Procedures for Developing State Rail Plans

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Several state rail plans have been developed under the Regional Rail Reorganization Act of 1973 and the Railroad Revitalization and Regulatory Reform Act of 1976. These plans typically use an index method to rank those lines that are eligible for continuation subsidies. The usefulness and applicability of the index procedure, however, are characterized by several problems. The purpose of this paper is to review these problems and to present an alternative method of ranking branch rail lines. This method is the benefit-cost ratio approach, which was used to develop the Iowa Department of Transportation rail plan. The ratio provides estimates, first, of the dollar value of each rail line to shippers, receivers, and the community and, second, of the annualized present dollar value of the cost of operating, maintaining, and upgrading the rail line.

The Railroad Revitalization and Regulatory Reform (4R) Act of 1976 provides up to $360 million in financial assistance to states for "transitional continuation of service on light density rail lines that are necessary to continued employment and community well-being throughout the United States." To become eligible to receive financial assistance under this act, a state must develop a state plan for rail transportation and local rail assistance (1). A similar eligibility requirement was specified in the Regional Rail Reorganization (3R) Act of 1973. This act provided $90 million in rail service continuation subsidies for each of two years to states in the northeast region.

Under the 3R Act (2, 3, 4), several state rail plans have been developed, most of which are based on criteria and guidelines suggested by the Rail Services Planning Office (RSPO) of the Interstate Commerce Commission (ICC). The procedure typically used in these plans is to (a) identify a set of specific variables presumed to be affected by rail abandonment, (b) quantify the potential impact of abandonment of individual rail lines on each variable, (c) develop a weighting value for each variable, and (d) develop a composite index value for each rail line. The computed index is then used to rank the eligible lines for continuation subsidies. Factors typically included in the composite indexes include

1. Projected increase in fuel consumption,
2. Projected increase in air pollution,
3. Projected number of jobs lost,
4. Projected wages lost,
5. Projected taxes lost,
6. Projected sales lost,
7. Projected increase in consumer prices,
8. Historical number of cars shipped or received,
9. Operating cost of alternative modes, and
10. Subsidy required to continue operation of the line.

There are several reasons why the index method was used in the initial state rail plans. First, it provided a means of aggregating a number of diverse but seemingly obvious impacts of rail abandonment into one number. Second, it enabled planners to develop a ranking of lines in the relatively short time required by the Regional Rail Reorganization Act of 1973. Third, it provided a method of comparing branch lines that was accepted by legislators.

Closer examination of the index procedure, however, reveals several problems inherent in this method. Recent studies have indicated that rail abandonment has had little or no effect on a number of the variables included in the indexes. Fuller and Hyman (5) estimated the impact of abandonment on fuel consumption on a rural, low-volume, class 1 branch line in Wisconsin. They concluded that, if the freight were hauled by truck to the nearest railhead and shipped from that point by rail, abandonment of the case line in Wisconsin would result in a net reduction of 74 496 L (19 682 gal) of diesel fuel used annually. Emissions of three pollutants also would decline. This evidence suggests that trucks are more fuel efficient on short hauls than are trains operating on low-volume, low-speed, rural branch lines.

Two types of studies have been made to determine the impact of rail abandonment on firms and communities. One type of study has estimated the potential impact of abandonment on towns that currently have rail service. Poth (6, 7), for example, asked shippers and receivers located on rail lines threatened with abandonment what they thought the effect of abandonment would be on their businesses and communities. These subjective estimates were then used as coefficients to quantitatively estimate the direct and indirect effects of abandonment. Fink and Goode (8) used a telephone survey of businesses located on "potentially excess" lines in Pennsylvania to obtain subjective estimates of direct potential employment loss from proposed abandonment of the lines. Using the subjective estimates and a multiplier, Fink and Goode calculated the total direct and secondary employment loss if the lines were abandoned. The Poth and the Fink and Goode studies forecast large income-employment losses from potential rail abandonment.

A second set of studies measured the actual impact of abandonment on communities. Bunker and Hill (9) measured the impact of rail abandonment on agricultural production and on associated grain-marketing and fertilizer supply firms located on two abandoned rail lines by comparing the growth of the firms located on the abandoned rail lines with the growth of nearby firms. The chief impact was on fertilizer dealers. There was no clear indication that abandonment had any significant impact on total employment.

Due (10) measured employment and population in two Oregon counties before and after abandonment of a branch line. Allen (11) measured population growth, transportation costs, and firm adjustments in 10 communities before and after rail line abandonment. Due and Allen concluded that the short- and long-run effects of abandonment on these variables were relatively small.

Sloss, Humphrey, and Krutter (12) attempted to measure the overall effects of rail abandonment on the development of nine test counties that had lost a major portion of their trackage. These nine counties were compared with nine control counties that had either no abandonment or relatively little abandonment. Sloss found no significant impacts attributable to abandonment. Economic indicators included in this study were change in total bank deposits, change in total value added by farm products, change in value added by manufacturing, change in number of employees in manufacturing, change in new capital expenditures, change in retail sales, and

change in wholesale sales.

Miller, Baumel, and Drinka (13) used an analysis-of-variance model to compare growth performance measures of cooperative grain elevators located on abandoned rail lines with cooperative grain elevators located on existing rail lines. They found no significant differences in the rate of growth of sales, earnings, and assets of the two groups of cooperatives. They also compared performance measures of towns located on abandoned rail lines with towns on 71 branch rail lines in Iowa. They found no significant differences in the rate of growth of population, retail sales, bank demand deposits, bank loans and discounts, and bank surpluses, reserves, or undivided profits. Demand deposits and bank loans and discounts were interpreted as gross measures of income in the communities.

The results of the available studies that have examined the actual rather than the potential impacts of abandonment strongly suggest that many of the community and firm factors included in the index method of ranking branch rail lines may not be relevant for many branch rail lines.

Simat, Helliesen, and Eichner, Inc. (14), compared the actual impacts of abandonment with impacts predicted by the protesters at Interstate Commerce Commission abandonment hearings. Businesses located on 10 abandoned lines were examined in the study. The study concluded that a number of small individual businesses were severely hurt. One of the 10 lines examined in the study was the Chicago and Northwestern line between Holstein and Moville, Iowa. The 1973 study indicated that Nitro Gas Company and Spencer Chemical Company (Pierson, Iowa) and Fullerton Lumber Company (Moville, Iowa) were forced out of business by the rail abandonment. A visit in June 1977 to Pierson and Moville, however, revealed that Nitro Gas had sold its facilities to the Spencer Chemical Company, which was sold to the Gulf Oil Corporation. The Farmers Cooperative Elevator Company at Pierson then purchased the original Nitro Gas fertilizer facilities. These facilities are still intact and are handling a greater volume of fertilizer than ever. Fullerton Lumber still is in operation and has operated continuously since the rail line was abandoned. These findings cast doubt on the validity of the retrospective study's results.

The effect of line closure on local property taxes has been included in several state rail plans. Johnson identified three problems with this procedure (15, p. 13):

> First, Section 306 of the Revitalization Act prohibits assessment and tax rates at levels higher than those applied to other commercial and industrial property in the taxing jurisdiction. Secondly, railroad land and properties of closing firms will continue to be owned by someone and thereby will continue to generate property tax revenues with or without the presence of the railroad. The only reduction in tax base will result from reclassification of abandoned rights of way to agricultural and forestry use. The third point is the most important. Property tax is not a real value. Property taxes are portions of the value of property. The value of property depends on rents returned in production. Thus, property tax reductions with line closure are already counted in rent reductions accompanying declining output.

Thus, property taxes do not seem to be a relevant variable for the index procedure.

The index method also has further problems. Apart from the fact that the index method relies on projected impacts rather than on actual impacts of abandonment on the variables, the index method disregards the ability of labor to move to alternative jobs and the ability of capital to be shifted to other employment activities. The composition and distribution of employment can vary over time.

Johnson (15) has pointed out that the factors included in the indexes do not distinguish net effects from gross effects of rail abandonment or rail preservation. Johnson argues correctly that this has led to double counting of benefits. He cites one example in which area income losses were approximated by the total annual sales of firms likely to close if the railroad line were abandoned. Another benefit included in the index was the loss of property taxes paid by these firms. Because taxes are paid from the firm's sales, property taxes were counted twice. Similarly, job losses were counted twice when job losses were included in the index as a separate variable along with area income losses measured by firm sales, inasmuch as the wages and salaries are paid from firm sales.

The weighting system also creates problems with the index method. Some state rail plans have based the weighting system on surveys of citizen ranking of preferences. There is no assurance that the weighting system derived from citizen surveys or assigned by the planners will approximate the actual relative importance of each variable in the index.

Finally, the index method is useful as a decision tool only if a fixed amount of funds previously has been allocated to branch-line maintenance and upgrading subsidies; the method is not helpful in deciding how much should be allocated, however. For example, if a given line has an index value of 62 and a variable operating loss of $375/car, this value is of little use in deciding whether to provide a $375/car subsidy to maintain the line. The index method cannot answer the important question, Should the line be subsidized and (or) upgraded? An alternative analysis is needed to determine whether a given line should be subsidized and (or) upgraded.

A benefit-cost ratio (16) can provide the information needed for this decision. The benefit-cost ratio for retaining the line rather than abandoning it is defined as the net additional product transportation and handling costs of abandoning the line divided by the net additional cost of retaining the line. The net additional transportation and handling costs incurred if the line is abandoned include

1. Net additional trucking costs to or from a nearby rail station or to or from market if this is less expensive than trucking to the nearby rail station,
2. Net additional rail transport costs to or from the market—increased or decreased rail rates—if the product is trucked to or from a nearby rail station,
3. Net change in product handling costs,
4. Net change in shipper or receiver facility costs,
5. Net change in product value if the product is shipped to a different market after abandonment, and
6. Net change in highway maintenance costs from the increased trucking.

Other additional costs appropriate to an individual rail line that can be added to the numerator include

1. Rail line operating deficit, net of ownership costs;
2. Annualized present value of the upgrading costs to the appropriate class level, net of salvageable materials; and
3. Annualized present value of land and salvage materials forgone if the line is retained rather than abandoned.

This ratio, properly computed, will provide an estimate of the dollar value of the line to shippers, receivers, and the community compared with the annualized present-value dollars invested in operating, maintaining, and upgrading the rail line. The individual bene-

fits in the numerator and the individual costs in the denominator are each weighted by $1. A ratio greater than 1.0 indicates that the value accruing to shippers, receivers, and the public from operating the line exceeds the cost of retaining the line. A ratio less than 1.0 indicates that less than $1 in shipper, receiver, and community benefits would be returned for each $1 invested in retaining the line.

Several computer algorithms are available for estimating the ratio (16, 17). Although considerable effort is required to estimate the ratio for a given line, this procedure is less costly than making possibly erroneous decisions based on indexes having no clear meaning.

The procedure of computing benefit-cost ratios for each light-density rail line has been used by the Iowa Department of Transportation in developing its state rail plan (18). The objective of the rail plan is to categorize the state's branch lines into six separate rail system priority levels. Initially, the Iowa Department of Transportation consulted with citizen and rail advisory committees to identify a base mainline rail system. This base system includes the principal interstate mainlines in Iowa and consists of approximately 40 percent of the total state trackage. The remaining 60 percent branch-line system is divided into six 10 percent priority levels that indicate the economic importance of the lines.

An iterative procedure was used to obtain each priority level. For example, the 50 percent system was obtained by the addition of branch lines to the 40 percent mainline system on the basis of the highest benefit-cost ratio. Benefit-cost ratios were computed for individual branch lines, assuming that only the 40 percent base mainline system existed. Then, the branch line with the highest benefit-cost ratio was added to the 40 percent system. Next, the benefit-cost ratios for selected nonsystem branch lines affected by the addition of the first line were recomputed. Finally, the branch line with the highest benefit-cost ratio of all remaining nonsystem branch lines was added to the rail system. Branch lines were added into the system until all remaining 10 percent priority levels were established.

The results of the analysis provided a ranking of the branch lines that the state of Iowa considered for financial support. These results were then combined with potential industrial and natural resource developments and expected changes in the mainline railroad system to develop a final state rail plan. This procedure enables rail planners to determine the most economically efficient use of upgrading funds from railroad companies, rail users, and state and federal governments. An analysis that compares the cost to the public, if the branch line is abandoned, with the cost of retaining the line is a better rule for the allocation of resources than is the index method.

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