INDIANA DEPARTMENT OF TRANSPORTATION

(INDOT)

SHRP2 EconWorks Case Studies

(Improved Economic Insight)

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FINAL REPORT

Updated January 8, 2016

This report will cover the Indiana Department of Transportation (INDOT) SHRP2 EconWorks (C03) Case studies project. The presentation will be discussed under, Project Summary, Methodology, EconWorks Case Studies and Result Summary.

PROJECT SUMMARIES

The Indiana Department of Transportation originally started with the compilation of the following six projects for the Improved Economic Insight Case Studies (EconWorks):

- A freeway upgrade of the rural portions of US-31 between Indianapolis and South Bend
- A new interchange on I-64 in Corydon
- The Johnson County East-West Corridor
- The NE Indiana passenger rail line between Columbus, OH and Chicago, IL
- Improved highway access to the Port of Indiana at Burns Harbor
- An upgrade to SR-3 between I-74 and I-70.

US-31 is the primary north-south connection between the Greater Indianapolis and Michiana Regions. Currently, INDOT is upgrading the sections through Hamilton County and between Plymouth and South Bend to a freeway, and building a freeway bypass around Kokomo. With these projects nearing completion, there is a lot of interest in upgrading the balance of the corridor which consists of two separate sections between Westfield and Kokomo and between Kokomo and Plymouth.

Harrison County and the City of Corydon have been pursuing a new interchange on I-64 west of the city to relieve congestion on the existing interchange at SR-135 and support the region's land use plans. There is a transportation earmark for this project, and a lot of interest by community leaders in the potential economic impacts of this project.

Johnson County is upgrading Worthsville Road to a 4-lane east-west urban arterial. The project will join I-69 in Morgan County with I-65 in Johnson County, and I-74 in Shelby County. Sections of the project in Johnson County are currently under construction including a new interchange on I-65. The project is intended to enhance mobility in the central part of the county and reduce congestion on Main Street and Whiteland Road.

The NE Indiana Passenger Rail Line is intended to link Chicago, IL with Columbus, OH. The project is intended to provide rail service to the cities of Fort Wayne, Warsaw, Plymouth, Valparaiso, as well as NW Indiana.

The Port of Indiana at Burns Harbor access project calls for the construction of a bridge and highway to improve access to the facility. The project is intended to reduce congestion and provide redundancy in case of accidents.

The SR-3 corridor project will upgrade the highway to 4 lanes from I-74 to I-70. The project will include bypasses of Rushville, Dunreith, and Spiceland. The goals of the project include enhancing freight mobility and reducing congestion. Community leaders in Rush County hope to spur economic development around Rushville by improving its connections to the interstates and the Honda plant in Greensburg.

METHODODOLY

The first step was to search EconWorks for a set of case studies similar to the project being studied. The documentation would be assembled, and summarized. Finally, My Tools would be used to estimate potential economic impacts.

Our first challenge was discovering that EconWorks only contains highway projects. This eliminated the NE Indiana Railroad from consideration.

EconWorks uses basic criteria such as project type, region, motivation, area type, and economic distress. The default setting is to select all of the values under each criterion. Users are can un-select the values that do not apply to their project.

There are also supplemental criteria such as project cost, market size, AADT, population density, airport travel distance, topography, project length as well as population, employment, and income growth rates. Supplemental criteria are inputted via slider bars which allow users to select a range of values for each criterion.

As the user makes his selections, EconWorks provides a running total of the cases meeting the search criteria. The indicator starts with the entire 105 case database, and drops as additional filters are selected. Once the user is satisfied, he can have EconWorks display a summary of the results. The user can then review this summary, and choose the cases that best match their project. EconWorks will then compare these projects. Users can return to the query for more detailed project information and links to the case study documentation.

EconWorks also has feature titled “My Project Tools”. This tool provides the user with an estimate of economic impacts. Users select from eight project types (Intermodal freight and passenger projects are not supported by this tool.) Users then select the region, area type, and whether the study area is economically distressed. Finally, the project length is inputted, and the tool returns an estimate of the project’s cost and AADT and its impact on jobs, wages, and output. The economic estimates are displayed as a range of potential impacts. The user can refine this estimate using a set of slider bars which cover project cost, AADT, land use policy, infrastructure, and business climate. For this study, project cost and AADT were used to refine the estimate. The other criteria were left at the default settings.

In some cases, INDOT had already run an economic impact analysis on the project. In these cases, the results were compared with the EconWorks estimates.

Initial efforts proved very frustrating. Setting the criteria to match the subject project usually resulted in zero cases. Widening the net could yield fifty or more cases. Some criteria had more impact than others. The supplemental criteria were not very helpful especially given the effort needed to calculate some of their values. Many of the slider bars did not allow for a great deal of precision. For example, the minimum project cost was $1 billion. Of the supplemental criteria, cost, AADT, and length proved to be the most useful. Eventually, we hit on a strategy that focused on using project type to narrow down the field to about 15 cases. The rest of the basic criteria were left selected as were the supplemental criteria. If the case total exceeded 20, then the project length or AADT criteria was used to narrow the field down.

EconWorks has ten project types: bypass, bridges, intermodal freight, widening, intermodal passenger, interchange, beltway, limited access road, connector, and access road. While most of these project types are self-explanatory, limited access road, connector, and access road were not. A conference call with the EDR Group yielded definitions for these projects. A limited access road is an interstate, toll road, or other freeway including freeway upgrades of existing facility. An access road is a highway connecting an industrial park or other employment generator with the rest of the network. A connector is a project that links or improves access between two other corridors. It is recommended that these definitions be spelled out on the EconWorks website.

ECONWORKS CASE STUDIES

The following projects are discussed as the Indiana Department of Transportation EconWorks Case Studies.

1. US-31 Freeway Upgrade

Project Type: Limited Access Road
Project Description: Freeway upgrade from Hamilton County to Kokomo & from Kokomo to Plymouth
Project Cost (millions 2015$): Hamilton Co. to Kokomo = $250; Kokomo to Plymouth = $711; Total: $961
Project Max AADT: Hamilton Co. to Kokomo = 26,220; Kokomo to Plymouth = 20,340; Total: 26,220
Project Length: Hamilton Co. to Kokomo = 19.5; Kokomo to Plymouth = 58.0; Total: 77.5
Initial Cases: 14
Final Cases: 4 – #2: I-68, #4: I-29 #23: SR-29, and #28: I-27

This project consists of two sections separated by the Kokomo Bypass. The first section begins at the north end of the freeway upgrade in Hamilton County and runs north to tie into the south end of the bypass. The second section begins at the north end of the Kokomo Bypass and runs north to tie into the existing US-31 freeway at Plymouth.

My Tools was used to analyze each section separately, and the entire project as a whole. The overall corridor results are summarized below. The northern section performed almost as well as the entire corridor.

EconWorks My Project Tools Economic Impact Estimate for US-31 FWU from Hamilton Co. to Plymouth

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	3,617 - 6,029	$169.5 - $282.5	$538.6 - $897.7
Supplier and Wage Impacts	2,077 - 3,462	$98.3 - $163.8	$305.8 - $509.7
Total Impacts	5,695 - 9,491	$267.7 - $446.2	$844.5 - $1,407.4
Estimated Project Cost ($):	$957.4 million	**Estimated AADT:**	26,195

This project was analyzed as part of the Governor's Blue Ribbon Report. A comparison of the impacts is shown below.

	Jobs	Wages (mil.)	Output (mil.)
BRP Estimate	12,257	$1,100.5	$1,128.7
EconWorks Estimate	5,695 - 9,491	$267.7 - $446.2	$844.5 - $1,407.4

Of the two estimates, the Blue Panel Estimate is probably more accurate. MCIBAS makes project-specific estimates of travel behavior, calculates their cost savings, and estimates their impact on Indiana's economy. EconWorks looks at projects in general and estimates their impacts as a function of project cost, AADT, and length. MCIBAS looks at impacts on the statewide network whereas the EconWorks studies seem to be corridor-specific.

2. SR-3 Corridor Upgrade

Project Type: Widening and bypasses
Project Description: Widen to 4 lanes from I-74 to I-70 and bypass Rushville, Dunreith, and Spiceland
Project Cost (millions 2015$): $350.2
Project Max AADT: 12,036
Project Length: 36.13
Initial Cases: 17
Final Cases: 6 -- #10: Corridor D, #58: Corridor J, #59: Corridor O, #128: Iowa Highway 60, #129: Minnesota Highway 60, #130: US-54 Alamogordo NM

The cost estimate slider would not go below $760 million for widening projects. This will exclude a large number of projects from consideration by this tool. It might be wise to check the linkage between length and cost. The SR-3 corridor Upgrade project was advanced for study with the C11 tools.

EconWorks My Project Tools Economic Impact Estimate for SR-3 ATL from I-74 to I-70

	Jobs	***Wages (mil.)***	***Output (mil.)***
Direct Impacts	*5,027 - 8,379*	*$235.5 - $392.5*	*$748.5 - $1,247.6*
Supplier and Wage Impacts	*2,887 - 4,811*	*$136.5 - $227.6*	*$425.0 - $708.3*
Total Impacts	*7,914 - 13,190*	*$372.1 - $620.1*	*$1,173.5 - $1,955.9*
Estimated Project Cost ($):	*$760.2 million*	***Estimated AADT:***	*12,096*

The impacts were scaled by an adjustment factor of 0.46 because the estimate project costs fell outside the limits offered by My Tools. The adjusted results are shown below:

EconWorks My Project Tools Economic Impact Estimate for SR-3 ATL from I-74 to I-70 - Adjusted

	Jobs	**Wages (mil.)**	**Output (mil.)**
Direct Impacts	2,316 - 3,860	$108.5 - $180.8	$344.8 - $574.7
Supplier and Wage Impacts	2,887 - 4,811	$62.9 - $104.8	$195.8 - $326.3
Total Impacts	3,646 - 6,076	$171.4 - $285.7	$540.6 - $901.0
Estimated Project Cost ($):	$350.2 million	**Estimated AADT:**	12,096

This project was analyzed as part of the Governor's Blue Ribbon Report. A comparison of the impacts is shown below:

	Jobs	**Wages (mil.)**	**Output (mil.)**
BRP Estimate	460	$42.2	$44.6
EconWorks Estimate	3,646 - 6,076	$171.4 - $285.7	$540.6 - $901.0

Scaling the EconWorks output to reflect the lower cost estimates of the project served to close the gap between EconWorks and MCIBAS, but the EconWorks results are still significantly higher. Of the two estimates, the Blue Panel Estimate is probably more accurate. MCIBAS makes project-specific estimates of travel behavior, calculates their cost savings, and estimates their impact on Indiana's economy. EconWorks looks at projects in general and estimates their

impacts as a function of project cost, AADT, and length. MCIBAS looks at impacts on the statewide network whereas the EconWorks studies seem to be corridor-specific.

3. I-64 Corydon Interchange

Project Type: Widening and bypasses
Project Description: Construct a new interchange west of the existing SR-135 interchange
Project Cost (millions 2015$): $25.3
Project Max AADT: 17,550
Project Length: 0
Initial Cases: 13
Final Cases: 3 -- #210: Commerce Pkwy Interchange, #99: Veterans Pkwy Georgia, #131: I-94/Opportunity Drive Interchange

The goal of this project was to relieve congestion at the existing SR-135 interchange, and support the region's land use plans.

EconWorks My Project Tools Economic Impact Estimate for new I-64 Interchange at Corydon

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	321 - 534	$15.0 - $25.0	$47.7 - $79.6
Supplier and Wage Impacts	184 - 307	$8.7 - $14.5	$27.1 - $45.2
Total Impacts	505 - 841	$23.7 - $39.5	$74.8 - $124.7
Estimated Project Cost ($):	N/A for Interchange	**Estimated AADT**	17,639

It appears that the tool is best used for major system to system interchanges with high traffic volumes. Most of the interchanges in EconWorks are major system- to- system facilities with AADTs in the 100,000 to half a million range. EconWorks contains only a small handful of low-volume interchanges which were built or modified as part of an industrial access project. EconWorks only has one rural interchange. The first attempt at this project yielded zero impacts. After some trial and error tinkering, it appears that the economic distress factor is critical. With distressed areas, My Tools returns zero impacts. With non-distressed areas, it also does. The analysis was redone and displayed above. It is not entirely clear whether this quirk is the result of the database or there is a theoretical reason for this. The report does discuss the impact of existing economic conditions on a project's impacts, but does not state that an interchange will have no impact on a distressed area no matter how much traffic uses it.

4. Johnson County-Worthsville Road Upgrade

Project Type: Widening and interchange
Project Description: Construct a new interchange on I-65 and widen to four lanes
Project Cost (millions 2015$): $210.6
Project Max AADT: 16,382 **Project Length:** 20 **Initial Cases:** 12 **Final Cases:** 0

EconWorks is geared towards major state and inter-state projects. Review of the selected cases did not find any that matched this project. My Tools had a minimum cost of $614 million for the widening project type.

EconWorks My Project Tools Economic Impact Estimate for Worthsville Rd Corridor Upgrade

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	5,099 - 8,499	$238.9 - $398.2	$759.3 - $1,265.5
Supplier and Wage Impacts	2,928 - 4,880	$138.5 - $230.8	$431.1 - $718.5
Total Impacts	8,028 - 13,379	$377.4 - $629.0	$1,190.4 - $1,984.0
Estimated Project Cost ($):	$614.0 million	**Estimated AADT**	16,560

The impacts were scaled by an adjustment factor of 0.34 because the estimate project costs fell outside the limits offered by My Tools. The adjusted results are show below:

EconWorks My Project Tools Economic Impact Estimate for Worthsville Rd Corridor Upgrade - Adjusted

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	1,749 - 2,915	$81.9 - $136.6	$260.4 - $434.1
Supplier and Wage Impacts	1,004 - 1,674	$47.5 - $79.2	$147.9 - $246.4
Total Impacts	2,753 - 4,589	$129.4 - $215.7	$408.3 - $680.5
Estimated Project Cost $):	$210.6 million	**Estimated AADT:**	16,560

5. Port of Indiana-Burns Harbor Connector

Project Type: Access Road/Bridge
Project Description: Construct a new bridge to connect the port with the rest of the highway network
Project Cost (millions 2015$): $18.0
Project Max AADT: 13,209
Project Length: 2.0
Initial Cases: 18
Final Cases: 3 -- #1: Hammondsport Industrial Access Rd, #11 Clermont County Industrial Park, #14-Columbus-Lowndes County Riverside,

This project is intended to provide redundancy to the existing SR-249 Bridge over US-12 and seven railroad tracks. The challenge is to do this without interfering with other entrances to this facility. The cases in EconWorks are geared towards simple upgrade the highway leading to the industrial facility. For access roads, My Tools has a maximum project cost of $5.7 million for industrial access projects. The Burns Harbor project was advanced for study with the C11 tools.

EconWorks My Project Tools Economic Impact Estimate for Access Road to Port of Indiana at Burns Harbor

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	293 - 488	$13.7 - $22.9	$43.6 - $72.7
Supplier and Wage Impacts	168 - 280	$8.0 - $13.3	$24.8 - $41.3
Total Impacts	461 - 768	$21.7 - $36.1	$68.4 - $113.9
Estimated Project Cost ($):	$5.7 million	**Estimated AADT:**	13,011

The impacts were scaled by an adjustment factor of 3.16 because the estimate project costs fell outside the limits offered by My Tools. The adjusted results are show below:

EconWorks My Project Tools Economic Impact Estimate for Access Road to Port of Indiana at Burns Harbor - Adjusted

	Jobs	Wages (mil.)	Output (mil.)
Direct Impacts	925 - 1,541	$43.3 - $72.3	$137.7 - $229.6
Supplier and Wage Impacts	531 - 884	$25.3 - $42.0	$78.3 - $130.4
Total Impacts	1,456 - 2,425	$68.5 - $114.3	$216.0 - $360.0

RESULT SUMMARY

EconWorks performs best for projects which match the cases in the database. These are mega-projects, interchanges, and industrial access roads. Many of the projects that INDOT considers are too small for EconWorks.

Post-construction economic impact studies are resource-intensive. Transportation agencies are not going to spend those resources on minor projects. They are going to conduct studies on projects where there is an interest from elected officials and stakeholders. On the academic side, researchers are going to focus on subjects where they can get funding. As the database grows, this might change.

The My Project Tools feature is basically a set of regression equations derived from the database. For each project type, users must select the region, area type (rural, urban, or mixed), and economic distress (yes or no). From there, the economic impacts are driven by project length, cost, and AADT. (Interchanges impacts are a function of AADT only.) It would be helpful if the user guide was expanded to address some of these issues and maybe recommend some best practices.

There were some strange results. It was noted that the SR-3 corridor upgrade was shown to have almost the same impact as the US-31 freeway upgrade. Analysis performed by INDOT estimated that the freeway upgrade would have significantly higher impacts. Many of the small projects in this study seemed to perform better than a major project like the US-31 project. A direct comparison of SR-3 and US-31 is problematic since they are different project types. What is boosting the impacts of these smaller projects is their cost. My Tools would not go outside its data limits. The minimum cost for a widening project of that length was $760 which is more than double our $350 million estimate, and puts this project on par with the scope of the northern US-31 section. Worthsville Road project will probably cost around $200 million, but My Tools would not go below $614 million. This causes My Tools to think these projects are bigger than they are with impacts to match. When the US-31 sections were analyzed separately, the north section had almost as much impact as the entire corridor.

For INDOT, the primary utility of this tool will probably be in providing this information to elected official and other stakeholders as part of project or plan development. This tool will have limited utility for INDOT in regards to project selection. In response to demands by decision-makers, INDOT has invested heavily in upgrading its in-house economic impact analysis capabilities with the result that it can deliver a project-specific estimate in a few days. This has served to compress the planning process, and moved many activities from the mid and late stage planning stages forward.

The Blue Ribbon Panel Economic Impacts

The economic impacts of Blue Ribbon Panel Projects were estimated using INDOT's Major Corridor Investment Benefit Analysis System (MCIBAS). MCIBAS incorporates several models in a process to estimate project-driven changes in travel behavior, monetize them, and calculate their impacts on the greater economy. The MCIBAS process begins by using the Indiana Statewide Travel Demand Model (ISTDM) to estimate changes in travel behavior. NET_BC, a model post-processor, converts these changes into travel data which is inputted into the Economic Analysis Tool (EAT) which is an Excel tool that monetizes this data, and prepares business transportation cost changes for input into the REMI PI+ model. The results from the REMI model are put back into EAT for inclusion in a summary report covering both Benefit-Cost Analysis and Economic Impact Assessment. In cases where there are no other changes besides travel, a Simplified Economic Analysis Tool (SEAT) can be used for linear regression to estimate economic impacts from changes in business transportation costs. Given that the Blue Ribbon Panel assumed that INDOT revenue and spending would remain constant, the SEAT was used to analyze those projects.

Use of Projects and Estimated Project Impacts to Engage the Public and Decision Makers

INDOT used the MCIBAS tools to assist with decision making for the Governor's Blue Ribbon Panel on Transportation Infrastructure and Asset Management investments for proposed major added capacity improvements and priority ranking. The tool was used to estimate impacts in terms of: jobs, gross regional product, real personal income, and quality of life (travel time savings and emissions). Unfortunately, the tool is limited to only major added capacity projects and does not perform well for projects that are added capacity. INDOT's intent for C03 and C11 was to evaluate tools to help expand our capability to analyze non-congestion/economic opportunity projects and operational improvements. The information from the MCIBAS was made available to the public and stakeholder. The information used to drive asset management decision and scoring is currently internal. Once INDOT expands our economic analysis capability and economic consideration can be performed on more types of projects, information will be publicly available and potentially used for public engagement for alternative decision making. INDOT will continue to use economic impact estimate in decision-making.

Agency and MPO Business Rules for Economic Analysis

There is a strong interest in the use of economic analysis in project decision-making, engaging stakeholders, and the general public, particularly with MAP-21 and performance base planning and asset management requirements.

The issue is consistency. We will need consistent definition, assumptions, approach between INDOT and the MPOs, and comparing the benefits of different modal analysis. The second issue will be working through disagreement if there is MPO and an INDOT economic analysis. There will need for a forum to discuss early coordination between the agencies for economic analysis to work out and agree upon assumptions, definitions, and approach. Business rules can be developed through Indiana Model User's Group (MUG) and documented in the joint INDOT/MPO Planning Roles and Responsibilities document. The MUG includes technical members from INDOT and the MPOs, consultants, and researchers. We will need to agree on and document the appropriate use of the tools, data input sources, default value assumptions, model availability and performance, land-use/growth rate assumptions, input into scoring mechanisms/thresholds, and other related topics. For Indiana small MPOs, the C03 tool may be their best options for sketch-level planning and decision making.

Agency and MPO Implementation Plan for Economic Analysis

INDOT has already developed a mechanism. However, analysis for asset management uses a benefit cost ratio for scoring consideration. The challenge, at the early stage of project development and planning, is that costs are volatile and are usually underestimated. INDOT will need to develop a new scoring criterion that can categorize projects and evaluate the merit in terms of jobs added/maintained, GRP impact, real personal income, and a benefit/cost range to avoid fluctuating project cost estimates. The MPO will need to be at the table during these discussions. The Model User's Group (MUG) will be used to discuss and develop an implementation plan and also to identify technical needs; staff resources, training, follow-up discussions, and potentially a statewide on-call consultant or FHWA Resource Center to answer complex questions and approaches. The INDOT/MPO Planning Roles and Responsibility Document will be used to reference the business rule. The document is a joint agreement with INDOT, the MPOs, and RPOs on how we carry-out coordinate basic to technical transportation planning activities. Revisions to INDOT's scoring mechanism will start the summer of 2016 with implementation expected in early fall 2016, prior to the next statewide call for projects.

List of Recommended Additional Case Studies

- Added Travel Lanes Project: From CR 500N 1.48 miles S. SR 46 to 2.46 miles N of SR 46 in Columbus, IN
  Open To Traffic Date – 2010 **Pre-Construction Economic Impact Data Availability** – YES

- Added Travel Lanes Project: From Aboite Center Road from W Jefferson Blvd to Coventry Lane in Fort Wayne, IN
  Open To Traffic Date – 2011 **Pre-Construction Economic Impact Data Availability** – YES

- Auxiliary Lanes, Two-way Left Turn Lanes Project: From 6th St/W Shafer Dr from S Street to US 24 in Monticello, IN
  Open To Traffic Date – 2011 **Pre-Construction Economic Impact Data Availability** – YES

- New Interchange Construction Project: I-65 South at 109th Street in Crown Point, IN
  Open To Traffic Date – 2011 **Pre-Construction Economic Impact Data Availability** – YES

- Added Travel Lanes Project: From Kinser Pike to Pete Ellis Drive in, Bloomington, IN
  Open To Traffic Date – 2012 **Pre-Construction Economic Impact Data Availability** – YES

- New Road Construction Project: From CR 30 to CR 28 in Elkhart-Goshen, IN
  Open To Traffic Date – 2012 **Pre-Construction Economic Impact Data Availability** – YES