

JOINT TRANSPORTATION RESEARCH PROGRAM

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Measurement and Monitoring of the Performance of Highway Investment

Introduction

Performance-based programming has become increasingly important because it leads to efficient allocation of constrained resources, facilitates the development and justification of budget proposals, and holds decision makers accountable to the public. The newest surface transportation reauthorization legislation, Moving Ahead for Progress in the 21st Century (MAP-21), specifically addressed transparency and accountability for highway expenditures by tying the highway program to measurable performance goals. Although performance measurement has been widely accepted as an essential tool, no state has a fully developed methodology to routinely monitor and evaluate the effectiveness of highway expenditure at a statewide level. Rather, performance measures are often used on a project-by-project basis and at the planning level. The present study develops a methodology to use performance measures and historical expenditure data to evaluate the effectiveness of the highway investment program after implementation. The established methodology will assist INDOT in addressing the requirements of MAP-21.

There are four levels of measureable impact from highway investments. The first level includes the physical results obtained through investment. The second tier of impacts includes tangible operational improvements such as reductions in the number of crashes and travel time savings. The physical and operational improvements to the system lead to the third level of impacts—economic growth. The final level of return encompasses externalities such as improvements to air quality and reduced energy use, primarily through decreased congestion. The present study considers the first three levels of return—physical, operational, and economic.

Objectives of the study include:

- Establish a systematic, comprehensive, and robust tool for INDOT to measure and monitor physical and operational returns from statewide highway investment
- Model the relationship between performance and expenditures for physical and operational improvements
- Quantify the economic development impacts of statewide highway investment in Indiana

Findings

- In general, the condition of INDOT's physical assets and the performance of INDOT's operational assets have improved over the study period. The pavement condition has steadily improved, with higher proportions of pavements in excellent and acceptable condition, between 2002 and 2009. The overall bridge condition has not changed much during the analysis period. While there has not been an apparent improvement, neither has there been a significant decline in bridge condition. The proportion of sample roadways with congestion during the peak period has steadily decreased since 2002. The number of fatality and non-fatality injury crashes per 100 million vehicle miles traveled has decreased since 2003.
- Investments made by INDOT between 1995 and 2009 have been effective in ensuring that INDOT's pavement condition, bridge condition, and safety performance have been sustained over time.
- The relationships between performance and expenditure appear to be different for different classifications of roadways (Interstates, non-Interstate

NHS roadways, and non-NHS roadways).

- Economic impact estimation indicates that INDOT investment in transportation assets between 1995 and 2010 created 179,905 jobs and increased total earnings by \$9.53 billion (in 2010 constant dollars) to the state economy.
- In addition to the construction industry, industrial sectors like health care, manufacturing services, retail trade, and government sectors have benefited the most from transportation expenditures.

Implementation

The study has demonstrated that INDOT's investment in the statewide highway network has maintained and improved the system over time. Although some information is readily available via annual reports and the online Indiana Transparency Portal, the data are limited and difficult to gather. INDOT may consider refinements to web-based reporting tools to provide relevant performance and expenditure data to the public.

Additionally, the present study suggests only the first of many potential post-implementation program evaluations. INDOT can compare previously-published estimates of performance with the actual measured performance. This can be routinely performed in the future.

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