

A NOTE ON IMPACTS OF ADJACENT LAND USE ON BLUE RIDGE PARKWAY OPERATING COSTS*

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ABSTRACT

The National Park Service has long been interested in effects of adjacent land uses upon costs of operating national parks. Although studies have described such effects, little work has been done to quantify them [1-4]. Objectives of this study were to determine how factors internal and external to the Blue Ridge Parkway affect the cost per visit and total cost of operating the Parkway. Parkway administrators were seeking information which could be useful in budgeting and land use planning. Only costs of administration and maintenance were considered, not construction or non-market costs such as scenic damage or congestion.

PROCEDURES

The Parkway, which meanders 470 miles along the crest of the Blue Ridge Mountains in Virginia and North Carolina, was divided into twelve segments with varying degrees of development in adjoining counties and with different concentrations of Parkway facilities. Segments averaged about forty miles long

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and forty miles wide and included only counties bordering the Parkway. Cross-sectional linear regression analysis of the following form for the year 1977 was used to determine the impact of selected variables upon total Parkway payroll costs and costs per recreational visit (lack of data precluded a time series analysis):

$$TC_i = f_1(I_{ij}, \dots, I_{ij}, E_{ik}, \dots, E_{ik}) \quad (1)$$

$$CV_i = f_2(I_{ij}, \dots, I_{ij}, E_{ik}, \dots, E_{ik}) \quad (2)$$

where:

TC_i = total annual cost of operating Parkway segment i

CV_i = annual cost per recreational visit of operating Parkway segment i

I_{ij} = internal variable j on Parkway segment i

E_{ik} = external variable k on Parkway segment i

Since costs of supplies and administration were estimated to be proportional to staffing levels, and since about 80 percent of Parkway operating costs are salaries and wages, the latter were used as total operating costs and allocated to the twelve segments according to Park Service records. For each segment, costs per visit were the payroll costs divided by recreational visits. The latter were developed from Parkway traffic counters, with reductions made for estimates of commuter use, on the assumption that the Park Service seeks to provide recreational visits only.

Internal variables for each segment were overlook parking spaces; tent, trailer, and picnic sites; seats of concession capacity; lodge capacity (pillows); visitor center parking spaces; recreation area acreage; and a 0-1 dummy variable indicating absence or presence of a concession.

For each Parkway segment, total population and employment in several categories were all highly correlated. Thus, population and population density were chosen as the best indicators of land development (the external variables) in adjacent counties for each Parkway segment.

Maximum R^2 improvement through stepwise variable selection was used to search for a logical and statistically significant model. Non-linear models showed little or no improvement over linear approaches.

RESULTS

Fifty-seven percent of the variation in total operating costs was explained by the following equation:

$$TC_i = 110,630 + 718.77 V_i + 162.41 S_i \quad (3)$$

(340.13) (75.02)

where:

- V_i = visitor center parking spaces
(significant at $p = 0.064$)
- S_i = tent, trailer and picnic sites ($p = 0.059$)
- i = indexes segments 1 through 12
- Standard error for each coefficient is in parentheses
- $R^2 = 0.57$.

Sixty-eight percent of the variation in operating cost per recreational visit was explained by the equation below:

$$\begin{aligned}
 CV_i = & 0.074615 + 0.066677 C_i + 0.000010 R_i & (4) \\
 & (0.017101) \quad (0.000004) \\
 & - 0.000199 S_i \\
 & (0.000104)
 \end{aligned}$$

where:

- C_i = a 0 - 1 concession variable ($p = 0.004$)
- R_i = recreation area acreage ($p = 0.02$)
(for S_i , $p = 0.090$)
- $R^2 = .68$.

The positive coefficients for C_i and R_i reflect the increased cost per user when facilities are present and when use is dispersed over larger areas. The negative coefficient for S_i suggests economies of scale accompanying larger facilities.

No external variable was found to be significant at the 0.15 level or below for models analogous to references [3] and [4]. Thus, Blue Ridge Parkway operating costs are primarily a function of facilities, the location of which is unrelated to the degree of development in adjoining counties. Visitor facilities are located mainly at points of historic or scenic interest on the Parkway.

NON-OPERATING COSTS

Parkway administrators indicated that costs of screening and Parkway access eliminations increased with the percentage of private land and development projects bordering the Parkway. However, no formal analysis of such costs was made, due to limited data.

IMPLICATIONS FOR PLANNING AND MANAGEMENT

The analysis suggests that adjacent urban development has little or no influence on Blue Ridge Parkway operating costs, given the current location of

facilities. However, in future expansion, if new facilities were located closer to population centers, operating costs per visitor could probably be reduced. Visitation rates of local users to such areas would likely be higher than at more distant facilities. The resulting economies of scale in operation as well as aggregate reduced travel costs for local users could be significant, since an estimated one-third of Parkway recreational users are from neighboring counties [5].

We caution against extrapolating this study's findings to other parks. The long linear nature of the Blue Ridge Parkway and the location of its facilities led to the results found here. Other configurations could cause substantially different relationships between adjacent development and park operating costs.

REFERENCES

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