
Chapter VI
COST ANALYSIS

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This chapter investigates the railroad industry expenditures in two areas: accident incident costs and safety prevention costs. Cost data are generally available from four sources, including the Interstate Commerce Commission Uniform System of Accounts, the internal accounting systems of the railroads themselves, the Association of American Railroads, and the Federal Railroad Administration. One of the problems with the Uniform System of Accounts is that it was designed for the purpose of economic (rate) regulation of railroads, and as

such, does not contain detailed safety expenditures. The internal accounting systems utilized by the railroads provide detailed costs by activities that aid management in performing the planning and monitoring functions of the railroads. Unfortunately, most of the existing accounting systems yield relatively sparse information concerning railroad safety expenditures. Furthermore, since there is no standard format of internal accounting systems, safety expenditure categories among railroads are not comparable.

RAILROAD INDUSTRY ACCIDENT COSTS

Costs to the railroad industry resulting from accidents present a monetary loss that cannot be retrieved and as such cannot be used to upgrade or improve the industry itself. Therefore, it is in the interest of the railroads to determine the

reasons behind these accidents in an effort to minimize accident expenditures while maximizing the railroads' safety and improving the overall financial condition of the industry.

SOURCES OF ACCIDENT COST DATA

The two major sources of railroad accident cost data are the Interstate Commerce Commission (Uniform System of Accounts —USOA) and the Federal Railroad Administration. Each Class I line-haul railroad, Class I switching and terminal railroad, and Class 11 railroad is required to file yearly financial reports with the ICC. These reports are intended to aid the ICC in regulating the railroad industry. A third source of industry accident cost data is the Association of American Railroads. Various member carriers, representing approximately 95 percent of the United States, Canadian, and Mexican mileage, submit accident cost data to the AAR more detailed than those required by the ICC. The fourth source is the internal accounting systems of the various railroads.

The costs to the railroad industry resulting from railroad accidents include three major categories and a total of five specific categories. These include:

- Injuries to persons.
- Loss and damage of property:
 - Damage to railroad property,
 - Damage to livestock on right-of-way,
 - Loss and damage of freight.
- Clearing wrecks.

These costs are further explained and analyzed in the following sections.

Injuries to Persons

This category includes the costs of injuries to railroad employees and to persons other than railroad employees. These costs include direct claims expense estimates of probable liability, compensation for injuries or death, transportation, legal, and witness fees.

Damage to Railroad Property

Damage to railroad property (including equipment, track, and roadbed only) was reported to the FRA when the damage exceeded \$750.

Damage to Livestock on Right-of-Way

All railroads are required to report costs of damage to livestock on right-of-way to the ICC in their annual report. These costs include direct expenses and related employee salaries, expenses, office rent, and probable liability.

Freight Loss and Damage

As with injuries to persons and damage to livestock on right-of-way, railroad companies report freight loss and damage to the ICC. However, the amount of freight loss and damage specifically relating to accidents maybe much less than those costs furnished to the ICC. For example, freight loss and damage costs are also reported to the AAR but divided into various cause categories. 1 These include the following:

<i>Cause category</i>	<i>Percent of total freight Loss and damage, 1976 data</i>
Shortage, packaged shipment	1.78
Shortage, bulk shipment	4.07
All damage not otherwise provided for	53.24
Defective or unfit equipment	3.40
Temperature failures	5.06
Delay	2.54
Robbery, theft, pilferage	5.26
Concealed damage	0.69
Train accident (lading only)	20.69
Fire, marine, and catastrophes	1.76
Error of employees	0.94
Vandalism	0.64
	100.00

The percentage of the total, obtained only for 1976, gives an indication of the contribution of each cause to total freight loss and damage. The train accident cause is seemingly the only cause specifically relating to railroad accidents and therefore the only cause cost item which should be included in the category "Freight Loss and Damage" for this analysis. Over the 10 years 1966-75, lading damage resulting from train accidents as a percentage of total freight loss and damage increased from 11.2 percent to 19.4 percent and, as previously shown, increased to 20.69 percent in 1976. Another interesting note is the miscellaneous category — "All Damage Not Otherwise Provided For" — which represented over 50 percent of the total freight loss and damage in 1976. This miscellaneous category impedes the development of measures for identifying specific causes which could then be analyzed for reducing these types of freight loss and damage costs.

Clearing Wrecks

This last item includes all labor in wrecking service, lading and transferring lading from wrecked cars, building and removing temporary tracks, cost of train service, and other supplies and expenses. These costs are not included in the damage costs reported to FRA in the accident reports.

¹ Association of American Railroads, Operations and Maintenance Department, Freight Claim and Damage Prevention Division, Chicago, Ill. (Annual Summary).

ACCIDENT COST TRENDS

Table 27 presents a 10-year summary of costs to the railroad industry resulting from railroad accidents for the period 1966-75. This table reveals that total industry accident costs rose approximately 130 percent during this period, as expressed in current-year dollars. Furthermore, as a percentage of operating revenues, total accident costs rose from **2.4** percent to **3.5** percent during this 10-year period. As shown in table **28**, the total accident cost in 1966 expressed in constant 1975 dollars, and based on the consumer price index, was \$415.7 million, while in 1975 it was \$575.4 million (+ 38.4 percent). While the number of casualties generally decreased, the dollar value of claims resulting from casualties increased, and at a greater rate than that of the increase in costs resulting from total loss and damage to property (45.8-percent increase versus a 21.4-percent increase). The increase in the aggregate costs of casualty claims reflects the fact that the cost per claim increased at a rate which is greater than the rate of decrease in the number of casualties. Based on data available for this study, it is difficult to determine the reason(s) for this occurrence. Thus, it is recommended that further research be conducted in this area. The increased costs for the other major categories, expressed as the percentage increase or decrease from 1966-75 in constant **1975** dollars, are presented in table 28.

Some concern may be raised about the use of the consumer price index to deflate all of the various cost categories into constant 1975 dollars. Deflating all accident costs with an inaccurate index may lead to more distortions in the data than if the data were left in current-year dollars. For example, the "Damage to Railroad Property" and "Clearing Wrecks" categories were also deflated using two other indices, the AAR index of material prices and wage rates and the FRA reporting threshold index. As indicated in table **28**, expenses incurred by railroad companies for damages to property rose 79.3 percent between 1966-75 in current dollars. Using the AAR index of material prices and

wage rates index to adjust the costs of damage to property to 1975 dollars, there is a decrease of 17.3 percent. This compares to an increase of 8.1 percent for damage to railroad property when the consumer price index is used to adjust the costs to 1975 dollars. When the FRA index is used, the costs over the 10-year period for this category show a 15.7-percent increase. Furthermore, no matter what index is used in these calculations, the increase or decrease in costs is not continuous, but fluctuates greatly from 1966-75.

Since the AAR index includes many items which are not directly related to the repair of equipment, track, and roadbed, it is possible that the material prices and wage rates index has overstated price increases for repairs to damaged property, thereby understating expenses incurred by railroads for damages to property. On the other hand, the percentage distribution of 40 percent labor and 60 percent materials used in the development of the FRA threshold index number may have tempered price increases for repairing damages to property. The price of labor rose considerably higher than the price of materials for the 10-year period 1966-75. Since labor prices have been weighted less in the FRA index, this index understates the true price increase for repairing damage to property and thereby overstates expenses incurred by railroad companies in the repair of damage to equipment, track, and roadbed.

Another example of the problems in using various indices for deflating costs is presented with respect to the category "Clearing Wrecks." Again using the consumer price index to adjust costs to 1975 dollars, table 28 shows that these costs increased 92.1 percent, compared with an increase of 218.6 percent in current dollars. When these costs are adjusted to 1975 dollars using the AAR and FRA indices, the increase in costs is 46.8 percent and 105.5 percent respectively. Again, these costs fluctuated from year to year, as did the costs of damage to railroad property.

Table 27.—Costs to the Railroad Industry From Railroad Accidents, 1966-75
(Current year dollars)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Injuries to persons ^a (includes casualties and injuries to employees and to persons other than employees)	108,492,202	115,077,314	123,074,380	145,927,369	154,764,738	158,582,000	161,000,000	201,200,000	241,000,000	0 00
Loss and damage of property										
Damage to railroad property ^b	98,960,779	96,650,250	114,344,312	129,547,904	121,625,278	109,784,045	107,520,340	49,361,172	87,700,347	177,398,202
Damage to livestock on right-of-way ^c	1,525,072	1,531,166	1,396,076	1,561,802	1,775,979	1,995,000	1,779,000	2,357,000	2,388,000	1,851,000
Loss and damage, freight property	18,683,312	21,372,369	25,992,260	32,144,849	36,782,768	35,022,182	32,761,662	38,988,647	55,475,358	60,705,703
Total loss and damage to property	119,169,163	119,553,785	141,732,648	163,254,555	160,184,025	146,801,227	142,061,002	190,706,819	145,563,705	0
Clearing wrecks ^a	22,980,542	25,223,989	30,500,907	36,869,886	41,035,214	38,477,000	40,664,000	61,747,000	78,305,000	73,206,000
Grand total	250,641,907	259,855,033	295,305,305	346,051,810	355,988,973	350,582,227	358,931,002	463,273,819	565,640,105	575,400,905
Operating revenues (000's)	10,654,666	10,366,041	0,854,678	1,624,333	1,991,658	12,689,014	17,175,000	17,770,081	16,922,841	16,401,860
Percentage of operating revenues	2.4	2.5	2.7	3.0	3.0	2.8	2.7	3.1	3.3	3.5

^a Interstate Commerce Commission, *Transport Statistics in the United States, Railroad Companies, 1966-76*.

^b Federal Railroad Administration, *Accident Bulletin, Summary and Analysis of Accidents on Railroads in the United States, 1966-75*.

^c Association of American Railroads, *Annual Summary of Freight Loss and Damage*.

**Table 28.—Railroad Accident Cost
(Dollars in millions)**

Accident cause category	1966		1975		Percent change	
	Current \$	1975\$	1975\$	Current \$	1975\$	
Injuries to persons.	\$108.5	\$179.9	\$262.2	+ 41.7	+ 45.8	
Total loss and damage of property .	119.2	197.6	240.0	+ 101.4	+ 21.4	
Damage to railroad property.	(99.0)	(164.1)	(177.4)	+ 79.3	+ 8.1	
Damage to livestock	(1.5)	(2.5)	(1.9)	+ 21.4	-26.8	
Freight loss and damage	(18.7)	(31.0)	(60.7)	+ 224.9	+ 95.9	
Clearing wrecks.	23.0	38.1	73.2	+ 218.6	+ 92.1	
Grand total	250.6	415.7	575.4	+ 129.6	+ 38.4	
Operating revenues.	10,654.7		16,401.9			

SOURCE: Compiled by OTA from Federal Railroad Administration, Association of American Railroads, and Interstate Commerce Commission data.

The applicability of the AAR indices to adjust the costs of clearing wrecks to 1975 dollars may be suspect in view of the fact that many railroad companies hire outside contractors to perform this service. As such, changes in the level of railroad wage rates may not reflect changes in actual labor costs of clearing wrecks. In spite of this fact, the actual cost of clearing wrecks appears to have risen between 1965 and 1975. This may be the result of an increase in certain types of accidents and/or increased labor costs.

Although there has been discussion about the usage of various cost indices in adjusting costs, to put the total railroad accident costs in perspective, the consumer price index was used to adjust the various costs to constant **1975 dollars**.

Table 29 presents the breakdown of various railroad accident costs (previously shown in table 27) as a percentage of total railroad accident costs by year. As seen, the cost of injuries to persons averaged approximately 45 percent of total railroad accident costs, with a high of 49.1 percent in 1972 and a low of 41.7 percent in **1968**. The "Total Loss and Damage to Property" category has also been approximately 45 percent of total railroad accident costs, ranging from a low of **39.6** percent in 1972 to a high of 48.0 percent in 1968. The cost of clearing wrecks rose gradually from 9.2 percent in 1966 to 13.8 percent in 1974 and then fell to 12.7 percent in **1975**.

Table 29.—Percentage of Total Railroad Accident Costs

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Injuries to persons.	43.3	44.3	41.7	42.2	43.5	47.2	49.1	45.4	42.7	45.6
Total loss and damage to property	47.5	46.0	48.0	47.2	45.0	41.9	39.6	41.1	43.4	41.7
Damage to railroad property	(39.5)	(37.2)	(38.7)	(37.4)	(34.2)	(31.3)	(30.0)	(32.2)	(33.2)	(30.8)
Damage to livestock	(0.5)	(0.6)	(0.5)	(0.5)	(0.5)	(0.6)	(0.5)	(0.5)	(0.4)	(0.3)
Freight loss and damage	(7.5)	(8.2)	(8.8)	(9.3)	(9.1)	(10.0)	(9.1)	(8.4)	(9.4)	(10.6)
Clearing wrecks.	9.2	9.7	10.3	10.7	11.5	11.0	11.3	13.3	13.8	12.7
Grand total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: Compiled by OTA from Federal Railroad Administration, Association of American Railroads, and Interstate Commerce Commission data.

RAILROAD INDUSTRY PREVENTIVE COSTS

For the purpose of determining railroad industry expenditures in the areas of safety prevention, the available database includes the Interstate Commerce Commission Uniform System of Accounts and individual railroad internal accounting systems. The Uniform System of Accounts was designed for the purpose of economic (rate) regulation of railroads and, as such, does not contain detailed safety expenditures.

Internal accounting systems utilized by railroads provide detailed costs by activities that aid management in performing the planning and control functions. Examination of internal accounting systems is a most effective way of identifying the level of industry expenditures in the accident/incident and safety area. However, one of the problems encountered in examining various railroad internal accounting systems is that only those safety expenditures that are directly attributable to each railroad's safety functions can be identified. This occurs because a large portion of safety costs are common costs. The common cost problem occurs whenever multiple outputs result from a set of inputs. When this is the case, all of the inputs contribute, in common, to the production of all of the outputs, and there is no way of uniquely assigning an increment of inputs to an increment in a particular output. Alternatively, reducing the level of a particular output, say safety, will not reduce the input requirements and, therefore, the costs. For example, signal systems contribute both to safety and to operational efficiency, and it is not possible to logically allocate a portion of signal costs to each of these functions.

Another problem associated with identifying safety expenditures is the lack of standard accounting systems. Even in instances where railroads have responsibility accounting systems, the basic structure of the system and the particular chart of accounts may not be sufficiently comparable to permit a detailed and comprehensive analysis of safety expenditures. Since some of the railroad responsibility accounting systems are based on a functional organization of accounts, while others are based on an objective organization, this difference in organization severely limits the comparability of the accounts. Although all railroads are required to maintain a specific set of accounts for purposes of reporting to the ICC, these accounts yield very little information about railroad safety expenditures.

Thus, the total cost of railroad safety programs cannot be identified because:

- The uniform system of accounts does not isolate safety program costs.
- Even though some railroads have internal accounting systems that identify such costs, these systems are not comparable from railroad to railroad.
- Because a significant portion of safety prevention costs are common costs, they cannot be identified. Furthermore, these costs could not be identified, even if an appropriate accounting system were available, without arbitrarily allocating such costs among safety and other operating purposes.