AGRICULTURAL EXTENSION SERVICE • UNIVERSITY OF MINNESOTA

Minnesota AGRICULTURAL ECONOMIST

NO. 569 JULY 1975

Grain Trucking In Minnesota- What It Costs In Region 6E

Trucking is an integral part of Minnesota's grain transportation system. This report shows that high utilization levels keep trucks competitive with railroads, particularly for hauls less than 85 miles. However, regulation by the Public Services Commission may work against truckers trying to maintain high truck utilization.*

By K. William Easter and Rolland J. Nevins**

RECENTLY, the nation's rural transportation system has received much attention because of its inability to move farm commodities as fast and as efficiently as needed. With the large export grain movements over, some of the alarm and attention may have subsided. But, hopefully, people now realize that rural transportation is an important economic factor needing improvement.

Farm commodities require transportation for creation or preservation of their value. This value depends on the ability to move commodities from where they are relatively abundant to where they are less plentiful. Farm commodities are bulky, with relatively low value. Therefore, they have relatively high transportation costs. Consequently, cost inefficiencies in transportation affect both producers and consumers.

This article explores some transportation issues relating to Development Region Six East. This region consists of Kandiyohi, McLeod, Meeker, and Renville Counties. All these counties are located from 50 to 120 miles west of the Minneapolis-St. Paul area. Grain production and grain transportation are important to the region's economy. The region produced 41.5 million bushels of corn, 8.2 million bushels of soybeans, and 6.9 million bushels of oats in 1972. Of this 56.6 million bushels, elevators shipped 26.8 million bushels to the Twin Cities and Savage.

This paper discusses the existing grain transportation system, develops two model truck firms for cost analysis, and compares the transportation costs with the rates charged. These same issues are important in all grain-producing areas of Minnesota.

*This article summarizes part of the work being done with research funds from Title V of the Rural Development Act of 1972.

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Bill Easter discusses grain trucking problems with a long-distance hauler unloading at a Minneapolis terminal. The trucker complains that costs continue to rise while rates remain the same.

Trucking is a vital tansportation link for Minnesota grain. Over half the grain shipped to the Twin Cities comes by truck.

The existing grain transportation system

Three east-west railroads and the lone north-south railroad in Region 6E are main lines. Only the Burlington Northern to Hutchinson and the Chicago Northwestern are not main lines. The Chicago Northwestern line is being upgraded to handle the large hopper cars. No rail rates are available directly to the gulf. Even though the rail network is quite good because of the region's location, about 45 percent of the grain shipped from elevators to the Twin Cities area moves by truck. The highest concentration of total traffic is on Highway 12, with Highways 212 and 7 having slightly lower concentrations. In 1972, Highway 7 had the most commercial traffic.

Fifty-seven Trucking firms in Region 6E have the authority to haul grain. There are also about 40 firms located within a 25-mile radius of the region authorized to haul grain. The number of firms actively trucking grain is not known, but it is considerably less than the number holding permits. This is possibly because a permit costs only $20. This cost is relatively low compared to the returns from hauling grain when demand and profitability are high or to haul grain occasionally to keep truck utilization up.

Data from revenue and expense reports filed at the Public Services Commission (PSC) indicate at least 21 firms within or close to the region are actively engaged in trucking grain. The size of the firms ranges from 1 to 22 trucks. However only one firm is larger than 10 trucks, while nine are one-truck firms and six are two-truck firms. No relationship exists between the size of the firm and the utilization levels (miles per truck year). Average fuel consumption per truck of these 21 firms is one gallon for every 4.53 miles. Average cost per mile varies from a low of $.167 per mile to a high of $.719 per mile, with a mean of $.394 per mile. No accurate statements can be made about individual cost figures, such as tires, maintenance, and insurance, because of variabile reporting and lack of detailed information.

Model firms for cost analysis

To obtain an accurate estimate of trucking costs, two model firms were developed. Model I has two "units," and Model II has 10 "units." A "unit" is defined as a diesel tractor pulling an 810-bushel straight bottom grain trailer. Personnel requirement assumptions for Model I are a half-time secretary-bookkeeper and two drivers. For Model II, the requirements are a full-time secretary-bookkeeper, a full-time mechanic, a full-time manager, and 10 drivers. In many cases, the drivers or managers will be owners, but it is assumed that the owners will be paying themselves a salary. As in most cases in Region 6E, the driver changes oil, filters, and gaskets and greases and washes the "unit." For this work, he receives no compensation other than his percentage of the load revenue. Because he is paid on a percentage of load basis, he receives no additional pay for loading and unloading waiting time.

The costs presented below for Models I and II are intended to be representative of the costs of typical, efficiently operating firms in Region 6E. They are based on data collected (directly from suppliers of the equipment, fuel, insurance, and tires) in September and October of 1974. The PSC revenue and expense reports and other studies were used as checks and to fill in minor data gaps.

Investment costs

The investment costs approximate the average capital investment of a typical firm (table 1). A Model I firm needs two units, permits and licenses, and only a small office in the home. A pickup truck in Model I is used half for business and half for personal use. A per "unit" comparison of the investment costs shows Model I has $48,507.25 cost per "unit" and Model II has a $43,730.60 cost per "unit." Most of the investment cost advantage for Model II comes from the $3,120 difference in cost of tractors. The rest comes from economies realized in the buildings, land, and shop equipment. The difference in tractor costs occurs because small firms are assumed to be operated by owners who purchase optional equipment such as air conditioning, fancy chrome, custom seats, fancy transmissions, and stereo radios.[1]

Fixed costs

The items analyzed as fixed costs are capital cost, depreciation, office salaries, licenses and permits, taxes, insurance, and general office expenses. The fixed costs per "unit" are $13,595.99 for Model I and $14,500 for Model II (table 2). Model I realizes its advantage in fixed costs per "unit" from its small office and personnel requirements. Equipment costs represent 17 percent and 16 percent of the total fixed costs for Model's I and II, respectively, while taxes, licenses, and permits represent 12 percent of the total fixed costs for each model.

Variable costs

The variable costs include fuel, oil, filters and gaskets, grease, batteries, tires, maintenance and repair, and driver compensation. All of the variable costs are calculated on a running mile basis (table 3). Fuel costs represent over one-third of the total variable costs, and driver compensation represents almost one-half of the total variable costs. The higher cost of maintenance and repair account for the difference in the total variable costs between the two models. The Model II firm is assumed to employ its own mechanic. Therefore, it has lower maintenance and repair labor costs than Model I.

Cost per cwt-mile and per running mile

The cost per cwt-mile represents the cost of hauling 100 pounds of grain to market plus the cost of the return trip. Both the costs per cwt-mile and the costs per running mile decline with utilization per year (table 4). At lower utilization levels, the costs may be slightly high because maintenance and repairs were assumed to be the same at all utilization levels.

[1]This indicates that, for the owner-driver, the satisfaction or utility gained from the optional equipment is higher than that gained from the lower costs.

Table 1. Investment Costs

Item	Model I	Model II
Building	$ 8,550.[b]	$ 34,200.[a]
Land	250.	1,000.
Office Equipment	500.	2,500.
Shop Equipment	1,016.50[d]	4,066.[c]
Pickup	2,250.	4,500.
Tractors[e]	64,480.	291,200.
Trailers	19,968. (22,464.)[f]	99,840. (112,320.)[f]
Total Investment Cost	$97,014.50 (99,510.50)	$437,306. (449,786.)

[a]$30,000 + (30,000 × .14) = $34,200.; .14 is increase in the Wholesale Price Index (WPI) of building materials.

[b]One-fourth of $34,200., the building costs for a 10-truck firm, to estimate the building costs of the 2-truck firm.

[c]$3,800 + (3,800 × .07) = $4,066.; .07 is increase in the WPI of mechanical equipment.

[d]One-fourth of $4,066., the shop equipment costs for the 10-truck firm, to estimate the shop equipment costs for the 2-truck firm.

[e]Model I—$32,240: each Model II—$29,120.; Model I costs per unit are higher because small firms are assumed to put more options on their equipment. These are not the list price, but what dealers thought they would actually sell for.

[f]Represents the cost of a hopper bottom trailer instead of a straight bottom trailer.

Table 2. Fixed costs

Item	Model I		Model II	
Capital cost		$ 4,918.83		$ 22,032.84
Depreciation		9,414.91		41,995.34
Office salaries		2,500.00		29,560.00
Licenses and permits		2,180.20		10,856.00
Taxes				
Highway use	444.00		2,220.00	
Real estate	283.80		1,135.20	
Social Security	146.25		1,623.96	
Unemployment	205.70		1,060.80	
		1,079.75		6,039.96
Insurance				
Workmen's compensation	159.75		1,888.88	
Health & Medical	1,000.00		4,550.00	
Nonrevenue equipment	238.54		877.00	
Revenue equipment	3,160.00		15,800.00	
		4,558.29		23,115.88
General office expenses		2,540.00		11,400.00
Total fixed costs		$27,191.98		$145,000.02

Table 3. Variable costs per unit

Item	Model I	Model II
	Cost/mile	Cost/mile
Fuel	$ .0993	$ .0993
Oil	.00165	.00165
Filters & gaskets	.00337	.00337
Grease	.00009	.00009
Batteries	.0004	.0004
Tires	.01055	.01055
Maintenance & repair	.03438	.02112
Driver compensation	.12607	.12607
Total variable cost	$ .27581	$ .26255

The cost data do not suggest any significant economies of scale from adding more tractors. There may be some very slight economies of scale for Model II at the very high utilization levels because its office personnel are being used more efficiently. As mentioned above, costs per mile drop as utilization goes up. A movement from a 60,000-mile utilization level to a 120,000-mile level drops the costs per running mile $0.11 for Model I and $0.12 for Model II.

At a public hearing held by the PSC Nov. 5, 1974, raising minimum rates was discussed. Cost data were presented by the Minnesota Permit Truckers Association, showing running costs per mile ranging from $0.46 to $0.52 per mile. Utilization levels were not given, so direct comparisons cannot be made. But it is evident that their costs were either higher than those indicated in this study or that their utilization levels were less than 80,000 miles per year.

Cost compared with rates

The PSC-regulated minimum grain-hauling rates have, in many cases, become maximum rates because of intense competition. Trucking firms must file at least the minimum rate or higher and cannot legally haul at any rate except the rate filed. Rates higher than the minimum usually occur only in high demand situations and for hauls of over 80 miles.

A comparison of the minimum rates and costs per cwt-mile highlights the importance of utilization

Table 4. Cost per cwt-mile and cost per running mile at varying utilization levels*

	Model I				Model II			
Utilization per "unit"	Fixed costs per mile	Variable costs per mile	Cost per running mile	Cost per cwt-mile**	Fixed costs per mile	Variable costs per mile	Cost per running mile	Cost per cwt-mile**
	dollars							
60,000 mi.	.2266***	.2758	.5024	.00209	.2417	.2626	.5043	.00210
80,000 mi.	.1700	.2758	.4458	.00186	.1813	.2626	.4439	.00185
100,000 mi.	.1360	.2758	.4118	.00172	.1450	.2626	.4076	.00170
120,000 mi.	.1133	.2758	.3891	.00162	.1208	.2626	.3834	.00160

*assumes 100 mile average loaded trip distance

**Cost per cwt-mile $= \frac{\text{cost per running mile} + 2}{480}$

***$27,191.98 ÷ 2 = $13,595.99 ÷ 60,000 miles = .2266

level and trip distance in determining firm profitability (table 5). The cost per cwt-mile within each utilization level varies for each loaded trip distance because of varying driver compensation. This is due to the changing load revenue for different trip lengths. Driver compensation is based on a percentage of load revenue. Under the current regulated rate structure, revenue per mile decreases as the trip distance increases. Hence, driver compensation per mile will also decrease as the trip distance increases.

There is a definite advantage, under the current rate structure, for shorter trips. For example, a firm with an average loaded trip distance of 55 miles could make a profit even at the 60,000 mile utilization level. A firm with an average loaded trip distance of 115 miles would have to operate at a utilization level of 100,000 miles per year to make a profit. The firm with an average loaded trip distance of 200 miles could not break even at the high utilization level of 120,000 miles per year. In other words, rates per mile decline faster than the costs per mile (table 5).[2]

These cost-rate comparisons assume no back hauls. For the vast majority of firms in Region 6E, this is a good assumption. Their level of back hauls is less than 5 percent. However, large firms with a more complete office staff may be able to achieve higher levels of backhauls and utilization. Some large firms do have backhaul levels of 25 percent or more. Because rates are regulated, all benefits of backhauling accrue to the trucking firms and the drivers. The same rate must be charged whether it is a backhaul or not. If the firm can cover its costs with the inbound load, the revenue of the outbound load minus deadhead distances will be profit.

In shortrun slack periods, a firm having authority to haul from any origin in the state may make the longer trip hauls if it can cover variable costs and contribute something towards fixed costs. For example, the variable cost per cwt-mile for a 200-mile trip distance and 100,000 mile utilization level

[2]An owner-operator can make $10 more per trip on a 55-mile trip than on a 75-mile trip.

Table 5. Rate per cwt-mile vs. cost per cwt-mile

			Model I	Model II
	Loaded trip distance*	Rate per cwt-mile	Cost per cwt-mile	Cost per cwt-mile
60,000 mi.	55	$.0028	$.00236	$.00237
	75	.0022	.00221	.00222
	85	.0020	.00215	.00216
	95	.00189	.00212	.00213
	100	.0018	.00209	.00210
	105	.00181	.002093	.002103
	115	.00174	.002072	.002082
	200	.0014	.001957	.001967
	300	.00127	.00192	.00193
80,000 mi.	55	.0028	.00213	.00212
	75	.0022	.00198	.00197
	85	.0020	.00192	.00191
	95	.00189	.00189	.00188
	100	.0018	.00186	.00185
	105	.00181	.001863	.001853
	115	.00174	.001842	.001832
	200	.0014	.001727	.001717
	300	.00127	.00169	.00168
100,000 mi.	55	.0028	.00199	.00197
	75	.0022	.00184	.00182
	85	.0020	.00178	.00176
	95	.00189	.00175	.00173
	100	.0018	.00172	.00170
	105	.00181	.001723	.001703
	115	.00174	.001702	.001682
	200	.0014	.001587	.001567
	300	.00127	.00155	.00153
120,000 mi.	55	.0028	.00189	.00187
	75	.0022	.00174	.00172
	85	.0020	.00168	.00166
	95	.00189	.00165	.00163
	100	.0018	.00162	.00160
	105	.00181	.001623	.001603
	115	.00174	.001602	.001582
	200	.0014	.001487	.001467
	300	.00127	.00145	.00143

*One-way loaded trip distance in miles.

Table 6. Truck and rail rates, 1974

Loaded trip distances	Truck rates		Rail rates
	PSC minimum	Actual*	
miles	cents per cwt.		
56-65	15½	15½	15½
66-75	16	16	15½
76-85	16½	16½	16⅖
86-95	17½	19⅘	17⅘
96-105	18½	22	19½

*From survey of grain elevators in region 6E.

is $.00102 for Model I.[3] The variable cost per cwt-mile is below the rate per cwt-mile of $.0014. Therefore, a $.00038 (.0014 − .00102) contribution per cwt-mile could be made towards fixed costs. Owner-operators may haul for an even lower rate than variable cost because driver compensation accounts for almost half the variable costs. In other words, owner-drivers may accept a wage less than that paid hired drivers.

Truck and rail rates

Published rail rates and PSC minimum rates are very competitive between 50 and 100 miles from the Twin Cities (table 6). A recent survey of actual rates charged grain elevators in Region 6E confirms this. Actual rates charged by truckers are the same as the PSC minimum rates up to 85 miles; then they jump 2½ to 3½ cents per cwt. above the minimum. Truck rates also follow rail rates until 85 miles and then are 2 to 2½ cents per cwt. higher.

Elevators close to the Twin Cities report difficulties obtaining railroad cars. In contrast, those beyond 80 miles report fewer problems of rail car availability.

Long turnaround time for rail cars was also a problem for some elevators. But distance from the Twin Cities was not related to this complaint. Still, it appears that, at about 80 to 85 miles and beyond, railroads are providing better service to their customers. At this distance from the Twin Cities, elevators seem to prefer rail transportation if it is available. For distances under 80 miles, trucks may have a slight advantage due to their greater flexibility.

Conclusion

Much lower costs are attainable at higher utilization levels per truck. This comes from spreading the fixed costs over more miles. Some problems in reaching high levels of utilization are the seasonality of production, the variability of production, and the Public Service Commission's licensing authority restricting some firms to small hauling areas. In fact given the competitive nature of grain trucking, one wonders why the regulations exist.

The current regulated rate structure for grain trucking creates inefficiencies in resource use. Because a firm operating at short distances can make a profit at low utilization levels, there will be entry of firms keeping the utilization levels low and the costs high. At the same time, firms operating at longer trip distances will need higher utilization to reduce costs per mile enough to make a profit.

Firms will enter the industry to take advantage of short-haul profits and create excess capacity. With excess capacity, trucking firms, particularly during slack periods, will make long hauls even though they can only cover variable costs and possibly some fixed costs. The end result of this regulation is that short hauls subsidize longer hauls. This works to the disadvantage of regions close to the Twin Cities. Farmers there pay high rates for short hauls to the Twin Cities, while farmers further away pay rates below the average cost of trucking.

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[3] Total cost/cwt-mile − Fixed cost/cwt-mile = VC. cwt-mile

$$.001587 - .136\frac{\times 2}{480} = .00102$$

See table 4 for fixed costs and table 5 for the total costs on a 200-mile trip.

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Agricultural Extension Service
University of Minnesota

NO. 569 JULY 1975

Agricultural Extension Service
Institute of Agriculture
University of Minnesota
St. Paul, Minnesota 55108

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Cooperative Agricultural Extension Work
Acts of May 8 and June 30, 1914

OFFICIAL BUSINESS

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Roland H. Abraham, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108.

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Prepared by the Agricultural Extension Service and the Department of Agricultural and Applied Economics. Views expressed herein are those of the authors, but not necessarily those of the sponsoring institutions. Address comments or suggestions to Associate Professor John J. Waelti, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, Minnesota 55108.

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