	1	0	3
Improve Access to Marine Port	7	2	0	9
Improve Labor Market Access	26	0	4	30
Improve Delivery Market Access	29	3	0	32
Any of the above				*58*
Promote Economic Development				
Facilitate Site Development	42	2	8	52
Facilitate Tourism	26	0	0	26
Any of the above				*65*
Reduce Congestion				
Mitigate Congestion	47	0	7	54
All Projects	**78**	**10**	**9**	**97**

from the meta analysis can help serve as a high-level guide to transportation agencies in their selection of programs of highway capacity projects that will provide a larger return on investment in terms of long-term economic impacts. For instance, the meta analysis indicates that the type of project (e.g., an interchange versus a ring road) and the settings of project (e.g., areas that are economically distressed versus those that are not) matter considerably more than the amount of money spent to build the project. The final report also describes the study design that underlies the data collection and database development processes; presents findings from analysis of the dataset; and presents lessons learned for interpreting existing case studies, developing future case studies, and using the web tool for planning and decision making.

Availability: Summer 2012

Data Dictionary

The Data Dictionary provides an overview of the data gathered for the case studies that are presented on the T-PICS website. It outlines sources of data, range of values, hierarchical classifications, and overall definitions in order to assist the user to properly understand and use the data. It provides a summary of dataset content and properties, and an in-depth explanation of data field including the field type, source, missing values, and definition. It also includes guidance on using impact estimates, an explanation of how economic impact estimates were derived, and guidance on how to use this information.

Availability: *Summer 2012*

User Guide

As part of this project, a user guide to the T-PICS web tool was developed. The guide is an instruction manual that explains the logic of the T-PICS web tool and how the system should be used. It contains instructions for using the Case Search page, including searching with basic and other criteria, viewing case search results, comparing case search results, and viewing a case. The guide also describes how the My Project Tools page can be used to estimate a range of potential economic impacts for a planned transportation project.

Availability: July 2012

Pilot Tests

A pilot test of T-PICS is currently being conducted by the Minnesota Department of Transportation. The objective of this project is to test the utility of T-PICS as a tool for enhancing decision making in the planning of highway capacity additions and whether it produces results that are credible and reasonable. The results of this work will include an assessment of T-PICs; additional guidance for future T-PICS users; and recommendations for improving and extending T-PICS.

Status: The pilot test began in 2012.

Webinar

In May 2010, a webinar was held on T-PICS. The webinar included a description of T-PICS and a demonstration of the web tool.

Availability: A recording of the webinar and a PDF of the slides are available on the Recorded Capacity Webinars page, which can be accessed at TRB.org/SHRP2/webinars.

Video

A 14-minute video was made to demonstrate how the web tool can be used to conduct before-and-after assessments of a range of projects, compare case studies developed for each project to other similar projects in the database, and view a wide range of information about each of the case studies. The video also demonstrates how to estimate a range of possible economic impacts that might result from constructing a project.

Availability: The video is available at vimeo.com/34680932.

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