The I-69 Evansville-to-Indianapolis Study
Tier 1 Environmental Impact Statement

Task 3.2.2 Report

Economic Performance Measures

Technical Report

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1 Introduction

This technical report was prepared for the I-69 Evansville-to-Indianapolis Study Tier 1 Environmental Impact Statement (EIS), Task 3.2.2, Establish Economic Performance Factors. The objective of this task is to define a set of performance factors that will be used in both the needs assessment and goals analysis for the Purpose and Need Statement within the Draft EIS. At this stage, we seek to determine the performance factors that will be considered in the decision making process. Specific decision rules will be developed in Task 5.

This technical report is organized as follows:

- **Section 2** briefly reviews the purpose of establishing performance factors and summarizes the proposed framework for the performance factors in this EIS; and
- **Section 3** identifies potential economic development performance factors, evaluates the potential for using each factor, and recommends a set of factors for use in this project.

2 Background

This section briefly provides a brief overview of the organization and flow of the environmental study process. It will also discuss the rationale for identifying performance factors, and the framework for use of the performance factors.

Project Background

The fundamental purpose of this study is to identify and evaluate alternatives for improvements to the transportation corridor between Evansville and Indianapolis. The study will evaluate a full range of geographic alternatives, including upgrades to existing highways and various new alignments in the region. It also will consider potential non-highway modes.

Due to the large size of the study corridor, the study is being conducted as a "tiered" EIS. Tier 1 will resolve major planning issues, including evaluating the impacts of taking no action (the "no-build" alternative) and making decisions regarding mode, preferred corridors, and any projects of independent utility. Tier 2, which will be conducted after Tier 1, will complete the environmental process, including determining an exact alignment, detailed impacts, and mitigation strategies.

The major steps in the Tier 1 process include:

- Purpose and need;
- Scoping;
- Screening;
- Environmental analysis / refinements;
- Draft EIS; and
- Final EIS.

This technical report was prepared as part of Task 3 of the project, which will develop a Purpose and Need statement that describes the need for and purpose of the I-69 Evansville-to-Indianapolis Project.

Performance Factors Framework

A critical step in developing the Purpose and Need statement and laying the groundwork for the ensuing alternatives analysis is to identify the key factors to be used in evaluating the needs of the Southwestern Indiana region (the "needs analysis" portion of the Purpose and Need Statement) and the ability of proposed alternatives to address those needs (the "goals analysis" portion of the Purpose and Need Statement).

Performance factors are used for decision-making by agencies or organizations (or for external audits of an agency or organization). Agencies use performance factors to rank capital investment alternatives, evaluate programs, or allocate a given level of resources among program or projects. Typical activities include long-range strategic planning, near-term project programming, and alternatives evaluation at the corridor or facility level.[1]

Project Goals

Defining performance objectives that relate clearly to agency or program goals is central to an effective planning process. Performance factors may be identified that describe a rather large number of dimensions or issues. For example, performance factors may be related to broad goal categories such as mobility, safety, or economic development. For the I-69 Evansville-to-Indianapolis Study, performance factors must be defined that correspond to the project's Purpose and Need statement. Although the Purpose and Need statement is still under development, project goals generally fall under three headings:

- Strengthening the transportation network in Southwestern Indiana;
- Supporting economic development within Southwestern Indiana; and
- Completing the Evansville to Indianapolis portion of Corridor 18, the planned international trade corridor designed to link Canada and Mexico.

Accordingly, performance factors have been recommended in three categories –- transportation (see Task 3.2.1 Report), economic development (see Section 3), and Corridor 18 (see Task 3.2 Report).

Performance Factor Dimensions

Performance factors also may be classified according to several dimensions. The following dimensions are critical to this project:

- **Perspective** –- In addition to measuring current conditions, performance factors should be able to compare the benefits and impacts of alternative improvement strategies.

[1] *Performance-Based Planning Manual*, prepared for the National Cooperative Highway Research Program, Project 8-32 (2), *Multimodal Transportation: Development of a Performance-Based Planning Process*, by Cambridge Systematics, Inc., November 1999.

- **Mode** –- Performance factors should address highway impacts, with the flexibility to address other surface transportation modes.
- **System level** -- Performance factors should address facility, corridor, and network-wide conditions.
- **Spatial perspective** -- Performance factors should address regional, state, and when appropriate, national goals/impacts.
- **Time-frame** – Performance factors should address long-term future conditions at a particular point in time.

It is useful to consider these dimensions in selecting and implementing a set of performance factors, not only to reduce analytical effort by eliminating some irrelevant performance factors, but also to ensure that adequate breadth is instilled in the planning process so that all relevant issues are addressed.

Selection Criteria

Other common criteria for selecting performance factors for a planning process include:

- **Measurability –** Is it possible to generate the performance factor with the tools and resources available? How much would it cost to adequately quantify this factor? What level of accuracy is needed for this factor to be useful? How reliable are the sources of data for this factor? Are needed data available?
- **Forecastability –** Can we realistically compare future alternative projects or strategies using this factor? Is it difficult to define this factor using existing forecasting tools?
- **Differentiation** – Can the factor differentiate among alternatives? Will significantly different alternatives have significantly different values?
- **Usefulness –** Is this factor useful? Is it a direct factor of an issue or concern? Is it primarily an indicator of condition, or is it capable of diagnosing transportation or economic deficiencies and their causes?
- **Clarity –** Is this factor understandable to policymakers? To transportation professionals? To the public? The ultimate decision markers for this project will not be transportation professionals. The study's recommendations and rationale for those recommendations must be acceptable to a non-technical audience.

3 Economic Performance Factors

This section evaluates potential economic performance factors for this project. These performance factors primarily are intended to address the following question:

- ***Which alternatives satisfy the element of the project's draft purpose and need statement related to supporting economic development within Southwestern Indiana?***

Most of the performance factors described in this section would be used to compare improvements to a "no-build" alternative that involve no changes to the transportation system in Southwestern Indiana beyond the improvements that currently are programmed as part of state and local long-range plans.

The potential performance factors have been grouped into seven categories. The first three categories reflect different factors that ***contribute*** to economic development opportunities, and the last four categories reflect different ***outcomes*** of economic development. The categories are as follows:

- Cost savings;
- Accessibility;
- Reliability;
- Economic growth;
- Industry mix;
- Regional economic equity; and
- Social welfare

For each category, this section identifies and describes example performance factors; indicates related data sources and analytical approaches; discusses the appropriate geographic scale for analysis; and screens performance factors by the criteria identified in Section 2. For each category, multiple performance factors may be suitable for assessing current conditions and/or differentiating among alternative transportation investment strategies.

Cost Savings

An important trigger of economic development is the ability of a highway project or other transportation improvement to reduce transportation costs in a region. Transportation cost savings are an important catalyst for economic development because reduced business costs increase productivity and make businesses more competitive. These productivity increases can

lead to greater sales, profits, employment, and an enhanced business climate. This enhanced business climate also can attract new business growth to the region. Potential cost savings performance factors include the following (see Table 3.1):

- Value of monetary user benefits (i.e., those which affect income flows in the economy); and
- Value of non-monetary user benefits (i.e., those which have value to people but do not directly affect income flows in the economy).

Table 3.1 Cost Savings Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Monetary user benefits	N, S, R	●	●		●	●
Non-monetary user benefits	N, S, R	●	●		●	

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System.

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria.

Value of monetary user benefits

Transportation improvements create user benefits such as changes in travel time, cost, and safety. Techniques have been developed to value all of these benefits in monetary terms, but only some of these user benefits actually generate changes in income flows in the economy. These are the user benefits that reduce costs or increase sales for businesses and/or provide additional income for spending by households, such as the following:

- Business cost savings or productivity increases from reductions in driver time for truck deliveries and on-the-clock auto trips;
- Business cost savings from accident cost reductions for truck and on-the-clock auto trips;
- Household spending savings from accident cost reductions for non-work auto trips; and
- Business and household spending changes from vehicle operating cost changes for all types of trips.

The standard practice is to count user benefits for all travelers in the study area, including pass-through travelers whose trips originate and terminate outside of the state. Thus, this factor provides a national perspective on the project benefits. However, INDOT's analytical procedures also enable estimation of a regional or statewide allocation of these national

benefits. This statewide or regional allocation is more appropriate for estimating the impact of these cost savings on business competitiveness and economic growth opportunities in Indiana.

Value of non-monetary benefits

Other types of impacts can affect the attractiveness of an area as a place to live and/or do business, even though they do not directly affect the flow of income in the economy. These types of benefits include the following:

- Value of travel time savings for personal auto trips (i.e., those not on-the-clock for business purposes). Personal time savings do not increase household income, but these savings can still be directly translated into a dollar-equivalent value, based on studies of personal willingness to pay for time savings.
- Quality of environment factors, such as quality of air, water, noise, and visual environment. While these factors are directly covered in the separate analysis of environmental impacts, they in some cases also have longer-term positive or negative effects on a region's economic growth potential.

Recommended Factor

The value of business or other cost savings do not directly measure the extent of economic development in a region, but rather an important contributing factor to economic growth. Because of the critical link between transportation costs and economic development, it is recommended that these cost savings be analyzed separately as well as used as inputs to economic impact models. The following cost savings performance factor is recommended:

- Value of monetary user benefits, which represents the change in income flows associated with changes in travel time, cost, or safety due to transportation improvements. This is a measure of the performance of alternatives, but not of the baseline condition, and will be assessed from a national, state, and regional perspective.

The non-monetary user benefits are significant for understanding the full impact of the alternatives, but will not be used as performance factors because they are better captured through other factors, such as the environmental impact analysis that will take place in Level 3 of the screening process.

Accessibility

Access to markets is another trigger of economic development for a region. Accessibility measures assess the extent to which a transportation improvement enhances the connections between regional businesses and suppliers, customer markets, labor markets, or other types of activities. Accessibility factors can be used in at least two ways:

- To "benchmark," or compare existing and planned accessibility in the study area with that of other comparable areas; and
- To compare changes (absolute and/or percent) among alternatives, and therefore to help identify the alternatives producing the greatest benefits.

Benchmarking can help identify disparities between the study region and other regions. For example, the average travel time to a major airport or intermodal facility could be compared for the study region and for other parts of the state. Benchmarking also could identify the extent to which alternatives reduce disparities among regions. Benchmarking, however, would require additional analysis consisting of the following steps:

1. Define other comparison or "peer" regions within Indiana that have comparable data available; and
2. Develop factors of accessibility for each peer region using the same procedures as described below.

It is recommended that benchmarking be undertaken as part of the development of the Purpose and Need Statement, to demonstrate whether there is a need to improve accessibility to the Southwestern Indiana region. The benchmarking would enable comparison of Southwestern Indiana's accessibility to other parts of the state, or to an aggregate measure of accessibility for the entire state. In addition, because accessibility is expected to be a critical trigger of economic development in the study area, it is recommended that the incremental change in accessibility be calculated for each alternative compared to the no-build alternative. The accessibility factors are most appropriately estimated at a regional level for Southwestern Indiana, although an aggregate factor of accessibility can be calculated for the entire state.

Potential accessibility factors include the following (see Table 3.2):

- Access of businesses to labor and consumer markets;
- Access to freight buyer/supplier markets;
- Access of population to jobs;
- Access of businesses to intermodal facilities; and
- Access of population to recreational, educational, cultural, health care, or other amenities.

Table 3.2 Accessibility Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Access of businesses to labor and consumer markets	S, R	❍	❍	●	●	●
One-day freight access to buyer/supplier markets	S, R	❍	❍	●	●	●
Access of population to jobs	S, R	❍	❍	●	●	●
Access to intermodal facilities	S, R	❍	❍	●	●	●
Access to recreational/ educational/cultural/ health care/other amenities	S, R	❍		●	●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Access of businesses to labor and consumer markets

This factor assesses the size of the local labor and consumer markets available to businesses. An expanded labor market can improve the productivity of existing businesses as well as attract new businesses to the region. While benefits are primarily regional, the productivity gains can have positive net effects at the state and national levels as well. Expanding consumer markets may have more mixed effects, helping businesses expand but also increasing competition from other businesses outside the region.

The simplest form of this factor is the population within X minutes (typically 30 or 45 minutes) of the average business in the region. Alternatively, a gravity-based factor can be developed that weights population in inverse proportion to its distance from the business. A third option is to identify a few major employment centers (e.g., cities) and compute the population within X minutes of each.

Data requirements include:

- Zone-to-zone travel times within the study area, for the no-build as well as each of the alternatives being compared;
- Population and employment by zone; and
- An appropriate "impedance" coefficient on travel time, taken from the Indiana Statewide Travel Model (if the weighted accessibility factor is used).

The calculation steps (provided for the example of determining 30-minute accessibility of population to businesses) include:

1. For each traffic analysis zone (TAZ) in the study area, identify the TAZs that are within a 30-minute roadway travel time and sum the population in these TAZs.
2. Weight the population within 30 minutes of each zone by employment in that zone.
3. Sum the weighted population for each zone and divide by the sum of total employment over all zones to obtain the population within 30 minutes of the "average" employment site across all zones in the study area.

One-day freight access to buyer/supplier markets

This factor is based on the same principle as access to labor and consumer markets, but measures broader inter-regional accessibility to buyer and supplier markets for freight, goods, and services. Improving this accessibility also can reduce costs and improve productivity, thereby improving the potential for business expansion and attraction within the region. Again, effects primarily will be regional, but there may be some net state-level and national-level benefits as well.

One-day access to buyer and supplier markets cannot be computed solely from Indiana Statewide Travel Model data since a one-day radius (roughly six hours or 250 miles) extends well outside the modeling area. As an alternative, major buyer and supplier markets falling within a 250-mile radius (e.g., Chicago, St. Louis, Indianapolis) could be identified and the travel time savings to these markets could be computed. This could be done using travel model data on travel times from each study area zone to the external zone on the route to the major market area. The travel time savings to this external zone would be weighted by total employment in each study area zone to develop an overall weighted average travel time savings.

Access of population to jobs

This factor is similar to the "access to labor markets" factor described above, but reflects employment opportunities from an individual perspective. For example, this factor would describe the number of jobs within 30 minutes of the average resident. The factor could be useful in describing economic opportunities, but it does not directly relate to business

expansion and location decisions. The factor could be computed using a methodology similar to "access to labor markets."

Access to intermodal facilities

This factor would describe the accessibility of study area businesses to key intermodal facilities such as ports or airports. It could be computed in one of the following ways:

- Average travel time to a specific type of facility, such as an international air cargo port, a major marine port, or an area with a number of important facilities (e.g., Chicago). This could be an employment-weighted average, developed by computing the change in travel time from each TAZ to a specific facility type (or external zone on the path to a specific facility) and weighting by employment in that TAZ.
- Percent of employment within X minutes of a specific facility type. This would be computed in the same manner as "access to labor and consumer markets," as described above.

Access to recreational, educational, cultural, health care, or other amenities

This is an important indicator relating to quality of life for area residents. It is somewhat more difficult to measure, however, as these amenities may be difficult to identify and define from a quantitative standpoint. In addition, the effect of access to these amenities and economic development is not as direct as, for example, the role of access to labor or buyer/supplier markets.

Access of population to jobs can serve as one proxy for this factor, since concentrations of jobs will be correlated with other opportunities and amenities. An alternative would be to define key recreational, educational, cultural, and/or other centers, and identify the percentage of population within X minutes of these centers; for example, the percentage of population within 30 minutes of a technical college or four-year university.

Recommended Factors

The recommended accessibility factors include:

- Access of businesses to labor and consumer markets, which captures project benefits for attracting workers and shoppers; and
- One-day freight access to buyer/supplier markets, which captures project benefits related to improved freight connections.

These accessibility factors are those most closely associated with a direct impact on economic growth. The remaining factors could be considered as well, since they also measure the ability of the transportation system to provide residents with access to jobs, education, health care, and similar amenities. However, they are more difficult to measure.

Reliability

Transportation improvements increasingly are driven by public and business interest in providing reliable connections between markets. This is particularly true in many industries today, as the shift toward just-in-time manufacturing and electronic commerce makes an increasing number of freight shipments time-sensitive, with the risk of increased costs if delivery windows are not met. Like accessibility, reliability often is an important precursor to economic development.

The reliability concept is difficult to measure for two reasons. First, data on the reliability of travel times and speeds, the percentage of deliveries that are time-sensitive by different industries, or the economic costs associated with not meeting these windows are generally incomplete. Second, the Indiana Statewide Travel Model and other modeling tools currently available to INDOT are not capable of analyzing dynamic changes in travel times between particular points.

Potential reliability performance factors include the following (see Table 3.3):

- Percent of vehicle-miles traveled (VMT) on four-lane divided highways; and
- Percent of employment within X minutes of a four-lane divided highway.

Table 3.3 Reliability Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Percent of VMT on four-lane highways	S, R	❍	❍	●	●	●
Percent of employment within X minutes of a four-lane highway	S, R	❍	❍	●	●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Percent of VMT on four-lane highways

Four-lane highway access is a proxy for reliability. Some businesses will consider only locations along four-lane, limited-access highways, and others strongly prefer these locations. One reason is the greater travel time reliability and safety associated with truck movements along these routes, which is particularly important for businesses dependent on time-sensitive deliveries. An additional reason is the preference for some shoppers, tourists, and other travelers to travel on these routes, which is particularly important for businesses dependent on customer, visitor, or employee access. While the percent of VMT on four-lane (or greater) facilities is not a direct measure of travel time reliability benefits, it nonetheless is closely related to business perception of these benefits and as a result to the potential for business location and expansion in the area.

Percent of employment within X minutes of a four-lane highway

Similarly, the percent of employment within a particular threshold (e.g., 30 minutes) of a four-lane highway could be calculated in a similar manner as accessibility factors described earlier. This concept may more closely represent the thinking that goes into business location decisions than the simple allocation of VMT among four-lane and two-lane facilities. However, calculating this factor may be a complicated and imprecise analytical exercise given the scale of the Indiana Statewide Travel Model.

Recommended Factor

It would be desirable to accurately calculate reliability. The proposed factors are the best which can be calculated using available tools; however, both serve merely as a proxy for estimating improved reliability. Further, the proposed factors might be biased against certain alternatives. Therefore, **none** of these factors are recommended.

Economic Growth

Economic growth performance factors are designed to capture different aspects of overall economic growth. Potential factors include the following (see Table 3.4):

- Net change in employment;
- Net change in real disposable income;
- Per capita change in real disposable income;
- Net change in real output or business sales; and
- Net change in gross regional product or value added.

Table 3.4 Economic Growth Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Net change in employment	N, S, R	●	●	●	●	●
Net change in real disposable income	N, S, R	●	●	●	●	●
Per capita change in real disposable income	N, S, R	●	●	●	●	●
Net change in real output or business sales	N, S, R	●	●	●	●	●
Net change in gross regional product or value added	N, S, R	●	●	●	●	

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Net change in employment

Change in employment is a standard economic performance factor that captures the net increase or decrease in jobs in the economy. This factor is easily understandable to policymakers and the public. However, the number of jobs does not necessarily reflect the important economic benefits of increasing personal income.

Change in employment can be calculated using the Major Corridor Investment-Benefit Analysis System (MCIBAS), which links the Indiana Statewide Travel Model to a regional econometric model developed by Regional Economic Models, Inc. (REMI). Inputs to the REMI model include direct changes to the economy such as user benefits and anticipated business attraction impacts. The model output includes the direct employment impact of these changes as well as indirect employment effects generated by changes in demand for intermediate goods and the re-spending of income from the direct and intermediate employment impacts. Net employment changes can be estimated for each alternative.

An important issue for analyzing employment changes is the extent to which new jobs in Southwestern Indiana represent transfers of jobs from other portions of the state or nation. The MCIBAS system is constructed with a two-region REMI model that allows estimation of the impacts specific to Southwestern Indiana and the state as a whole. In addition, a national-level analysis will be considered that would address only the employment gains associated with

business cost savings and increased business efficiency, and would omit the business attraction impacts that represent net transfers among regions.

Net change in real disposable income

This factor primarily reflects the change in wage income earned by workers within the region. 'Real' income refers to income adjusted for inflation and 'disposable' income refers to income net of taxes. 'Net' income refers to the accounting of any subregional income reductions due to geographic shifts in economic activity. Personal income can increase as business growth leads to rising salaries and/or the hiring of additional workers. It also can increase as new economic migrants move to a region in search of employment opportunities.

Personal income is broader than user benefit factors in that it includes benefits to non-users of the transportation system. However, it can be a conservative measure of the true income impact, insofar as there is also some net business income (profit) generated. Some of that profit may be paid out as dividends to local business owners or else reinvested locally in buildings, equipment, or labor – thus further improving the economic base of the region. The personal income factor also undercounts total societal benefits in that it gives no value to user time savings for personal travel that do not lead directly to changes in business activity levels – for example, reduced travel time for shopping trips.

This factor also is calculated for the region and the state by MCIBAS. The REMI model's personal income forecasts capture income changes of both local residents and migrants into the region. The REMI model forecasts changes in economic migration based on changes to wage rates and employment opportunities. Similar to the changes in employment, regional and state impacts would reflect both business cost savings and business attraction, while national level changes reflect user benefits only.

Per capita change in real disposable income

In addition to the previous factor that reflects aggregate real disposable income changes, this factor estimates income changes per resident. It is calculated by simply dividing real disposable income by population. This factor is preferable in some circumstances because it more directly accounts for any changes in financial well-being of the average person and is more understandable to the general public. For example, a scenario that leads to increased low-skill, low-paying jobs may increase total income and employment, but the shift toward low-paying jobs could decrease real disposable income per capita. If one of the primary economic development goals of the highway corridor is to increase the number of high-paying jobs, then this could be an important performance factor.

Net change in real output or business sales

This factor estimates the change in regional business output, production, or business sales. This indicates how the cost savings or productivity gains associated with the transportation improvement would affect business decisions to expand production or increase sales in the

region. The overall dollar value of business output in a region reflects the cost of making products and providing services, and not necessarily the benefit of a project to the region.

This factor is calculated for the region and the state by MCIBAS. It is be expressed in real dollars (i.e., adjusted for inflation). Similar to the employment and disposable income factors, this factor could be estimate at a regional, state, or national level.

Net change in gross regional product or value added

Value added essentially is the sum of wage income and corporate profit generated in the study area. Value added can overestimate the true benefit to a region, because it includes all business profit generated in the region, including that which is paid out as dividends to owners of the business who do not reside in the region, and that which is reinvested in corporate facilities outside of the region. Thus, while value added is the most appropriate measure of impact on overall economic activity in a region, the personal (wage) income factor often is preferred as a more conservative measure of income benefits to residents of an area.

This factor is calculated for the region and the state by MCIBAS. It is be expressed in real dollars (i.e., adjusted for inflation). Similar to the employment and disposable income factors, this factor could be estimated at a regional, state, or national level.

Recommended Factors

The following economic growth performance factors are recommended:

- Net change in employment, which is the most easily understood growth factor;
- Net change in real disposable income, which is the most conservative measure of the total income impact of a project; and
- Change in real disposable income per capita, which allows interpretation of how much better off the average individual in the region is in dollar terms.
- Net change in real output. Although not all of the benefits shown here accrue to the study region, or even the State of Indiana, it is an important measure of benefit at the national level.
- Net change in gross regional product. As with net change in real output, this is an important measure of benefit at the national level.

Each of these factors will be computed in two ways: one method calculating only the benefits associated with business efficiency gains, and one method that includes attraction of new business investment and tourism spending, much of which represent transfers from other parts of the country. Net change in real output or gross regional product, while valid measures of economic growth, are recommended as lower-priority factors.

Industry Mix

It may not be sufficient to simply estimate the total economic growth that could be expected from a transportation improvement; it also may be of interest to understand how this growth will affect particular industries within the economy. Industry mix economic performance factors attempt to capture changes in the range of activities occurring in a region. Key issues include:

- Is employment concentrated in a few industries or spread across many?
- Are the major industries in decline or growing nationally?
- Are there varied high and low-skill occupations?
- Does the transportation improvement support the region's target industry goals?
- Does the transportation improvement benefit (or inhibit) specific industries?

Potential industry mix factors include the following (see Table 3.5):

- Economic diversity;
- Economic stability;
- Percent of jobs in high-growth / slow-growth industries;
- Percent of jobs in high-paying / low-paying industries;
- Net job growth in particular target industries;
- Net change in farm income;
- Net change in forest income;
- Net change in tourist visitor-days; and
- Net change in roadside business sales.

Economic diversity

Conceptually, economic diversity measures the distribution of employment in a region by industry and firm. Flint, Michigan is a classic example of a city that lacks economic diversity because such a large proportion of the area employment is in the auto industry (specifically, General Motors). Benefits to strong economic diversity include the lack of reliance on a few local firms and the ability to insulate the region from economic downturns in specific industries.

Table 3.5 Industry Mix Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Economic diversity	S, R	❍	❍	●	●	
Economic stability	S, R	❍		●	●	
Employment in high-growth or slow-growth industries (absolute or percent change)	S, R	❍	❍	●	●	●
Employment in high-paying or low-paying industries (absolute or percent change)	S, R	❍	❍	●	●	●
Net job growth in targeted industries	S, R	❍	❍	●	●	●
Net change in farm income	R	❍	❍		●	●
Net change in forest income	R	❍	❍		●	●
Net change in tourism visitor-days	S, R	●	●		●	●
Estimated change in roadside business sales/employment	R	❍	❍		●	

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

There are multiple ways to measure economic diversity. A simple approach would estimate the percentage of workers employed in the region's five (or 10) largest industries. Therefore, a low value for this factor would indicate strong economic diversity. A more complex approach would build an index that measures the share of total employment in each industry compared to the national average. The factor would become more sensitive to change as its calculation becomes more complex, but at the same time it may become more difficult to explain or interpret.

The data required to estimate these factors are employment by industry. The REMI model provides a baseline estimate of employment by two-digit SIC code and the MCIBAS analysis

will generate an alternative forecast of employment based on the transportation improvements. The specific industries that grow or decline in the alternative forecast would determine whether or not the economic diversity of the Southwestern Indiana region has improved. For example, if the industries that enjoy employment growth due to the transportation improvement are primarily smaller industries in the region, then economic diversity would increase.

Economic stability

Economic stability measures capture the volatility of a regional economy – for example, the variation in growth rates from year to year or the susceptibility of the economy to recession. A transportation improvement could make a regional economy more stable by diversifying its economic base or by introducing new types of industries that are more insulated from business cycles. An economic stability index can be developed by examining annual or quarterly growth rates for employment or income and comparing these to national averages. While useful for examining the historical pattern of a region, these types of factors are difficult to forecast given the tendency for most economic models to project long-range trends rather than business cycles.

Employment in high-growth or slow-growth industries

These factors capture the share of regional employment (or the change in jobs) in high-growth industries. If the transportation improvement is able to attract high-growth industries to the region, then this factor would increase. The factor would be estimated by analyzing United States employment growth trends to identify the most rapidly growing industries. The factor would equal the percentage of total Southwestern Indiana employment in those growing industries, or the absolute change in employment in these industries in the region.

A similar factor could calculate the share of employment in slow-growth and declining industries. The share of jobs in these industries could decrease due to job gains in faster-growing industries, or it could increase if the jobs attracted by the transportation improvement are in slower-growing industries. These factors could be particularly relevant in Southwestern Indiana because of its relatively high reliance on agricultural and manufacturing jobs. Neither of these sectors are growth industries nationwide and it will be important for Southwestern Indiana to increase its share of growth industries over time.

The data required to estimate these factors are employment by industry. The REMI model provides a baseline employment estimate by two-digit SIC code and the MCIBAS system will generate alternative employment forecasts based on the improvements.

Employment in high-paying or low-paying industries

A successful economic development initiative will not only increase overall employment, but also improve the quality of these jobs and raise wages. One way to measure this effect is by estimating the percentage of jobs in high-paying industries. High-paying industries can be identified using average wage data by industry for the nation and for Indiana. The percentage of jobs in those industries produces the performance factor. If the transportation improvement

is able to attract high-paying jobs, then this factor will increase. It also is possible to experience no net change in jobs but still increase this factor if high-paying jobs are substituted for low-paying jobs. A similar factor could calculate the share of employment in low-paying industries.

The Southwestern Indiana REMI model includes data on employment and average wages at the two-digit SIC level and the MCIBAS system will generate an alternative employment and wage forecast based on the improvements.

Job growth in target industries

Frequently, economic development strategies target specific industries to promote the growth and well-being of the region. Examples of target industries often include high-technology manufacturing and services, professional services, and automotive manufacturing. Target industries usually are selected because a region wants to attract higher-paying jobs, higher-skilled jobs, industries that complement existing regional businesses, or growth industries.

This concept requires the identification of target industries for Southwestern Indiana, either through review of existing economic development strategies or in coordination with local economic development and chamber of commerce groups. Once target industries are identified, it is a relatively simple procedure to estimate the growth in employment for these target industries using the MCIBAS system.

Net change in farm income

A major transportation improvement in this region may require a loss of farmland. This loss not only has environmental disbenefits, but also represents an economic loss because land may be taken out of production. To estimate the full economic impact of this loss, it is important to know how the land was being used (i.e., specific crops or livestock raised on the land, or if the land was not in active use); and the economic value of these uses (i.e., estimated crop or livestock prices).

Broad estimates of the change in farm acreage and the types of acreage that are taken out of production will be developed as part of the environmental analysis. The change in farm income can be calculated by applying Indiana-based commodity prices to the change in farmland for each major category of use, based on available data.

Net change in forest income

Similarly, the transportation improvement may require the use of land that currently is forested. Again, the economic impact could be estimated if data exist on how the forest currently is used and the value of any forest products produced from this land. Estimates of this change will be developed based on available data.

Net change in visitor-days

This concept measures the difference in visitor-days to the region and/or state due to the transportation project. Theoretically, improved access to a region will make it more attractive and easy to visit, and will increase the number of visitor-days. Increases in visitor days to a region will increase spending in the local area and contribute to expanding the overall economy. In this sense, tourism spending is a form of exports for the region, generating new dollars to the economy. Conversely, the potential for Southwestern Indiana residents to more easily visit attractions outside of the region because of the transportation improvement represents a negative spending impact.

MCIBAS includes a tourism impact model that uses baseline tourism activity as the basis for forecasting net changes in tourism due to transportation improvements. The change in visitor days is a direct result of the estimated travel time savings to the region from key origin markets, or from the region to key tourist destinations. To the extent that the transportation improvement attracts visitors from other parts of the state to Southwestern Indiana, visitor-day factors will represent a transfer of economic activity within the state. New visitors attracted from outside of the state to Southwestern Indiana represent a gain in spending for both the region and the state.

Total change in roadside business sales or employment

This factor estimates the impact of highway improvements on sales or employment of businesses located along the roadway. In general, the local effects of a highway improvement project fall into two categories:

- Changes in access patterns, such as left-turn prohibitions or elimination of curb cuts. Such changes generally make it more difficult for customers to access businesses and therefore may inhibit sales for particular types of businesses.
- Changes in traffic volumes resulting from the improvements. Since traffic volumes generally increase when roadway improvements make the road easier to travel, these usually increase sales.

These types of impacts tend to cancel each other out at a broad regional or statewide level, but can be significant for individual corridors. Given the multiple corridors that will be studied in this EIS, it is recommended that this factor be included.

The precise impact of the highway on individual businesses cannot be determined without detailed information on project design and retail market characteristics. However, aggregate factors of potential vulnerability can be estimated using the following process:

1. Conduct an inventory of the existing businesses along the corridor and classify these businesses by type of business, current access characteristics, and location.
2. Estimate business sales and employment at these businesses using available data on sales and employment per establishment, by establishment type.

3. Estimate the range of change in sales due to the highway improvements, based on the estimates of the economic dependence of each type of business on pass-by traffic. This analysis will use the Highway Access Restriction Eliminator (HARE) model, which was developed for the National Cooperative Highway Research Program (NCHRP) and has been applied for previous corridor studies in Indiana.

Recommended Factors

The following industry mix performance factors are recommended:

- Employment in high-growth industries or other target industries, which indicates the extent to which the transportation improvement supports regional economic development goals;
- Employment in high-paying industries, which highlights the extent to which new jobs are high-paying, quality jobs;
- Net change in farm income and forest income, which address important local issues; and
- Estimated change in roadside business sales, which is significant given the potential for some alternatives to involve access restrictions on existing corridors or shifts in travel patterns among corridors.

Economic diversity and stability factors are not recommended due to the difficulty constructing meaningful values for these concepts. Employment growth in target industries is not recommended because there does not appear to be consensus around a specific list of target industries in the region today. Tourism visitor-days are estimated by the MCIBAS system, but do not appear to be a major rationale for this project.

Regional Economic Equity

This category of performance factors addresses the differences in economic conditions among geographic areas. It is important to know how well the Southwestern Indiana economy compares with conditions in the state and the United States and to quantify the effect that the transportation improvement might have on narrowing existing equity gaps.

Potential regional economic equity factors include the following (see Table 3.6):

- Ratio of persons employed / labor force; and
- Per capita real disposable income.

Table 3.6 Regional Economic Equity Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Ratio of persons employed/labor force	S v R, N v R	●	●	●	●	●
Per capital real disposable income	S v R, N v R	●	●	●	●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Ratio of persons employed to the labor force

This factor is calculated by dividing the number of jobs in the economy by the labor force. The labor force includes those working and those looking for work (unemployed) but does not include persons not actively seeking work. The more common measurement for this type of concept is the unemployment rate, which is a ratio of unemployment to labor force. While historical data are available, regional forecasting of unemployment rates is rare and neither REMI nor Woods & Poole forecast these data.

REMI provides the level of employment and the labor force at the regional, state, and national level. Comparisons of the ratio for each geographic area will highlight any labor market competitive shortcomings or strengths for Southwestern Indiana. Impacts of the transportation improvement on Southwestern Indiana will be simulated using the MCIBAS system to determine any changes in the employment/labor force ratio.

Real disposable income per capita

As discussed in a previous section, real disposable income per capita is calculated by dividing real disposable income by population. This concept measures growth, but also can be used for comparison of economic well-being between the region, state, and nation. The primary data source is the MCIBAS system, which will cover the region and the state. The transportation improvement will affect real disposable income per capita for both Southwestern Indiana and the state as a whole, but will be assumed to have minimal impact nationally. Any current gap between Southwestern Indiana and the state will be estimated and alternative simulations will project any reductions in the gap.

Recommended Factors

Two spatial equity performance factors are recommended:

- Ratio of employment to labor force, which is the best method available to forecast the unemployment rate concept.
- Per capita real disposable income, which provides a simple comparison of economic well-being of the region with the state and nation.

Social Welfare and Age Distribution

Some of the more challenging issues facing Southwestern Indiana relate to the distribution of economic opportunities among age groups and income groups in the region. A common goal of economic development, attempting to increase the chances for success of those individuals struggling in the local economy. A policy that makes "the rich richer" is not a complete development policy; ideally, economic development programs can assist those with fewer opportunities and less income.

Potential socioeconomic equity factors include the following (see Table 3.7):

- Working-age population;
- Percent of population below the poverty level; and
- Transfer payments.

Table 3.7 Social Welfare and Age Distribution Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Working age population	S, R	●	●	●	●	●
Percent of population below poverty level	S, R	❍		●		●
Transfer payments	S, R	●	●	●	●	

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Working age population

Southwestern Indiana, like many primarily rural areas, has struggled to retain high school and college graduates during the past few decades. This performance factor would calculate the percentage of Southwestern Indiana's population that is in the prime working age, typically defined as 16 to 64.

The REMI model includes a detailed demographic module that provides estimates of total population by single-age and five-year cohorts. The REMI model also breaks down these cohort forecasts by gender and racial / ethnic group. This information would be available for the historical time period as a measure of existing conditions in the study area, as well for the forecast period. The population projections will enable analysis of the extent to which an alternative transportation investment changes economic migration patterns of workers in search of better economic opportunities.

Percent of population below poverty level

Perhaps the most common economic performance factor for this category is the percent of the population living below the poverty line. The poverty line is defined by the federal government for different household sizes to reflect "a national minimum—an income level…below which we do not want any American to have to live."[2] Statistically defined poverty lines allow for the calculation of the percentage of population living above and below it.

Unfortunately, these data are not readily available. The REMI model provides virtually no income distribution information. Woods & Poole Economics provide data on the number of households in different income groups, yet the breakouts do not include the poverty line and more significantly, there is no ability to perform policy simulation analysis with these data. U.S. Census data provide historical trend information, but there is no basis for forecasting this level or comparing the differences among alternatives. Substantial effort would be required to construct a rough proxy for this performance factor.

Transfer payments

Transfer payments are primarily government transfers of income for programs such as unemployment insurance, welfare income-maintenance programs, and education and training programs. Total transfer payments increase if more people in a regional economy are unemployed, not looking for work, or otherwise dependent on government support. Economic development initiatives often aim to reduce the dependency of individuals on government transfers. To the extent that the transportation improvement in Southwestern Indiana can reduce unemployment, transfer payments also would be reduced.

[2] As described by Robert Lampman, one of the key designers of the official measure of poverty, in *America Unequal* by Sheldon Danziger and Peter Gottschalk (1995).

Historical data on transfer payments are available from the U.S. Bureau of Economic Analysis and included in the REMI model. The MCIBAS system allows for comparison of total transfer payments, transfer payments per capita, or transfer payments as a percentage of total personal income among alternatives. The REMI model generates this variable based on the ratio of employment to population in the region rather than on specific income-distribution information. This value can be calculated for both Southwestern Indiana and the state of Indiana.

Recommended Factor

Two socioeconomic equity factors are recommended:

- Working age population,
- Transfer payments, which provide a rough estimate quantifying benefits of the transportation improvement to lower-income, less-privileged groups. The other factor that people might more readily demand, the poverty level, is not easily estimated using the current generation of modeling tools.