ECONOMICS OF UNIT TRAINS

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B. A., Tabor College, 1971

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Agricultural Economics

Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1974

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CHAPTER I

INTRODUCTION

The Unit Train Concept

The unit train is a management technique that permits efficient planning through long-range contractual commitment of shipper and carrier and dedication of the equipment. Specifically, a unit train consists of a dedicated set of haulage equipment loaded at one origin, unloaded at one destination each trip, and moving in both directions on a predetermined schedule.[1]

No new technological change was necessary to introduce the unit train. It represents a breakthrough in concept. For the railroad, it means getting back to what rails do most efficiently, carry large tonnage of one product in specialized equipment from one point to another.[2] The challenge it offers to motor carriers, bargelines and pipelines is steadily increasing. It is becoming one of the most potent weapons with which the railroads can fight their unending war against their competitors.

To help distinguish between a conventional train and a unit train, we need to precisely define a unit train's attributes:[3]

(1) The rolling stock and engines must be dedicated to a particular unit train service.

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[1] Thomas O. Glover, "Unit Train Transportation of Coal: Technology and Description of Nine Representative Operations," U. S. Department of the Interior, Bureau of Mines [Washington, 1970] (U. S. Bureau of the Mines. Information Circular 8444), p. 1.

[2] "Fast Track for the Unit Train," Dun's Review, April, 1968, p. 66.

[3] "Highballing to Market in Unit Trains," A. T. Kearney and Co. Inc., Chicago, Illinois, February 1968, pp. 10-11.

(2) The rolling stock, engines and terminal facilities must be under unified control. This is facilitated by single party ownership of all equipment, terminal facilities, and right of way.

(3) The train should run between fixed points. To obtain fast turn around, specialized terminal facilities for fast loading and unloading must exist. Such facilities can be economically justified at only a limited number of locations.

(4) A rigid schedule must be established and adhered to. Since the service is specialized, it would not be economical to maintain equipment and personnel on stand-by awaiting the arrival of a unit train. Relatively large quantities of goods are involved. Shippers will therefore be unwilling to pay storage and handling costs incurred while waiting indefinite periods for the unit train to arrive. Also, a rigid schedule may allow railroads to operate unit trains in off-peak times.

(5) The total train weight (payload plus car weight) must remain relatively fixed. Many of the economic advantages are lost if excess engine capacity is assigned or if the unit train must wait while additional engine capacity is obtained.

At a minimum, two conditions must exist for unit train service to be instituted.[4] First, the instituting railroad must have a reasonable expectation of increasing net revenues through unit train service. This can be achieved either as a result of increasing gross revenue at a given level of

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[4]T. Q. Hutchinson, "Feasibility of Unit Trains for Moving Apples and Lettuce from the West," Marketing and Transportation Situation, U. S. Department of Agriculture, Economic Research Service, May, 1973, pp. 18-19.

cost or reducing cost at a given level of gross revenue. Second, prospective customers must have a reasonable expectation of increasing their net revenues. This result can be obtained through reduced transportation charges, increased sales, higher commodity prices as a result of increased market quality or some combination of the above.

Although the development of the unit train concept derived its initial thrust in the transportation of coal, its application has been extended to a long list of commodities. Such commodities as fertilizer, sand, iron ore, wheat, corn, soybeans, sugar, canned vegetables, flour, and others, to some extent, have already enjoyed the economy offered by unit train transportation. The unit train concept could be further extended to a host of commodity movements provided shippers and receivers are willing to make the necessary investments in loading and unloading facilities and railroads are able to economically complete the system within the bounds set by the Interstate Commerce Act.[5]

Statement of Objective

This study attempts to: 1) analyze the regulatory economic climate which gave birth to present day unit train service, 2) determine what incentives are necessary to the carrier, shipper and receiver for instigating unit train service, 3) analyze the effect unit train service has had on the development of containerized freight, 4) analyze the past, present and future application of unit train service in Kansas, and 5) summarize the advantages and disadvantages of unit train service over single car service.

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[5]Gus Welty, "Unit-Trains: Traffic by the Trainload," Railway Age, September 24, 1973, p. 32.

CHAPTER II

EVOLUTION OF UNIT TRAIN REGULATION

Regulation Prior to 1958

Although the unit train concept was known before the turn of the century, railroad management was unable to use the technique due to restrictive Interstate Commerce Commission policy. The Commission held that reduced rates for trainload lots demonstrated "undue preference" to large shippers and "unjustly discriminated" against small shippers who could not provide a trainload, in violation of Section 3 of the Interstate Commerce Act of 1887.[1] The Commission maintained this restrictive policy, rejecting multiple-carload rates, until 1939.

In a case decided in 1939, the Commission first authorized a departure from its policy of prohibiting lower rates per ton on multiple car shipments. This ruling, in Molasses from New Orleans, Louisiana to Peoria and Pekin, Illinois, authorized water competitive railway rates on molasses in tank cars, minimum of 1,800 tons (about 38 carloads) from certain Louisiana origins to Peoria and Pekin, Illinois.[2] The Commission stated: "We find nothing unlawful in the establishment of railroad rates on a quantity larger than a carload, when moving a single shipment . . . designed to meet competition from other modes of transport whose unit of transportation is not limited to single carloads, provided a just and reasonable relation in rates as between the larger

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[1] Paul W. MacAvoy and James Sloss, Regulation of Transport Innovation (New York: Random House, 1967), pp. 14-15.

[2] Molasses from New Orleans, Louisiana to Peoria and Pekin, Illinois 235 I. C. C. 485 (1939).

and smaller quantities of the same traffic is maintained."[3]

Although the I. C. C. decision in the molasses case was a dramatic change in policy, favoring certain multiple-car shipments, it did not completely clear the track for unit train operations. Between 1939 and 1958, a number of multiple-car rates, which were compensatory to the carriers involved, were condemned because they were found to be "lower than necessary to meet competition."[4] Railroads issuing tariffs which in the opinion of the Interstate Commerce Commission were "lower than necessary to meet the competition" were considered engaging in "destructive competition" prohibited by the national transportation policy.[5] The policy which the Commission pursued at that time is sometimes described as "fair sharing." This means the attempt to equalize the relative advantages and disadvantages of competitive modes of transportation so that their attractiveness to the shipper is approximately the same. Expressions of the "fair sharing" mentality can be found throughout the history of multiple-car rate decisions, in cases where the rate gained approval as well as where it failed to do so. An example of this philosophy can be easily seen in the first molasses case. Although private barge competition was said to be the sole reason for allowing the new technique, the proposal failed, in part, because it went further than was necessary to meet the competitive situation.

Also, during this same period, the Commission was unwilling to approve

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[3] Ibid., p. 502.

[4] "Interstate Commerce Commission member (Charles A. Webb) sees Clear Track for Trainload Ratemaking," Transport Topics, No. 1475: 81, November 18, 1963.

[5] George E. McCallum, New Techniques in Railroad Ratemaking, Washington State University, 1968. Bureau of Economic and Business Research, Study No. 44, p. 124.

multiple-car rates which deviated widely from their carload counterparts. Multiple-car/single-car rate ratios lower than eighty-five percent were generally disapproved.[6] After the Transportation Act of 1958, this consideration became relatively unimportant.

Regulation Subsequent to 1958

The late 1950's found the railroad facing new competition. In 1958 a 10-inch pipeline was opened for movement of coal in slurry form directly from the mine to an electricity generating station for a rate per ton considerably below the applicable carload freight rate. The success of this first line led to proposals for building several other pipelines to serve other generating plants.[7]

A second technological development favored the transport of electricity over the shipment of the energy resource for the production of electricity. Several East Coast utilities proposed building extra-high-voltage transmission lines from proposed mine-mouth generating stations to major consumption areas. The project was justified on the grounds of "lower cost" for electricity transmission as compared with those for carload transport of coal.[8]

The third major threat to railroad traffic was the replacement of utility companies' coal traffic by imported fuel oil. By 1959, a number of Atlantic seaboard generating companies had been transferring large shares of their boiler fuel requirements to imported fuel oil.[9]

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[6] Ibid., p. 121.

[7] Paul W. MacAvoy and James Sloss, op. cit., p. 27.

[8] Ibid., p. 28.

[9] Ibid., p. 26.

While the imported fuel oil threatened East Coast demand for coal transportation, the coal slurry pipelines and the high voltage transmission lines were threats to coal transport to both coastal and interior locations. The railroads response to this intense competitive pressure was the introduction of trainload service and rates.

Although many of multiple-carload tariffs approved by the Commission constituted place discrimination, the Commission justified wide variations in rate-cost differences on the basis that the railroads had no other recourse: other fuels would displace coal in electricity generation, if rates were uniform per mile of transport, with the consequences that the railroad would lose large tonnages of traffic.[10] The tailoring of carload rates to meet the competition of unregulated transporters was given complete approval by the Commission in 1960 in the case of Coal to New York Harbor Area.[11] The Interstate Commerce Commission stated that differences in rates did not constitute "unlawful discrimination" if these differences were necessary to protect regulated carriers from competitors beyond the reach of regulation.[12]

Several subsequent multiple-car rate cases have carried this policy a step further and have been of great importance in unit train rate making. One such case was the New Haven case in which the Supreme Court abolished the so-called "umbrella theory" of rate making. In this case, in reference to the Transportation Act of 1958, the Supreme Court stated:

> . . . it is clear that Congress did not regard the setting of a rate at a particular level as constituting an unfair or destructive competitive practice simply because

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[10]Ibid., p. 69.

[11]Coal to New York Harbor Area, 311 I. C. C. 355 (1960).

[12]Ibid., p. 367.

> that rate would divert some or all of the traffic from a competing mode.[13]

Thus the Supreme Court rules that the "lower than necessary to meet competition" test was outlawed by the Transportation Act of 1958.

Another land-mark case in multiple-car rate making is the famous "Big John" case, involving drastically reduced rates on grain. In this case, the Commission held railroad out-of-pocket costs to be the criteria used in determining the transport mode having an inherent cost advantage where the primary competition to be met is that of unregulated transportation. The Commission said:

> . . . the Commission departed from the fully distributed cost standard in ascertaining the inherent advantage of the low cost mode in the instant proceeding because the dominant portion of the considered grain traffic moves by an unregulated mode. Where such a situation exists, it was concluded that the inherent advantage of competing regulated modes should be evaluated in the light of a cost standard that will encourage increased movement by a regulated mode. Accordingly, it was determined that a comparison of out-of-pocket costs is the appropriate method for ascertaining whether the respondents [railroad] or the barge-lines held the inherent competitive advantage on this movement.[14]

On the basis of the decisions in the "New Haven" and "Big John" cases, it can be construed that unit train tariffs find Interstate Commerce Commission approval more easily now than in the past. However, rates which destroy the competitive position of regulated carriers possessing an inherent cost advantage or which are unduly discriminatory, preferential or prejudicial or

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[13]Interstate Commerce Commission v. New York, New Haven and Hartford Railroad Co., et al., 372 U. S. 745 (1963).

[14]Grain in Multiple-Car Shipments - River Crossings to the South 325 I. C. C. 772 (1965).

non-compensatory are still condemned by the Commission.[15] In keeping with these general rate making guidelines, the Commission has often deviated from unit train rate making precedents in cases where dissimilar circumstances warrant it. For example, when unregulated competition is not present, as was the situation in the "Ingot Molds" case,[16] the Commission is less likely to use out-of-pocket costs as valid criteria in establishing whether a unit train rate is compensatory, especially if there are objections raised by other railroads.

It has been especially hard to predict exactly what constitutes unjust discrimination. Here again, dissimilar circumstances can cause different decisions in unit train rate cases. For example, due to the shortage of train cars, the Commission has at times condemned unit train tariffs which call for the use of carrier furnished cars.

In the case Grain by Rent-a-Train, IFA Territory to Gulf Ports, the Commission stated:

> With that [boxcar] shortage growing in dimensions, any plan which has the effect of removing a portion of the supply of cars available to all shippers in times of great demand and dedicating that portion of the already inadequate supply to the exclusive use of particular shippers is unjustly discriminatory, and unduly preferential and prejudicial.[17]

Thus, the tariff was held in violation of sections 2 and 3 of the Interstate Commerce Act.

Although the Transportation Act of 1958 as interpreted by the Supreme Court has had a favorable impact upon unit train development as a whole, the

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[15] Transport Topics, loc. cit.

[16] Ingot Molds, Pa., to Steelton, Ky. 326 I. C. C. 77 (1965).

[17] Grain by Rent-a-Train, IFA Territory to Gulf Ports 339 I. C. C. 584 (1971).

precedents set by the Commission in unit train rate making cases are far from clear. Only a general trend can be construed from rate making precedents. In general the Commission has tended to approve unit train tariffs which are below fully distributed costs when their competition is unregulated and has not approved unit train tariffs below fully distributed costs when their competition is a rival regulated carrier. Even this general principle has been violated in certain situations. Thus, on the basis of precedent, it is very difficult to predict with any degree of confidence, the fate of future unit train tariffs which are tested before the Commission.

CHAPTER III

INCENTIVES FOR UNIT TRAIN DEVELOPMENT

Carrier Incentives

In a free economy, such as ours, the primary motive force in bringing about change in any industry is profits. In exploiting unit train potential, railroads need to coordinate their profit motive with the profit motive of their customers and potential customers. In contrast to conventional rail operations, the intensity of planning, as well as the degree of control over aspects of the operation are much greater and more sophisticated in unit train planning. This intense planning is a key to attaining the efficiency necessary to reduce costs sufficiently to more than offset the reduction in rate. Systems designed to serve the needs of the customer through realistic pricing of the service, and by sharing the increased productivity with the customer should yield greater application of the concept and thus yield greater profits to all involved.[1] Reflecting the complexities involved in negotiating unit train service, unit train tariffs are usually rather lengthy and detailed as illustrated in Appendix A.

Often the principle restriction to a unit train move where interlining between two railroads is necessary, is the inability of the railroads to agree to join in the service.[2] The problems of interlining unit train movements are magnified over those of a single line to the extent that it is virtually

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[1]Robert N. Morris, "The State of the Unit Train Art," Unit Train Operations, Railway Systems and Management Associations [Meeting of Sept. 29-30, 1966] Chicago, 1967, p. 12.

[2]Ibid., p. 16.

impossible to achieve optimum performance when interlining is necessary. Historical evidence indicates that single responsibility for the unit trains' success brings about greater awareness of competitive threats, whereas inter-line hauls tend to fragment the attention of each company taking part.[3] Therefore, mergers open up new opportunities for unit trains.

The railroads' low incentive rates, often as low as 50 percent of regular rates, are a necessary inducement for starting the chain of events which ultimately lead to mutual benefits.[4] While conventional rail rates are based on a number of different rate-making systems, including to some degree, cost of service, the costing and subsequent pricing of a unit train operation is much simpler.[5] In developing the costs involved in the movement of conventional single car freight, operating expenses such as road crew and locomotive costs must be assigned to the car in some equitable way, usually on a tonnage basis. But the costs will vary depending on the size of train, whether the train is a through or way train and other arbitrary costs. Thus, conventional rates based on "cost of service" are averages at best which may or may not reflect actual conditions. Switching costs are assigned in a similar inaccurate fashion. Equipment cost will vary depending on such factors as type of equipment, utilization factor and empty return ratio (which

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[3]Lawrence T. Forbes, "Marketing the Unit Train," Unit Train Operations, Railway Systems and Management Associations (Meeting of Sept. 29-30, 1966) Chicago, 1967, p. 70.

[4]Lewis K. Sillcox, "The Challenge of the Unit Train," Unit Train Operations, Railway Systems and Management Associations [Meeting of Sept. 29-30, 1966] Chicago, 1967, p. 5.

[5]Association of American Railroads Superintendents, "Advantages and Disadvantages of Unit Trains," Report of Committee No. 5 [In the Association's Proceedings of the Seventy-Third Annual Meeting and Committee Reports] Chicago, 1969, p. 145.

can rarely be stated with any degree of accuracy). In contrast, unit train operating costs can be ascertained with near perfect accuracy.[6] Since the train's route and schedule are known and constant and since power requirements and train size are constant, such costs can easily be distributed to freight movement. Often no switching costs are involved and since cars are dedicated to the train, their entire investment and maintenance cost is simply prorated over the entire unit train movement for as long as it is expected to last or until the equipment wears out, whichever comes first. Although this comparison somewhat oversimplifies costing and does not consider all costs involved, such as allocations of sunken costs, management services costs, etc., it serves to illustrate the relative preciseness of unit train costing.

Since conventional rates are tailored to some extent to the cost of service, many rates could be reduced simply by eliminating some expensive options included in rates. For example, the present grain rate structure has built in it the cost for performing up to three transits en route for the shipper.[7] This means more switching which implies poorer utilization of equipment and more damage to equipment. Presently, whether a shipper uses the transit en-route privileges or not, the conventional trains' grain rate structure has built in this cost, so he pays for it. Of course, unit trains could not perform transits en-route but their rates wouldn't reflect such costs either. This illustrates further that unit train customers are charged according to actual costs involved in moving their freight as compared to conventional trains' average cost-based rates.

Essentially, railroads operating unit trains can be considered

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[6] Ibid.

[7] Ibid.

wholesalers of freight, where long term shipping contracts of bulk freight are scheduled on a regular basis.[8] It is because of the volume of movement and regularity of movement that freight costs per ton mile are drastically reduced. Properly implemented, the unit train can offer remarkable cost savings through greatly improved equipment utilization, through the elimination of much terminal time, and by avoiding the classification of cars and attendant yard costs experienced in ordinary service.[9] Often savings are also realized through more efficient use of crew labor, through the reduction of supervisory, clerical and operating personnel and through the elimination of weighing of cars.[10]

Compared to unit train utilization of equipment, the conventional rail car can be considered wasteful both in terms of time and money as depicted in Figure 1. Rail cars in conventional trains move on the average only 2 1/2 hours a day or about 10 percent of the time.[11] Of the 10 percent, nearly 4 percent is empty car movement so actual revenue service movement reduces to 6 percent of the time.[12] Consequently, the average rail car moves only 52 miles per day.[13] During the 90 percent of the time when the car is not moving, 40 percent of the time is spent in the customers' yards and 50 percent of the

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[8]Lewis K. Sillcox, "Bulk Freight," Canadian Railway Club, Official Proceedings, V. 57, No. 4, p. 37, April 13, 1964.

[9]Robert N. Morris, loc. cit.

[10]Ibid.

[11]Arthur G. Bailey, "The Economics of Unit Trains," Unit Train Operations, Railway Systems and Management Associations [Meeting of Sept. 29-30, 1966] Chicago, 1967, p. 19.

[12]Ibid., p. 20.

[13]Ibid.

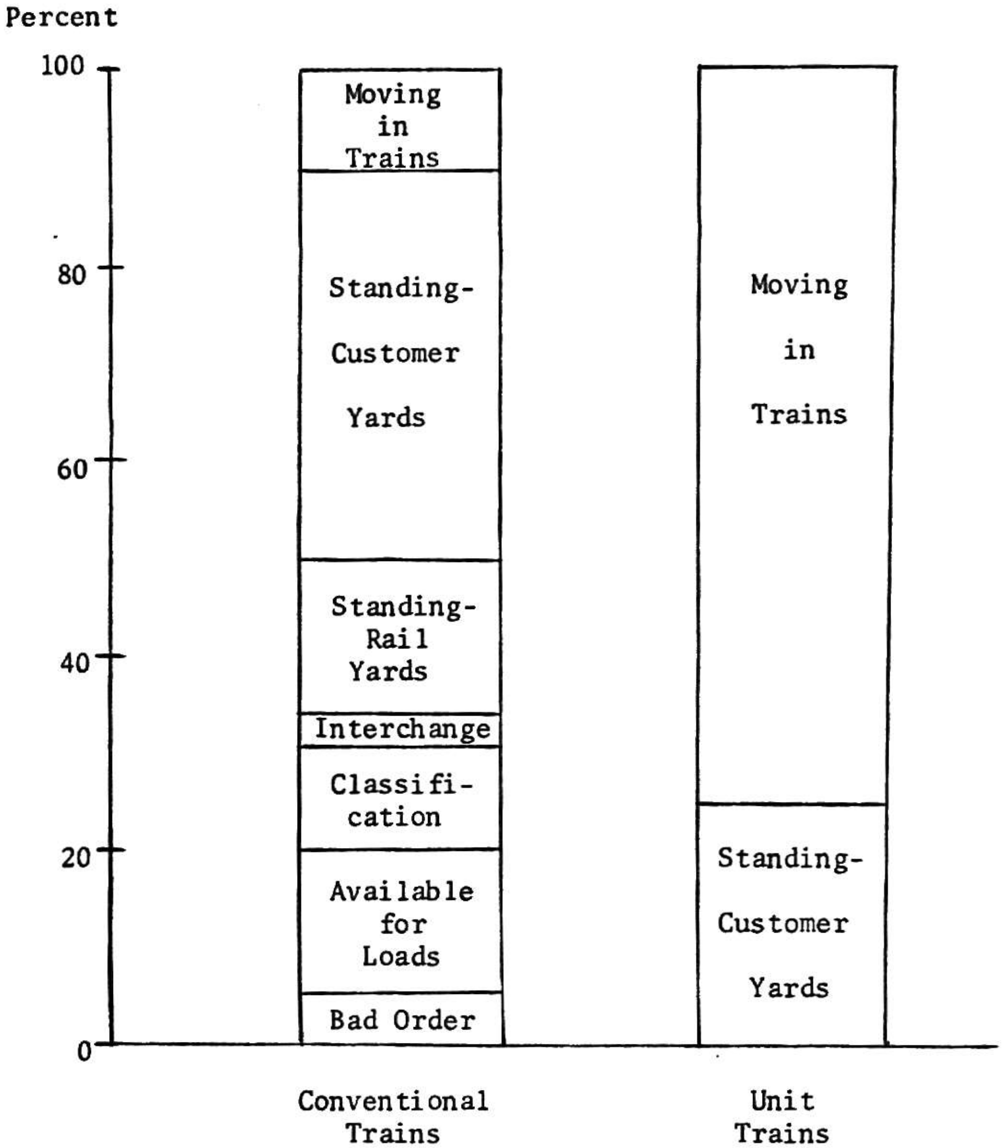

Figure 1

Car Equipment Utilization Comparison:
Conventional and Unit Train

Source: Arthur G. Bailey, Unit Train Operations, Railway Systems and Management Associations [Meeting of September 29-30, 1966] Chicago, 1967, p. 20.

time is spent in rail yards.[14] The unit train operation attacks this deplorable utilization situation in both places. The 50 percent rail yard time is virtually eliminated and the 40 percent customer yard time is drastically reduced to half and in some cases much further.[15]

The average unit train is moving 75 percent of the time with some moving as much as 90 percent of the time.[16] While the average unit train moves 450 miles a day, the average intercity motor carrier moves only 300 miles a day.[17] The increased utilization of equipment made possible through fast turnaround and high volume movement, is one of the prime reasons for the success of the unit train concept. It is a large part of the reason for the greater percentage of net income on gross revenues which unit trains realize compared with conventional trains. The unit train percentage of net income on gross revenue is estimated to average twice that of the 8 percent industry average as shown in Figure 2.[18]

Regularity of shipments is an essential asset of unit trains. Irregularity of shipments destroys the unit train's primary advantage, of lower costs through greater utilization of equipment.[19] Gathering cars at a loading point and then dispersing them at the unloading point just for sake of trainload movement does not necessarily result in economic savings. This type of service can easily cost the railroad more than would normally occur when cars

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[14]Ibid.

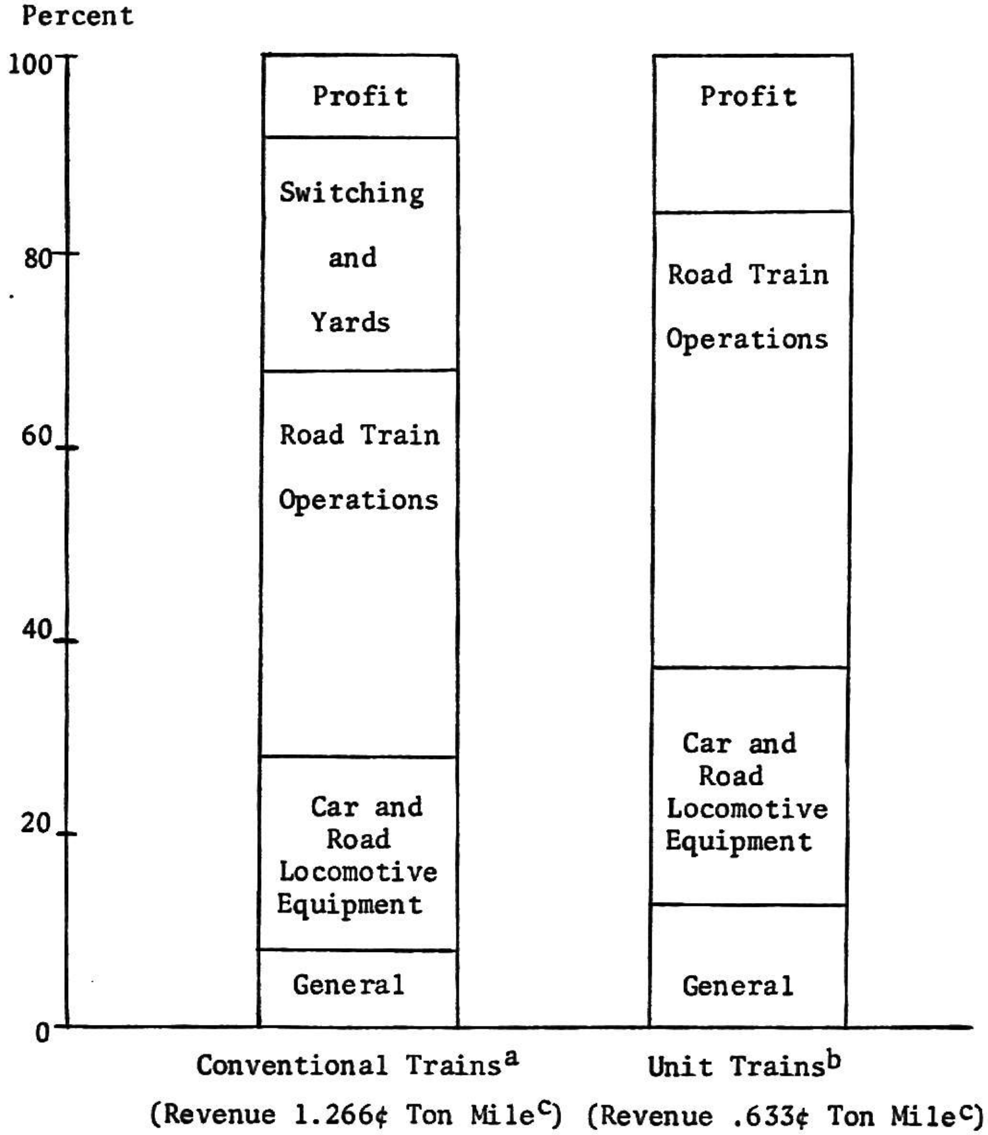
[15]Ibid.

[16]Ibid.

[17]Ibid.

[18]Ibid.

[19]Jervis Langdon, Jr., "Management Views the Unit Train," Unit Train Operations, Railway Systems and Management Associations [Meeting of September 29-30, 1966] Chicago, 1967, p. 3.



[a]1965 average for class I railroads

[b]1965 unit train averages estimated

[c]Since 1965, when unit train movements were predominantly coal traffic, the difference in average revenue rates between conventional and unit trains has substantially decreased.

Figure 2

Economics of Trains

Source: Arthur G. Bailey, Unit Train Operations, Railway Systems and Management Association [Meeting of September 29-30, 1966] Chicago, 1967, p. 21.

are individually fed into regularly scheduled or overflow trains. Conversely, optimum unit train utilization of equipment occurs when there is fast turn-around and full load movements in both directions of the shuttle.[20]

For rail cars used in unit train service, certain maintenance costs are sharply reduced. This is due to the fact that a substantial portion of rail car damage is incurred in terminals where switching cars from one train to another results in shock and damage to equipment.[21] Since unit trains avoid switching and classification yards, damage and maintenance associated with such functions are also avoided. Therefore, most of the car maintenance costs are a direct function of the miles operated and as a result can be planned for in a more regular way.

In financing rail equipment, the financier wants assurance that the equipment will be utilized over the life of the loan. He wants to be assured that the equipment being financed can generate sufficient revenue to pay for itself over the loan repayment period. Ideally, he would like to see the shipper contract freight movement with the carrier for the life of the equip-ment, and he would like for the receiver to pledge to buy this freight volume thus assuring utilization of equipment during the critical months of loan repayment.[22] Obviously, such pledges from the shipper and receiver would not be possible in normal rail freight movements; however, in the special case of unit trains, such arrangements are not uncommon. Therefore, the railroad is

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[20] Ibid.

[21] Lewis K. Sillcox, "Bulk Freight," op. cit., p. 53.

[22] C. L. Bergmann, "Imaginative Financing," Integral Trains, Railway Systems and Management Associations [Meeting of May 27-28, 1963] Chicago, 1963, p. 6.

better able to finance equipment when used in unit trains because of greater confidence in its profitability.

Although theoretically, unit train equipment can be furnished by either the railroad, shipper, receiver or some combination of the three, a study conducted by Arthur G. Bailey, an Associate with the management consulting firm of A. T. Kearney and Company concludes that railroads can experience a higher return on investment when their customers furnish the cars and locomotives as shown in Figure 3. In 1965 while the average return on investment for Class I railroads was 3.68 percent, it was estimated that the combined effect of a better than average net income return on revenue and the railroads' reduced investment by reason of customer furnished cars resulted in a 10 percent return on investment for unit trains as shown in Figure 3.[23] If the customer furnished the locomotive power also, a 12 1/2 percent return on investment could be realized.[24] Thus, according to this study, the more the customer invests in railroad equipment, the greater the railroads' return on investment is. Bailey suggests that railroads' purchases of new unit train equipment lowers the railroads' potential return on investment since under this arrangement, the customer is not as financially bound to one mode of transport and therefore, is more likely to switch to an alternative mode of transportation, leaving the railroad with underutilized equipment. Obviously, however, railroads which already own equipment which is underutilized would benefit by utilizing their own equipment in unit train service. Another advantage of customer-owned equipment is that the burden of obsolescence does not rest on the railroads.

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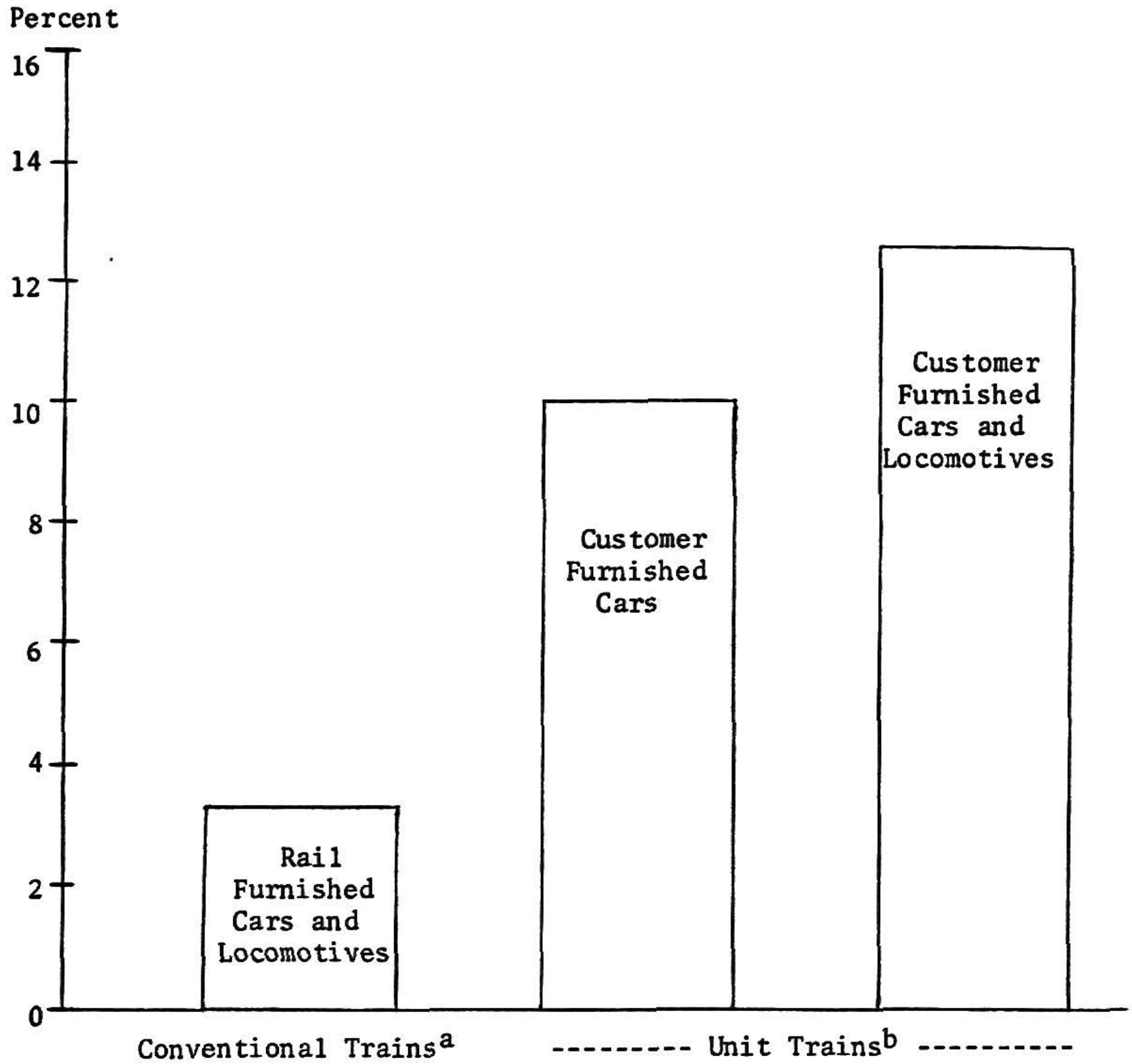
[23]Arthur G. Bailey, op. cit., p. 24.

[24]Ibid.



[a]1965 average for class I railroads

[b]1965 unit train averages estimated

Figure 3

Return on Investment

Source: Arthur G. Bailey, Unit Train Operations, Railway Systems and Management Associations [Meeting of September 29-30, 1966] Chicago, 1967, p. 24.

Unit trains are expected to strengthen railroads in a number of ways. The first mission of the unit train for the railroads is to assure retention of traffic which the rails already hold but which might otherwise be lost to a competitive mode of transport.[25] A prime example where unit trains are performing this function is in the coal industry where unit trains are largely responsible for retaining coal traffic to utility companies.

The second objective of unit trains is to expand the volume of freight on commodities which the railroad has historically hauled.[26] By lowering the freight rate, the demand for the commodity should increase, through the expansion of market area made possible by the lower freight rate.

A third expectation from unit trains is that they will be a means of regaining traffic already lost to competing modes of transport.[27] This potentiality has already been proven in the Ohio coal pipeline situation and railroads are hopeful that sufficiently low rail costs and rates will ultimately cause a slowdown in the expansion of petroleum products pipelines thus expanding rail freight as existing facilities deteriorate.

Lastly, unit trains are expected to create shipper demand for transportation of commodities which in the past have not moved due to prohibitively high transport costs.[28] Although a specific example is hard to cite, it is not hard to imagine the exploitation of certain mineral deposits in the United

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[25] A. J. Gellman, "The Integral Train and Its Environment," Integral Trains, Railway Systems and Management Associations [Meeting of May 27-28, 1963] Chicago, 1963, p. 8.

[26] Ibid.

[27] Ibid.

[28] Ibid.

States which as yet are untapped because of the cost of transportation.

In summary, unit train traffic can come from a combination of sources such as barge, truck, pipeline, or traffic not previously entering distribution channels. It should be remembered, however, that any transfers from conventional to unit train service would not increase gross rail revenue.[29]

Shipper and Receiver Incentives

The shipper and receiver are primarily interested in reducing overall transportation costs. Where unit train service has been instituted, this objective has been met through a combination of lower freight rates and better service.

The Chicago, Rock Island and Pacific Railroad offers modified unit train service from Midwest states plus Texas and Oklahoma on corn and soybeans shipments. Their reduced rates, which are 10 to 25 percent below single car rates, apply to unit trains composed of a minimum of 54 cars gathered from Rock Island points.[30] Each participating origin point must contribute a minimum of five cars. While normally, the railroad places the burden for a required annual volume on the shipper, Rock Island places the burden of 100,000 tons of annual volume on the receiver at the port since it is the receiver who exports shiploads of grain and who has the greatest ability to deal in large annual volumes.[31] To lessen railroad costs, Rock Island requires big-volume receivers to contract for a minimum of five consecutive unit train movements

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[29]T. Q. Hutchinson, "Feasibility of Unit Trains for Moving Apples and Lettuce from the West," Marketing and Transportation Situation, U. S. Dept. of Agriculture, Economic Research Service, May, 1973, p. 19.

[30]"Rock Island Offers Reduction on Grain Rates," Railway Age, August 10, 1970, p. 13.

[31]Ibid.

to be eligible for the reduced rates.[32] The Rock Island unit train service is designed to broaden the market for the farmers' grain, alleviate the country elevator of large quantities of grain quickly, and allow the exporter to purchase larger quantities of grain on a scheduled basis thereby reducing ship and car demurrage costs.

Although rate reductions in unit train service are important and have been substantial, there are other benefits in the form of improved service which have also had significant impact on unit train service development and success. The shipper and receiver do not focus their attention solely on the transportation rate but are seeking the lowest overall cost of transporting freight. In overall costs, such factors as inventory time in transit, damage, loading and unloading costs, regularity of service and its effect on inventory costs and many other factors are given consideration.[33] The service is much more satisfactory if it eliminates some previous transportation problems. Such unit train advantages as elininating delays, reducing loss and damage to freight, reducing inventory costs at either the receiver or shipper end or both, and faster service can offer real cost savings potential to the shipper and receiver.[34]

An example where warehousing is avoided both on the shipping and the receiving end is in Southern's auto parts train which operates daily from Cincinnati to Atlanta.[35] This train is actually part of the auto assembly

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[32]Ibid.

[33]Alfred E. Perlman, "Unit and Integral Trains in Perspective," Integral Trains, Railway Systems and Management Associations [Meeting of May 27-28, 1963] Chicago, 1963, p. 2.

[34]Robert N. Morris,loc. cit.

[35]Ibid.

line thus the maintenance of very rigid schedules is essential to its success.

A very significant factor to the automobile movement revolution was improved service. On March 20, 1970, General Motors dispatched its first unit train from Chicago to Los Angeles, carrying cars and parts.[36] Carrying over 1 million dollars worth of new cars, it made the trip non-stop in 62 hours, almost a full day faster than conventional freight. In 1972 GM established the need for a total of five daily unit trains going from the Midwest to San Francisco, Los Angeles, Atlanta and Arlington, Texas and one going from Kansas City to Chicago.[37] The run from Kansas City to Chicago was established because of extreme damage incurred to new automobile moving between the two cities. By by-passing both the Kansas City and Chicago rail yards, damage, theft and vandalism have virtually been eliminated. The unit train is responsible for having halted a ten-year rise in transit damage, substantially reducing transit time and eliminating the nagging problem of lost cars.[38] While it is relatively easy to lose a car it is relatively hard to lose a train.

As is the case in automobile movement, speed quite often is an essential reason for establishing a unit train service. Perishable commodities, such as meat, fish, fresh fruit and vegetables move under refrigeration and usually move over long distances. Rapid movement reduces the investment in equipment assigned to such service, increases the marketable life of the commodity, and reduces damage often incurred in switching.[39]

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[36] "Unit Trains and Containers Combine to Cut General Motors' Damage Bill," Traffic World, March 20, 1972, p. 43.

[37] Ibid.

[38] Ibid.

[39] Lewis K. Sillcox, "Bulk Freight," op. cit., p. 40.

Improved quality control and increased operating efficiency were important considerations for instituting a weekly 60-car unit train movement of citrus juices from Bradenton, Florida to Kearny, New Jersey.[40] Tropicana Products, Inc., the world's largest producer of chilled citrus juices, believes the unit train opens a new era in citrus juice distribution. Although the present unit train services only domestic markets, Tropicana studies give evidence that it may cost less to ship juice to New Jersey by unit train and ship the juice from there to European markets than it presently costs to ship juice directly from Tampa to Europe.[41]

Another advantage unit trains can offer shippers and receivers is simplified billing. For example, only one bill of lading and one freight bill is processed for a unit train while 50-100 separate bills of lading and freight bills would normally be handled for similar volume movement in conventional trains.[42]

The Soo Line Railroad and Pennsylvania Railroad in jointly sponsoring a unit-train wheat tariff from Duluth, Minnesota to Buffalo successfully initiated the first unit grain train in the United States by offering the Lake Superior millers substantially more wheat shipping flexibility.[43] The unit train rate which applies during the winter months when the lake is frozen allows the millers to take advantage of the peculiarities of the wheat pricing structure. Robert Alexander, director of Transportation and Distribution of

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[40]"Unit Train Hauls One Million Gallons of Orange Juice a Week," Railway Age, June 29, 1970, pp. 52-53.

[41]Ibid.

[42]Robert E. Alexander, "The Shipper Views the Unit Train," Unit Train Operations, Railway Systems and Management Associations [Meeting of September 29-30, 1966] Chicago, 1967, p. 83.

[43]"Grain by Unit Train," Railway Age, January 20, 1964, p. 121.

the Pillsbury Company, explains the reason Pillsbury and other millers have used the unit train:

> Due to the heavy demands for wheat during the fall inventory accumulation period, premiums for cash wheat usually advanced significantly. Once this demand was satisfied, the cash premiums dropped rapidly. There was no way that the miller could hedge against this market loss since it occurred in the differential between cash wheat and the wheat futures price.[44]

Thus, the unit train with its low rail rate gave the shipper the flexibility he desired to offset disadvantages he would normally be faced with during the winter months when Great Lakes shipping is halted.

Unit train equipment has in the past been owned by the railroad, shipper or receiver. While the advantages offered to the railroad when equipment is financed by the shipper or receiver has already been discussed, Bailey suggests that the advantages offered to the shipper or receiver are likewise substantial.[45] His theory is that since railroad tariffs are not long term contracts, the railroad is faced with speculation of a possible diversion of the equipment to other, more conventional services. This possibility could suddenly be realized with rail furnished cars in the event the shipper decided to discontinue the unit train service and change to some other transportation alternative. The railroad must charge more for cars than it would cost the shipper or receiver over the long run because a rail tariff cannot be contracted. He suggests, therefore, that with no certainty of continued use of the cars, the railroad must allow for substantial equipment investment in the tariff.[46] Thus, he concludes that equipment furnished by the shipper or

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[44]Robert E. Alexander, op. cit., p. 82.

[45]Arthur G. Bailey, op. cit., p. 25.

[46]Ibid.

receiver pockets the full cost advantage of the unit trains' low cost potential for car equipment utilization.[47]

It is difficult to accept Bailey's argument that the railroad must charge more for cars than it would cost the shipper or receiver, since, both the railroad and the receiver or customer must expect a fair return on their investment plus a return for risk in investing in rail equipment. Apparently, Bailey overlooks the fact that when the carrier or receiver buy cars, they too inflict an added cost of risk of ownership. Their heavy investment in rail equipment makes them inflexible to alternative modes of transportation. Thus their cost is in the form of foregoing alternative transportation opportunities. In contrast, the railroad has much greater flexibility in utilization of rail cars, since the railroad can always integrate cars from a unit train back into other trains.

Another argument in favor of shipper or receiver ownership of equipment is that the carrier furnished equipment would have to be designed along general purpose lines in order to provide for flexibility in its utilization should it become necessary to divert the car to general service usage. The shipper or receiver ownership of equipment allows for greater specialization of equipment to meet the specific needs of the particular situation.[48] The rail furnished car is less likely to be best suited for the shipper or receivers' needs. Tropicana, for example, ordered 150 refrigerated cars for its unit train from Fruit Growers Express with particular specifications which they considered necessary to control the quality of their delivered product,

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[47]Ibid.

[48]T. W. Schroeder, "The Shipper Views the Unit Train," Unit Train Operations, Railway Systems and Management Associations [Meeting of September 29-30, 1966] Chicago, 1967, p. 89.

in this case, citrus juices.[49] Their cars will be equipped with cushioning devices, interior lading protective devices, other special devices for shock absorption, and will be insulated with two-pound-density polyurethane foamed in place.[50] From this list of specifications required for quality control during shipment, it's not hard to understand why Tropicana decided to buy their own cars.

As of 1966, the shippers or receivers had never yet furnished the locomotive power for a unit train, though cost studies suggest savings to shippers or receivers might be realized in so doing. The cost studies indicate that in cases where an interlining movement is involved, substantial economic advantage could be attained through better equipment utilization by dedicating customer furnished locomotive power to the train through the entire route of operation.[51] Where two railroads are involved, it is doubtful that they could attain equally good equipment utilization by having each line furnish their own locomotives as could customer furnished locomotive power dedicated to the entire unit train movement.

In order to successfully develop a unit train service, the receiver and shipper as well as the carrier, of course, must expect greater net benefits as a result. The benefits which have just been discussed must outweigh the disadvantages which sometimes occur as a result of unit train service.

However, there are also some real disadvantages in using unit train service. The major one associated with unit train service is the inconvenience

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[49]"Unit Train Hauls One Million Gallons of Orange Juice a Week," loc. cit.

[50]Ibid.

[51]Arthur G. Bailey, loc. cit.

and expense of shipping in large lots.[52] Loading and unloading within the restrictions of a unit train tariff may seriously disrupt normal operations in a small plant. Nearly any shipper who has not tendered or received large shipments previously, may find it necessary to install expensive loading or unloading facilities.[53] Another common expense, rail siding extensions, are often necessary due to the number of cars being tendered or unloaded at one time. In some situations, especially for small producers, stockpiling is necessary to accumulate sufficient volume for unit train service. The costs involved in handling must be considered as a disadvantage to the shipper. Often times, extra storage facilities must be constructed at either the shipper or receiver end to handle the large inventory requirements.[54] Such is the case at export erminals served by unit trains. Previous low demurrage rates experienced in conventional trains caused exporters to use rail cars as temporary storage facilities until existing elevator space became available or until ships arrived for loading. Faced with stiff penalties for excess loading or unloading time, facilities must be available for quick loading and unloading when unit train service is used.

When the shipper and receiver dedicate large sums of money into loading and unloading facilities, rail cars, and other costs unique to the operation, they restrict their freedom of choice.[55] Once they make a substantial

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[52]George E. McCallum, New Techniques in Railroad Ratemaking, Washington State University, 1968, Bureau of Economic and Business Research Study No. 44, p. 273.

[53]Ibid., p. 274.

[54]William B. Saunders, "The Outlook for Unit Trains," Transportation Journal, Spring, 1964, p. 12.

[55]George E. McCallum, loc. cit.

commitment, alternative transportation advantages would have to be substantial to more than offset the sunken costs invested in facilities and equipment necessary for unit train service. Therefore, sunken costs, usually necessary for successful unit train movement, is another disadvantage which the shipper and receiver must consider in contemplation of unit train service.

Public Incentives

Since the general public pays for transporation costs through the goods and services it consumes, the ultimate benefactor of low-cost transportation is the consuming public. Commonwealth Edison Company has realized very substantial savings through the operation of unit train service between Midland Electric Coal Co. and Joliet. Edison states that as a result of the unit train service fuel cost savings to their customers amounts to more than $4,000,000 per year.[56] Other utility companies have realized similar savings from unit train service which ultimately results in a lower utility bill to the consumer. Thus, the consumer has a very direct interest in low-cost transportation service.

In addition to its immediate gains from low-cost transportation, the general public has a long-term interest in transportation services which promote an efficient allocation of resources, reduce unnecessary instability in employment and strengthen the national defense.[57] Unit trains seem to have two separate effects on employment. First, because of the modern specialized equipment needed in fast loading and unloading and because many operational

[56]Eugene C. Bailey, "Extent of the Market for Integral Trains," Integral Trains, Railway Systems and Management Associations [Meeting of May 27-28, 1963] Chicago, 1963, p. 27.

[57]George E. McCallum, loc. cit.

tasks normally associated with conventional trains, such as switching, are eliminated, significant manpower savings have resulted.[58] For example, automated unloading systems have resulted in a 40 percent cost savings in labor in a number of operations. Unit train service has at times, however, created some new jobs within the railroad company but these jobs usually are of a professional nature.[59] Thus, while such new jobs as "coordinator of unit train operations" are created within the railroad company by introducing unit train service, employment of blue collar workers has tended to decline.

While the unit train service itself tends to lessen employment in the railroad industry, the lower transportation cost which it makes possible could quite easily create additional jobs. For example, in Northern Minnesota where iron ore mining is an essential industry, low-cost unit train service was contemplated in an effort to ship ore to steel mills on a year around basis instead of only seasonally when the Great Lakes are not frozen. A study was conducted concluding that during the winter months when Great Lakes shipping is impossible unit trains' low-cost would make Minnesota's ore more competitive with imported ore which moves by water.[60] If, as a result of an increased ability to compete with imported ore, production of Minnesota useable ore would increase by as little as 5 percent, it was estimated that approximately 480 jobs would be created.[61] Thus, the market expanding potential which

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[58] "Railroad Technology and Manpower in the 1970's," U. S. Department of Labor, Bureau of Labor Statistics, Bulletin 1717, p. 50.

[59] Ibid.

[60] U. S. Area Redevelopment Administration, ARA Case Book, U. S. Department of Commerce, Area Redevelopment Administration, Washington, D. C., U. S. Government Printing Office, 1964 - No. 7, September, 1964, p. 14.

[61] Ibid.

low-cost rates make possible, certainly has the potential of dramatically influencing the communities' economy as well as the aggregate economy of the nation.

CHAPTER IV

UNIT TRAINS AND CONTAINERIZATION

Domestic Freight Potential

For the past several decades, the railroads' share of total ton-miles of intercity freight has been declining as shown in Figure 4. This trend has been caused primarily by the increase in competitive truck, waterway and pipeline transportation as is also evident from Figure 4. Containerized freight moved in unit trains gives the railroads an opportunity to better compete for intercity freight traffic.[1] It may be a way for the railroads to stop the decline and regain a greater percentage of total ton-miles of intercity freight traffic.

Of the three basic types of railroad equipment alternatives in moving intercity freight, boxcars, trailers on flat cars, and containers on flat cars, greatest economic benefits are offered through COFC when permanently coupled in a unit train.[2] Box cars are easily eliminated as the most practical alternative because their use results in excessive material handling time and cost.[3] In evaluating TOFC and COFC alternatives, consideration must be given to minimization of the ton weight of the train and thus the total weight that the engines must pull. This minimizes both operating expenses and investment

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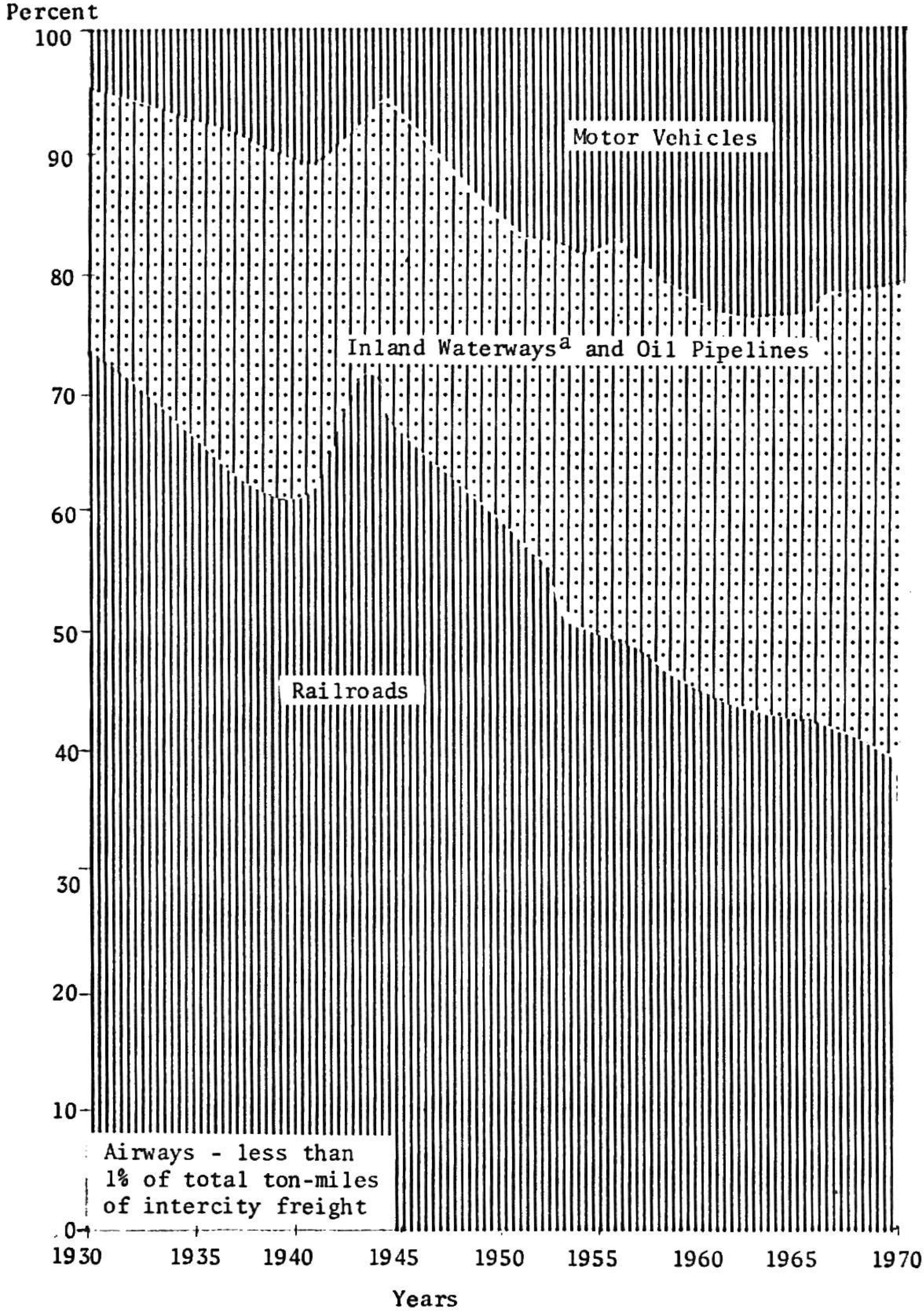
[1]Alan R. Cripe, "Containerization and Integral Trains," Integral Trains, Railway Systems and Management Associations [Meeting of May 27-28, 1963] Chicago, 1963, p. 16.

[2]Highballing to Market in Unit Trains, A. T. Kearney and Co. Inc., Chicago, Ill., February 1968, p. 13.

[3]Ibid.



[a]Includes both regulated and unregulated traffic

Figure 4

Percentage Distribution of Ton-Miles of Intercity Freight

Source: Interstate Commerce Commission, Annual Reports, 1930-1970.

in motive power. Also, minimization of investment in cars and containers is desirable. Equipment costs account for a significant portion of total unit train costs, thus keeping such costs as low as possible is important.

The use of containers instead of trailers on flat cars saves four tons of trailing weight per car since containers eliminate the extra dead-weight in trailer bogie and trailer hitch required on the car.[4] Flat cars used in container trains are approximately three tons lighter than piggyback flat cars since piggyback cars require heavy decking and bridge plates not needed on container cars.[5] The lower center of gravity experienced in all container trains allow greater speed on curves and gives greater overall stability which is desirable since speed is an important attribute of unit trains.[6] The much greater cross section of trailers' dimensions as compared with containers causes greater wind resistance of significant consequence as documented by Santa Fe Railway in highspeed experimental operations.[7] Obviously the container is superior to the trailer in unit train movement of intercity freight.

Early experimentation and development of containerized unit train service has occurred outside the United States. England's Liner Trains are nothing more than container unit trains.[8] They provide fast intercity shuttle service operating with only 12, 45-foot cars or 24, 20-foot containers. These double-ended trains shuttle freight in containers back and forth between load centers,

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[4]Ibid.

[5]Ibid.

[6]Alan R. Cripe, op. cit., p. 18.

[7]Highballing to Market in Unit Trains, op. cit., p. 13.

[8]Alan R. Cripe, op. cit., p. 16.

and highway operations serve various pickup and delivery points on an overnight basis. The success of the British Liner Trains can be attributed to their ability to cut conventional freight rates by 30-50 percent through the economics of unit train containerized service.[9]

The Japanese Tikaido Line provides daily containerized unit train service between such cities as Osaka and Tokyo which are 350 miles apart.[10] The train operates at night at an average speed of 80 miles per hour.[11] Daily utilization of equipment over 700 miles of track allows for great economy of movement.

The Soviet Union is working rapidly on containerization systems also. Over six percent of the total Soviet Rail Transport is in containers.[12] The Russians are planning to increase this to 15 percent shortly. Considering the fact that Russian railroads provide 80 percent of all ton-kilometers of transport, it is considerable volume.[13]

The first railroad in the United States to offer all container train type of service is the New York Central with their Flexi-Van system of containerization and supervan trains.[14] The New York Central has had amazing success with their all-container train even though it is not a unit train and thus does not optimize savings potential in freight movement. They learned, however, that the weak link in containerization is the transfer of containers to and

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[9] Ibid.

[10] Ibid., p. 17.

[11] Ibid.

[12] Ibid.

[13] Ibid.

[14] Ibid.

from various modes of transportation.[15]

To maximize the efficiency of unit container trains, an efficient terminal facility capable of rapid low cost transfer of containers between modes is important.[16] The originating container terminal serves as a concentrating point where individual containers can be collected in trainload quantities. The destination terminal serves as a break-bulk point or a point of transfer to other mode or modes of transport. Since terminal costs are substantial, terminals should be located only in places where large volume of freight makes economically possible labor saving devices which result in low terminal expenses per container. Terminal delays tend to nullify the benefits derived from fast over-the-road speeds and work against good equipment utilization.[17] The terminal facility could be considered a short-term storage facility where containers are stored until tractor-trailers arrive to pick them up or until the train arrives to load. Thus, the arriving unit container train would never need to wait on tractor-trailers to arrive for unloading and similarly the tractor-trailers could eliminate waiting time when delivering containers for train movement by storing them in the terminal instead of waiting for the train to arrive. Automated container terminal facilities can reduce transfer costs to as little as three cents per ton and can cut handling time to 30 seconds per container.[18] A standard 40-foot container could be transferred for about 75 cents while today's trailer transfers in conventional

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[15]Ibid.

[16]Ibid., p. 19.

[17]Ibid.

[18]Ibid., p. 22.

terminals cost two to three dollars.[19] Thus, while modern container terminals require a large initial investment in capital, the long run cost per container transfer is extremely cheap.

In two separate studies conducted by the international management consulting firm of A. T. Kearney and Co. Inc., of Chicago, the feasibility of developing intercity unit container train service between major United States cities was examined. The first study, conducted for the National Association of Food Chains and sponsored by Del Monte Corporation, entitled "Highballing to Market in Unit Trains," concluded that there is sufficient tonnage consistently available to warrant the introduction of two unitized container train services, each operating between two cities on a once-a-week basis.[20] One of the trains would shuttle between San Francisco and Chicago and the other between San Francisco and New York. This report recommends employing fully containerized unit trains made up of lightweight adjustable skeleton cars on which containers would be anchored. The containers, transferrable between modes, would travel from the field or processor over highways and make the long transcontinental haul on unit trains and at the destination terminal, transfer back again to highway vehicles for delivery to market. The proposed San Francisco to Chicago train would reach Chicago in 62 hours and the San Francisco to New York train would arrive in 77 hours. The economic benefits from these trains was estimated to result in a 17 to 18 percent reduction in the cost of transporting canned goods. The faster, more reliable train schedule would also result in less inventory requirements for distributors and

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[19]Ibid.

[20]Highballing to Market in Unit Trains, op. cit., p. 12.

food chains at destination. The study concludes that there is no direct cost reduction available on produce although indirect benefits may prove substantial. Reducing the time of unit trains in transit will improve arrival condition, extend shelf life by three days, and insure better quality of the produce. The study was confident of the availability of sufficient tonnage to insure adequate use of backhaul capacity at a satisfactory rate. This study calculated that a $13,750,000 investment in engines, cars, containers, chassis and terminal facilities would be necessary to get the first two trains moving. For implementation, the report recommends that a single intelligence organize the service because of the need for maximum utilization of expensive specialized yards, optimum utilization of train equipment in both directions and coordination of backhaul.

The second study by the Kearney Co. dealing with containerization of intercity freight, was conducted for the D. H. Overmyer Co., Inc., a New York City based warehousing company operating in 56 cities. The results of this study concluded that between 100 and 200 million tons of freight could be containerized and moved by unit train between major cities.[21] To handle the mass of freight, up to 80,000 unit train movements would be required. As a result of the Kearney study, Overmyer has developed a terminal-system plan which calls for the construction of 15 intermodal terminals for speedy handling of goods packed in containers.[22] The terminals would be linked by unit trains. Initially, intermodal terminals will be built in seven metropolitan centers:

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[21] "Overmyer Envisions $1 Billion Intermodal Container Terminal and Unit Train System," Traffic World, Feb. 22, 1969, p. 28.

[22] "Progress Toward Effectuating Intermodal Terminal System is Rapid, Overmyer Says," Traffic World, June 28, 1969, p. 103.

New York City, Cleveland, Detroit, Chicago, Dallas/Fort Worth, Los Angeles, and San Francisco. Overmyer claims that the containerized unit train rates will be substantially below box car rate and far below truck rates. The speed of the unit train would be much faster than conventional trains and comparable to the fastest truck service. The initial equipment costs at the outset will run about $200,000,000 and over a 10 year period, Overmyer expects the terminal-system plan to cost $1 billion.

International Freight Potential

American railroads acting as a "land bridge" for containerized cargo moving in both directions between Europe and the Far East have the potential of capturing a large volume of international freight. The landbridge concept has two goals, speed and economy of shipping that replaces the Panama Canal leg for ocean-going freight with a transcontinental railroad trip.[23] By using trains between Atlantic and Pacific ports, valuable time savings can be realized in international freight shipments.

By definition, landbridge is a through container movement with an ocean voyage on each end and a rail haul in the middle.[24] A close relative of landbridge, minibridge, merely lops off the ocean voyage at one end. Minibridge traffic is traffic moving between the United States' West Coast and Europe and traffic moving between the United States' East Coast and the Far East.[25]

Since both landbridge and minibridge freight volume is increasing, the

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[23] "The Ultimate Unit Train? - Support for 'Land Bridge' Grows," Distribution Manager, May, 1968, p. 44.

[24] "Ship-rail 'Land Bridge' Speeds Europe-to-Asia Cargoes," Industry Week, 1972, p. 26.

[25] "Minibridge is Here and It's Healthy," Railway Age, May 29, 1972, p. 29.

railroads are planning container unit trains to fully economize the landbridge and minibridge concepts as sufficient volume builds. Already a European shipper can save 10 days in shipments to Japan by shipping via train across the United States. While conventional all-ship freight moves from Europe to Japan by way of Panama Canal in 31 to 32 days, landbridge allows shipments to arrive in 21 to 22 days.[26] Unit container trains are expected to trim several more days off of the total transport time, thus making the landbridge concept more attractive by offering faster service at lower cost.

The railroads, ship operators and consumers are all benefactors of the landbridge and minibridge concepts. The ship operators benefit by having to make only one stop, either on the west or east coast of the United States instead of unloading partially on one coast and then moving through the Panama Canal before reaching the other coast.[27] For the ocean carriers, time savings translate into capital-investment savings. With ships operating in just one ocean, fewer ships are needed.

For the railroads, the creation of new volume increases revenues. The container unit train is the ultimate step in realizing the volume potential and thus the revenue potential of international freight traffic.

The consumer benefits ultimately through lower prices and faster service; while the United States manufacturer can look forward to lower transportation costs on exports. While total transportation costs have not yet been significantly reduced by minibridge or landbridge service as opposed to water travel, containerized unit train service promises lower over-all transportation

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[26] "Ship-rail 'Land Bridge' Speeds Europe-to-Asia Cargoes," op. cit., p. 26.

[27] "Minibridge is Here and It's Healthy," op. cit., p. 30.

costs.[28]

John A. Grygiel, head of Santa Fe's market research department is very optimistic of the landbridge and minibridge future in creating volume for unit container trains. He visualizes sufficient international freight volume necessary for making a minimum of 26 round trips a year economically feasible. As in all unit train movements, coordination between the railroad and the shipping and receiving terminals is crucial to its success. In the case of landbridge and minibridge, this means that the shipper, ship operators and the railroad must work closely together in order to smoothly coordinate this sophisticated concept.

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[28]Ibid.

CHAPTER V

KANSAS APPLICATION OF UNIT TRAIN SERVICE

Initial Development

Unit train development has not occurred as rapidly in Kansas as it has in such states as Iowa, Illinois, and Minnesota. Although there have been a number of multiple-car and trainload movements of single commodities from Kansas origins, none of these movements can be accurately identified as unit train service. The nature of the movements have usually been irregular and of insufficient volume for the railroads to experience the cost reductions which are normally associated with unit train service.

Some of the Kansas railroads which have experimented with multiple-car and trainload shipments are the Santa Fe, the Union Pacific, the Missouri Pacific, and the Missouri-Kansas-Texas. The Santa Fe has moved trainload quantities of wheat from Wichita and Hutchinson origins to the Gulf. Also, it has moved trainload quantities of grain sorghum for West Coast export from Salina to the Pacific. Although the U.P. does not serve the East Coast nor the Gulf, it originated 65-car trainloads of wheat from Salina to the East Coast via regular interlining railroads and from Hays to the Gulf via regular interlining railroads. The Missouri Pacific has experimented in distributing 70 cars to several elevators along their line and then assembling them for a trainload movement to the Gulf. This type of distribution and gathering of cars for trainload service proved unsuccessful in their experiment due to the difficulty of coordinating a large number of elevators in loading their cars promptly.[1]

The National Farmers Organization has established two locations in Kansas, Parsons and Centralia, as grain accumulation points for multiple-car and trainload shipments. They have shipped as many as 13 cars of a certain commodity at one time from their Parsons facility which is served by the Missouri-Kansas-Texas. The NFO's Parsons facility has the capacity for loading 60 cars in 48 hours without switching. Their Centralia facility, located on the Missouri Pacific lacks the rail siding for loading more than four or five cars without switching. As sufficient volume develops at grain accumulation points in Kansas and in other states, the NFO plans to utilize their fleet of several hundred leased hopper cars for unit train movements from their grain accumulation points to export markets.[2]

All of these initial multiple-car and trainload movements of Kansas grain have moved at single car rates. The shipper, therefore, has not benefited from lower rates as is usually the case in unit train service.

Potential Development

Several Kansas commodities are likely candidates for future adoption of unit train service. Since wheat is annually produced in Kansas in much larger quantities than can be consumed, vast quantities of it are annually shipped out of the state, often to export destinations. Another commodity which is especially well suited for unit train movement in Kansas is fresh meat. Kansas meat packing plants are high concentration centers of fresh

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[1]Robert D. Pierce, Missouri Pacific Railroad, Assistant Regional Sales Manager, Private Interview held at 4801 Gardner Avenue, Kansas City, October 1, 1974.

[2]Bill Brungardt, National Farmers Organization, Grain Representative, Telephone Interview, October 3, 1974.

meat which is annually shipped in large volume to specific destinations.

Although Kansas presently does not have any unit train service in operation, the Santa Fe has recently introduced the first proposal for unit-train service in Kansas. They are proposing a reduced rate on 50-car shipments of milo from Salina to Long Beach, California. Their proposed reduced rate of 83 cents per cwt. applying to shipments of grain sorghum consisting of 4,750 tons or more, represents a rate reduction of 8 percent below present single car rates of 89.5 cents per cwt.[3] If this first proposal of unit train service with reduced rates in Kansas is not contested, other railroads are likely to offer similar service and rate reduction to the Gulf in order to remain competitive.

Not all specific unit train applications are necessarily in the best interest of the Kansas economy. For example, since grain sorghum is a surplus feed grain used to fatten cattle in Kansas, the effects of new unit train service may cause sorghum prices to rise. Although domestic sorghum producers would benefit from a rise in prices, should a regional shift in cattle feeding occur, the total effect upon the Kansas economy resulting from a shift in the beef industry from Kansas to other states would be adverse. Thus this particular potential application of unit train service may not necessarily be in the best interest of the Kansas economy.

A study recently conducted by Iowa State University concludes that unit train service in hauling major farm commodities is the key to increasing railroad net revenue. Results of this study revealed the possibility of increasing railroad annual net revenue by 5.1 cents per bushel in transporting corn and soybeans from country elevators in an experimental 6 1/2 county area

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[3]Ray W. Snook, Santa Fe Railroad, Marketing Manager, Private Interview held at Room 203, 900 Jackson, Topeka, October 1, 1974.

to destinations when significant changes were instituted into the traditional grain transportation system.[4] Greatest railroad net revenue was achieved by establishing ten subterminal elevator points in the 6 1/2 county area from which 50-car unit trains could load. Conditional to this particular option was the abandonment of 73 percent of the rail lines in the 6 1/2 county area. A similar option also containing ten subterminals in the experimental area from which 50-car unit trains could load, but also maintaining 100 percent of the rail lines, yielded an annual increase in railroad net revenue of 3.7 percent per bushel of corn and soybeans.[5]

It appears that the additional railroad revenue is generated in two ways. First, through cost savings associated with unit train movements and second through the elimination of light density rail lines. The Kansas rail system is substantially different from Iowa's, therefore caution must be exercised in making comaprisons of this study to Kansas. Iowa is plagued with too many rail lines and thus a high percentage of light density and low capacity lines. While only 44 percent of Iowa's lines are capable of carrying cars of gross weight greater than or equal to 263,000 pounds,[6] over 75 percent of Kansas lines have such capacity. Thus it is likely that Iowa railroads would experience a greater increase in net revenue through rail abandonments than would railroads operating in Kansas. Nevertheless, the subterminal system of grain accumulation for loading unit trains as evaluated in the Iowa study, appears to be directly applicable to Kansas wheat movement.

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[4]Phillip C. Baumel, Thomas P. Drinka, Dennis R. Lifferth, and John J. Miller, "An Economic Analysis of Alternative Grain Transportation Systems: A Case Study," Iowa State University, Ames, Iowa, November, 1973, p. 68.

[5]Ibid.

[6]Ibid., p. 11.

If railroads could realize increased net revenue of 4 cents per bushel in transporting Kansas wheat, as a result of cost savings experienced in unit train service, over $9 million of increased net revenue could be gained. Since railroads are the dominant method of transportation of Kansas wheat, this increased revenue could affect the price of wheat at local country elevator points. If railroads choose not to reduce rates as a result of increased revenues, the Kansas farmer would still benefit from a healthy transportation system which could afford greater investment in cars, equipment, and in maintenance of existing track.

Another recent study indicates that Kansas is a major exporter of processed beef, ranking fifth in the nation. Results of this study indicate Kansas exports more than 1 1/4 billion pounds of processed beef annually.[7] While motor common carriers transport 75 percent of all interstate volume, 20 percent of the interstate shipments are transported by TOFC rail service and the remaining 5 percent by refrigerated rail car.[8]

Fifty-five percent of all interstate shipments of Kansas processed beef go to Eastern Seaboard States.[9] Several of these states, located in close proximity, receive a large share of total Kansas shipments. New York receives 15 percent, New Jersey 8 percent, and Massachusetts 7 percent.[10]

The application of unit train service from Wichita, Kansas, which is a major meat processing center, to major consumption destinations such as

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[7]Steven George, "An Analysis of Flow Patterns and Transportation for Beef from Kansas Federally Inspected Plants in 1972," A Master's Thesis, Kansas State University, Manhattan, Kansas, 1974, p. 77.

[8]Ibid., p. 40.

[9]Ibid., p. 77.

[10]Ibid., p. 31.

New York, Boston, and Atlantic City appears as a realistic possibility. For example, each week the state of New York consumes enough Kansas processed beef to fill 120 semi-trailers (4.2 million pounds), which is sufficient volume needed to fill a unit train of 60 flat cars.[11] If the railroad would reduce their rates by 20 percent as a result of cost savings associated with unit train service, the transportation cost per pound of Kansas processed beef delivered to New York City would be 1/2 cent less. The net effect of such cost savings should yield greater quantity demanded for Kansas processed beef. Also since unit train service is faster and usually cheaper than conventional rail service, the rails competitive position with motor carriers should be improved as well. Thus, the total effect of unit train service would be of mutual benefit to both Kansas meat processors and railroads.

Problems in Development

Despite the alleged benefits associated with unit train service to both the carrier and the shipper, unit train service has not developed rapidly in Kansas. There seem to be several possible reasons for this. One theory is that cost savings associated with unit train movement may be overstated by some over-zealous promoters who study isolated cases where conditions for unit train service are optimal. These optimal conditions probably occur only in very few instances. An example of such optimal conditions might be the movement of coal from one mine site to one utility plant on a year round basis, where the coal is non-perishable, not subject to market condition changes and where the demand for coal by the power plant is continuous day after day and year after year. Such optimal conditions would allow for maximum

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[11]Steven George Bittel, op. cit., p. 29.

benefits from unit train service. Such conditions, however, are indeed rare in Kansas.

Another reason for the lack of unit train development in Kansas may be the lack of intermodal competition. Often, it is argued, intermodal competition is necessary to compel railroads to streamline operations. Where intermodal competition is not strong as in Kansas, particularly in the West, railroads are slow in achieving maximum efficiency. Inter-railroad competition quite often is not sufficient to bring about changes needed to maximize railroad efficiency. In contrast, where barge-truck competition is strong, railroads are more prone to develop unit train service as has been demonstrated in Minnesota, Iowa, and Illinois.

In the past, barge-truck competition has varied widely on the Missouri River. Although barges can move up the Missouri River as far north as Sioux City, their operations fluctuate according to the demand for them on the Mississippi River. Also, during the previous period of heavy exporting, barges did not really compete with railroads since each mode was operating at peak capacity. When excess capacity exists in both modes and when the barge lines operate steadily on the Missouri River, as is the case presently, the competition for grain from Northeast Kansas is strong between the truck-barge combination and the railroads.[12] As a result, the railroads are more likely to consider reducing costs and rates through the adoption of unit train service from select points in Northeast Kansas to the Gulf.

Developing grain accumulation points, necessary for unit train movement of wheat, is not easy. Initially, a suitable location on a railroad's

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[12]Robert D. Pierce, loc. cit.

main line must be found. This location should have storage capacity of approximately 350,000 bushels, a side track of sufficient length to handle 50 cars without switching, and loading capacity of 15,000 bushels per hour.[13] Such a location was referred to earlier as a subterminal. In order to initiate the development of a subterminal, the local country elevators would need to work together in planning such a subterminal. The subterminal facility could take the form of expansion and improvement of an existing elevator properly located or the construction of an entire new facility. Much planning would need to be done before such a facility could be established. The cooperation of all area country elevators would be essential to its success.

Where subterminal facilities have been constructed, opposition has often come from the country elevators. They feel that they are being placed in an inferior bargaining position since they often lose rail service altogether and thus are forced to truck the grain to the accumulation point. This loss of an alternative mode of transport causes many country elevators to oppose the subterminals. Some even fear that eventually the subterminal would run them out of business since the country elevator would be at their mercy.[14]

Terminal elevators, already able to rapidly load trainloads of grain and having plenty of short-term storage capacity required for unit train service, seem ideally equipped for unit train service. Since only 166,000 bushels are needed to fill a 50-car train of wheat, if a unit train was established between Hutchinson and Houston on a twice a week basis, in a year's

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[13]Walter D. Hanson, "The Grain Train--Is It for You?" Feed Management, May, 1974, p. 9.

[14]Phillip C. Baumel, Thomas P. Drinka, Dennis R. Lifferth, and John J. Miller, op. cit., p. 125.

time, only 17 million bushels of wheat would have been moved. This is less than the storage capacity of the Far-Mar-Co. elevator (22 million bushels) in Hutchinson. Yet, none of the terminal elevators in Kansas have asked for lower rates even though they have in some cases loaded trainload quantities of wheat out of their facilities. Terminal elevators tend to oppose unit train development since they have a lot of storage space which they want to utilize. They fear that if unit train development caught on, many subterminals would be established which would directly merchandise grain without going through the regular terminal channels. Thus, terminal elevators see unit train development as potentially detrimental to their existence.

As already suggested in Chapter III, interlining often is a hindrance to unit train development. This problem is vital to beef processing plants which are located in Kansas and which market a large quantity of processed beef in the Eastern Seaboard states of New York, Massachusetts and New Jersey. Since none of the Kansas railroads serve that part of the nation, interlining with one or more eastern railroads would be an essential part of a unit train which served points in these states. Thus, interlining would tend to frustrate and complicate the development of unit train service between Kansas and the east coast.

Finally, unit train development is hindered by the problem of car ownership. Where railroads have furnished cars devoted to unit train service, the ICC has in certain instances accused the railroads of discriminating against single car shippers who now have fewer cars available for their use. This type of ICC opposition has been most noticeable when there is a car shortage. In contrast, during periods of excess car capacity this objection is seldom raised.

To avoid the ICC objection of railroad ownership of cars devoted to unit train service during times of car shortages, many shippers have leased their own fleet of rail cars. In order for the rail car to pay for itself, the car must be utilized for at least 2,150 loaded miles each month.[15] Thus, shippers who lease cars are assuming a lot of risk. Unless the shipper is reasonably sure of continuous utilization of the cars, he may be opposed to leasing cars, since most lease arrangements cover a period of several years. In contrast to the average shipper, the railroad has much greater flexibility in utilization of rail cars than a shipper, since the railroad can always integrate cars from a unit train back into other trains in the event that a unit train is abandoned.

Many shippers across the nation, including NFO which operates in Kansas, wishing to avoid ICC opposition to unit train movement plus save money, have recently risked leasing and buying their own cars. Given the large number of shipper-owned cars coming into the rail system, railroads are concerned about underutilization of their own rolling stock. Unless this trend ends soon, the railroad may establish new policy concerning the movement of shipper-owned cars when rail-owned cars are available and idle.

In summary, Kansas unit train development has not been rapid mainly because 1) the optimal conditions, necessary for fully realizing the cost savings potential of unit trains, may not exist in Kansas applications; 2) there is a lack of intermodal competition; 3) the development of a subterminal system involves planning and cooperation between many country elevators, who quite frequently oppose subterminal development; 4) terminal elevators, in an ideal position to take advantage of the unit train concept, are in opposition to it; 5) in certain potential Kansas applications, interlining is necessary; and 6) the problem of car ownership has not been resolved.

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[15] Robert D. Pierce, loc. cit.

CHAPTER VI

ADVANTAGES AND DISADVANTAGES OF UNIT TRAINS

The attributes of unit train operations have already been discussed throughout this report. To summarize these attributes a roster of advantages and disadvantages of unit train operations follows.

Advantages

- Unit trains are planned and scheduled, which allows for a more orderly operation.
- Equipment utilization is maximized, which substantially reduces capital investment.
- Specially designed cars allow economies through standardization, resulting in lower maintenance costs.
- Loading and unloading of equipment is tightly controlled.
- Switching is reduced if not completely eliminated, not only at loading and unloading points but also at intermediate yards. Often this relieves congested facilities for other uses.
- Reduced switching minimizes damage to equipment, thus lowering maintenance costs and prolonging car life.
- Loss and damage claims are reduced.
- Billing and accounting are simplified.
- Costing procedures are simplified.
- There is increased customer interest, because his overall costs are reduced.
- There is a minimum-tonnage commitment, usually of substantial volume.

- There is a tendency for unit train operations to hasten railroad technology. Examples are continuous loading and unloading, special locomotive creep control devices, and automatic weighing.
- Increased publicity results for the railroad industry, in an image of progressive thinking.
- Low-cost transportation is produced.

Disadvantages

- Traffic moved in unit trains does not take advantage of excess capacity in existing trains.
- Crew-scheduling is sometimes difficult to match with the unit train schedule which results in excess labor costs.
- Shipper must commit himself to an obligation to load and ship a specified volume in specified periods.
- Often there is a 100% empty car return.
- Special motive power must be provided in an area where it may not ordinarily be available.

Although the list of advantages is longer and more impressive than the shorter list of disadvantages, the final test of unit train desirability is in the total net cost of a unit train operation and its relationship to the cost of moving the same tonnage in regular service. Finally, the importance of cooperation between railroad and customer cannot be overemphasized since it is a major key to the success and lower cost of any unit train operation.

ACKNOWLEDGMENTS

The author wishes to express sincere thanks to his major professor, Dr. Orlo Sorenson for his helpful suggestions, criticism and encouragement in writing this report and for his excellent guidance throughout the author's graduate studies.

APPENDIX A

AN EXAMPLE OF A TYPICAL UNIT TRAIN TARIFF[a]

A minimum tonnage requirement per shipment and per year is an essential part of most unit train tariffs and rates effective when these minimum requirements are not met are usually a part of the tariff also. Another essential provision of nearly all unit train tariffs is a provision for restricted loading and unloading time. Provisions dealing with contigencies such as strikes, fires, train wrecks or other uncontrollable circumstances generally are included in the tariff as well.

For illustration purposes, a unit train tariff on bituminous steam coal put into effect September 8, 1967, between the Pennsylvania Railroad Co. (carrier), Hanna Coal Co. (shipper), and Detroit Edison Co. (consignee) containing nine major provisions is cited:

1. The carriers will transport bituminous steam coal loaded in cars furnished by shipper or consignee at Georgetown, Ohio, to one consignee at Trenton, Mich., at a rate of $1.66 per 2,000-pound ton (Pennsylvania Railroad Coal Tariff 3306-B). Said rate includes the return movement of the empty cars from Trenton, Mich., to Georgetown, Ohio.

2. Bituminous steam coal shall be loaded in cars of not less than 100 tons' capacity each.

3. Shipments shall be tendered to the Pennsylvania Railroad on one bill of lading at a single mine located at Georgetown, Ohio, on a single day

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[a]Source: Thomas O. Glover, M. E. Hinkle, and H. L. Riley, "Unit Train Transportation of Coal," U. S. Department of the Interior, Bureau of Mines, Information Circular No. 8444, 1970.

from one consignor destined to a single consignee at Trenton, Mich., in minimum lots of 78 cars, minimum weight per shipment 7,800 tons.

4. The empty cars shall be tendered to the New York Central Railroad at Trenton, Mich., on a single day consigned to a single mine at Georgetown, Ohio, in minimum lots of 78 cars, or in minimum lots of 60 cars when provisions under 5(A) become applicable.

5. When it becomes impossible for the shipper or consignee due to the necessity for car repairs or maintenance, or to circumstances beyond their control, to furnish a minimum of 78 cars for loading in accordance with provisions of this tariff, the carrier will:

(A) Accept for movement to Trenton, Mich., shipments in minimum lots of 60 cars, minimum weight per shipment 6,000 tons, at a rate of $1.66 per ton (Pennsylvania Railroad Coal Tariff 3306-B), or

(B) Provide sufficient cars of railroad ownership to permit loading at the mine a minimum aggregate of 78 cars, minimum weight per shipment, 7,800 tons; the rate applicable to such coal loaded in cars of railroad ownership will be $2.05 per ton (Pennsylvania Railroad Coal Tariff 3306-B).

6. All loaded cars shall be tendered to the Pennsylvania Railroad for movement to destination within 4 hrs. of the time of actual placement of the empty cars at the mine.

7. All empty cars shall be tendered to the New York Central Railroad at Trenton, Mich., within 6 hrs. from the first 7:30 a.m. after time of placement of loaded cars of coal on the receiving tracks of the consignee, excluding Saturdays, Sundays, and holidays if no unloading is performed on those days.

8. At the expiration of the time limits mentioned, charges per trainload as indicated below will be assessed by the Pennsylvania Railroad against

the consignor and by the New York Central Railroad against the consignee for any delay in tendering cars within the time limits specified:

Excess time	Detention charge
1st hr. or fraction thereof	$ 30.00
2nd hr. or fraction thereof	100.00
Each hour or fraction thereof in excess of the 2nd hr.	200.00

Exceptions

(a) The above charges will not apply if the consignor cannot furnish and load 78 cars for any shipment under this tariff because of any of these conditions: The necessity for car repairs or maintenance or circumstances beyond the control of the shipper or consignee including strikes; interruption of railroad service due to an accident, damage to equipment, or car shortage; curtailment of coal production or loadings by consignor due to an accident or equipment failure at origin; act of God; or an embargo.

(b) When the use of railroad-owned equipment, as specified in 5(B), does not permit the loading of 7,800 tons within 4 hrs., the above charges will not apply.

(c) When at the time of actual placement on consignee's rail siding, lading is frozen or congealed so as to require heating, thawing, or loosening to unload, the 6 hours free unloading time shall be extended an additional 24 hours, provided consignee shall notify the railroad's agent at destination of the congealed or frozen condition of the lading within 10 hours of placement.

(d) If, as a direct result of a strike of consignee's employees, or an accident or equipment failure at the consignee's plant, or act of God, consignee cannot unload all cars of a consignment prior to such occurrence, no detention charges will be assessed.

(e) When as a result of the act or failure of any carrier participating in the transportation, two or more trainload consignments are bunched, i.e. constructively placed, or actually placed within 24 hours, consignee shall, to the extent necessary, be allowed the free time to which the consignee would have been entitled had the trainload consignments not be bunched.

9. Carriers will not perform the service of weighing carloads of coal for the assessment of freight charges. Weights for billing purposes shall be determined by the weighing of coal by either shipper or consignee on scales approved by the carriers and subject to their inspection.

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ECONOMICS OF UNIT TRAINS

by

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B. A., Tabor College, 1971

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Agricultural Economics

Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1974

Railroads have been slow in instituting unit train service. The primary reason for this becomes evident after reviewing the Interstate Commerce Commission's regulation of multiple-car rates. Until 1939, the Interstate Commerce Commission followed a very restrictive policy, prohibiting lower rates for multiple car shipments on the grounds that such rates showed "undue preference" to large shippers and "unjustly discriminated" against small shippers. Since 1939 and notably since The Transportation Act of 1958, the Commission's position has gradually grown more favorable toward multiple-car and eventually unit train rates. Important cases which set precedents for future unit train ratemaking were the "New Haven" and "Big John" cases.

Although ICC regulation has been a detriment to application of the unit train concept, it is only a prerequisite to such service. Application of the unit train concept occurs only where there are sufficient incentives to not only the railroad but also the shipper and the receiver. Incentives to the railroad usually are in terms of greater volume and thus greater net revenue. The shipper and receiver incentives most often are in the form of lower rates although speed and quality of transportation are often cited as factors in instituting such service as well.

The application of the unit train concept has been most extensive along the eastern seaboard. During the 1950's, eastern utility companies, threatening to switch to cheaper sources of energy than coal, caused railroads to seek new ways of cutting costs and thus rates to retain valuable high volume coal traffic. Since then, the application of unit train service has extended to such varied commodities as wheat, soybeans, corn, fertilizer, canned vegetables, orange juice, flour and iron ore.

An extension of the unit train concept has resulted in an interest in containerization of freight. Several studies indicate that containerized freight, when moved long distances by unit trains, produces economical fast transportation. Such studies have surveyed the intercity freight potential as well as the international freight potential. International freight movement is of two kinds: 1) freight originating on the east coast destined for the Far East and freight originating on the west coast destined for Europe and 2) freight movement between Europe and the Far East. Such freight movement would normally move through the Panama Canal; however, by introducing fast containerized unit train service, the railroad has the potential of gaining valuable traffic by acting as a bridge between the two oceans.

Unit train service in Kansas is just now beginning to develop. Various factors have caused the service to develop very gradually in Kansas. These factors include, lack of intermodal competition, opposition from terminal and country elevators and problems concerning car ownership.