

Chapter 6

ADHS COMPLETED SECTIONS ECONOMIC EVALUATION CONCLUSIONS

This study examined the completed portions of the Appalachian Development Highway System and sought to determine the economic benefits and economic impacts estimated for the completed portions of the ADHS. The study then compared those economic benefits and impacts with the tax dollars used to build and maintain the highways, in an attempt to determine what the highway investments have achieved toward net economic development. The study results are summarized in this chapter in four ways:

- Economic Efficiency Benefits;
- Economic Development Impacts;
- Economic Evaluation Results; and
- Study Conclusions.

The study results, from all of these perspectives, indicate that the completed portions of the Appalachian Development Highway System have in fact attained their economic development objectives. As a result of the ADHS, the Appalachian Region has become a better place to live and work, the Region is more efficient, job opportunities have been created and the Region is better able to compete with other regions of the US for economic activity.

ECONOMIC EFFICIENCY BENEFITS

The efficiency benefits calculated in this study are those net user cost savings that FHWA and other highway agencies typically and traditionally calculate when economically evaluating a highway project – travel time savings, vehicle operating cost savings, and accident savings. The total efficiency benefits for three example years for the twelve corridors combined are shown on **Exhibit 6-1**.

Exhibit 6-1
EFFICIENCY GAINS DUE TO ADHS COMPLETED SECTIONS
Appalachian Region
(\$Thousands)

<u>Savings Type</u>	<u>Annual Savings</u>		
	<u>1975</u>	<u>1995</u>	<u>2015</u>
Time Savings	\$207,129	\$785,812	\$1,943,382
Operating Cost Savings	(10,855)	(11,178)	45,870
Accident Savings	10,853	47,449	70,050
Total Efficiency Gains	\$207,127	\$822,083	\$2,059,302

Evaluation Conclusions

From a travel perspective, the ADHS corridors clearly make places in the Region more accessible, by dramatically reducing the time it takes to travel from one place to another. The ADHS makes travel in the Appalachian Region safer and more efficient.

But this is only a part of the total ADHS economic value. These efficiencies in turn cause the Appalachian Region to be a better place to work and invest, which creates economic opportunity as discussed below.

ECONOMIC DEVELOPMENT IMPACTS

The study's findings indicate that the completed portions of the ADHS have had a positive effect on the economic well being of the residents and businesses of the Appalachian Region. The ADHS has helped the Region to retain and attract jobs and resident population, and has contributed to the Region's economic health and production (as measured by employment opportunities, resident population, wages and value added).

Job Impacts

The ADHS has provided access to portions of the Region, has helped the Region to be better able to compete economically, and has generally helped to retain some firms, and to attract other firms. All of this has helped to create job opportunities in the Appalachian Region.

Exhibit 6-2 summarizes the net number of jobs in the Appalachian Region estimated to be due to the completed portions of the ADHS. Currently there are an estimated 16,000 jobs in existence in Appalachia due to the twelve completed ADHS corridors and it is forecast that there will be over 42,000 jobs attributable to these same twelve ADHS corridors by the year 2015. As a percentage of total employment in the Appalachian Region, 42,000 jobs is slight; but, in terms of helping the Appalachian Region to retain its residents and offer new opportunities, this is a significant job impact.

Exhibit 6-2
JOBS INCREASE DUE TO ADHS COMPLETED SECTIONS
Appalachian Region

<u>Due To</u>	<u>Jobs in Any Single Year</u>		
	<u>1975</u>	<u>1995</u>	<u>2015</u>
Competitive Advantage	1,790	12,200	35,800
Roadside Expenditures	320	1,390	2,960
Tourism	320	1,290	2,920
ADHS Construction	<u>3,680</u>	<u>1,390</u>	<u>510</u>
Total Jobs	6,100	16,270	42,190

In 1995 only 11 percent of the jobs attributable to the ADHS were due to the act of constructing the highways (the expenditure of the state and federal funds); 89 percent of the jobs were due to the fact that the highways are open and making the Appalachian Region to be more attractive for private investment.

Evaluation Conclusions

Population Impacts

The twelve ADHS corridors are also expected to help the Region to retain and/or attract population. This is principally because of the job opportunities attributable to the ADHS. The total population increase (retained or attracted) estimated to be due to the twelve ADHS corridors is shown on **Exhibit 6-3**.

Exhibit 6-3
POPULATION INCREASE DUE TO ADHS COMPLETED SECTIONS
Appalachian Region

<u>Due To</u>	<u>Population in Any Single Year</u>		
	<u>1975</u>	<u>1995</u>	<u>2015</u>
Competitive Advantage	2,320	22,750	73,900
Roadside Expenditures	270	1,980	4,790
Tourism	280	1,930	4,880
ADHS Construction	<u>11,820</u>	<u>3,760</u>	<u>910</u>
Total Population	14,690	30,420	84,480

The vast majority of this population is due to the estimated Competitive Advantage caused by the ADHS. In effect, the study suggests that the ADHS helps the Appalachian Region to better compete, and this helps to retain and attract both job opportunities and resident population.

Wages Impacts

Because jobs will be retained or attracted that otherwise would be lost to the Appalachian Region, wages are paid that would also be otherwise lost. These are summarized on **Exhibit 6-4**. These total over \$400 million in 1995, and are estimated at over \$1.1 billion by the year 2015. This implies that the ADHS has been successful in attracting jobs.

Exhibit 6-4
WAGES INCREASE DUE TO ADHS COMPLETED SECTIONS
Appalachian Region
(\$Thousands)

<u>Due To</u>	<u>Annual Wages</u>		
	<u>1975</u>	<u>1995</u>	<u>2015</u>
Competitive Advantage	\$15,560	\$324,800	\$1,001,050
Roadside Expenditures	2,970	33,220	81,500
Tourism	2,430	33,440	75,250
ADHS Construction	<u>47,110</u>	<u>34,620</u>	<u>19,960</u>
Total Population	\$68,070	\$426,080	\$1,177,760

Evaluation Conclusions

Value Added Impacts

One way of summarizing the total net economic impact of the twelve corridors in the Appalachian Region is to present the impacts in “value added” terms. Value Added is intended to represent the total net inflow of impacts into the Appalachian Region. It includes the effect of the wage increases, a major portion of the productivity and efficiency gains, and other forms of quantifiable economic benefit and impact. In the calculation of value added impacts, care was taken to avoid the double counting of impacts.

The total value added impacts, by year, are shown on **Exhibit 6-5**. These are estimated at \$1.0 billion in 1995, and over \$2.9 billion annually by the year 2015. These values are much of the impacts used in the impact/cost calculations.

Because the construction impacts are early in the process, and because their value tapers off once the construction is complete, the construction impacts of **Exhibit 6-5** occur early. Then, following that, the impacts attributable to highway use occur and increase over time.

Exhibit 6-5
VALUE ADDED DUE TO ADHS COMPLETED SECTIONS
Appalachian Region
(\$Thousands)

<u>Due To</u>	<u>Annual Value Added</u>		
	<u>1975</u>	<u>1995</u>	<u>2015</u>
Competitive Position	\$54,840	\$444,830	\$1,752,250
Roadside Expenditures	8,190	54,870	118,410
Tourism	7,350	52,850	108,110
Other Efficiencies	90,436	390,908	972,759
ADHS Construction	<u>109,900</u>	<u>58,200</u>	<u>22,990</u>
Total Value Added	\$270,715	\$1,001,658	\$2,974,519

Total Impacts and Benefits

Exhibit 6-6 summarizes the total 1965-2025 costs, benefits and impacts, all discounted at 7 percent per year. These are the net total present values that represent the life cycle analysis. As shown, the efficiency benefits exceed the costs (benefit/cost of 1.18), and the economic development impacts also exceed the costs, even when the Construction Impacts are excluded.

Evaluation Conclusions

Exhibit 6-6
TOTAL DISCOUNTED COSTS, BENEFITS, AND IMPACTS
Completed Segments of ADHS
1965-2025

TOTAL COSTS

Capital Costs	\$3,978,268,000
Maintenance Costs	<u>160,530,000</u>
Total Costs	\$4,138,798,000

TOTAL EFFICIENCY BENEFITS

Time Savings	\$4,678,898,000
Vehicle Operating Costs	(32,037,000)
Accident Savings	<u>247,680,000</u>
Total Benefits	\$4,894,541,000

TOTAL DEVELOPMENT IMPACTS

Competitive Advantage	\$2,699,500,000
Roadside Impact	253,070,000
Tourism Impact	235,968,000
Other Efficiencies ^(a)	2,422,700,000
Construction Impact ^(b)	<u>1,457,585,000</u>
Total Impacts	\$6,940,760,000

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- (a) Accident savings and non-business other efficiencies not included in the competitive advantage, roadside, and tourism impacts.
- (b) Economic value of the federal funds, in terms of hiring road construction workers, etc. Should not be used as benefit when trying to justify the federal expenditure.

Evaluation Conclusions

ECONOMIC EVALUATION RESULTS

The completed segments of twelve ADHS corridors were evaluated from three different perspectives, with the results summarized on **Exhibit 6-7**.

Exhibit 6-7
ECONOMIC EVALUATION RESULTS
Twelve Completed ADHS Corridors

<u>Perspective</u>	<u>Net Present Value</u>	<u>Internal Rate of Return</u>	<u>Benefit or Impact/Cost Ratio</u>
Economic Efficiency	\$+755,743,000	7.87%	1.18
Regional Economic Development	\$+1,344,376,000	8.29	1.32
Economic Development Incl. Construction	\$+2,801,961,000	10.55	1.68

Evaluation Rules: The Appalachian Development Highway System is economically justified (has an economic rationale) if:

- The Net Present Value is positive (+).
- The Internal Rate of Return is 7.0% or greater.
- The Benefit/Cost Ratio is 1.0 or greater.

NOTE: Economic Efficiency, Regional Economic Development, and Economic Development Including Construction should never be added together. To do so would be to double count.

SOURCE: Wilbur Smith Associates

Economic Efficiency Results

From a travel efficiency perspective (excluding economic development impacts), the ADHS corridors completed to date are estimated to have a legitimate economic rationale. The present value of the economic efficiency gains exceeds the ADHS costs by \$755 million, with a constant dollar 7.9% return on investment.

Given that efficiency gains of this type exclude transfer payments and double counting, it is concluded that the ADHS completed segments make sense economically from the national perspective. The gains in efficiency and productivity exceed the costs incurred, returning \$1.18 for every \$1.00 expended.

Evaluation Conclusions

Regional Economic Development Results

The Appalachian Regional Commission was established to aid the economic and social well being of the Appalachian Region. Therefore, the extent to which the ADHS has been found to assist the Region with its economic development goals is a very relevant issue for the Appalachian Regional Commission.

For purposes of the economic impact/cost expenditure calculation, the impacts due to the direct expenditure of federal funds are excluded (so as to not attempt to use the expenditure of the funds as a reason to spend the federal funds).

The result, as shown on **Exhibit 6-7** for Net Present Value, is a very attractive \$1.34 billion. This means that the residents of the Appalachian Region benefited from the ADHS by \$1.34 billion more than the ARC administered federal expenditure of funds to build the ADHS. The ADHS appears to have been a good use of federal investment dollars.

The economic rate of return of 8.29% (in constant dollars) and a discounted impact/cost ratio of 1.32 reinforce the Net Present Value findings. According to this study's calculations, the economic development impacts of the completed portions of the ADHS exceed the cost budget for the ADHS. The ADHS seems to be achieving its economic development goals.

Economic Development Results, Including Construction Impacts

The above conclusions might be viewed as conservative, in that they do not include the impacts that occur in the Region when federal funds are spent in the Region. When the effects of this federal funding are included, the results become even more favorable to the ADHS. When these construction impacts are included, the NPV is a positive \$2.8 billion, the IRR is 10.55%, and the Benefit/Cost is 1.68. All of these are very attractive and are indicative of a prudent investment. Clearly the federal expenditures on the ADHS have had positive benefits and impacts on the Appalachian Region.

STUDY CONCLUSIONS

This study examined the twelve ADHS corridors that are complete or nearly complete. It examined the corridors from the economic efficiency perspective and from the Appalachian Region's economic development perspective. The study's key issues were identified in Chapter 1. What follows are the answers to these issues based on the results of this study.

Evaluation Conclusions

Question #1: To what extent, and in way ways, does the ADHS make the Appalachian Region more efficient?

Conclusion: By supplementing the individual state highway investments, the ADHS provides highways that might not have otherwise been built within the Region. These ADHS highways created benefits in the form of travel efficiencies valued at \$4.89 billion (1965-2025). Improved road conditions and access have resulted in greater efficiency. The efficiencies are quantified as accident savings and travel efficiency savings. By making the Region to be more efficient and accessible, economic opportunity has expanded.

Question #2: Has the ADHS directly or indirectly caused job opportunities retention and attraction in the Appalachian Region? How many job opportunities are believed attributable to the completed portions of the ADHS?

Conclusion: The study's calculations find that by 1995 there was a net increase of approximately 16,000 jobs that would not have existed without the completed portions of the ADHS; it is estimated that these twelve corridors will have yielded a net of 42,000 Appalachian jobs by the year 2015. These jobs are estimated to have occurred because the ADHS made the Region more accessible and more efficient as a place to invest, live, and work. The ADHS has played a role in retaining and attracting jobs to the Appalachian Region.

Question #3: Has the ADHS led to increased production in the Region? How much?

Conclusion: According to this study's estimates, the net increase in value added was \$1 billion in 1995, and will increase to \$2.9 billion by the year 2015. The total present value of this increased production is \$6.9 billion (1965-2025). Clearly the ADHS has been successful in increasing the Region's production, which of course results in increased job opportunities and increased wages.

Question #4: Federal funds have been used to build the ADHS. Has the desired economic development occurred? Is the magnitude of that development sufficient to indicate that the ADHS is a good, prudent investment?

Conclusion: The use of federal funds to build these ADHS highways has clearly yielded economic progress for the Appalachian Region. In comparing the net value added increases with the amount of funds used to build and maintain the highways, an impact/cost ratio of 1.32 is determined. This is indicative of a good, prudent investment.

Question #5: What is the economic rate of return on the federal investment? Is it sufficient to indicate that this was a good use of tax payer funds?

Conclusion: The economic rate of return on the federal investment from an efficiency perspective is 7.87 percent and from the Region's economic development perspective is 8.29 percent per year (in constant dollars; if inflation were included, the rate of return is higher). This is a solid return on the investment. Over the life cycle of the ADHS, for each \$1 invested, the return is \$1.18 in efficiency, and a total of \$1.32 in total economic impact (\$1.68 when the

Evaluation Conclusions

construction expenditure impacts are included). These are indicative of a good use of tax payer funds.

Question #6: *How do the various ADHS completed corridors compare, one with the others? Do they all appear to have been sound investments?*

Conclusion: All of the twelve completed ADHS corridors produce efficiency benefits, from a per corridor low of \$59 million (Corridor A/A1) to a high of \$1.2 billion (Corridor B). The individual corridor efficiency returns on investment range from 5.44 percent per year (Corridor E) to 10.06 percent (Corridor T). In other words, they all yield a rate of return of a reasonable size. The rate of return for all twelve corridors from the travel efficiency perspective is a very respectable 7.87 percent per year. While some corridors are better than others, they all appear to have been reasonable investments.

Question #7: *To what extent have the ADHS corridors benefited the highway users? The non-users? Do people have to use the ADHS corridors in order to benefit from them?*

Conclusion: The most direct beneficiary is the highway user. The users have benefited because the highways dramatically increased travel speeds, reduced accidents, and made Appalachian Region places more accessible. By making the Region more accessible, non-users of the highways were positively impacted—due to job creation, better jobs (wages), and other opportunities. Therefore, the ADHS highways appear to have benefited the people of Appalachia, even those who do not use the specific highways.

Question #8: *Have the completed ADHS corridors helped the Appalachian Region to compete on a more equal basis with other regions of the US for economic development?*

Conclusion: The largest single impact attributable to the ADHS is the fact that the completed ADHS highways have helped the Appalachian Region to be better able to compete for economic opportunity. This competitiveness is valued at \$2.7 billion (1965-2025). Clearly, the ADHS has helped the Region to make progress, even though the system is not yet complete.

The Appalachian Development Highway System, as originally conceived by the U.S. Congress, was intended to help the economy of the Appalachian Region. This study examined the ADHS, to determine whether the completed portions of the ADHS have attained their objective.

The ADHS cannot take credit for all growth, or even a majority of the growth, in Appalachia's last thirty-two years. But it can take credit for enough growth (42,000 jobs, 84,000 people, \$2.9 billion wages, \$6.9 billion value added) to show that the ADHS has been a good investment in Appalachia's, and America's, future.