An Analysis of Techniques Used in Highway Economy Studies by Various States

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In order to determine the "State-of-the-Art" of procedures employed throughout the nation to complete highway engineering economy studies, the Research and Planning Division of the South Dakota Department of Highways reviewed a total of 44 reports published by 21 states during the period 1963-1966. Results of this analysis were compared with an appraisal of 130 economy studies submitted to the Bureau of Public Roads during the year 1962 by 34 states, the District of Columbia and Puerto Rico. Projects analyzed included alternate highway locations, alternate river crossing schemes, interchange or grade-separation justification, and surface-type determinations. Many of these studies were conducted by consulting engineering firms under contract to highway departments.

Slightly improved techniques were used in those studies developed subsequent to the year 1962 as revealed in the following tabulation.

ITEM	BPR ANALYSIS (1962)	S.D. ANALYSIS (1963-1966)
Percentage of the reports using road-user analysis	73%	89%
Percentage of the reports which included a road-user analysis using the benefit-cost ratio method of solution	72%	49%
Percentage of the reports which included a road-user analysis using the total annual transportation cost method of solution	28%	51%
Percentage of the reports using benefit-cost ratio method, and considering multiple alternatives, in which a "second benefit ratio" was computed....	11%	20%
Percentage of the reports which included a road-user analysis establishing annual capital highway costs.....	63%	92%
Percentage of the reports which included a road-user analysis including accident cost	5%	10%
Percentage of the reports which included a road-user analysis including highway maintenance costs.....	55%	79%
Percentage of the reports which included a road-user analysis including specific stated interest rate	67%	77%

It is apparent that the latter of the two analyses reveals a higher percentage of reports using the road-user benefit analysis. However, there seems to be a sharp percentage decrease in the use of the benefit-cost ratio. This is ex-

plained by the large percentage increase in the use of the total annual transportation cost method of solution. Furthermore, it can be noted that the South Dakota survey indicates a higher percentage of reports using the benefit-cost ratio method, and considering multiple alternatives, in which an incremental, or second benefit, ratio was computed.

It is also apparent that most analysts are now using annual capital highway costs in their studies. The percentage of reports employing different service lives for various components of the highway (e.g., right-of-way, structures, surfaces) has risen slightly, from 68 percent in 1962 to 75 percent in the later period.

Accident cost considerations are slowly finding their way into economic studies. The low rate of use of accident costs in the past might be attributed to the lack of factual data needed by the economist to include this user cost item.

Highway maintenance costs are being considered in a larger proportion of the more recent studies being published. Possibly, the availability of localized maintenance cost data might be influencing the trend for increased use of this element.

The last item covered in the comparison relates to interest rates selected for economy study computations. The number of reports citing specific interest rates constitutes a higher percentage in the more recent survey. The distribution of stated interest rates for the two time periods shown below indicates an apparent increase in the average interest rate with the passage of time.

INTEREST RATE Percent	BPR ANALYSIS (1962) Percent Reports Using	S.D. ANALYSIS (1963-1966) Percent Reports Using
0.0	20	23
0.1-3.9	22	8
4.0-5.9	45	31
6.0-7.0	13	38
Over 7.0	0	0

Assuming that the sample of economy study reports reviewed by South Dakota is representative of the total accomplished and published, it can be acknowledged that the trend seems to be that the later reports exhibit closer conformance to the techniques advocated by some of the leading authorities in the highway economics field. There is, of course, much room for improvement in the basic procedures or analyses applied throughout the country.

For instance, road-user benefits were generally calculated for design-year or terminal-year traffic, and were assumed to be uniform for the entire analysis period. This method tends to discount present characteristics or patterns when studying alternate highway improvement situations.

The low usage of the incremental or second benefit ratio when considering multiple alternatives is also disturbing. Possibly, this is due to the format of AASHO's manual, "Road User Benefit Analysis for Highway Improvements," which presents the second benefit ratio in the Appendix, with little emphasis on its capabilities expressed within the main body of the publication.

Probably the most controversial element associated with benefit analysis studies is the interest rate selected for use. Some economists hold that no interest considerations are necessary and others argue for rates up to 10 or 12 percent. It appears that a majority of the analysts are currently using an in-

terest rate in the neighborhood of 5 percent to compute annual capital cost on an amortized basis. It is not the intent of this discussion to debate interest rate decisions; however, a segment of the published reports does not state the rate of interest employed, if any. This deficiency should be rectified to aid the reader in evaluating the economy study results.