SOME ECONOMIC EFFECTS OF MOTOR TRUCKS UPON THE MOVEMENT OF WHEAT FROM COUNTRY ELEVATORS OF OKLAHOMA

By

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF FIGURES

CHAPTER I

METHOD OF ANALYSIS

Introduction

Utilization must be possible for wheat to possess value. Generally, for utilization to take place, wheat must be transported from the area of production to an area of consumption. Parts or combinations of four stages of transportation are incurred in such movements of wheat:

(1) Transportation from the farm to the local market.

(2) Transportation from the local market to the terminal market.

(3) Transportation from the terminal market to either the domestic market or seaport.

(4) Transportation from the seaport to the foreign market.

Wheat may be utilized during any stage of the process from before leaving the farm until reaching its furthest destination, the foreign market.

History

During approximately the first one-third of the present century, wheat movement in Oklahoma followed rather rigidly the pattern previously outlined. This was so because there was no practical alternative to the system.

Until replaced by the motor truck, horse drawn wagons hauled wheat to the local markets. From these markets, transportation was by railroad until the wheat was consumed or delivered to the sea coast for ocean transportation.

This pattern was rigid until the depression years of the 1930's. The rapid decline in agricultural prices that occurred during the 1930's, plus a slow downward adjustment of railroad rates caused a diversion of train traffic from local markets to motor trucks.

This trend continued until the gas rationing of the war years forced a cessation of such motor truck usage.[1] After World War II, the usage of motor trucks for transportation of wheat quickly attained its previous mark, and continued to flourish. Today, increasing competition by the trucking industry has resulted in large quantities of wheat being diverted from the previously unchallenged route by railroads to the increasingly employed route by trucks.

Objectives of Study

The objective of this study is to analyze the changing patterns of wheat movement between the local elevator and the final market. The extensive employment of trucks by the wheat trade coupled with their intensive use by many individual elevator operators has altered the formerly rigid pattern of wheat movement. Not only is the railroad by-passed as a transportation agent, but often the terminal market is omitted in the wheat shipment pattern. The exclusion of the terminal

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[1] William S. Hudson and Earl K. Henschen, The Transportation and Handling of Grain by Motor Truck in the Southwest. United States Department of Agriculture. Washington D. C., 1952.

from the marketing pattern stems from two basic differences in railroad and motor truck transportation. The first is the greater travel mobility of motor trucks. The second lies in the rate structures of the two systems of transportation. Rail rates contain transit privileges. These privileges allow country elevators to utilize terminal storage facilities enroute without an increase in transportation charges. Motor truck rates do not allow for transit stops and the terminal is often by-passed.

The first part of this study shows the extent of wheat movement by truck and by rail, and the reasons why such differentiations in hauling patterns occur. The second part of this study presents the possible effects of the changing transportation pattern upon the transportation industry and the grain trade in Oklahoma.

Procedures

Time Period of Study

The transportation of wheat was studied in relation to the wheat handling season because largest amounts of wheat move during the harvest period; the remainder is stored and moved at a later date, usually before the next harvest period. Oklahoma elevator managers generally consider the wheat marketing year for wheat from May 1 of one year to April 31 of the following year. The crop years 1958-59, 1959-60, and 1960-61 were the years studied. This period was chosen for two reasons. First, it would show what has happened in the immediate past when major changes had occurred. Secondly, a preliminary survey showed it infeasible to attempt to secure information for earlier years as many elevator managers did not have records available for a longer time period.

Preliminary Work

During the latter part of 1960, a mail questionnaire was sent to each of approximately 475 country elevators in the state. A follow-up mailing was used for those firms not answering the initial questionnaire. These methods yielded approximately 232 replies. Many replies were incomplete and thus unusable. Completed schedules from 152 of the 475 sent out yielded information for a preliminary analysis in the western part of the state.[2] From this analysis it was determined what needed information would be available for the major study, and which information would be most meaningful when obtained. The preliminary study aided in determining best methods to use in obtaining the interview data.

Area Included in the Survey

To study the transportation of wheat in Oklahoma, the state was stratified into two classifications. These classifications were designated major and minor wheat producing areas. Only the major production area was sampled by interviews with elevator managers. This area is comprised of 33 counties in approximately the western one-half of the state (Figure I-1). These 33 counties yielded 95 percent of the wheat produced in the state for the three year period under study. The 33 counties were clustered into seven groups of approximate equal distance from the Texas Gulf. These seven groups are:

Area I, Harmon, Jackson, Greer, Kiowa, and Washita Counties,

Area II, Tillman, Cotton, Comanche, Caddo, and Grady Counties,

Area III, Canadian, Oklahoma, Kingfisher, Logan, and Payne Counties,

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[2] Adlowe Larson and Tom W. Yates, "Trucking of Wheat From Oklahoma Country Elevators," Oklahoma Current Farm Economics. December, 1961. Volume 34, Number 4, pp. 91-94.

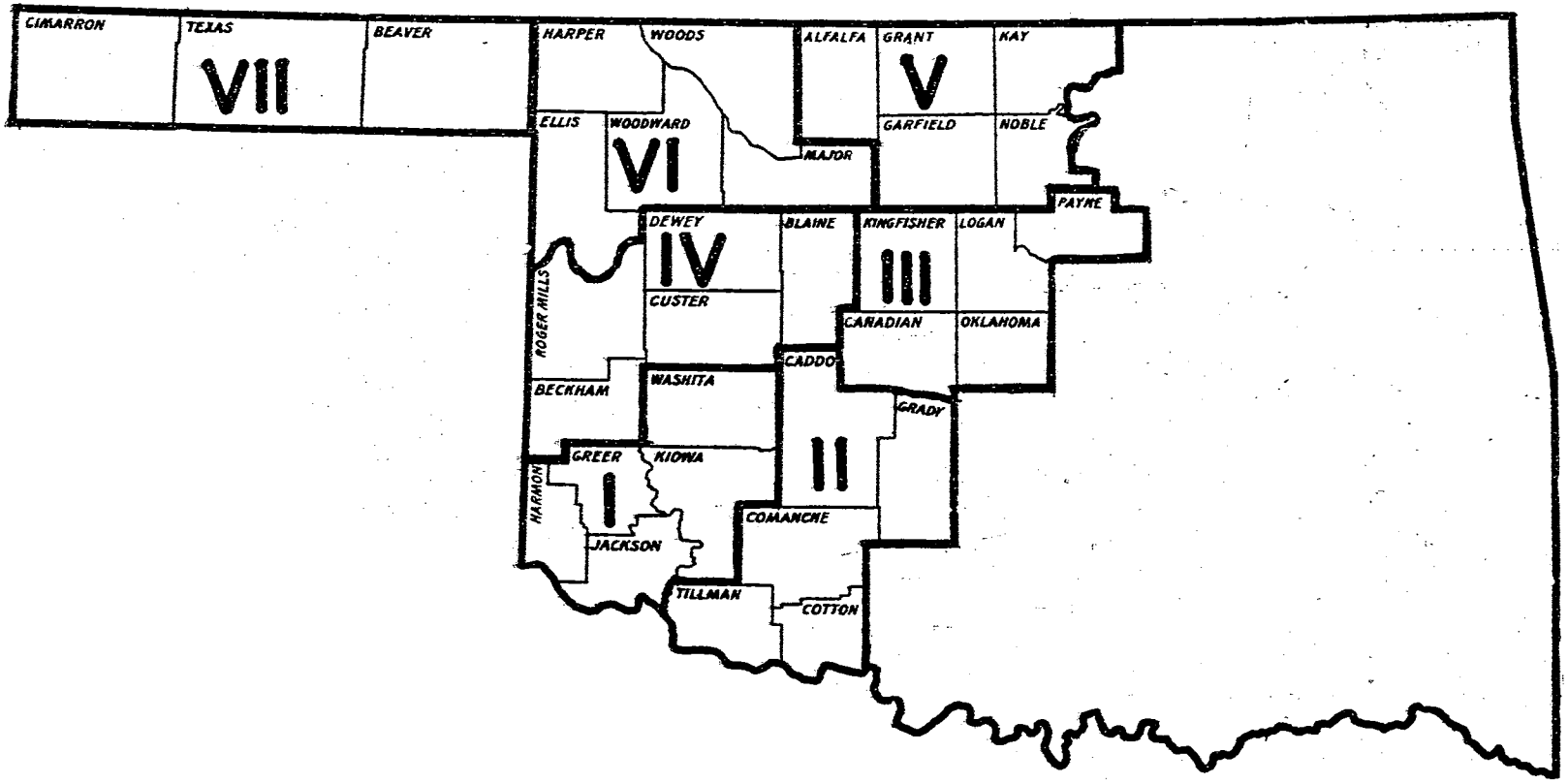

Figure 1-1. Relevant Counties of Study

Area IV, Beckham, Roger Mills, Custer, Dewey, and Blaine Counties,

Area V, Noble, Garfield, Kay, Grant, and Alfalfa Counties,

Area VI, Major, Woods, Woodward, Harper, and Ellis Counties, and

Area VII, Beaver, Texas, and Cimarron Counties.

The counties were clustered according to distance because truck and rail rates are based on the length of haul. Part of the analysis was to determine the effect of the length of haul upon rate charges for both truck and rail shipment of wheat. The Texas Gulf was chosen as the destination point because almost all of the wheat produced in Oklahoma was ultimately shipped to this destination by either motor truck or railroad.

Construction of Sample

The Agricultural Extension Division of Oklahoma State University furnished a list of the 398 grain handlers in the 33 counties of analysis. From this list, only country elevators handling wheat directly from farmers were used in this study. This eliminated storage points handling only Commodity Credit Corporation wheat, terminal elevators and grain brokers.

The samples used in this study were drawn by utilizing random numbers. A number was assigned to each of the local elevators that had previously been determined suitable (neither terminal nor Commodity Credit points). Since complete information about the elevators comprising the sample was not obtainable, some substituting later became necessary. One hundred ten elevator operators were interviewed. Table I-1 shows these 110 elevators grouped according to capacity and the areas of the state from which they were sampled. This sample comprised approximately

one-third of the country elevators in the western one-half of the state. Figure I-2 shows the distribution of these 110 elevators sampled in comparison to the entire population of country elevators in the 33 counties of study.

TABLE I-1

NUMBER OF ELEVATORS SAMPLED BY CAPACITY AND LOCATION

Capacity (in thousands of bushels)	Area I	Area II	Area III	Area IV	Area V	Area VI	Area VII	Total
0 - 99	6	6	2	4	4	1	5	28
100 - 199	7	4	2	2	3	2	1	21
200 - 299	4	4	1	3	2	2		16
300 - 399	1	2	3		2	1	2	10
400 - 499	1	1	1		3	1		7
500 - 599		1	2	1	3			7
600 - 699	1		1		1	1		4
700 - 799	1	3		2	2			8
800 - 899	1		1			1		3
900 - 999				1	1			2
1000 - 1099					1	1		2
1100 - 1199				1				1
1200 - 1299	1							1
Total	23	21	12	14	22	10	8	110

Field Procedure

Field substitutions were required when (1) the elevator drawn for sampling had gone out of business; (2) the firm handled no wheat, or

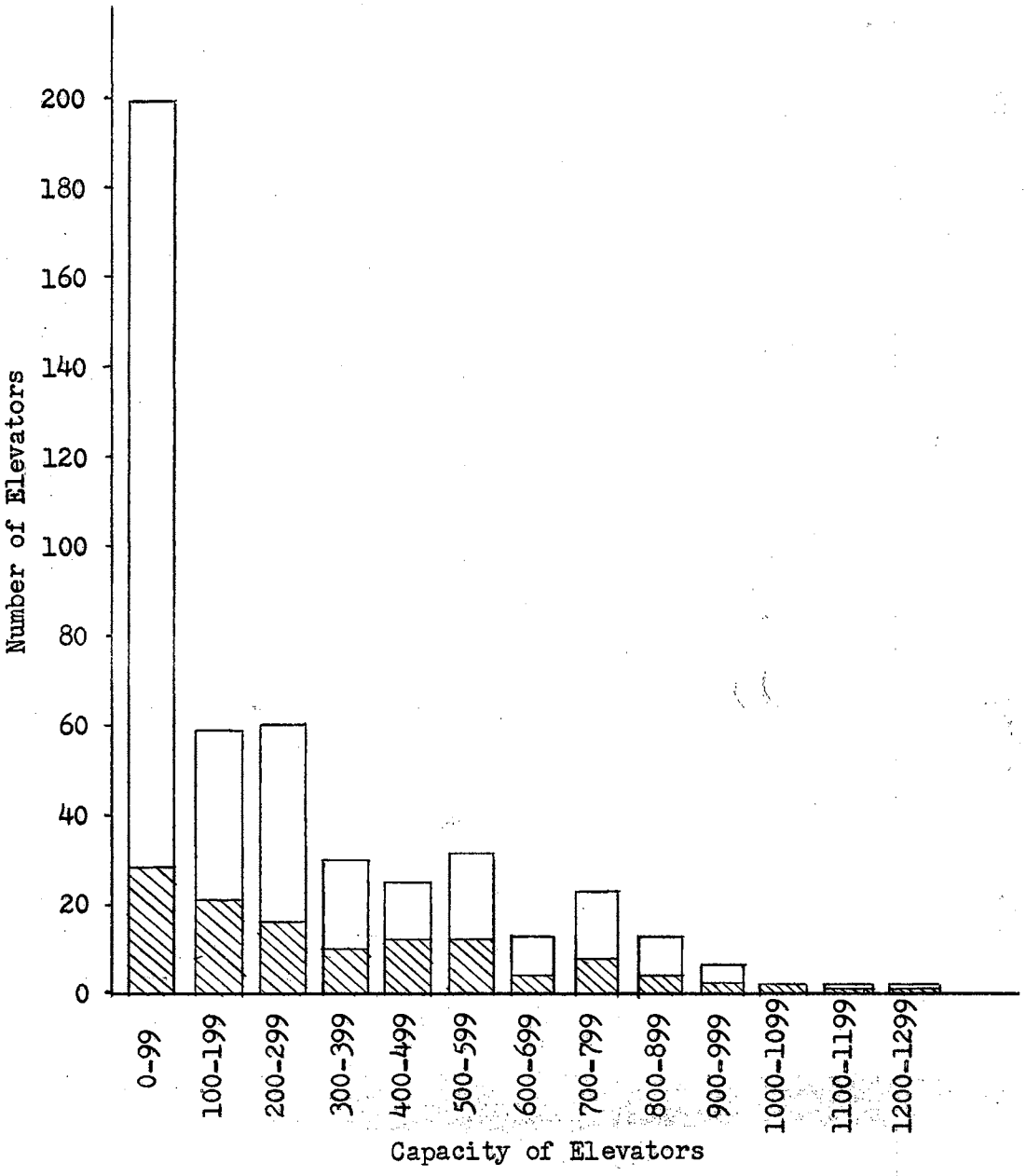

Figure 1-2. Size Distribution of Elevators in Western Oklahoma and Size Distribution of Sample Elevators

handled Commodity Credit Corporation wheat exclusively; (3) the elevator was closed for the season and the manager either (a) could not be found at home, or (b) traveled from elsewhere to manage the unit during harvest season; (4) no records were available; or (5) the manager refused to cooperate.

The method used on field substitutions required the interviewer to locate in the same general area another elevator having approximately the storage capacity as the original selection.

CHAPTER II

ECONOMIC DIFFERENCES IN RAIL AND TRUCK RATES

Motor-Vehicle Regulation

Transportation of almost all commodities is regulated in varying degrees by governmental action. Wheat is no exception. In general, the federal government regulates interstate commerce and the state and local governments regulate intrastate commerce.

This pattern was clearly exemplified by the passage of the Motor Carrier Act in 1935 (now Part II of the Interstate Commerce Act). This legislation gave virtually full authority to the Interstate Commerce Commission to regulate common and contract motor vehicle carriers operating in interstate commerce while leaving the states free to exercise taxing and certain regulatory functions.[1] It should be pointed out that the power of states to control intrastate commerce was not greatly altered by this Act.

There are exceptions in the Motor Carrier Act. The Act states that transportation of certain types is exempt from economic regulation. Section 203 (b)[2] declares, in part, that:

> Nothing in this part, except the provisions of section 204 relative to qualifications and maximum hours of service of

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[1]Fritz R. Kahn, Principles of Motor Carrier Regulation, Wm. C. Brown Company, Pub., Dubuque, Iowa, 1958, p. 2.

[2]United States Code, Title 49, Section 303 (b).

> employees and safety of operation or standards of equipment shall be construed to include (1) ... (6) motor vehicles used in carrying property consisting of ordinary livestock, (including shell fish), or agricultural (including horticultural) commodities (not including manufactured products thereof), if such motor vehicles are not used in carrying any other property, or passengers, for compensation: ...

Thus, carriers are exempt from regulation of the Interstate Commerce Commission so long as they haul ordinary livestock, fish, and unmanufactured agricultural commodities. The term "agricultural (including horticultural) commodities (not including manufactured products thereof)" is not defined in the Act. It implies agricultural commodities in their natural state and those which have not acquired new forms, qualities, or combinations as a result of treating or processing.[3] These carriers are "free lance" and do not have franchises as do common carriers. Therefore, wheat is an exempt commodity. The safety requirements set forth by the Commission are not exempt from regulation by either the states involved or the federal government.

Railroad Regulation

The authority given to the Interstate Commerce Commission by Congress is in the form of broad and vague policies. The Commission has the function of interpreting and giving concrete meaning to the congressional declarations.

Part I of the Interstate Commerce Commission Act was revised in 1940 to insure against any possibility that motor and water carriers might be regulated in the interests of the railroads. The revised rule in Part I applicable to railroads states that:

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[3]Fritz R. Kahn, p. 17.

> In the exercise of its power to prescribe just and reasonable rates the Commission shall give due consideration, among other factors, to the effect of rates on the movement of traffic by the carrier or carriers for which the rates are prescribed; to the need, in the public interest, of adequate and efficient railway transportation service at the lowest cost consistent with the furnishing of such service; and to the need of revenues sufficient to enable the carriers, under honest, economical, and efficient management to provide such service.[4]

The power of the Commission to prescribe "just and reasonable rates" for rail transportation does not make exception of agricultural commodities. Furthermore, in order for a railroad to acquire a change in the prescribed rates, the change must be shown necessary. This "burden of proof" for rate changes is required in Section 15 (7) of the Transportation Act of 1940 and applies to proposed reductions as well as increases.

The fact that ratewise wheat is an agriculturally exempt commodity when truck shipment is employed makes truck transportation rates more flexible than rail shipment rates from country elevators.

Differences in Rates

Variation by Methods

During the time period studied a difference in shipping charges prevailed between truck and rail shipment of wheat. Furthermore, in the case of shipment by rail there were two possible standardized rates faced, while in the employment of trucks rates were not standardized and differed with neighboring elevators. There were two basic reasons for rail rates being standardized while truck rates were not. The first reason was

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[4]Section 15 (a) (2) 54 Stat. L. 912 (1940) via Earnest W. Williams, The Regulation of Rail-Motor Rate Competition, Harper and Bros., Publishers, New York, 1958, p. 13.

the institutional factor discussed in the previous section; i.e., governmental regulations of rail shipments versus the agricultural exemption for wheat handled by truck. The second reason was the type of competition involved within each industry. Before trucks accounted for much of the wheat shipments in Oklahoma, the railroads approached a monopoly position with many individual elevators. A pure monopoly is a market position in which there is a single seller of a particular product for which there are no good substitutes.[5] In this case, the product was services that the railroads were attempting to sell to the elevators, and the monopoly tended to exist because each country elevator usually had only one railroad upon which to ship the wheat. With the advent of trucking, if the railroad was the only method utilized by a country elevator for wheat shipments, the monopolistic tendency still existed. By utilizing trucks the elevator no longer faced the tendency of monopolistic transportation by railroad. For wheat shipments from country elevators, the trucking industry approached pure competition. Pure competition is characterized by: (1) the product of each seller being identical with that of every other seller; (2) each seller being so small relative to the entire market in which he operates, that by himself he cannot influence price; (3) a substantial degree of resource mobility existing in the economy; and (4) prices being free to move up and down without restraint of any kind.[6] Therefore, with a monopolistic industry, rates can be standardized for an area, or for the whole state, at the discretion of the monopoly, subject to governmental approval. With a more purely competitive

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[5]Richard H. Leftwich, The Price System and Resource Allocation, Rinehart and Company, Inc., New York, 1955, p. 196.

[6]Ibid., p. 165.

industry, prices are responsive to the market situation.

The two standardized rates facing rail shipment were the domestic rate and the export rate. During the 1958-1960 time period, the export rate generally was about 12 cents per bushel lower than the domestic rate. This difference was offset by restrictions such as a lesser number of transit privileges and a more limited number of destination points for domestic and export billings of wheat shipped to the Texas Gulf. The various destination points allowed for domestic and export wheat shipments to the Texas Gulf are shown in Table II-1. A transit privilege allows the stoppage of wheat at a point between the country elevator

TABLE II-1

POSSIBLE DESTINATION POINTS FOR DOMESTIC AND EXPORT BILLING OF WHEAT SHIPPED TO THE TEXAS GULF

Destination	Domestic	Export
Beaumont	x	x
Corpus Christi	x	
Freeport	x	
Galveston	x	x
Houston	x	x
Orange	x	
Port Arthur	x	
Texas City	x	x

and the final destination for some processing or handling. The railroad charges a through rate from the local elevator to the destination point. For wheat billed via the domestic rate, three transit privileges were

allowed. These might have been used for milling wheat into flour, or for storage purposes. The export rates, however, for Texas Gulf rail shipments of wheat are more restricted in regard to transit privileges. Depending upon which railroad transported the wheat, basic variations of transit privileges existed for export billing of wheat.

These are:[7]

(1) "One for one," whereby one transit stop was allowed for storage and an additional stop allowed for milling.

(2) "One and one," whereby if the first transit was taken at Enid another stop would be allowed on route either for milling or handling. If Enid were not one of the stops, then only one transit privilege was allowed.

(3) "One transit," whereby only one transit was allowed if wheat was shipped from the southern part of the state to Enid for storage.

There were attempts during the time period under study to standardize truck rates. One group attempting this found that a situation similar to pure competition in the employment of trucks existed. If their rates were set below those of the area by as much as one cent per bushel, little or no trucking was done from the elevators attempting the standardization. If the going rate of the area fell equal to or below their rates as a result of factors of demand and supply, elevator operators had available all the motor vehicles they could utilize. This attempt at area standardization was abandoned in favor of paying the going rate as determined by demand and supply factors of the area under question.

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[7] Southwest Lines Freight Tariff 5655G, Export Grain Tariff, issued by J. A. Boyer, Tariff Publishing Officer. Kansas City, Missouri, 1962.

Rail Rate Differences by Areas

The area differences in charges for rail shipment of wheat to the Texas Gulf can be observed by examining Interstate Grain Rates for Oklahoma. The section of the State under analysis in this study was divided into approximately 13 rate areas. Area differences arose when either or both the domestic or export rates for an area differed from another area. The rail rates in existence during the time period of this analysis are shown in Table II-2. Excluding the panhandle area, the remaining section of the state was partitioned into seven areas by these different rates, Figure 2-1.

The export charge for wheat to be shipped to the Texas Gulf from the southernmost part of the state was 45 cents per hundredweight. Because of the greater distance from the port, the rate from Enid was 50 cents per hundredweight. By utilizing the transit privileges, wheat could be billed via Enid from a local point, such as Frederick, for 45 cents per hundredweight. Thus, the wheat could move north to a terminal and then south to the Texas Gulf for a cheaper rate than could be obtained from the terminal initially.

This transit privilege is an important part of the rail transportation of wheat. It is extremely valuable during harvest when local elevator space is often utilized to capacity. Because of the larger storage facilities of the terminal elevators, wheat is shipped, using the transit privilege, from the local elevator via a terminal. The terminal then stores the wheat for, or buys it from, the local elevator for shipment at a later date. The transit privilege is also important for such purposes as blending various grades of wheat to obtain one

TABLE II-2

RAIL RATES FROM COUNTRY ELEVATORS IN OKLAHOMA TO THE TEXAS GULF IN EFFECT 1959-60

Town	County	To Galveston	
		Domestic Rate	Export Rate (Wheat Only)
		(Cents per 100 pounds)	
Hollis	Harmon	69 1/2	45
Altus	Jackson	69 1/2	45
Frederick	Tillman	69 1/2	45
Walters	Cotton	69 1/2	45
Lawton	Comanche	69 1/2	45
Mangum	Greer	69 1/2	50
Hobart	Kiowa	69 1/2	50
Anadarko	Caddo	69 1/2	50
Chickasha	Grady	69 1/2	50
Sayre	Beckham	69 1/2	50
Cordell	Washita	69 1/2	50
Cheyenne	Roger Mills	71	50
Arapaho	Custer	69 1/2	50
Watonga	Blaine	69 1/2	50
El Reno	Canadian	69 1/2	50
Oklahoma City	Oklahoma	69 1/2	50
Kingfisher	Kingfisher	69 1/2	50
Guthrie	Logan	69 1/2	50
Stillwater	Payne	69 1/2	50
Perry	Noble	69 1/2	50
Enid	Garfield	69 1/2	50
Fairview	Major	71	54
Newkirk	Kay	71	54
Woodward	Woodward	72 1/2	54
Taloga	Dewey	No Railroad	
Leedy	Dewey	72 1/2	54
Medford	Grant	72 1/2	54
Cherokee	Alfalfa	72 1/2	54
Alva	Woods	72 1/2	54
Arnett	Ellis	No Railroad	
Shattuck	Ellis	73 1/2	54
Buffalo	Harper	81	59
Beaver	Beaver	82 1/2	59
Guymon	Texas	85	59
Boise City	Cimarron	85	59

Source: Compilation of Interstate Grain Rates, Carloads, Circulars 100A and 110B, Enid Board of Trade, Traffic Department.

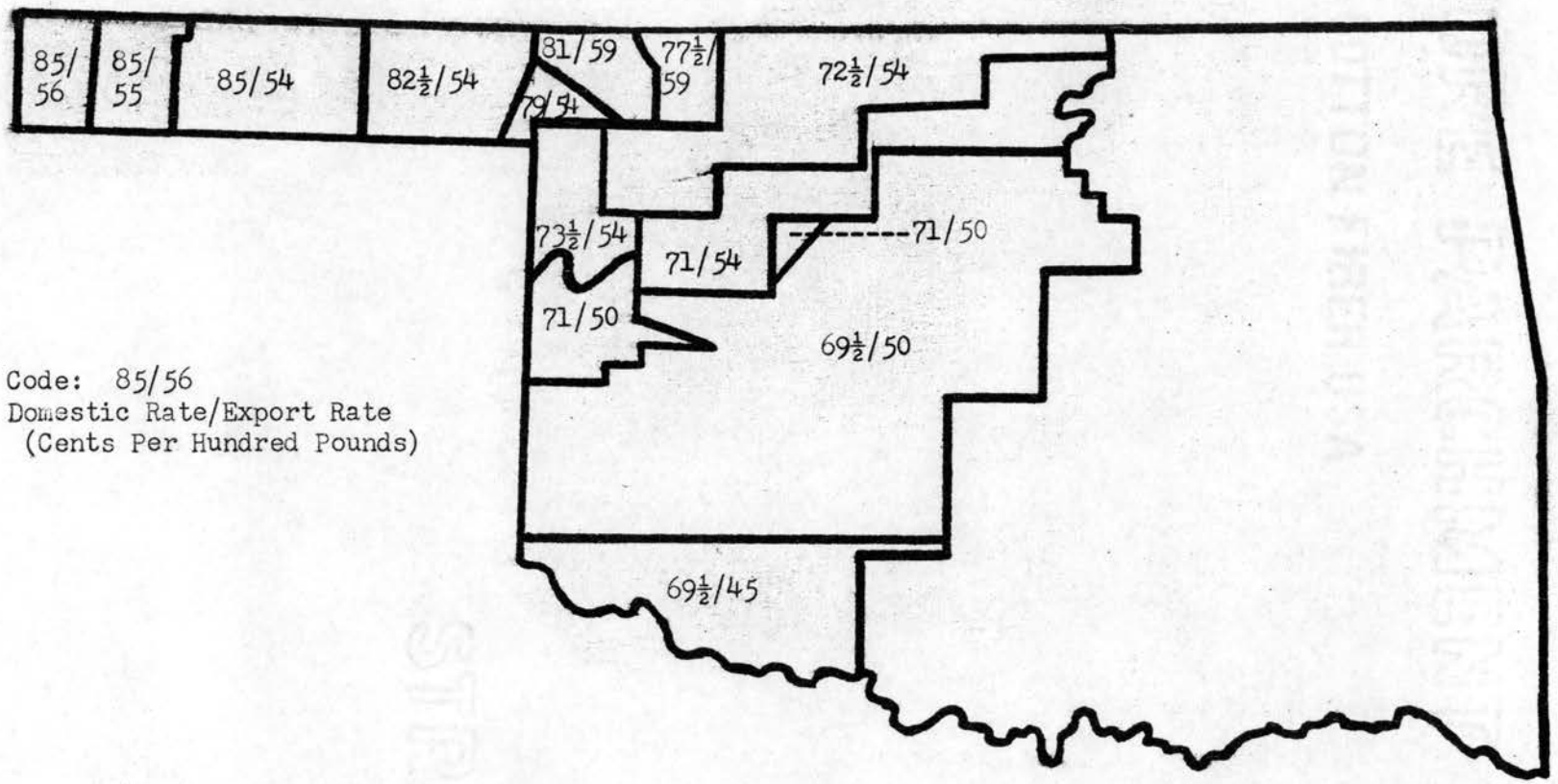

Figure 2-1. Generalized Pattern for Rail Shipment Charges

Fig 3

uniform grade. This blended wheat is desired because as a uniform grade it is worth more than the total of the different grades of unblended wheat when sold separately. It is a common rule of thumb that at least one cent per bushel can be added to the gross value of wheat by blending.

Truck Rate Difference by Areas

No uniform rate scale exists for trucking rates although there is usually some type of general pattern. Such a pattern may be altered by changes in the approximate boundaries of rate differentials, and in changes of various magnitudes within a uniform rate area. To illustrate these variations closer, suppose an increase occurs in the demand for trucks from country elevators in a given area. This would have an upward influence upon truck rates in the area. Because of the mobility of motor trucks, the attraction to the high rate area would create shortages in other areas if an equilibrium had previously existed. These areas would, in turn, bid rates up while seeking to regain their previous supply of trucks. If rates were high enough, vehicles previously having hauled such items as steel, fertilizer, and fence posts might be channeled to hauling wheat. Similar factors could lead to further reallocations, such as more rail movement. Another possibility might be for elevator managers to consider the rate increase temporary and decide to hold the wheat in storage until the rates returned to a lower level.

Not only are there general area differences in truck rates, but there are also isolated differences within an area. An example is a local, or group of local, elevators located inconveniently for access by motor truck. This limited access might be due to poor roads, long steep hills, or other geographical phenomena isolating the area. Such geographic factors may

increase trucking costs, and thereby increase rates.

Another condition that results in higher trucking charges for a particular elevator occurs when an elevator does not have the facilities for loading trucks conveniently. Lack of facilities could conceivably make drivers unwilling to haul from the elevator except at a bonus rate.

Actual Truck Rates

Although there were no rigid truck cost structures or rates in Oklahome facing the local elevator for wheat shipments to the Texas Gulf, as compared to rail charges for the time period relevant to this study, there was a general pattern. Truck rates, Table II-3, were approximately five cents per bushel lower than rail export rates, and 16 to 17 cents per bushel lower than rail domestic billings to the Houston-Galveston area. A generalized pattern[8] for motor truck shipment charges is shown in Figure 2-2. For the motor truck rate pattern, areas with differing rates were more uniform in size than areas in the rail rate pattern. Truck rates increased more uniformly as distance increased from the Texas Gulf than did rail rates. This characteristic can be observed by comparing Figures 2-1 and 2-2.

Theoretical Truck Transportation Rates

In the long run, truck rates for transporting wheat should cover the variable and fixed costs involved, including a normal profit to the entrepreneur. In the short run, at least variable costs should be

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[8] Courtesy Union Equity Cooperative Elevator.

TABLE II-3

TRUCK RATES FROM WESTERN OKLAHOMA TOWNS TO HOUSTON, TEXAS
1958-59 to 1960-61

Town	Rate Cents per Bushel	Town	Rate Cents per Bushel
Hollis	22	Altus	22
Frederick	21	Walters	21
Lawton	21	Mangum	22
Hobart	22	Anadarko	22
Chickasha	22	Sayre	24
Cordell	23	Cheyenne	24
Arapaho	23	Watonga	24
El Reno	23	Oklahoma City	23
Kingfisher	24	Guthrie	24
Stillwater	25	Perry	26
Enid	26	Newkirk	28
Taloga	25	Leedey	24
Medford	27	Cherokee	27
Alva	28	Arnett	28
Shattuck	28	Buffalo	29
Beaver	29	Guymon	29
Boise City	29		

Source: Union Equity Co-Operative Exchange.

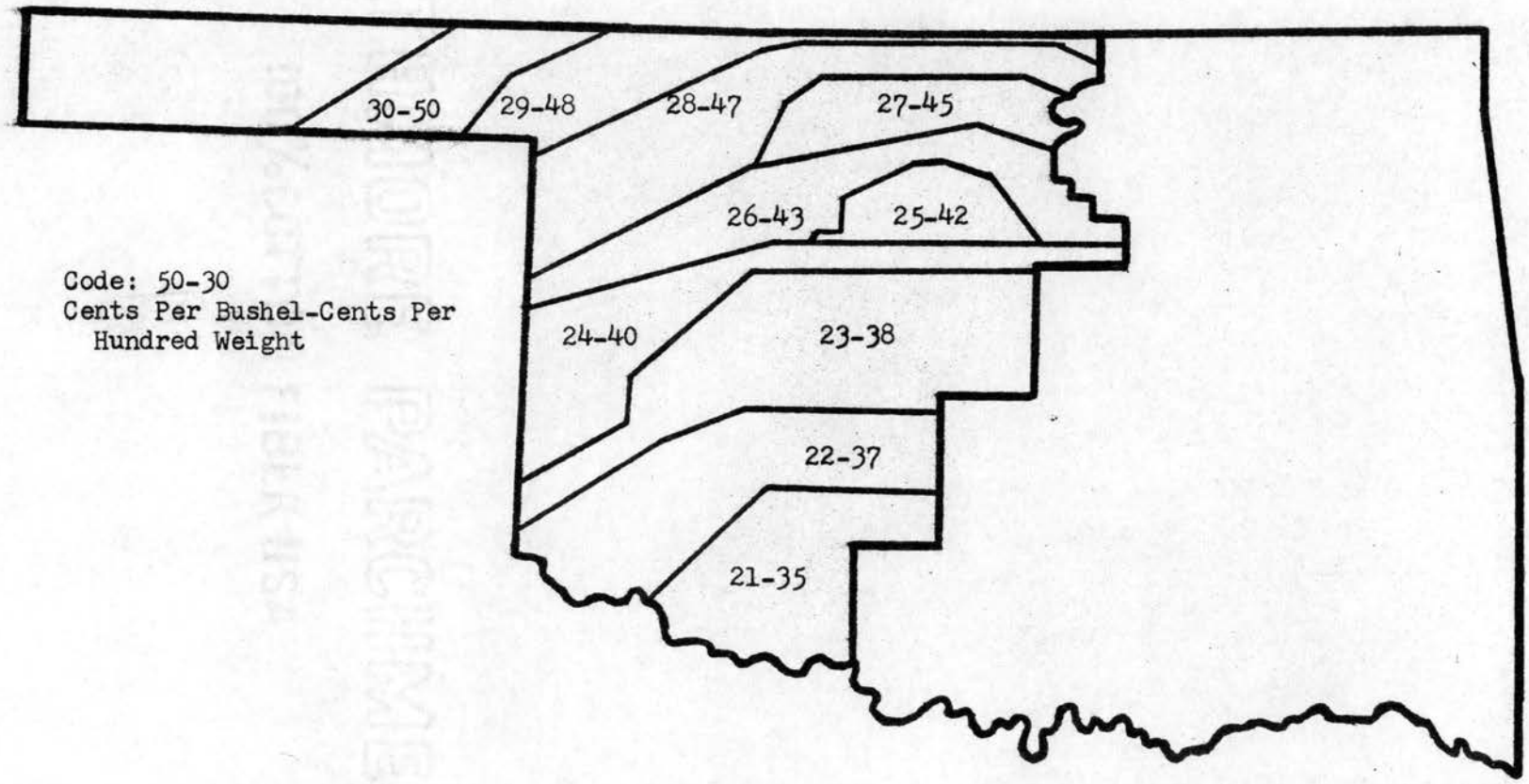

Figure 2-2. Generalized Pattern for Truck Shipments Charges

covered; otherwise, an adequate supply of motor vehicles would not be available. Although costs, and rates, increase with distance, they do not necessarily increase proportionally to distance. Most distance rates are constructed on the tapering principle.[9] This principle states that although the total rate or charge is greater for longer than for shorter distances, the rate per mile is less for the longer distances. The tapering principle holds true because of decreasing fixed costs as the mileage traveled increases.

Theoretical Market Networks

If geographical factors other than distance are not of significant importance in altering transportation rates, the costs for different geographic areas are related to the distances of hauls.

If such geographic phenomena as hills and valleys are excluded, a theoretical marketing system would lie on a plane. There are different shapes of market regions which could be conceived on this plane. For the purposes of this paper, a basic market region might be an area of wheat production from which a country elevator purchased its supply of wheat.

The following quotation, taken from August Lösch's book, The Economics of Location, deals with the shape and size of the market region.[10] "Elevator" might be substituted for "brewery" in order to apply its meaning to this study.

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[9]Russell E. Westmeyer, Economics of Transportation, Prentice Hall, Inc., New York, 1952, pp. 257-259.

[10]August Lösch, The Economics of Location, Translated by William F. Waglom, Yale University Press, New Haven, 1954, pp. 109-110.

> The deduction so far would be relevant if economic regions were circular in form. But they are not. Even if our district were full of breweries lying so closely together that their sales areas touched, one or another farmer would be tempted to start a brewery for himself. And he could do so. First, because all the corners between the circles would not yet have been fully turned into account; and second, because the size of the individual brewery could be reduced...without making the plant unprofitable.
>
> The corners can be utilized by pressing the circles together until a honeycomb results...
>
> Geometrically speaking there are two other possibilities for utilizing the corners between market circles: triangular or square economic regions can be imagined. But the hexagon has the advantage of being nearest to the ideal circular form. Consequently among all three possibilities the demand per unit of area is greatest with the hexagon.

Although the hexagon is the most efficient type of marketing area, the area relevant to this study is not served by a hexagon network. Because the market network is determined by the roads upon which farmers haul their wheat, and because the roads in Western Oklahoma are laid out according to the rectangular survey system of land measurement, a square market area seems most feasible. Lösch states:[11]

> We have already found the second best market region to be the square. In utilizing demand, it frequently is not much inferior to the hexagon and has the advantage of simply drawn boundaries, but also the disadvantage of longer roads. In the square, too, the relation between the number of settlements, and the size of the market areas, and the distance of their centers is extremely simple.

To illustrate why the square marketing pattern requires longer roads than the hexagon, a comparison of the two will be made. In theoretical form, a square market area would have a pattern as shown in Figure 2-3. The roads of the network run north-south and east-west. The outer boundary of this network represents points of equal distance from the market

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[11] Ibid., p. 133.

in the center when travel is limited to existing roads. The pattern for the hexagon is shown in Figure 2-4. Roads in this system not only run north-south, east-west as in the square pattern, but also in northeasterly-southwesterly, northwesterly-southeasterly directions. According to Lösch, the center or the metropolis of the entire marketing pattern has twelve principal lines of communication (highways in this case) radiating from it. To state this another way, six lines cross at the metropolis to give a cobweb shape. Such junctions as this occur only at the centers of the marketing pattern. Elsewhere, there are junctions of only two or three lines.

In the square marketing pattern, if several square segments of equal size are arranged symetrically to form a mesh, we can calculate equal distances of various areas from a given point. Such an arrangement is shown in Figure 2-5. The iso-distance lines for each square form the relevant pattern for this computation. Starting from the base point (a), the first diagonal line encountered when moving in a northwesterly direction shows an iso-distance of 20 miles. The next line shows 40 miles. This continues until the last diagonal line in the upper left corner of the graph is reached. This line shows an iso-distance of 160 miles from the base point.

If we move to a base point such as (b), the diagonal lines on either side of the horizontal and vertical roads intersecting at (b) are the relevant iso-distance lines. Starting from the iso-distance line 20 miles to the left of (b) and following it upward to the right, as indicated by the arrow, we find it relevant until it reaches point (c) located on the vertical road running north from (b). Beginning at this point, a new iso-distance line sloping downward to the right and perpendicular

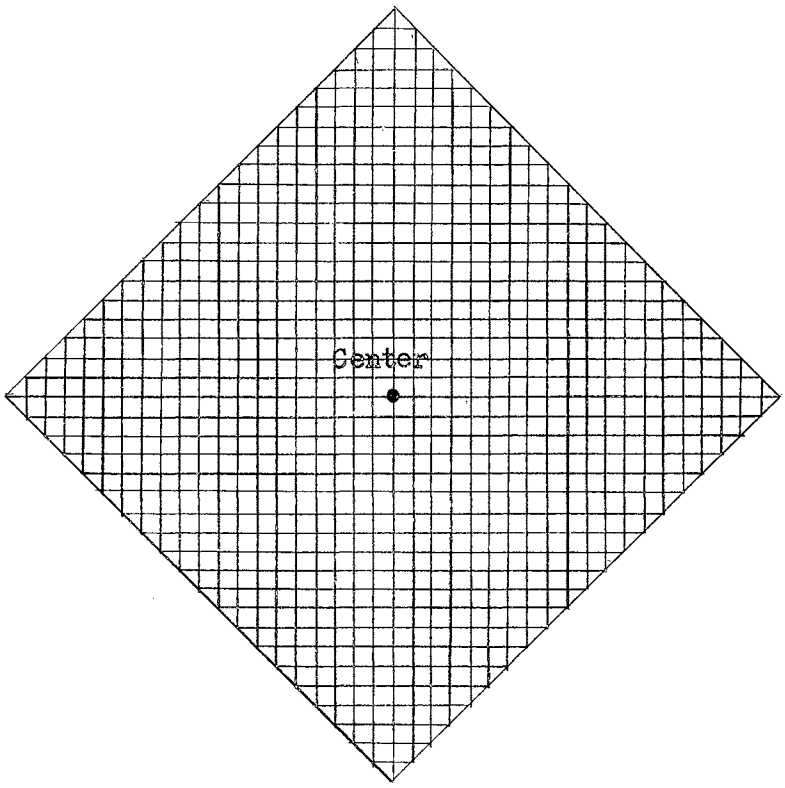

Figure 2-3. Square Marketing Pattern*
(one segment)

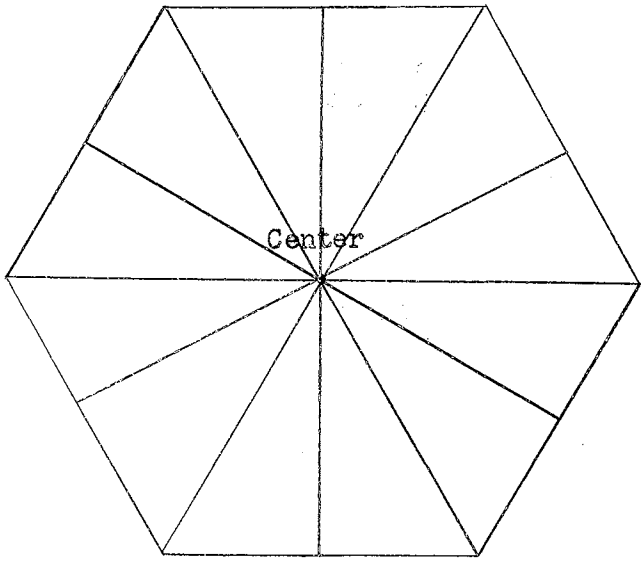

Figure 2-4. Hexagon Marketing Pattern
(one segment)

*Scale: 1 square = 1 square mile

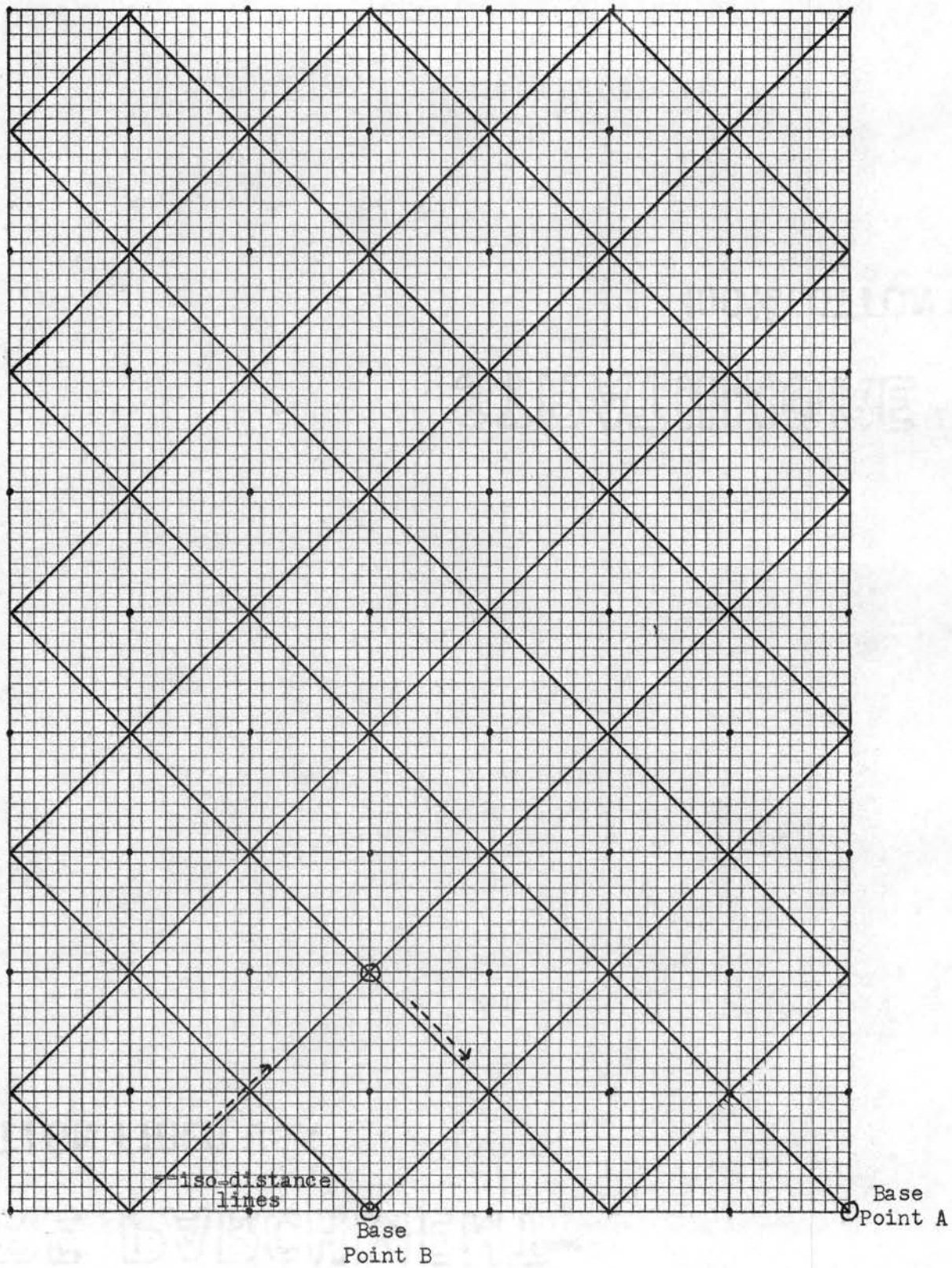

Figure 2-5. Theoretical Equal Distance Areas*

*Scale: 1 square equals 1 square mile

to the initial iso-distance line is relevant until the point 20 miles to the right of (b) is reached. The same method holds for lines parallel to these lines.

This square pattern may be used as a basis for explaining wheat trucking patterns in Oklahoma. It can be seen upon examination of an Oklahoma highway map, shown in Figure 2-6, that the existing major highways of Oklahoma upon which wheat moves toward the Texas Gulf form approximately a square pattern. Almost all highways go either north-south or east-west - there are few diagonals. This would seem to imply that the major wheat marketing area of Oklahoma is a large square market area or a succession of several. If this is so, it would be easy to construct uniform truck rates based on the length of haul to the Texas Gulf area to which most Oklahoma wheat moves and practially all that is exported.

Because the Texas Gulf area lies south and east of the area of this study, exit from the state generally is made via U. S. Highways 77 or 81.[12] If exit is made in the south central area (via U. S. Highway 277 or 183), or even the southwestern section (U. S. Highway 283), travel in Texas must eventually be made eastward, and the net effect would be the same if no diagonal roads were encountered. The square pattern is altered when diagonal sections of highways running other than north-south, east-west are traveled. Texas has several such diagonal highways but these do not effect the square pattern in Oklahoma.

To construct theoretical areas of equal highway distance from the Texas Gulf, a sliding base must be employed. The last large town through

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[12]Chester Robbins, Director of Trucking Operations, Union Equity Co-operative Exchange, Personal discussion.

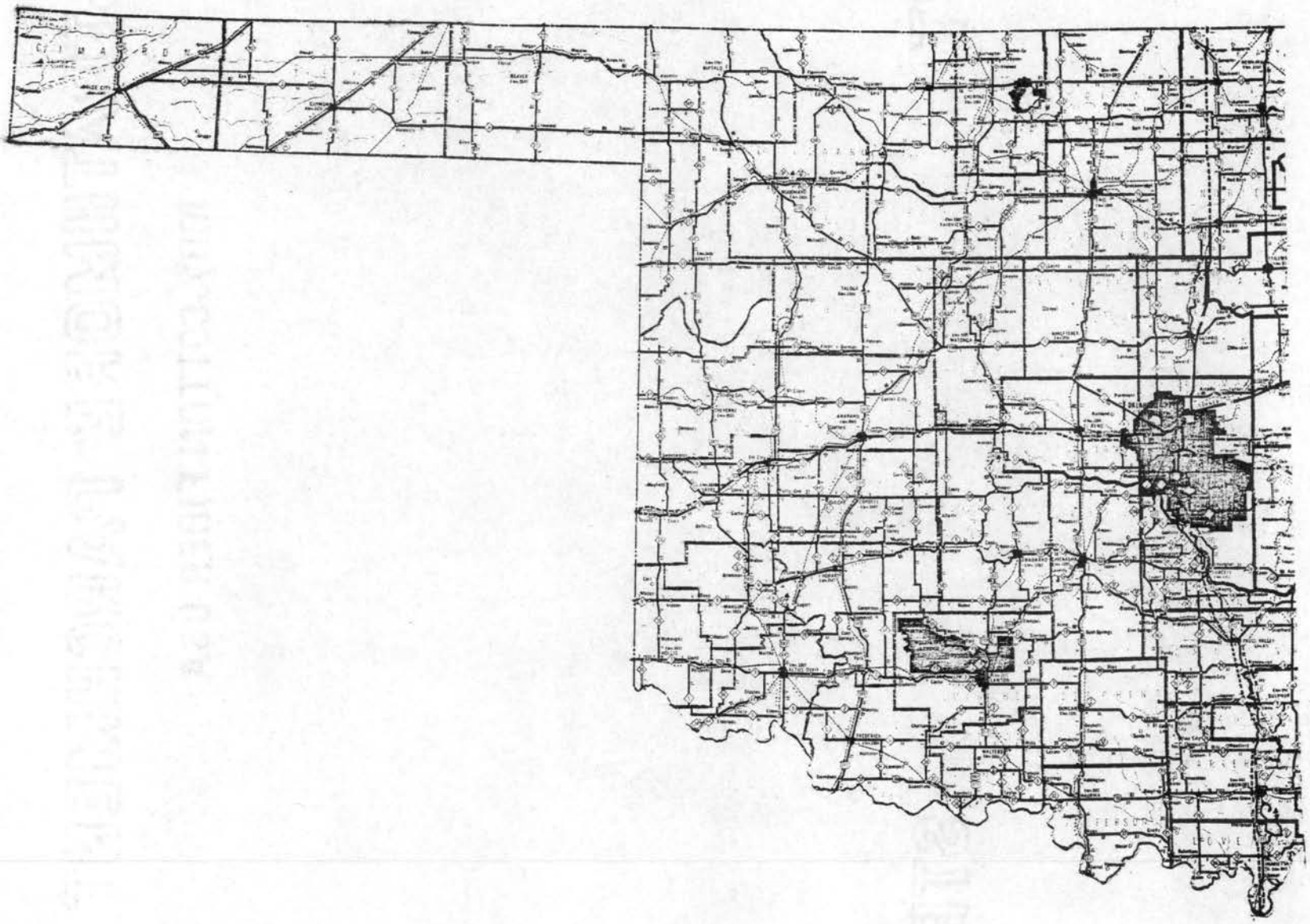

Figure 2-6. Map of Highways of Western Oklahoma

which a truck travels when leaving Oklahoma can be considered the base. By the use of such bases, theoretical equal distance areas as were shown in Figure 2-5 can be calculated for Oklahoma. If Waurika is considered a base point, its actual distance of 377 miles from Houston is relevant when constructing the iso-distance lines shown in Figure 2-7. These iso-distance lines are the theoretical boundaries for areas of equal distance for trucking wheat from Oklahoma elevators to the Texas Gulf. When exit is through Ardmore, the base slides to there and 254 miles is the relevant distance. For this study, the other base points are: Randlett, 399 miles; Frederick, 445 miles; and Altus 467 miles. Thus, the base "slides" to each of these points if they are the main exit for a particular elevator or area.

If diagonal highways were not present in Texas, i.e., if Texas followed the rectangular survey system, the sliding base would not be necessary for calculations. Also, without the diagonal highways of Texas, all distances from Oklahoma to the Houston area would be longer. The distance would grow proportionally greater the further westward the point is from which travel is initiated.

It should be pointed out that Figure 2-7 excludes geographical factors. Although there are some diagonal highways in this analysis, such as a little of U. S. 77, these will be ignored for the present and discussed in the following section.

A listing of the actual distance of points from Houston contained in the hypothetical areas of equal distance follows in Table II-4. The theoretical distances of Table II-4 were obtained by employing a sliding base. If the diagonal highways of Texas were not encountered, the sliding base would not be necessary as the square marketing pattern from

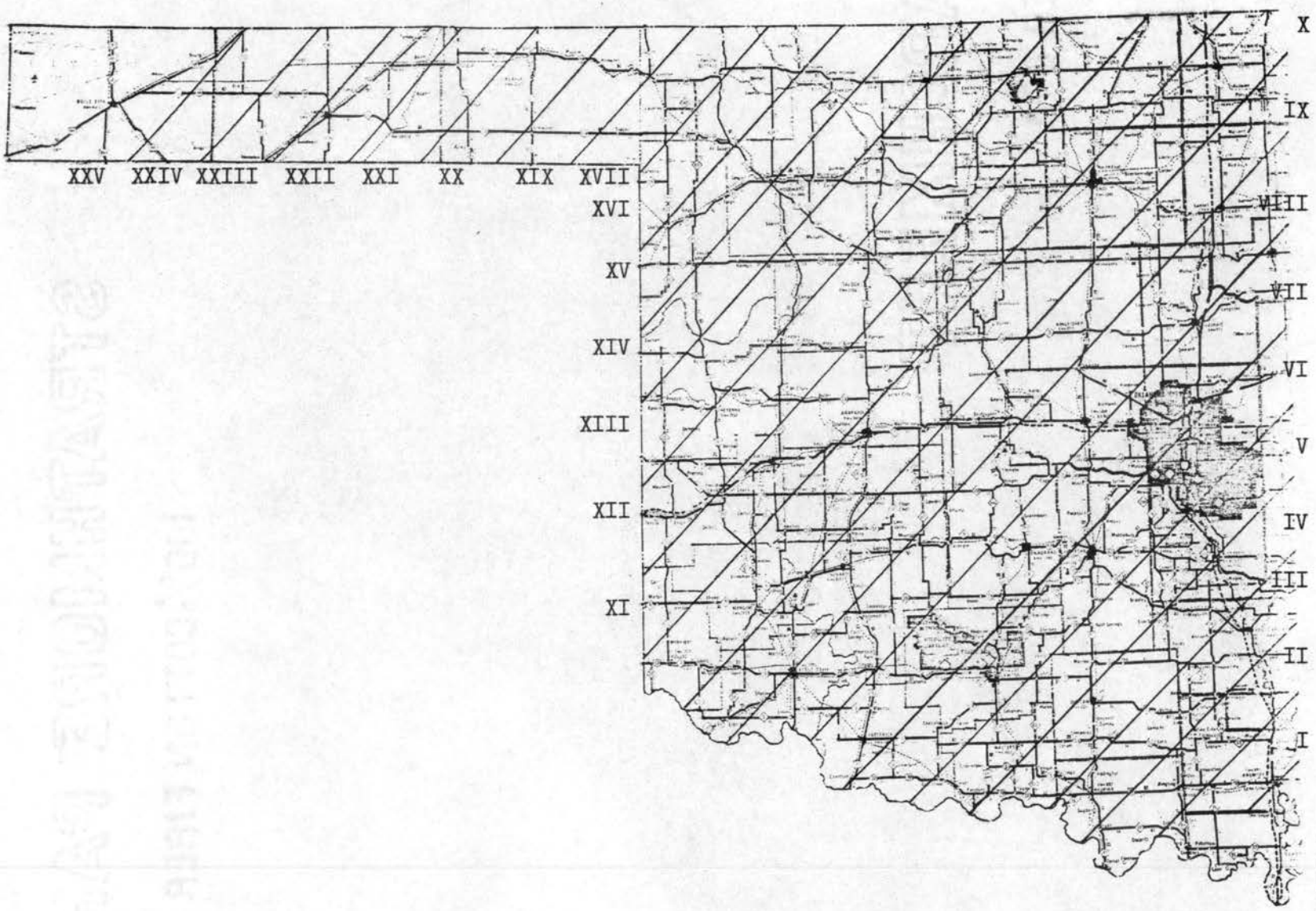

Figure 2-7. Map of Theoretical Equal Distance Areas of Western Oklahoma

TABLE II-4

ACTUAL DISTANCE AND THEORETICAL DISTANCE OF OKLAHOMA TOWNS FROM HOUSTON BY USING A SLIDING BASE[1]

Area	Town	County	Theoretical Dist.fr. Houston	Actual Dist.fr. Houston	Base
I	Temple	Cotton	387-407	397	(377)
I	Lindsay	Garvin	414-434	424	(354)
II	Grandfield	Tillman	407-427	412	(399)
II	Rush Springs	Grady	407-427	421	(377)
III[2]	Lawton	Comanche	427-447	421	(377)
III	Chickasha	Grady	427-447	441	(377)
III	Oklahoma City	Oklahoma	454-474	457	(354)
IV	Frederick	Tillman	441-461	445	(445)
IV	Anadarko	Caddo	347-367	460	(377)
IV	Yukon	Canadian	474-494	474	(354)
V[2]	Altus	Jackson	461-481	467	(354)
V[2]	El Reno	Canadian	467-487	473	(377)
V	Perry	Noble	494-514	520	(354)
VI	Hobart	Kiowa	481-501	493	(445)
VI	Kingfisher	Kingfisher	487-507	497	(377)
VI	Ponca City	Kay	514-534	552	(354)
VII	Hollis	Harmon	501-520	500	(467)
VII	Clinton	Custer	501-520	527	(445)
VII	Watonga	Blaine	507-527	518	(377)
VII[2]	Enid	Garfield	507-527	539	(377)
VII	Blackwell	Kay	534-554	576	(354)
VIII[2]	Sayre	Beckham	520-540	527	(467)
VIII	Canton	Blaine	527-547	542	(377)
VIII	Pond Creek	Grant	527-547	566	(377)
IX	Erick	Beckham	527-547	531	(467)
IX	Taloga	Dewey	540-560	564	(445)
IX	Jet	Alfalfa	547-567	579	(377)
X	Cheyenne	Roger Mills	547-567	549	(467)
X	Chester	Major	547-567	578	(445)
X	Manchester	Grant	567-587	596	(377)
XI	Harmon	Ellis	567-587	605	(445)
XI	Alva	Woods	587-607	607	(377)
XII	Arnett	Ellis	587-607	588	(467)
XII[3]	Woodward	Woodward	587-607	585	(377)
XIII	Shattuck	Ellis	607-627	603	(467)
XIV[3]	Laverne	Harper	627-647	626	(377)
XV[3]	Gate	Beaver	647-667	643	(377)
XVI[3]	Beaver	Beaver	667-687	676	(377)
XVII[3]	Guymon	Texas	687-697	689	(377)

[1]Theoretical distances within the same area differ due to the sliding base.

[2]Indicates town is located on or close to area boundary lines.

[3]Diagonal highway encountered from Woodward.

country elevators of Oklahoma to the Texas Gulf would be unaltered. By changing the base points in Oklahoma, allowances are made for the diagonal highways of Texas. This can be shown by an example. Chickasha is in the equal distance Area VI. Area VI includes all points which would be approximately equidistant from the Texas Gulf if diagonal highways of Texas were not encountered. Lawton and Oklahoma City are also in Area VI. Most trucks hauling from Lawton and Chickasha elevators leave the state via U. S. Highway 81 through Waurika. Therefore, Waurika would be the base point for shipments of wheat from all points west of Highway 81 and east of the next major highway. The next major highway encountered west of Waurika is U. S. 281 through Randlett. Randlett then becomes the base for all points west of U. S. 281 until another major highway is encountered. The north-south highways through the base points are relevant for areas west of them because the Texas Gulf is southeast of western Oklahoma, and travel would not usually be made westward to a highway when there is a comparable highway eastward from the origin point.

An iso-distance area is 20 miles wide. Both Lawton and Chickasha are in Area VI, which is two and one-half iso-distance areas from Waurika. Therefore, to the base, Waurika, of 377 miles is added 50 milees (2 1/2 · 20 miles) to give the shorter iso-distance line, 427 miles, (377 miles + 50 miles = 427 miles) of Area VI. The outer boundary of Area VI, with Waurika as the base, is obtained by adding horizontally and vertically the standard 20 mile width of the area to the shorter iso-distance line (427 miles + 20 miles = 447 miles). Since Lawton and Chickasha both utilize Waurika as the base point, the boundaries of 327 to 347 miles are relevant to both of these towns. The base for Oklahoma City is Ardmore. Oklahoma City is five equal distance areas (each

20 miles in width) from the base, Ardmore. Therefore, the theoretical distance of Oklahoma City is within a range from 454 to 474 miles from Houston (354 miles + 5(20 miles) = 454 miles + 20 miles = 474 miles). The actual distance is 457 miles to Houston.

The theoretical iso-distance areas drawn are altered by factors other than the diagonal roads of Texas. Rivers, mountains, and other factors altering the highway network alter the shape of actual iso-distance lines. Although the shape can be altered, the basic pattern is not changed so long as the square marketing pattern is the basic layout of the highway system. Instead of being straight (Figure 2-7) the theoretical iso-distance lines would be wavy and probably straight only for small segments. The development of actual iso-distance lines from Houston relevant to Oklahoma elevators is beyond the scope of this study.

Factors Altering the Square Market Pattern

A spatial analysis such as previously presented is not fixed. Factors of the real world are constantly altering and reshaping the picture. An example of such a factor is the construction of Interstate Highway U. S. 35. This route may become the dominant path for shipping wheat from Oklahoma. If this occurs, the effect will be that the general market pattern is oriented toward this highway.

Because Interstate Highway 35 contains diagonal segments, it is necessary to determine the effect of these segments on the marketing pattern. The following analysis also applies in varying degrees to other highways in Oklahoma containing diagonal segments.

When diagonal sections of a main highway are encountered, the equal distance lines relevant to the highway form various shapes. Consider

one segment of a square market pattern through which a diagonal highway passes in a northwesterly-southeasterly direction 30 degrees from the horizontal plane. Such a situation is shown in Figure 2-8. The sides of the marketing segment through which the diagonal highway passes are pulled outward. The new outer boundary of the segment can be reached by traveling the same distance via the new highway and relevant vertical and horizontal roads as the original distance (shown by dotted lines) could have been reached by traveling the original vertical and horizontal roads. A highway running 45 degrees from horizontal has the effect of pulling each of the two sides intersected outward into an isosceles shape. Anything other than a 45 degree line has one of the iso-distance sections of each new side longer than its other segment. With such diagonal shapes as previously described, the new marketing segment formed is a six sided figure, but not a hexagon.

The hexagon Lösch described did not have the network of vertical and horizontal lines forming a grid as does the present system. If we assume a second diagonal highway is constructed at any angle other than the one already present, an eight sided figure is obtained.

When a diagonal section of a highway deflects and travel continues on a vertical, horizontal, or even another diagonal section, the iso-distance lines are altered by this angle to form shapes of a basic pattern. This pattern is shown in Figure 2-9. Assumptions are that the main line of travel is along the dark line representing a highway and that travel will be made via the shortest route, i.e., trucks will not travel an extra distance to gain access to the highway.

If travel is to be made down the vertical highway, or to any point on the vertical highway such a point (a), there are relevant iso-distance

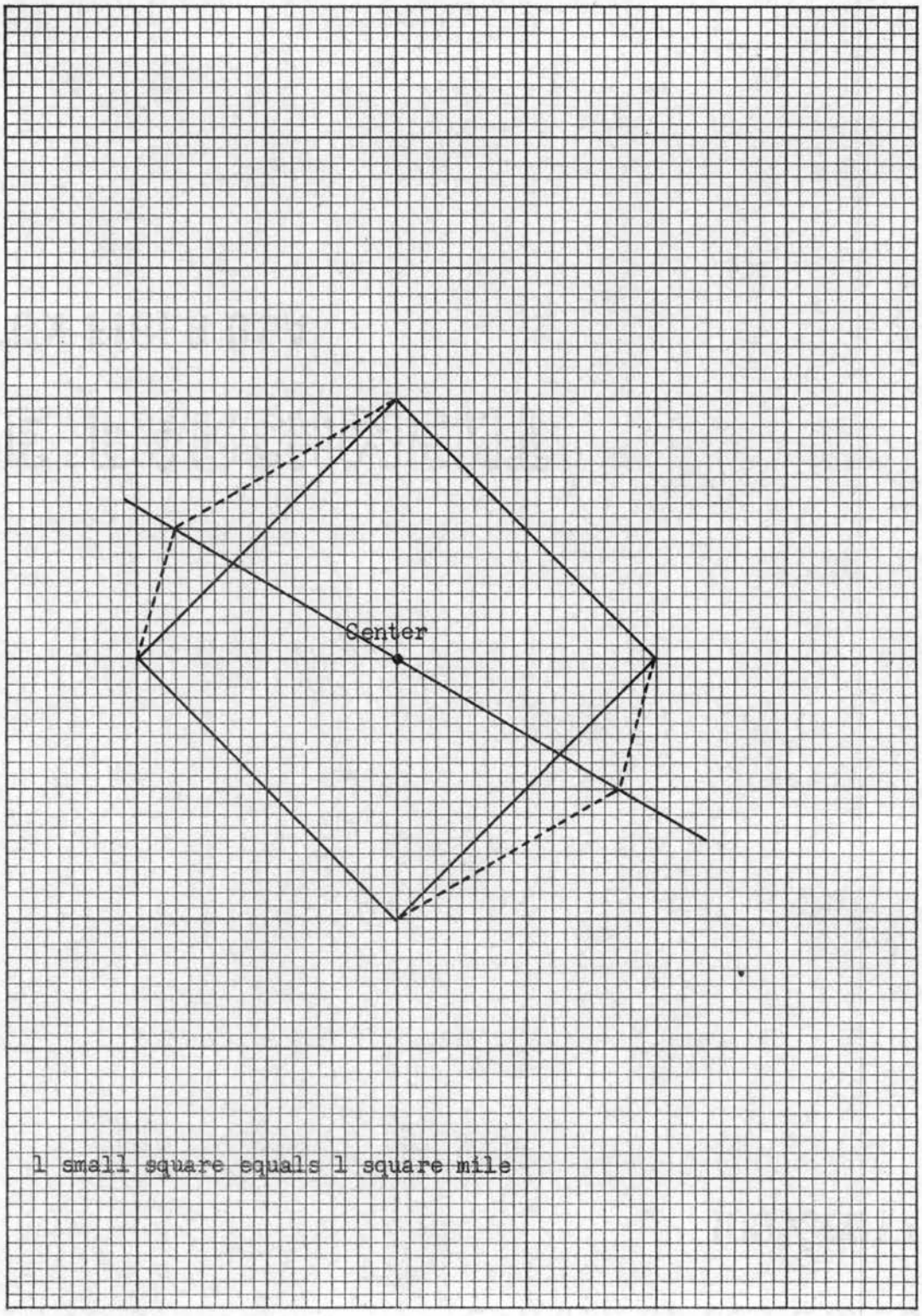

Figure 2-8. Effects on Outer Boundaries of a Marketing Segment by a 30 Degree Diagonal Highway

Source: Adlowe L. Larson, One of a Series of Theoretical Market Patterns.

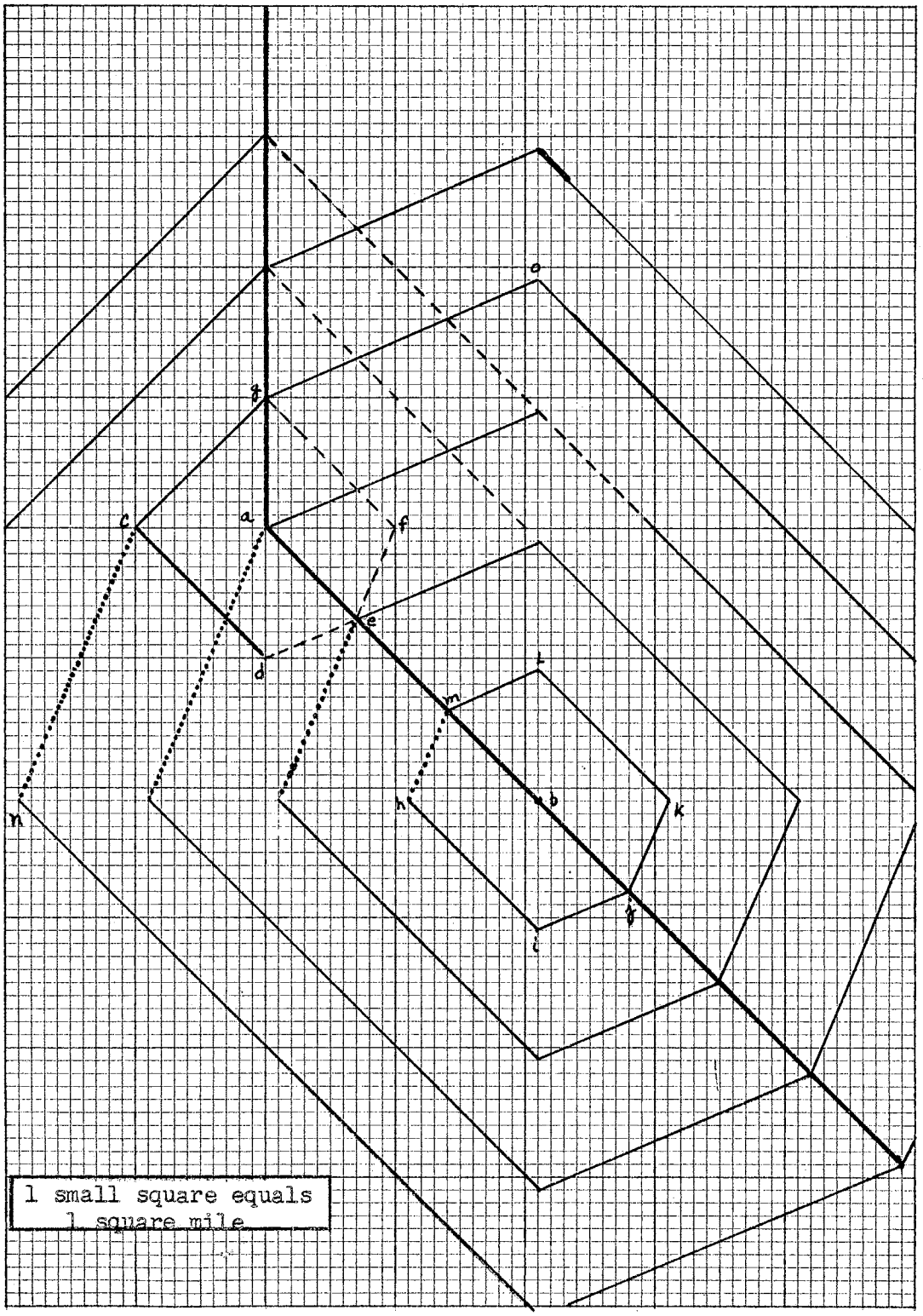

Figure 2-9. Iso-Distance Lines of a Connected Vertical and Horizontal Section of Highway

lines. For all points north of (a), the relevant lines are the dotted lines running downward to the right and the solid lines running downward to the left from the vertical section of highway. If point (a) were the destination point, the iso-distance lines in the northeast, northwest, and southwest quadrants would have the shape of those for a square marketing pattern. Because of the diagonal highway, the iso-distance lines in the southeast quadrant would have the two sided shape corresponding with diagonal segments of highways. The shape of the relevant iso-distant lines of point (a) are shown by the lines connecting points c, d, e, f, g, and a.

When the destination point is changed to point (b), the effects of the deflection of the highway can be seen. For the side of the vertical and diagonal highway forming the angle of less than 180 degrees, the solid iso-distance lines running upward to the right are relevant. These are relevant until directly above point (b); then the original shape of the square marketing pattern is obtained for this northeast quadrant (considering point (b) as the center of the quadrant).

For the iso-distance lines of the side formed by the greater than 180 degree angle, a different pattern is obtained. The original iso-distance lines of the vertical section are still relevant for the area bounded by the vertical line and a horizontal line westward from point (a). These lines become discontinuous at these vertical and horizontal lines and new equal distance lines acquire meaning. For the side of the angle greater than 180 degrees, the iso-distance lines of the diagonal section (the dotted lines sloping downward to the left) are now the pertinent lines.

The relevant iso-distance lines for all distances less than 30 miles

have a shape outlined by h, i, j, k, l, m, and h. Iso-distances of greater than 30 miles assume a shape shown by the lines connecting points n, c, g, and o for the northwest section of the marketing pattern. The remaining northeast, southeast, and southwest sections retain the same shape as the h, i, j, k, l section of the less than 30 mile pattern. The shape of the northwest section takes on this form because of the assumption all travel from northwest of point (a) will initially be in this direction to gain greatest advantage of the diagonal highway.

If the destination point were somewhere on the diagonal section other than (b), the market pattern would need to be reoriented around this point. The general shape of the pattern would be as shown, but some iso-distance lines would have different lengths.

These iso-distance lines are not fixed, and there is an infinite number of patterns of the same shape that can be drawn for a segment of highway depending on the position of the destination point. Different highway junctures change the pattern of the equal distance lines, but do not change the basic shape. In our dynamic society, new markets and new destination points commonly occur, as do constantly changing highway patterns. These dynamic elements change the relative importance of location of country elevators to give new competitive advantages or disadvantages to a particular area or elevator.

Summary

Wheat, when hauled by truck, was a commodity exempt ratewise from Interstate Commerce Commission legislation when hauled by unfranchised agriculturaly exempt truckers. Wheat hauled by railroad is regulated. Railroads have two rates (domestic and export) by which elevator managers

shipped wheat. Transit privileges and destination points were fewer for the export rate, but the price for the time period studied was about nine to eleven cents per bushel lower for the export rate than the domestic. During the same period, truck rates were generally five to six cents per bushel lower than the export rate.

Because of transit privileges and other institutional factors inherent in the rate structure of railroads, rail rates did not correspond as closely to the length of haul as did truck rates. Since truck rates corresponded closely with length of haul, the road network traveled by trucks determined the rates. There are several types of road networks, or marketing patterns; western Oklahoma conforms closely to one type, a square marketing pattern.

By utilizing the theory of a square marketing pattern, it is possible to construct lines of equal distances from a given point, the market. Since most of Oklahoma's wheat moved to Houston, Texas, making it a major market, a network of lines in Oklahoma showing theoretical equal distances from the Houston area were constructed. Texas is not laid out according to a square marketing pattern, therefore many diagonal highways were encountered to alter the theoretical network possible in Oklahoma. A sliding base system of distance calculation was used to largely overcome the obstacle of diagonal highways in Texas.

CHAPTER III

ADVANTAGES AND DISADVANTAGES OF TRUCK SHIPMENT OF WHEAT FROM COUNTRY ELEVATORS

The 110 elevator managers sampled for this study were asked to rank in order of importance to them items on a list containing several advantages and disadvantages of shipping wheat by truck. This list was constructed after consulting with several managers and was tested through the 153 completed replies of the mail questionnaire.

Of the 110 managers sampled 92 responded to the question as requested. Various reasons were given by the 18 managers who did not answer the question. Ten managers stated that they did not use trucks and, therefore, the question did not apply. Three schedules were incomplete because the managers were not present when the information was sought. The bookkeepers completed the remaining part of the schedule, but would not answer this question. The reason given for no response by three other managers was that they were compelled to use trucks for such reasons as no rail facilities, so did not think it fair to answer this question. The remaining two managers who did not answer this question contended they did not wish to do so.

The advantages and disadvantages of shipping wheat by truck were evaluated on a weighted basis. If a listed advantage or disadvantage were marked first, and most important, by a manager, a value of three points was assigned to it. Items marked second were given two points

and items rated third one point. A total for each item was calculated (Table III-1).

TABLE III-1

ADVANTAGES AND DISADVANTAGES OF SHIPMENTS OF WHEAT BY TRUCK

Reason	Weighted Value
Advantages of Shipping Wheat by Truck	
Lower transportation rates	155
Boxcar shortage	89
Sell on local elevator weights	58
Load out truck with less labor	55
Faster transportation (shorter time)	40
Unsatisfactory loss adjustment when shipped by rail	33
Other reasons	24
Smaller loads preferred	3
Disadvantages of Shipping Wheat by Truck	
Trucks not available at harvest	179
Trucks not dependable (when offered more money elsewhere)	102
Cannot time and plan labor use	56
Unsatisfactory weights or grades	43
Delay in getting paid	34
Lack of local storage	25
Other reasons	17
Extra costs at either Houston or Galveston market	12

Advantages of Shipping Wheat by Truck

Low Rates

Lower rates for motor truck shipment of wheat from country elevators were at the top of the evaluation and ranked as the main advantage by 41 of the 92 managers answering the question. This indicates that the cost of transportation was the dominant factor used in selecting the method of transportation from country elevators. As it was pointed out in an earlier chapter, the actual difference in truck rates and export

rail rates approximated five or six cents per bushel during the time period under study.

Boxcar Shortage

The second major reason for the use of motor trucks to transport wheat from local elevators indicated an imbalance in the interworking of demand and supply of boxcars. The delay of the railroads in leaving empty boxcars and removing loaded cars caused many managers to employ trucks. Managers often felt there was an adequate supply of boxcars and that the railroads did not utilize the cars in such a way as to obtain maximum use of them. It was expressed in personal interviews that the railroads moved boxcars to northern points to sit on the tracks two weeks before the wheat was ripe, while elevators further south, which were in great need of the cars because of the earlier ripening of the wheat, found them unavailable.

A shortage of boxcars became more critical if storage space was limited. When storage space was filled, and boxcars were not available, a much greater need for trucks was felt. If not enough trucks were available, wheat had to be either piled upon the ground or diverted to competitors. With shortage of transportation facilities, the nearest adequate storage was usually sought so vehicles could be allowed to return more quickly for reloading. This was especially true for both truck and rail shipment from country elevators north of Enid. For points south of Enid, the rail transit privilege was utilized, and, if the distance was not too great, wheat was trucked north for storage until it could be moved at a later date.

Sell on Weights of Local Elevator

To many elevator managers selling on weights of the local elevator was an important point. It was the third greatest advantage of trucks to the managers interviewed. For rail shipment, an elevator cannot sell on its weights unless it has scales to weigh the entire boxcar. Most country elevators do not have such facilities. Then the elevator operator can check on weights only by metering wheat into cars as they are filled. These devices, called hopper-scale meters, may be in error. A discussion of this error will be given under reason six, unsatisfactory loss adjustment when shipping by rail. There may be a difference in the amount of wheat delivered to the Texas port area and in the amount the elevator manager thought he shipped. If so, the manager does not know if there is an error in his measuring device, if there are losses in transit, or if there is an error in measurement at the destination point.

Most local elevators do have scales to weigh trucks accurately. If the local scales (either truck or rail) consistently agree with those of the destination point, an accurate determination can be made when losses in transit are incurred.

Load Out Trucks for Less Labor

It is easier to load trucks than boxcars with wheat for several reasons. One is that trucks do not require coopering which is the installation of grain doors, either wooden boards or cardboard. These grain doors hold wheat in the boxcar regardless of the position of the sliding doors of the boxcar.

Another factor which gives trucks a loading advantage is that boxcars must be cleaned before filling of grain can proceed. Truck drivers

clean their trailers themselves after each load. Drivers also often help with the loading operations. Places in the boxcar which might leak grain must be patched before loading can proceed. Truck drivers take care of such incidentals with their vehicles because they are usually responsible if leakages occur. The actual loading of trucks is also easier, because the trailer can be maneuvered forward and backward under the loading spout. Boxcars lack this ease, so workers must level the wheat in the car manually.

A breakdown of the time required for loading grain into boxcars and trucks is shown in Table III-2. The time required for loading trucks was practically uniform because less preparation was necessary. The time for loading boxcars varied considerably because of the time required to prepare the boxcar adequately to hold grain. The time requirements reflect the average time needed for each stage of the loading operation. If it is assumed that an average boxcar holds 1,800 bushels of wheat, the per bushel cost of loading a boxcar would be .0125 cents per bushel. A 600 bushel truck would only cost .0005 cents per bushel to load. This is a decisive advantage of trucks.

Faster Transportation

Another significant factor is the time required in shipping grain from point of origin to destination. With motor trucks, the in-transit time is greatly reduced from that of railcars. The shorter transit time carries less risk of loss or damage. When long transit time occurs, additional risk is incurred in shipping grain with high moisture content. At harvest time the moisture content of wheat often runs high. If the shipment time is long, moist wheat sealed in a boxcar may generate heat.

TABLE III-2

APPROXIMATE TIME REQUIRED AND DIRECT LABOR COSTS FOR LOADING GRAIN INTO BOXCARS AND MOTOR TRUCKS AT COUNTRY ELEVATORS[5]

Operation	Boxcar[1]		Truck[2]	
	Time	Cost[3]	Time	Cost[3]
	Man-Minutes	Dol.	Man-Minutes	Dol.
Spotting	2	0.05		
Weighing in			2	0.05
Cleaning	5	.125		
Sealing (making grain-tight)[4]	6	.15		
Installing "grain" doors (wooden or paper)	20	.50		
Actual loading	55	1.375	8	.20
Weighing out			2	.05
Pulling away	2	.05		
Total	90	2.25	12	0.30
Number of men used to load	1		1	

[1]Based on 108,000 lbs. or 1,800 bu.

[2]Based on 36,000 lbs. or 600 bu.

[3]Cost based on $1.50 per hour. Loading usually done by owner-operator or manager.

[4]On the basis that 75 percent of cars received other than Class "A" cars.

[5]Observations were made of 63 truck loadings at 14 country elevators and 16 carloadings at 9 country elevators.

Source: Reprinted from The Transportation and Handling of Grain by Motor Truck in the Southwest, p. 40.

This excessive heat will cause the wheat to be downgraded when reaching the destination point with a resultant loss to the shipper.

Unsatisfactory Loss Adjustment When Shipped by Rail

This reason for shipping ranked low among the advantages of trucks. One reason for this placing may be the similarity between the inability of an elevator to sell rail lots on its own weights (3rd most important advantage of trucks) and unsatisfactory loss adjustment. If there are no boxcar scales, the railroads will not take hopper-scale measurements of boxcar loads because of the inaccuracy of this system of measurement. The hopper-scale measurement device consists of a box or hopper which is attached to a scale. When the hopper is filled to a designated weight, the contents of the hopper are dumped into a boxcar. To understand how inaccuracy might arise, suppose the device were in error by .2 bushel for every 50 bushel dump. A boxcar with a capacity of 2,000 bushels would require 40 dumps to fill. This would amount to an aggregate error of 8 bushels, or 480 pounds of wheat. If the wheat were worth $2.00 per bushel, the manager would feel $16 worth of wheat had been "lost". He might feel his method of weighing was in error, or that losses in transit were happening.

This is not the case with trucks. If wheat is sold at the country elevator for truck shipment, the sale is on the basis of weights at the elevator. If wheat is to be transported by the local elevator for sale elsewhere, the elevator usually allows one and sometimes two bushels difference between the scale weights of the local elevators and the destination point. If a greater difference than this is encountered, the trucker is responsible.

For rail shipments, one-eighth of one percent loss per carload is considered normal because of shrinkage. This equals 150 pounds on a 2,000 bushel boxcar shipment. Only an amount greater than one-eighth of one percent of the shipment can be considered in filing for losses in transit.

This study found that many managers consistently sustain greater losses than this. Ten reported usual losses of .5 of 1 percent. This is 600 pounds of wheat if the boxcar contained 2,000 bushels when shipped. This is a loss of $20.00 with wheat valued at $2.00 per bushel. Two managers reported consistent losses of 1 percent when wheat was shipped by rail. One report of losses of 3,600 pounds per carload was received. This amounts to 3 percent loss of a 2,000 bushel shipment, or $120 worth of wheat. It may be that the manager made an error in calculation or that he made constant errors in calculating the amounts of wheat shipped. In cases similar to this type of reporting, one manager reported consistent 300 pound gains in rail shipments. Sixteen managers reported no losses in transit other than shrinkage.

Forty managers reported little or no loss in transit for truck shipments. One reported usual losses of 160 pounds. This amounts to approximately .4 of 1 percent of a load. One manager reported consistent gains of 75 pounds for his truck shipments.

Other Reasons for Truck Shipment

Four elevator managers gave the main advantage of trucks as being the only method of shipment available to them. This would occur for elevators which had had their rail service discontinued, or had never had such service.

Two managers stated that the higher net price received from truck shipment was the reason for using trucks. This is similar to the first ranked reason (lower transportation rates).

Smaller Loads Preferred

The fact that truck shipment is by smaller loads than rail seemed to make little difference to elevator managers. Because of the association of small loads with greater ease of loading, some votes for this reason might have been cast for the fourth rated advantage (load out trucks for less labor).

Disadvantages of Shipping Wheat by Truck

Trucks Not Available at Harvest

From the information gained during this study, greatest disadvantage of trucks is their unavailability at harvest time, (Table III-I). The first place ranking of "trucks not available at harvest" should not be confused with "lack of local storage," which was sixth in importance. This placing probably indicates that although enough trucks are not available for the harvest rush, this is not considered a lack of storage space by the managers. The interpretation of this reasoning is that although the truck rate was lower than rail, it was not significantly lower to warrant building space to store the harvest rush for later truck shipment. Therefore, enough trucks were not available at harvest to handle the large volumes of wheat that had to be moved from elevators without sufficient capacity to elevators of ample storage. This usually implies shipments to terminal facilities.

The shortage of trucks at harvest is more acute for smaller than for

larger elevators. This is so because small firms often try to ship all wheat as quickly as possible. An example of this is a small branch elevator with poor storage conditions. Often rats and other harmful elements are present. In such cases, wheat must be moved before contamination results. Often with small elevators, a manager is present only during harvest. As soon as harvest is over, the wheat is shipped, and the firm closed.

Trucks Not Dependable

If truck operators are offered more money to haul from a particular place, or area, they usually accept. This purely competitive characteristic of the trucking industry causes elevator managers to view the group as undependable. This feeling was strong enough to indicate that the "undependable" characteristic of motor truck operators is their second greatest disadvantage.

Cannot Time and Plan Labor Use

Boxcars are left on a siding to be filled at the discretion of the elevator operator. This enables him to allocate his work force to fill these cars at his own convenience. The railroad is contacted when the elevator has the car ready to be moved. This is not the case with trucks. Operators of trucks will not wait for other things to be done. When trucks arrive to be filled with wheat, this job is given top priority. Workers are pulled off other tasks to fill the truck. Furthermore, elevator managers do not know when a truck will arrive at the elevator. They usually know which day to expect the truck, and often whether it will be morning or afternoon. However, the time is usually not known accurately enough to allow careful planning of the day's jobs to be done.

Unsatisfactory Weights or Grades

Although some managers reported occasional short weights at Houston, this was not the general concensus of opinion. The major reason for this item's ranking as the fourth greatest disadvantage of wheat shipment by truck was unsatisfactory grades. Although this disadvantage was not highest in importance, a feeling of dissatisfaction with the present system of destination grades seemed apparent. Destination grade is the term applied to wheat shipments upon which the grading of the grain is done at the destination point. The wheat was placed on trucks and the grade given the grain at the destination point was the only evaluation of the grade. The shipper relies only upon this grade when receiving the value of his wheat.

Delay in Getting Paid

If an elevator is licensed to sell on its weights (licensed boxcar scales), payment can be received for the wheat when it is shipped. Before payment can be made on truck shipments, unless for sale to trucker at a local elevator, the wheat must be received at the destination point. This factor was the fifth greatest disadvantage of truck shipment of wheat.

Lack of Local Storage

In the area of study relevant to this paper, lack of total storage space for a season's crop was not a major problem. For individual elevators, lack of local space may be encountered, so wheat must be moved to adequate storage facilities such as terminal elevators. On an individual basis, the lack of local space to store the wheat until it can be shipped by motor truck provides a minor disadvantage of motor trucks according to the managers questioned.

Other Disadvantage of Trucks

Through this study, it was found that elevator operators considered other disadvantages caused by trucks. One of these reasons was that truckers do not support local schools through taxes, as do railroads. Also, some operators felt that their towns needed the rail facilities, and that trucks were undermining them. Other minor examples of disadvantages of trucks were given.

Extra Costs at Either Houston or Galveston Markets

Sale of wheat at the Texas Gulf markets was generally on destination grade. Under such a system, each shipment, whether by truck or by rail, had to be inspected. The inspection fee was approximately $2.25. If a protein analysis was made, an additional $1.00 was charged. Thus, if the capacity of a semitrailer was one-third or one-half that of a boxcar, the inspection fee totaled twice or three times as much as for rail shipment. However, managers seemed to consider this a minor difference, as indicated by its being placed as eighth in a group of eight disadvantages of truck shipments.

Evaluation of Truck Handling Facilities at Houston or Galveston

In addition to determining the advantages and disadvantages of truck shipment from the view of elevator managers, more information was sought. These managers were asked if an inability to handle trucks was a factor causing curtailed wheat shipments to the Texas Gulf. "Usually not" was the reply of 54 percent of the 70 answering this question. Thirty-three percent said sometimes truck shipments were curtailed because of inadequate facilities. Thirteen percent said inadequate facilities caused them to curtail shipments.

The elevators on the Texas Gulf did not have large storage capacity in relation to the volumes handled. Wheat was constantly being blended and loaded on ships to allow more trucks to empty. When such forces as hurricanes make it impossible for boats to either arrive or load at the port, or truck receipts are extra large, an inadequacy of handling facilities at the Texas ports may exist for short periods of time.

Summary

Of 110 elevator managers sampled, 92 evaluated the advantages and disadvantages of shipment of wheat by motor truck. According to these managers, lower transportation rates by truck than by rail were by far the greatest advantage of trucks. A shortage of boxcars at harvest was the second place advantage of shipment by truck. The ability of these 92 elevator managers to sell on their own elevator weights was the third greatest advantage. Close in importance to the third place advantage of trucks was the fourth place listing, the ability of elevator managers to load out trucks with less labor than required for boxcars. Other reasons listed as advantages of trucks over railroads were: (5th) faster transportation; (6th) unsatisfactory loss adjustment when shipped by rail; (7th) other reasons; and (8th) smaller loads preferred by managers.

The greatest disadvantage of trucks was their inavailability at harvest. The second greatest disadvantage reported was their relative undependability in continuing to haul from a particular elevator. If truckers are offered more money elsewhere, they will usually accept the offer. The remaining disadvantages of trucks are listed in order of decreasing importance as reported by the 92 managers giving information: (3rd) inability to time and plan labor in the use of trucks in contrast

with rail, (4th) unsatisfactory weights or grades (especially grades) encountered at the Texas Gulf elevators, (5th) delay in receiving payment as quickly as by rail, (6th) lack of local storage, (7th) other reasons, and (8th) other costs at either the Houston or Galveston market.

In evaluating Houston-Galveston terminal facilities, the managers were asked if an inability of these facilities to handle truck was a factor causing curtailed wheat shipments by them to the Texas Gulf. Of the responding managers, 54 percent answered "usually not", 33 percent answered "sometimes", and 13 percent reported "yes".

CHAPTER IV

TRUCK SHIPMENT OF WHEAT FROM COUNTRY ELEVATORS OF OKLAHOMA

Discussion of Sample

The 110 elevators sampled in this study were approximately 29 percent of the total number of elevators in the 33 counties in which they were located. In the three years covered by this study, these 110 elevators handled average amounts of 36 to 40 percent of the wheat produced in this western area of the state (Table IV-1). Handled wheat included

TABLE IV-1

BUSHELS OF WHEAT PRODUCED, HANDLED, AND PURCHASED IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

	Produced In Oklahoma	Handled by Elevators of Study	Purchased by Elevators of Study
1958			
Bushels	109,531,000	39,688,000	29,391,000
Percent of Oklahoma production	100	36.2	26.8
1959			
Bushels	84,879,000	33,777,000	29,518,000
Percent of Oklahoma production	100	39.8	34.8
1960			
Bushels	114,756,000	45,605,000	37,300,000
Percent of Oklahoma production	100	39.7	32.5

all wheat that the elevator actually purchased, and Commodity Credit Corporation wheat, which was not purchased by the elevator. Only the wheat that the elevator actually bought was considered purchased. Twenty-nine percent of the elevators handled 36 to 40 percent of the area wheat production because a large number of the small elevators were open only during the harvest season and larger elevators were sampled in their place. No interviews were conducted during harvest season for the convenience of the managers, and it was often impossible to contact the elevator managers of the small concerns. The size distribution of both the elevators relevant to this paper and the entire population of elevators of western Oklahoma was shown in Figure 1-2.

Truck Shipment of Wheat

Increasing Use of Motor Trucks

The use of motor trucks in transporting wheat from Oklahoma is increasing. The elevators sampled in this study reported an increase from 28.8 percent in 1958 to 33.6 percent in 1960 of their total wheat shipments as being by truck (Table IV-2).

TABLE IV-2

CHANGES IN SHIPMENTS OF WHEAT BY TRUCK IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Year	Total Wheat Shipments (bushels)	Truck Shipments (bushels)	Percent of Total
1958	36,878,000	8,918,000	24.2
1959	32,635,000	10,531,000	32.2
1960	41,823,000	13,951,000	33.4

Area Differences in Usage of Motor Trucks

Different areas of the state utilize motor trucks in varying degrees (Table IV-3). The majority of truck shipments of wheat came from roughly the southern two-thirds of the state (Areas I, II, III, and IV). In Area VI, Ellis, Harper, Woods, Woodward, and Major Counties, elevator managers did not employ trucks for wheat shipment to a great degree for the first two years studied. However, 1960-61 showed a substantial amount (28.8 percent) of wheat shipped from these counties.

The amount of wheat shipped by truck from the counties comprising Area I increased from 24.6 percent to 47 percent and then dropped to 34.6 percent in the three year period. This can be explained by considering yields in this area. Production in 1959, when 47 percent of the wheat was trucked, was low in these counties (6,767,000 bushels) as compared to the yields of 15,853,000 bushels in 1958 and 11,007,000 in 1960. The low production in 1959 allowed a greater percentage of the crop to be stored at harvest to be trucked at a later date.

The behavior of wheat shipments from Area II, Tillman, Cotton, Comanche, Caddo, and Grady Counties, can largely be explained by the fact that production behavior was similar to Area I, although less extreme yield variations occurred.

Area III, Canadian, Kingfisher, Logan, Oklahoma, and Payne Counties, showed a large increase in the employment of trucks in 1959 over their usage in 1958. The utilization of trucks in 1960 was similar to the level used in 1959.

The changes in the utilization of trucks by elevator managers in Area IV, Beckham, Roger Mills, Dewey, Custer, and Blaine Counties, and Area V, Alfalfa, Grant, Garfield, Kay, and Noble Counties, were similar

TABLE IV-3

AREA USAGE OF MOTOR TRUCKS FOR TRANSPORTATION OF WHEAT IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Area	1958-1959			1959-1960			1960-1961		
	Total Wheat Shipments (bushels)	Total Truck Shipments (bushels)	Truck Shipments (as a Percentage of total shipments)	Total Wheat Shipments (bushels)	Total Truck Shipments (bushels)	Truck Shipments (as a Percentage of total shipments)	Total Wheat Shipments (bushels)	Total Truck Shipments (bushels)	Truck Shipments (as a Percentage of total shipments)
I	8,891,000	2,187,000	24.6	4,860,000	2,284,000	47.0	10,064,000	3,484,000	34.6
II	5,827,000	2,388,000	41.0	5,361,000	2,673,000	49.9	7,116,000	3,055,000	42.9
III	3,853,000	1,252,000	32.5	4,550,000	2,007,000	44.1	5,131,000	2,180,000	42.5
IV	3,944,000	1,210,000	30.7	4,082,000	1,372,000	33.6	4,650,000	1,556,000	33.5
V	8,296,000	1,456,000	17.6	7,861,000	1,728,000	22.0	8,897,000	2,227,000	25.0
VI	4,867,000	240,000	4.9	4,704,000	362,000	7.7	4,551,000	1,312,000	28.8
VII	1,200,000	185,000	15.4	1,217,000	105,000	8.6	1,414,000	137,000	9.7
Total	36,878,000	8,910,000	24.2	32,635,000	10,531,000	32.3	41,823,000	13,951,000	33.4

Average Area usage for Trans of wheat in west Okla. Page 21 Fig 6

in that both these areas increased their usage of trucks at a fairly constant rate. This rate of increase was approximately constant when measured both as a percentage of total shipments and in terms of actual volumes. It should be pointed out that Area IV shipped a higher percentage of its wheat by truck (from 30.7 percent to 33.6 percent) than Area V (17.6 percent to 25 percent) for the years studied. This can be explained by the fact that Area V is centered around terminal facilities where boxcar handling has been traditional, while Area IV is closer to the southern part of the state from which truck shipment of wheat to the Houston area first originated.

Area VII, comprising the panhandle counties of Cimarron, Texas, and Beaver, reported very little movement of wheat by truck. The percentages of wheat shipped by truck were well below the state averages for the years studied.

Destination of Wheat Shipped by Truck

The majority of truck movements of wheat from Oklahoma country elevators was destined for Houston, Texas. There were several reasons for this. One reason was that Houston elevators had the facilities to quickly receive and unload trucks. Drivers were usually not required to wait in long lines to have their trailers unloaded. Another reason was that the cost was one cent less per bushel to ship to Houston than to Galveston. Still another advantage was the good highways for trucks to travel when shipment was to Houston.

During the period of study the total volume of wheat handled by truck increased in approximately uniform proportions for each of the destination areas (Table IV-4). An example of this is the Texas Gulf

TABLE IV-4

DESTINATIONS OF TRUCK SHIPMENTS OF WHEAT FROM WESTERN OKLAHOMA ELEVATORS, 1958-1959 to 1960-1961

Destination	Bushel Totals 1958-1959	Percentage of Truck Shipments	Percentage of Total Shipments	Bushel Totals 1959-1960	Percentage of Truck Shipments	Percentage of Total Shipments	Bushel Totals 1960-1961	Percentage of Truck Shipments	Percentage of Total Shipments
To terminal elevator in Oklahoma	1,355,000	15.2	3.7	1,912,000	18.2	5.9	2,495,000	17.9	6.0
To Texas Gulf:									
Houston	6,366,000	71.4	17.3	7,485,000	71.1	22.9	10,013,000	71.8	23.9
Galveston	90,000	1.0	.2	68,000	.6	.2	213,000	1.5	.5
Other	333,000	3.7	.9	216,000	2.0	.7	225,000	1.6	.6
Totals	6,789,000	76.1	18.4	7,769,000	73.7	23.8	10,451,000	74.9	25.0
Flour Mills	458,000	5.2	1.2	684,000	6.5	2.1	721,000	5.2	1.7
Other Points	316,000	3.5	.9	166,000	1.6	.5	284,000	2.0	.7
Totals	8,918,000	100.0	24.2	10,531,000	100.0	32.3	13,651,000	100.0	33.4

area. In 1958, this area was the destination for 6,789,000 bushels of wheat hauled by trucks. This 6,789,000 bushels accounted for 76.1 percent of all wheat trucked from the country elevators of Oklahoma relative to this study. As a percentage of total shipments, both truck and rail, the 6,789,000 bushels were only 18.4 percent. In 1959, 7,769,000 bushels of wheat were reported trucked to Houston. This was 73.8 percent of all truck shipments from country elevators of Oklahoma, and 24 percent of the total rail and truck movements. In 1960, 10,451,000 bushels of wheat were reported as transported to the Texas Gulf via motor truck. This was 74.9 percent of all truck shipments and 25 percent of the total shipments.

During the three years of study, Oklahoma terminal elevators also received an increasing volume of truck shipments of wheat. However, the total volume received was smaller than the volume moving to the Texas Gulf. For the 1958-1959 crop season, only 15.2 percent of the truck shipments and 3.7 percent of all shipments, both truck and rail, went to the Oklahoma terminal elevators. For the 1959-1960 season, this figure increased to 18.2 percent of truck and almost 6 percent of all shipments. During 1960-1961, 6 percent of all wheat shipments to Oklahoma terminals were by truck, and 17.9 percent of all truck shipments went to Oklahoma terminals.

Although there was no great change in the ratio of truck shipments to terminals, the volume constantly increased. A total of 1,355,000 bushels moved to Oklahoma terminals from the 110 elevators in 1958. In 1959 this increased to 1,912,000 bushels and in 1960 this figure was higher still to 2,495,000 bushels.

Flour mills received an increasing volume of truck shipped wheat

during the period of analysis. The elevators sampled reported 464,000, 684,000, and 721,000 bushels respectively shipped by truck to flour mills in the years 1958 to 1960.

In the three year period the elevators sampled reported from 1.5 percent to 3.5 percent of their wheat was shipped to points other than Oklahoma terminals, the Texas Gulf, or flour mills. This small amount being transported to other points was largely Commodity Credit Corporation wheat plus other transfers between country elevators, according to answers given by managers. The small amount of wheat moving to "other points" indicates that the majority of wheat shipments by truck from Oklahoma elevators was accounted for in the questionnaire used for this study.

Origin of Truck Shipments of Wheat from Country Elevators

Origin of Shipments to Terminals

Elevators from different areas of the state ship different proportions of wheat to terminal elevators of Oklahoma (Table IV-5). Elevator managers in Harmon, Jackson, Greer, Washita, and Kiowa Counties, comprising Area I, and elevator managers in Area II, Tillman, Cotton, Comanche, Caddo, and Grady Counties, reported no truck shipments of wheat to Oklahoma terminal elevators for the three years of this study. This means large volumes of wheat from the southern part of the state are by-passing the Oklahoma terminal elevators. In Area I, approximately one-third of all wheat shipped moved by trucks; Area II showed about two-fifths of its wheat moving by truck and thus by-passing the terminal elevators of Oklahoma. The terminals are by-passed because trucks allow no transit privileges. To ship to Oklahoma terminals from the southern

TABLE IV-5

TRUCK SHIPMENTS TO OKLAHOMA TERMINALS BY ORIGIN, FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Destination	Area	Bushel Totals 1958-1959	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area	Bushel Totals 1959-1960	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area	Bushel Totals 1960-1961	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area
To terminal Elevator in Oklahoma	I[1]	0			0			0		
	II[2]	0			0			0		
	III[3]	397,000	4.5	31.7	461,000	4.4	23.0	872,000	6.2	40.0
	IV[4]	155,000	1.7	12.8	513,000	4.9	37.4	390,000	2.8	25.1
	V[5]	618,000	6.9	42.4	793,000	7.5	45.9	951,000	6.8	42.7
	VI[6]	0	2.1	0	40,000	.4	11.0	150,000	1.1	11.4
	VII[7]	185,000	0	100.0	105,000	1.0	100.0	132,000	1.0	96.4
Total		1,355,000	15.2		1,912,000	18.2		2,495,000	17.9	

[1]Harmon, Jackson, Greer, Washita, Kiowa Counties.

[2]Tillman, Cotton, Commanche, Caddo, Grady Counties.

[3]Canadian, Oklahoma, Logan, Kingfisher, Payne Counties.

[4]Beckham, Roger Mills, Dewey, Custer, Blaine Counties.

[5]Garfield, Grant, Kay, Alfalfa, Noble Counties.

[6]Harper, Ellis, Woods, Woodward, Major Counties.

[7]Texas, Cimarron, Beaver Counties.

part of the state, a fee would be charged to haul the wheat from the country elevator to the terminal, then a second fee would be required to move the wheat from the terminal to the Texas Gulf. Such a system makes it uneconomical to ship wheat by truck to Oklahoma terminals from elevators of southern Oklahoma.

The elevators of Area III, Canadian, Oklahoma, Logan, Kingfisher, and Payne Counties, reported approximately 30 percent of their truck shipped wheat moved to Oklahoma terminals for the three years of study. This would only be about 12 percent of the total volume of wheat shipped by these elevators to Oklahoma terminals, because only about 40 percent of all shipments were by truck.

No definite pattern existed during the three years of study for shipments to Oklahoma terminals from Area IV, Beckham, Roger Mills, Custer, and Blaine Counties. Approximately 4 percent of all wheat shipped from this area moved to Oklahoma terminals in 1958. This increased to about 12 percent of all shipments in 1959 and decreased to about 8 percent of all shipments in 1960.

The elevators of Area V, Garfield, Alfalfa, Grant, Kay, and Noble Counties, reported a relatively consistent amount of their wheat shipments moving to Oklahoma terminals during the period studied. The average was a little over 43 percent of all local elevator truck shipments. This high percentage can be explained by the close proximity of these elevators to the Oklahoma terminals. However, only 21 percent of all shipments of wheat were by truck from these elevators. This indicates that only a small amount, approximately 9 percent of all wheat shipped, went to Oklahoma terminals by truck from Area V.

The elevators of Area VI, Harper, Ellis, Woods, Woodward, and Major

Counties, reported a negligible amount of wheat moving by truck during 1958 and 1959. In 1960, only about 11 percent of the truck shipments moved to Oklahoma terminals from this area.

Area VII, in the panhandle, which reported a small amount of wheat moving by truck, sent almost all truck shipments to Oklahoma terminals.

Origin of Shipments to the Texas Gulf

During the three years of this study, from 91 to 93 percent of all shipments of wheat from country elevators by truck were destined for either the Texas Gulf area or Oklahoma terminals. Since approximately 15 to 18 percent of the wheat trucked from country elevators went to Oklahoma terminals for this three year period, approximately 74 to 76 percent of the truck shipments went to the Houston area.

The effect of country elevator locations upon destinations of truck shipments of wheat can be seen in Table IV-6. Area I, Jackson, Harmon, Greer, Kiowa, and Washita Counties, reported 97.2 percent of the wheat trucked went to the Texas Gulf during any of the 3 years studied. It was this area which reported no truck shipments of wheat to Oklahoma terminal elevators (Table IV-5) in the three year period. Elevators of Area I trucked 24.6 percent of all wheat shipped in 1958. This figure jumped to 47.0 percent in 1959, and lowered to 34.6 percent of all shipments for the 1960-1961 period.

Area II, Tillman, Caddo, Cotton, Comanche, and Grady Counties, showed behavior in wheat shipments similar to that exhibited by elevators in Area I. No wheat moved to Oklahoma terminals in any year studied. In 1958, 2,108,000 bushels (88.3 percent of all truck shipments) moved to the Houston area from these counties. In 1959, 2,501,000 bushels (93.6 percent of all area truck shipments) were similarly shipped, and

TABLE IV-6

TRUCK SHIPMENTS TO THE TEXAS GULF BY ORIGIN, FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Destination	Area	Bushel Totals 1958-1959	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area	Bushel Totals 1959-1960	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area	Bushel Totals 1960-1961	Pctg. of Total (A) Truck Shpts.	(B) Truck Shpts. each Area
To Texas Gulf (total of Houston, Galveston, other)	I[1]	2,186,000	24.5	99.9	2,220,000	21.1	97.2	3,483,000	25.0	99.9
	II[2]	2,108,000	23.6	88.3	2,501,000	23.6	93.6	2,752,000	19.7	90.1
	III[3]	636,000	7.0	50.0	1,126,000	10.7	56.1	928,000	6.6	42.6
	IV[4]	1,025,000	11.5	84.7	853,000	8.1	62.2	1,166,000	8.4	74.9
	V[5]	604,000	6.8	41.5	747,000	7.1	43.2	963,000	6.9	43.2
	VI[6]	240,000	2.7	100.0	322,000	3.1	88.9	1,154,000	8.3	88.0
	VII[7]	0	0	0	0	0	0	5,000	.04	3.6
Total		6,789,000	76.1		7,769,000	73.8		10,451,000	74.94	

[1]Harmon, Jackson, Greer, Washita, Kiowa Counties.

[2]Tillman, Cotton, Comanche, Caddo, Grady Counties.

[3]Canadian, Oklahoma, Logan, Kingfisher, Payne Counties.

[4]Beckham, Roger Mills, Dewey, Custer, Blaine Counties.

[5]Garfield, Grant, Kay, Alfalfa, Noble Counties.

[6]Harper, Ellis, Woods, Woodward, Major Counties.

[7]Texas, Cimarron, Beaver Counties.

2,752,000 bushels (90.1 percent) were destined for Texas ports in 1960 from Area II. Elevators of Area II shipped from 41.0 to 49.9 percent of all wheat by truck.

Because of their closer proximity to Oklahoma terminal facilities, elevators of Area III, Canadian, Oklahoma, Logan, Kingfisher, and Payne Counties, shipped less of their trucked wheat (42 to 56 percent) to the Texas Gulf than did elevators of Areas I and II. Because Area III is south of the terminal facilities, more wheat moved by truck to the Houston area than moved from these counties to Oklahoma terminals for each year of study. Since almost all Oklahoma wheat ultimately is destined for the Texas Gulf, the marketing system might seem inefficient to move any wheat to terminal facilities from Area III and other areas south of the terminals. Such volumes moving to Oklahoma terminals do not necessarily represent inefficient behavior, however. This volume could have moved to the terminals from elevators in Area III and other points where the added value received from blending wheat would cover the additional transportation charges incurred.

The country elevators of Area IV, Beckham, Roger Mills, Custer, Dewey, and Blaine Counties, shipped the majority of their truck shipments to the Texas Gulf area during the three years of study. From this area, 62.2 to 84.7 percent of all truck shipments were destined for Texas ports in the three year period. Elevators of Area IV showed a pattern similar to the entire 33 county averages in the percentages of wheat shipped by truck, with the area having 30.7 percent, 33.6 percent, and 33.5 percent of total wheat shipments moving by truck respectively for the years 1958-1960.

Area V, Garfield, Grant, Alfalfa, Kay, and Noble Counties, showed

a lower percentage of wheat shipped by truck than the average of the seven areas. Managers reported 17.6 percent, 22.0 percent, and 25.0 percent of all shipments moved by motor truck. Although the Enid terminal facilities are located in this area, the country elevator managers reported that a range of from 41.5 percent to 43.2 percent of all truck shipments were destined for Houston in the three years.

As was pointed out earlier, truck shipments of wheat from Area VI, Harper, Ellis, Woods, Woodward, and Major Counties, were practically negligible until 1960-61. During this period, 28.8 percent of all wheat shipments were by truck, and 88 percent of these shipments were to the Texas Gulf ports.

In 1958-59, 15.4 percent, and in 1959-60, 8.6 percent of all wheat shipments were transported by truck in Area VII, Cimarron, Texas, and Beaver Counties. None of this wheat was shipped to the Texas port area. In 1960-61, 9.7 percent of all truck shipments, which accounted for 3.6 percent of total shipments, went to the Houston area. Truck shipments of wheat from the panhandle did not play the important role in wheat movements as did other areas of the state.

Origin of Shipments to Flour Mills and Other Points

Truck shipments of wheat to flour mills from the 110 elevators sampled in this study came almost entirely from Areas III and V (Table VI-7). This is understandable, as these areas contain most of the milling facilities of the area included in this study.

Table IV-8 shows bushels of wheat moving to points other than Oklahoma terminals, the Texas Gulf, and flour mills by truck shipments from country elevators during the three years of study. There was no

TABLE IV-7

TRUCK SHIPMENTS TO FLOUR MILLS BY ORIGIN FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

	Area	Bushel Totals 1958-59	Bushel Totals 1959-60	Bushel Totals 1960-61
To Flour Mills	I	1,000	64,000	0
	II	5,000	12,000	28,000
	III	229,000	420,000	380,000
	IV	10,000	0	0
	V	213,000	188,000	313,000
	VI	0	0	0
	VII	0	0	0
Total Receipts:		458,000	684,000	721,000

TABLE IV-8

TRUCK SHIPMENTS OF WHEAT TO DESTINATIONS OTHER THAN FLOUR MILLS, OKLAHOMA TERMINALS, AND THE TEXAS GULF BY ORIGIN FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Area	Bushel Totals 1958-1959	Bushel Totals 1959-60	Bushel Totals 1960-61
I	0	0	1,000
II	275,000	160,000	275,000
III	0	0	0
IV	20,000	6,000	0
V	21,000	0	0
VI	0	0	8,000
VII	0	0	0
Total	316,000	166,000	284,000

observable pattern to such movements. Individual elevators generally accounted for the volumes listed in the table.

The Effect of the Capacity of Country Elevators Upon The Destinations of Truck Shipments of Wheat

Elevators with different capacities are expected to ship different volumes of wheat in a given cropping season, i.e., a 500,000 bushel capacity elevator might ship ten times as much wheat in a year as a 50,000 bushel capacity elevator. This characteristic of elevator size makes it impracticable to use actual volumes of wheat in comparing variations in wheat shipments for different capacities of elevators. Percentages of total truck shipments were more relevant for each capacity grouping discussed in the following section.

The reason for comparing only shipments to the Texas Gulf and to Oklahoma terminals was that these two destination points accounted for approximately 95 percent of all truck shipments of wheat.

Actual Effect

The capacity of the country elevators from which wheat is trucked apparently has an effect upon the destination of truck shipments (Table IV-9). During the three years of study, elevators having a storage capacity of zero to 99,999 bushels moved 30.1 percent of their truck shipments of wheat to Oklahoma terminals and 37 percent to the Texas Gulf. But, elevators having a capacity of 100,000 to 199,999 bushels moved 1.9 percent of their truck shipments to Oklahoma terminals and 92.6 percent to Texas port areas.

Elevators of the size grouping 200,000 to 499,999 bushels reported

TABLE IV-9

DESTINATIONS OF TRUCK SHIPPED WHEAT FROM DIFFERENT CAPACITY ELEVATORS OF WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Capacity (bushels)		1958-1959 Oklahoma Terminals	1958-1959 Texas Gulf	1958-1959 Total shpts. (including Flour Mills and Other)	1959-1960 Oklahoma Terminals	1959-1960 Texas Gulf	1959-1960 Total shpts. (including Flour Mills and Other)	1960-1961 Oklahoma Terminals	1960-1961 Texas Gulf	1960-1961 Total shpts. (including Flour Mills and Other)
0-99,999	Truck shpts. (bushels)	385,000	527,000	1,322,000	378,000	341,000	1,027,000	338,000	638,000	1,389,000
	Pctg. of total truck shpts.	29.1	39.9	100	36.8	33.2	100	24.3	45.9	100
100,000-199,999	Truck shpts. (bushels)	28,000	1,100,000	1,189,000	26,000	1,056,000	1,184,000	18,000	1,438,000	1,498,000
	Pctg. of total truck shpts.	2.4	92.5	100	2.2	89.2	100	1.2	96	100
200,000-499,999	Truck shpts. (bushels)	437,000	2,216,000	2,782,000	646,000	2,923,000	3,859,000	1,112,000	3,602,000	4,964,000
	Pctg. of total truck shpts.	15.7	79.6	100	16.7	75.7	100	22.4	72.6	100
500,000-1,299,999	Truck shpts. (bushels)	505,000	2,946,000	3,625,000	862,000	3,449,000	4,461,000	1,027,000	4,773,000	6,100,000
	Pctg. of total truck shpts.	13.9	81.3	100	19.3	77.3	100	16.8	78.2	100
Total truck shpts.		1,355,000	6,789,000	8,918,000	1,732,000	3,449,000	10,531,000	2,495,000	10,451,000	13,951,000
Pctg. of total truck shpts.		15/2	76.1	100	16.4	73.8	100	17.9	74.9	100

18.3 percent of their truck shipments were transported to Oklahoma terminals and 76 percent to the Houston area. For elevators having 500,000 to 1,299,999 bushels storage capacity, the relevant percentages were 16.7 percent to Oklahoma terminals and 78.9 percent to the Texas Gulf during three years of study.

Area Relationship to Capacity Sizes

An assumption was made in the previous analysis that elevators of different capacity groupings were evenly dispersed throughout the seven areas of the state. That assumption will now be questioned. Table IV-10 shows the different capacities of elevator groupings and the area distribution comprising these groupings.

TABLE IV-10

AREA COMPOSITION OF GROUPED ELEVATOR CAPACITIES IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Area	Size of Elevator (in thousand bushels)				
	0-99	100-199	200-499	500-1,299	Total
I	6	7	6	4	23
II	6	4	7	4	21
III	2	2	4	4	12
IV	4	2	3	5	14
V	4	3	7	8	22
VI	1	2	5	2	10
VII	5	1	2	0	8
Total	28	21	34	27	110

It appears from Table IV-10 that the assumption of similar distribution of elevators among areas for each capacity grouping was not valid. Although there was a greater number of elevators studied from Areas I, II, and V than from the other areas, this would have made no difference upon the percentages of wheat shipped to each destination, assuming each capacity grouping was similar to the total population. This was not the case. Fifty-two percent of the total elevators sampled of Areas I and II, roughly the southern one-third of the state, were of less than 200,000 bushels capacity. The average capacities of elevators for the different areas of the state were as follows:

Area I	273,000 bushels
Area II	264,000 bushels
Area III	357,000 bushels
Area IV	371,000 bushels
Area V	403,000 bushels
Area VI	373,000 bushels
Area VII	132,000 bushels

Areas I, II, and VII were below the other areas in the average capacity of elevators. But, since a small amount of wheat was reported trucked from Area VII, it can be omitted for this discussion.

Almost 43 percent of the elevators in the zero to 99,999 bushel capacity range came from Areas I and II. This compares with over 50 percent from these two areas in the 100,000 to 199,999 bushel grouping; almost 38 percent in the 200,000 to 499,000 bushel range, and approximately 29 percent from Areas I and II in the 500,000 to 1,299,999 bushel grouping. Therefore, Areas I and II contained a large number of small elevators.

The large number of elevators (over 50 percent of the total group) located in the southern part of the state which had capacities of 100,000 to 199,999 bushels explains in part why only about two percent of the truck shipments from the 100,000 to 199,999 capacity grouping went to Oklahoma terminals. Since no wheat was shipped by truck from Areas I and II to Oklahoma terminals, over 50 percent of the elevators sampled of this capacity did not truck any wheat to Oklahoma terminals. This left less than 50 percent of the elevators sampled in the 100,000 to 199,999 capacity group to ship to Enid facilities.

Forty-three percent of the elevators in the smallest capacity grouping are located in Areas I and II. The high percentage of wheat trucked to Oklahoma terminals from the small capacity elevators came from only the 57 percent of the zero to 99,999 capacity elevators which are located in Areas III, IV, V, VI, and VII. Excluding the southern one-third of the state, small capcity elevators can be characterized as sending large percentages of their shipments to terminals. This is so because many of the small elevators are owned by old line concerns having larger terminal facilities. Many of the small elevators owned by the old line firms are used only as receiving points from which wheat is shipped to the large parent elevators to be blended with other wheat or ground into flour.

As the size of country elevators increased, more wheat moved directly to the Texas Gulf markets, thus by-passing the terminal facilities. As the size of elevators varied from the smallest capacity grouping (zero to 99,999 bushels) of Table IV-9, to the largest (500,000 to 1,299,999 bushels), the percent of wheat trucked to Oklahoma terminals decreased from approximately 37 percent to 16 percent of all truck

shipments. This characteristic is not relevant to the southern part of the state because no wheat is trucked to Enid terminals by any capacity grouping from this area. For areas other than I and II, changes in elevator capacity would have more influence on destination points.

Methods of Shipment

There are many different arrangements by which wheat is shipped from country elevators of Oklahoma by truck. The criterion determining to which of two categories a shipment of wheat belonged was the time in shipment the title to the grain was passed from the country elevator to the buyer. If title to the grain passed to the buyer at the time the grain was loaded on the truck, i.e., if the wheat was free on board at the country elevator, it was considered "sold at the elevator." However, if the local elevator operator arranged for shipment to a destination point, or if other arrangements were used whereby the title did not pass until the buyer took delivery of the grain, at other than the country elevator, the category was designated "handled for elevator before sale."

Sold at the Elevator

There are five basic subcategories, or methods of shipment, by which wheat is shipped from country elevators when title is transferred at the country elevator. These are shown in Table IV-11. It is apparent from the table that the relative methods by which wheat was sold at the local elevator for truck shipment did not greatly change during the period of study, although the volume of wheat sold at the elevator increased from 6,410,000 bushels to 10,260,000 bushels in the three year period. The greatest change in the method of shipments occurred during the 1959-60

TABLE IV-11

ARRANGEMENTS OF WHEAT SHIPMENTS FROM COUNTRY ELEVATORS WITH TITLE PASSED AT COUNTRY ELEVATOR IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Method of Shipment	1958-1959		1959-1960		1960-1961	
	Volume of Sales (bushels)	Total Truck Shipments (percentage)	Volume of Sales (bushels)	Total Truck Shipments (percentage)	Volume of Sales (bushels)	Total Truck Shipments (percentage)
Sold to truckers	647,000	7.3	712,000	6.8	1,073,000	7.7
Sold directly to brokers or grain dealers who furnished trucks	3,193,000	35.8	3,358,000	31.9	4,492,000	32.2
Sold to terminal and trucked by it from country elevator	1,541,000	17.3	2,684,000	25.5	4,124,000	29.5
Sold through grain dealers who arranged for trucks	160,000	1.8	435,000	4.1	83,000	.6
Sold by other arrangements	869,000	9.7	311,000	2.9	488,000	3.5
Total	6,410,000	71.9	7,500,000	71.2	10,260,000	73.5

season when terminal elevators became more actively engaged in truck shipment of wheat from country elevators than they were in the 1958-59 season, thereby increasing the percentage of wheat sold to terminals and trucked by them from country elevators.

Hauled for Elevator Before Sale

There were four arrangements by which wheat was hauled from country elevators before title was passed at the destination point. These methods were: hauled by truckers hired by country elevator; hauled by truckers hired for country elevator by terminal elevator; hauled in trucks belonging to country elevator; and hauled by other arrangements (Table IV-12). The volume of wheat hauled from country elevators with title remaining in the hands of the local firm was not as great as the volumes of wheat sold at the country elevator. Only from 26.5 to 28.8 percent of the total truck shipments were reported as having title pass at the destination point. The pattern of wheat hauled before sale was similar to the pattern of truck shipments of wheat, i.e., wheat hauled in this manner was increasing. As was true for sales at the country elevator, there were no great changes in the methods of truck shipments of wheat before sale from country elevators during the three years studied.

Summary

The 110 elevators sampled handled from 36 to 40 percent of the wheat produced in western Oklahoma. This volume of wheat was hauled in increasing proportions by motor truck. In 1958, 28.8 percent (8,918,000 bushels) of the wheat from these 110 elevators was hauled by truck,

TABLE IV-12

ARRANGEMENTS OF WHEAT SHIPMENT FROM COUNTRY ELEVATORS WITH TITLE PASSING AT DESTINATION IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Method of Shipment	1958-1959		1959-1960		1960-1961	
	Volume of Sales (bushels)	Total Truck Shipments (percentage)	Volume of Sales (bushels)	Total Truck Shipments (percentage)	Volume of Sales (bushels)	Total Truck Shipments (percentage)
Hauled by truckers hired by country elevator	1,965,000	22.0	1,801,000	17.1	2,341,000	16.8
Hauled by truckers hired for country elevator by terminal elevator	121,000	1.3	18,000	.2	137,000	1.0
Hauled in trucks belonging to country elevator	372,000	4.2	692,000	6.6	733,000	5.3
Hauled by other arrangements	50,000	.6	520,000	4.9	480,000	3.4
Total	2,508,000	28.1	3,031,000	28.8	3,691,000	26.5

whereas, in 1960 this figure had increased to 33.6 percent (13,951,000 bushels).

The southern two-thirds of the state accounted for the majority of truck shipments of wheat. Most of the wheat shipped from Oklahoma country elevators was eventually destined for Houston, Texas. Truck shipments to the various destinations increased in proportionate amounts as total truck volume increased.

Elevators of the southern one-third of the state reported no wheat hauled by motor truck to Oklahoma terminals; almost all went to the Texas Gulf. Elevators located closer to Oklahoma terminal facilities, especially elevators located north of these facilities, shipped larger volumes of wheat by truck to terminals than did outlying elevators at greater distances.

About five percent of all truck shipments were to flour mills and other points.

As the sizes of country elevators sampled decreased, larger percentages of wheat shipments were sent to Oklahoma terminal facilities. Elevators of the southern one-third of the state sampled averaged 100,000 bushels smaller in capacity than elevators in other areas of the state.

For shipments of wheat from Oklahoma country elevators, two categories were used to classify truck shipments. Wheat sold at the country elevator accounted for approximately 72 percent of all shipments, while that hauled for elevators before sale accounted for approximately 18 percent of all truck shipments.

As the volumes of truck shipments increased, the tendency to by-pass Oklahoma terminal facilities also increased. This by-passing was especially true for the southern part of Oklahoma.

CHAPTER V

RAIL SHIPMENT OF WHEAT FROM COUNTRY ELEVATORS

Although motor trucks have made deep inroads into the volume of wheat shipped from country elevators in Oklahoma, the railroad is still the dominant mode of transportation.

When interviewed for this study, many elevator managers stated they preferred to ship wheat by railroad. Many reasons were given for this preference. Some managers felt that since wheat transportation had always been by rail from their elevators, the pattern should not be changed. Other managers considered truckers unscrupulous because of such incidents as the receiving of bad checks passed by truck operators. Some managers stated that railroads support small towns through the taxes that are paid on the railroad property, and it was their responsibility as managers of the country elevators to ship by railroad.

Rail Shipment of Wheat

Decreasing Use of Railroads

As truck shipments of wheat from Oklahoma country elevators increased during the years studied, the percentage of rail shipments decreased. In 1958, the elevators interviewed for this study reported that 75.8 percent of their wheat shipments went by railroad. During the 1959-60 shipping period, this figure dropped to 67.7 percent of all shipments, and in 1960-61, the amount shipped by rail was 66.6 percent (Table V-1).

TABLE V-1

SHIPMENTS OF WHEAT BY RAIL FROM COUNTRY ELEVATORS IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

	Total Shipments (in bushels)	Total Rail Shipments (in bushels)	Rail Shipments as a Percent of Total Shipments
1958-1959	36,878,000	27,960,000	75.8
1959-1960	32,635,000	22,104,000	67.7
1960-1961	41,823,000	27,872,000	66.6

Area Differences in the Usage of Railroads

As was true for truck shipments of wheat, the area of the state in which a country elevator was located had a major effect upon the use of railroads for wheat shipments (Table V-2). The northern part of the state was an area with a high concentration of rail shipments of wheat during the period of study. The panhandle counties, Area VII, reported 84.6 percent, 91.4 percent, and 90.3 percent of their total shipments of wheat were by rail respectively during the years 1958-59, 1959-60, 1960-61. Elevators of Area VI, Harper, Ellis, Woodward, Woods, and Major Counties, moved 95.1 percent and 92.3 percent of their wheat shipments by rail in 1958-59 and in 1959-60. During the 1960-61 period, this figure dropped to 71.2 percent of all shipments. Elevator managers of Area V reported a gradual decrease of from 82.4 percent in 1958-59 to 78.0 percent in 1959-60 to 75.0 percent in 1960-61 of all wheat being shipped by rail.

Rail shipments from the central part of the state, when measured in percentages of total shipments, showed a slight decrease during the years

TABLE V-2

AREA USAGE OF RAILROADS FOR THE TRANSPORTATION OF WHEAT IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Area	1958-1959			1959-1960			1960-1961		
	Total Wheat Shipments (bushels)	Rail Shipments (bushels)	Rail Shipments in percent of Total	Total Wheat Shipments (bushels)	Rail Shipments (bushels)	Rail Shipments in percent of Total	Total Wheat Shipments (bushels)	Rail Shipments (bushels)	Rail Shipments in percent of Total
I	8,891,000	6,704,000	75.4	4,860,000	2,576,000	53.0	10,064,000	6,580,000	65.4
II	5,827,000	3,439,000	59.0	5,361,000	2,688,000	50.1	7,116,000	4,061,000	57.1
III	3,853,000	2,601,000	67.5	4,550,000	2,543,000	55.9	5,131,000	2,951,000	57.5
IV	3,944,000	2,734,000	69.3	4,082,000	2,710,000	66.4	4,650,000	3,094,000	66.5
V	8,296,000	6,840,000	82.4	7,861,000	6,133,000	78.0	8,897,000	6,670,000	75.0
VI	4,867,000	4,627,000	95.1	4,704,000	4,342,000	92.3	4,551,000	3,239,000	71.2
VII	1,200,000	1,015,000	84.6	1,217,000	1,112,000	91.4	1,414,000	1,277,000	90.3
Total	36,878,000	27,960,000	75.8	32,635,000	22,104,000	67.7	41,823,000	27,872,000	66.6

of study. Shipments from Area IV, Beckham, Roger Mills, Custer, Dewey, and Blaine Counties, showed only a slight dip in rail shipments. Sixty-nine and three-tenths percent of all wheat was moved by rail in 1958-59. This figure decreased to 66.4 percent during 1959-60, and then held constant at 66.5 percent of all wheat shipments occuring in 1960-61 from Area IV. Area III, Canadian, Oklahoma, Kingfisher, Logan, and Payne Counties, also in the central part of the state, showed fluctuating behavior in wheat shipments. This fluctuation resulted in a reduction in the percentage of wheat shipped by rail from Area III during the three years of study of from 67.5 percent in 1958-59 to a low of 55.9 percent in 1959-60, and to a slightly higher level of 57.5 percent in 1960-61.

Elevator managers of Area II, Tillman, Caddo, Cotton, Comanche, and Grady Counties, reported the lowest percentages of wheat shipped by rail of any area studied. There were two primary reasons for the low percentage of rail shipments of wheat from Area II. The first was a large concentration of motor trucks operating from Chickasha, in Grady County, and from Frederick, in Tillman County, which made trucks for this area readily available. The second was that Area II is a shorter distance from the Texas Gulf than the other areas of study. Because of the availability of trucks, and the closeness to the Houston area, elevators of these five counties reported only 59.0 percent, 50.1 percent, and 57.1 percent of all wheat shipments by rail for the three years studied.

Area I, Harmon, Greer, Jackson, Kiowa, and Washita Counties, showed the greatest fluctuation in total volume of wheat shipped during the three year period. A variation of from 4,860,000 total bushels in 1959-60 to 10,064,000 bushels in 1960-61 was shipped by both truck and rail

from this area. Railroads handled 75.4 percent of the 1958-59 shipments, 53.0 percent of the 1959-60 shipments, and 65.4 percent of the high shipments of the 1960-61 season.

Shipments by Destinations

The elevator managers interviewed reported the majority of their rail shipments of wheat went to terminal elevators in Oklahoma (Table V-3). It was reported that almost all of this wheat moving to the terminals of Oklahoma did so as a transit privilege, with the Texas Gulf area the final destination.

Although the elevator managers reported that 78 to 80 percent of their wheat went to Oklahoma terminals under the domestic rate, this was probably not the actual way the wheat was billed for rail charges. The country elevators generally sell their wheat to the terminal elevators when rail shipment is the mode of transportation. They sell this wheat to the terminals at the per-bushel price, called a "bid price", from which the charges for shipment to the Texas Gulf must be deducted. If the country elevators sell at the domestic shipping rate, the value received by the elevators is the bid value less the charges for rail shipment to Houston. The same is true for the export bid. The actual difference in the domestic and export bids usually corresponds to the difference in the domestic and export shipping rate charges from a given area so that the net prices are the same.

As an example, assume that an elevator manager at Perry, Oklahoma, decided to sell a rail shipment of wheat to a terminal elevator. During the years of study, the domestic rail rate was 41.7 cents per bushel from Perry to the Houston-Galveston market. The export rate was 30 cents per

TABLE V-3

RAIL SHIPMENTS OF WHEAT TO DIFFERENT DESTINATIONS BY DOMESTIC AND EXPORT RATES FROM COUNTRY ELEVATORS OF WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Destination	1958-1959				1959-1960				1960-1961			
	Domestic Rate		Export Rate		Domestic Rate		Export Rate		Domestic Rate		Export Rate	
	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)	Volume of Wheat (Bushels Shipped)	Total Rail Shipments (Percent)
Terminal Elevator in Oklahoma	22,284,000	79.7	0	-	17,706,000	80.1	50,000	.2	21,785,000	78.2	60,000	.2
Louisisna Gulf	100,00	.4	250,000	.9	100,000	.5	358,000	1.6	0	-	38,000	.1
Texas Gulf	3,063,000	10.9	301,000	1.1	1,960,000	8.9	46,000	.2	2,513,000	9.0	727,000	2.6
Flour Mills	464,000	1.6	0	-	432,000	1.9	0	-	726,000	2.6	0	-
Other Points	1,498,000	5.4	0	-	1,462,000	6.6	0	-	2,023,000	7.3	0	-
Total	27,409,000	98.0	551,000	2.0	21,660,000	98.0	444,000	2.0	27,047,000	97.1	825,000	2.9

bushel. Assume that the price of wheat was $2.35 per bushel at the Houston-Galveston market. Terminal elevators issued bids of approximately $2.33 per bushel for export shipment and $2.44 7/10 per bushel for domestic shipments. The shipping charges of 30 cents per bushel and 41.7 cents per bushel, respectively, were deducted from the bid price to arrive at the net difference which was $2.03 regardless of which bid was accepted. This $2.03 per bushel was what the country elevator would receive. This is shown in the following example. These prices quoted to tenths of a cent become very meaningful when multiplied by a large number

	Domestic Sale	Export Sale
Bid Price Issued by Oklahoma Terminal	$2.44 7/10	$2.33
Less: Shipping Charges	.41 7/10	.30
Net Price Received by Elevator	$2.03	$2.03

of bushels of wheat. There is a one and one-half cent per bushel charge at the Houston-Galveston market for unloading boxcars of wheat. Because of this unloading charge, the Oklahoma terminal bid price for rail shipments was set approximately two cents per bushel below the Houston-Galveston market price. It makes no difference which bid, domestic or export, is accepted; the terminal will ship all wheat by the export rate[1] to take advantage of the lower cost of shipment.

The method of issuing truck bids by the terminal elevators corresponds to the method used for rail bids. Bids for truck shipments of wheat are commonly at least two and one-half cents lower than the price

[1]John Fish, Director of Rail Transportation, Union Equity Co-operative Exchange, personal discussion with author, April, 1962.

per bushel the grain will receive at the Houston area. This is caused by a charge of approximately two and one-half cents per bushel being set for unloading trucks. From the bid price, the rate per bushel for truck transportation is deducted to give the net price per bushel received for wheat sold to terminal elevators when truck shipment is employed. Thus, if wheat at Houston was selling for $2.35 per bushel, the bid value issued by terminals would be about $2.32, to allow for unloading and other expenses. This $2.32 per bushel bid would, then, be less the transportation charge. If the charge were 26 cents per bushel for shipment to Houston from Perry, the elevator would receive a net price of $2.06 per bushel.

A small amount of wheat moved to the Louisiana Gulf from Oklahoma country elevators during the three years studied. The largest volume that moved in this direction was 2.1 percent of the total rail shipments in the 1959-60 wheat shipping period.

The second largest destination of rail shipments of wheat from country elevators was the Texas Gulf. For wheat to be shipped in this manner generally meant that the shipment was direct, with no transit stops. The large volume of wheat shipments directly to the Texas Gulf, reported as shipped via the domestic rate, must be questioned for the same reason as the reported movements to the Oklahoma terminals. Managers probably sold wheat to terminals at the domestic bid, and the terminals moved the wheat directly to the Texas Gulf at the export rate.

Flour mills received a small amount of wheat shipments by rail according to the elevator managers interviewed. The actual volumes reported shipped by rail were 464,000 bushels, 1.6 percent of all rail shipments, during 1958-59; and 432,000 bushels, or 1.9 percent of all rail shipments,

during the 1959-60 season. Two and six-tenths percent of the 1960-61 rail shipments (721,000 bushels) were destined for flour mills.

Between 5.4 and 7.3 percent of all rail shipments were reported as moving to points other than Oklahoma terminals, the Texas Gulf, the Louisiana Gulf, and flour mills in the period of study. Some of this wheat went to the Kansas City market, and much of the remainder of these shipments was transfers of Commodity Credit Corporation wheat.

Origin of Rail Shipments of Wheat from Country Elevators

Origin of Terminal Shipments. Although truck movements of wheat to Oklahoma terminals are highly sensitive to the area of the state from which shipment originated, rail shipments are not influenced greatly by elevator location (Table V-4). The reason for the insensitivity of rail movement from areas of shipment is because of the transit privileges allowed at Enid from any area of the state. Transit privileges make Enid terminal facilities convienent to utilize at no extra costs. Because of these privileges, high percentages of rail wheat from all areas go to Oklahoma terminals. The only areas of the state not shipping at least 80 percent of all rail shipments to Oklahoma terminals for all three years of study were Areas II, IV, and VII. Area IV, Beckham, Roger Mills, Dewey, Custer, and Blaine Counties, did not deviate far from the areas of the state shipping at least 80 percent of the rail shipments to Oklahoma terminal elevators. In 1959-60, Area IV showed 75.3 percent moving to terminals, whereas 82.2 percent had moved in this direction in 1958. During 1960-61, rail shipments from Area IV stood at 74.4 percent of all rail shipments. Because of its location, Area VII, comprised of the panhandle counties of Cimarron, Texas, and Beaver, had no rail wheat

TABLE V-4

RAIL SHIPMENTS TO OKLAHOMA TERMINALS BY ORIGIN FROM COUNTRY ELEVATORS IN WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Destination	Area	1958-1959 Bushel Totals	1958-1959 Percent of Total Seven Area Rail Shipments	1958-1959 Percent of Total Rail Shipments from Each Area	1959-1960 Bushel Totals	1959-1960 Percent of Total Seven Area Rail Shipments	1959-1960 Percent of Total Rail Shipments from Each Area	1960-1961 Bushel Totals	1960-1961 Percent of Total Seven Area Rail Shipments	1960-1961 Percent of Total Rail Shipments from Each Area
Terminal Elevator of Oklahoma	I	5,469,000	19.6	81.6	2,115,000	9.6	82.1	5,590,000	20.1	85.0
	II	2,078,000	7.4	60.4	1,873,000	8.5	69.7	2,562,000	9.2	63.1
	III	2,225,000	7.9	85.5	2,280,000	10.3	89.7	2,631,000	9.4	89.2
	IV	2,247,000	8.0	82.2	2,040,000	9.2	75.3	2,302,000	8.3	74.4
	V	6,138,000	22.0	89.7	5,496,000	24.9	89.6	5,921,000	21.2	88.8
	VI	4,127,000	14.8	89.2	3,942,000	17.8	90.8	2,839,000	10.2	87.6
	VII	0	0	-	0	0	-	0	0	0
	Total	22,284,000	79.7		17,746,000	80.3		21,845,000	78.4	

reported moving to Oklahoma terminals. One reason is that this part of the state is rather inaccessible by railroad to the Enid terminal facilities. Much of the rail movements of wheat from this area are routed by such Texas points as Amarillo, where terminal facilities are utilized. Area II, Tillman, Comanche, Cotton, Caddo, and Grady Counties, shipped a lower percentage of railroad transported wheat to terminal facilities than other areas. One reason for this behavior is probably that it has easier accessibility to the Houston-Galveston ports than do other areas of the state. However, the degree of accessibility is not greatly different when rail shipment is utilized. Another reason for the lower percentage of rail shipments to Oklahoma terminals is a utilization of storage facilities at Fort Worth, Texas, by some elevators of this area.

Origin of Texas Gulf Shipments. The percentages of rail shipments of wheat moving directly to Texas Gulf ports from different areas of Oklahoma did not vary among areas as greatly as did volumes of truck shipped wheat from these same areas (Table V-5). The elevator managers reported that 0.4 to 42.6 percent of the total rail shipments from each area of classification went directly to the Texas Gulf, whereas, 41.5 to 99.9 percent of each area's truck shipments moved directly to Texas ports. Rail shipments from five of the seven areas of classification were similar in percentage of wheat shipped to the Texas Gulf. The similarity is shown by approximately 10-20 percent of the rail shipments from these five sections moving to Texas ports. Individual areas did vary from the 10-20 percent of direct Texas Gulf shipments, but usually for only one year, and this was not considered a significant variation. This similarity of Areas I, II, III, IV, and VII can be explained by the transit privileges

TABLE V-5

RAIL SHIPMENTS TO THE TEXAS GULF BY ORIGIN FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

Destination	Area	1958-1959 Bushel Totals	1958-1959 Percent of Total Rail Shipments from Each Area: Seven Area Rail Shipments	1959-1960 Bushel Totals	1959-1960 Percent of Total Rail Shipments from Each Area: Seven Area Rail Shipments	1960-1961 Bushel Totals	1960-1961 Percent of Total Rail Shipments from Each Area: Seven Area Rail Shipments
Texas Gulf	I	1,070,000	3.8	300,000	1.4	695,000	2.5
	II	673,000	2.4	274,000	2.2	885,000	3.2
	III	326,000	1.2	25,000	.1	210,000	.7
	IV	325,000	1.2	500,000	2.3	448,000	.6
	V	26,000	.1	16,000	.1	43,000	.2
	VI	500,000	1.8	400,000	1.8	360,000	1.3
	VII	434,000	1.5	491,000	2.2	599,000	2.1
	Total	3,063,000	12.0	2,006,000	9.1	3,240,000	11.6

Destination	Area	1958-1959 Percent of Total Rail Shipments from Each Area	1959-1960 Percent of Total Rail Shipments from Each Area	1960-1961 Percent of Total Rail Shipments from Each Area
Texas Gulf	I	16.0	11.6	10.6
	II	19.6	10.2	21.8
	III	12.5	1.0	7.1
	IV	11.9	18.4	14.5
	V	.4	.3	.6
	VI	10.8	9.2	11.1
	VII	42.6	44.2	46.9

allowed upon rail shipment of wheat. These transit privileges allow equal access to terminal storage facilities and the Texas Gulf from most areas of the state. This approximately equal accessibility results in a greater primary movement to Oklahoma terminals, where storage space can be obtained until prices increase as they usually do in the post-harvest period. The Texas ports have no such storage space.

The two areas, V and VII, showing a significant variation in rail shipments from those of the other five areas in the percentage of wheat shipped to the Texas Gulf may have the divergence attributed to location. Area VII, the panhandle counties, has a more accessible route to the Texas Gulf than to Enid terminal facilities. This greater accessibility resulted in 42 to 46 percent of all rail shipments from the panhandle being shipped directly to the Texas Gulf. Area V, Alfalfa, Grant, Kay, Garfield, and Noble Counties, showed a negligible amount (less than .6 percent) of all rail shipments moving directly to the Texas Gulf. This may be attributed not only to this area's being closely located to the terminal facilities, but also probably to a greater ease in obtaining boxcars for shipments only as far as Enid. Another factor contributing to the low percentage of shipments to Texas ports from Area V might be the close association of managers of country elevators with the management of terminal units. Such personal associations likely contributed to these greater shipments to terminals than would otherwise be the case.

Origin of Louisiana Gulf, Flour Mill and Other Point Shipments. Rail shipments of wheat to the Louisiana port areas for all three years of study came from only one area of Oklahoma. This was Area II (Table V-6). These counties of Tillman, Caddo, Cotton, Comanche, and Grady shipped

TABLE V-6

RAIL SHIPMENTS OF WHEAT TO THE LOUISIANA GULF, BY ORIGIN OF SHIPMENTS FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

		1958-1959			1959-1960			1960-1961		
			Percent of Total Rail Shipments from Each Area			Percent of Total Rail Shipments from Each Area			Percent of Total Rail Shipments from Each Area	
Destination	Area	Bushel Totals	Seven Area Rail Shipments		Bushel Totals	Seven Area Rail Shipments		Bushel Totals	Seven Area Rail Shipments	
Louisiana Gulf	I	0			0			0		
	II	350,000	1.2	10.2	250,000	1.1	9.3	38,000	.1	.9
	III	0			208,000	.9		0		
	IV	0			0			0		
	V	0			0			0		
	VI	0			0			0		
	VII	0			0			0		
	Total	350,000	1.2		458,000	2.0		38,000	.1	

10.2 percent of all their rail shipments to the Louisiana Gulf in 1958-59. This figure was 9.3 percent of all rail shipments in 1959-60, and only .9 of one percent in the 1960-61 season. During only one year, 1959-60, elevator managers of Area III reported 208,000 bushels shipped to the elevators of the Baton Rouge area.

Rail shipments of wheat to flour mills from the seven areas of Oklahome were of no great consequence when measured in terms of total rail shipments of wheat (Table V-7). Elevator managers from Area II, Tillman, Cotton, Comanche, Caddo, and Grady Counties, reported from 5.5 to 8.2 percent of all rail shipment went to flour mills during the three years of this study. These shipments of wheat were probably to mills located in Texas because of the southern location of Area II and the large milling facilities in Texas. Area VII, the panhandle counties, showed 6.7 to 15.8 percent of all rail shipments destined for flour mills. These shipments were also probably to the mills of Texas because of easier rail connections with Texas points than for Oklahoma facilities. The other areas, I, III, IV, V, and VI, apparently had little or no shipping of wheat to flour mills by railroad.

Elevator managers reported shipments of wheat to "other points" in a pattern which showed no large percentages of wheat moving by rail for any area except Area VII (Table V-8). The managers of these panhandle elevators reported from 37 to 49 percent of their rail shipments moved to destinations other than the Texas Gulf, Oklahoma terminals, flour mills, and the Louisiana Gulf. The largest share of these shipments were probably to terminal elevators of Texas where storage space could be utilized. Elevator managers of Area V reported that a consistent 9.7 to 10.6 percent of their rail shipments went to points other than those

TABLE V-7

RAIL SHIPMENTS OF WHEAT TO FLOUR MILLS, BY ORIGIN OF SHIPMENTS FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

		1958-1959			1959-1960			1960-1961		
			Percent of Total			Percent of Total			Percent of Total	
Destination	Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area
Flour Mills	I	123,000	.4	1.8	57,000	.3	2.2	40,000	.2	.6
	II	191,000	.7	5.5	220,000	1.0	8.2	276,000	1.0	6.8
	III	0	0		30,000	.1	1.2	110,000	.4	3.7
	IV	50,000	.2	1.8	50,000	.2	1.8	58,000	.2	1.9
	V	0			0			0		
	VI	0			0			40,000	.1	1.2
	VII	100,000	.4	9.8	75,000	.3	6.7	202,000	.7	15.8
	Total	464,000	1.7		432,000	1.9		726,000	2.6	

TABLE V-8

RAIL SHIPMENTS OF WHEAT TO OTHER POINTS, BY ORIGIN OF SHIPMENTS FROM WESTERN OKLAHOMA, 1958-1959 to 1960-1961

		1958-1959			1959-1960			1960-1961		
			Percent of Total			Percent of Total			Percent of Total	
Destination	Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area	Bushel Totals	Seven Area Rail Shipments	Rail Shipments from Each Area
Other Points	I	42,000	.2	.6	104,000	.5	4.0	255,000	.9	3.9
	II	147,000	.5	4.2	71,000	.3	2.6	300,000	1.1	7.4
	III	50,000	.2	1.9	0			0		
	IV	112,000	.4	4.1	120,000	.5	4.4	286,000	1.0	7.3
	V	666,000	2.4	9.7	621,000	2.8	10.1	706,000	2.5	10.6
	VI	481,000	1.7	47.4	546,000	2.5	49.1	476,000	1.7	37.3
	Total	1,498,000	5.4		1,462,000	6.6		2,023,000	7.2	

already mentioned. This volume of wheat moving in such a manner probably is made up of transfers of Commodity Credit Corporation wheat plus other transfers among elevators.

Seasonal Movement of Wheat From Country Elevators of Oklahoma

Years Studied

To analyze the seasonal movements of wheat from Oklahoma country elevators, two crop years were chosen for study. These years were from June 1st of 1959 to May 31st of 1960, and from June 1st of 1960 to May 31st of 1961. There are basically two reasons why these years were chosen. The first was that records of the actual shipments of wheat were most readily available. The second reason was that by studying these two years, a comparison of shipments of wheat during periods of high and low yields could be made. A low harvest of 84,879,000 bushels of wheat was made in the 33 counties of study in 1959-60. A high yield figure of 114,756,000 bushels came from the same 33 counties in 1960.

Movement of Wheat

A visual comparison can be made from Figure 5-1 of the actual volumes of wheat that moved from Oklahoma country elevators by motor truck and railroad. It is interesting to compare the volumes of wheat that moved by the two methods during the harvest periods of the two years shown. During June of ~~1960~~ 1966 and ~~1961~~ 1967, 13,955,000 and 18,363,000 bushels of wheat were reported as shipped by rail. This compares with 2,420,000 and 2,864,000 bushels hauled by motor truck during the same month. The greater utilization of boxcars can be attributed to their greater availability during harvest season.

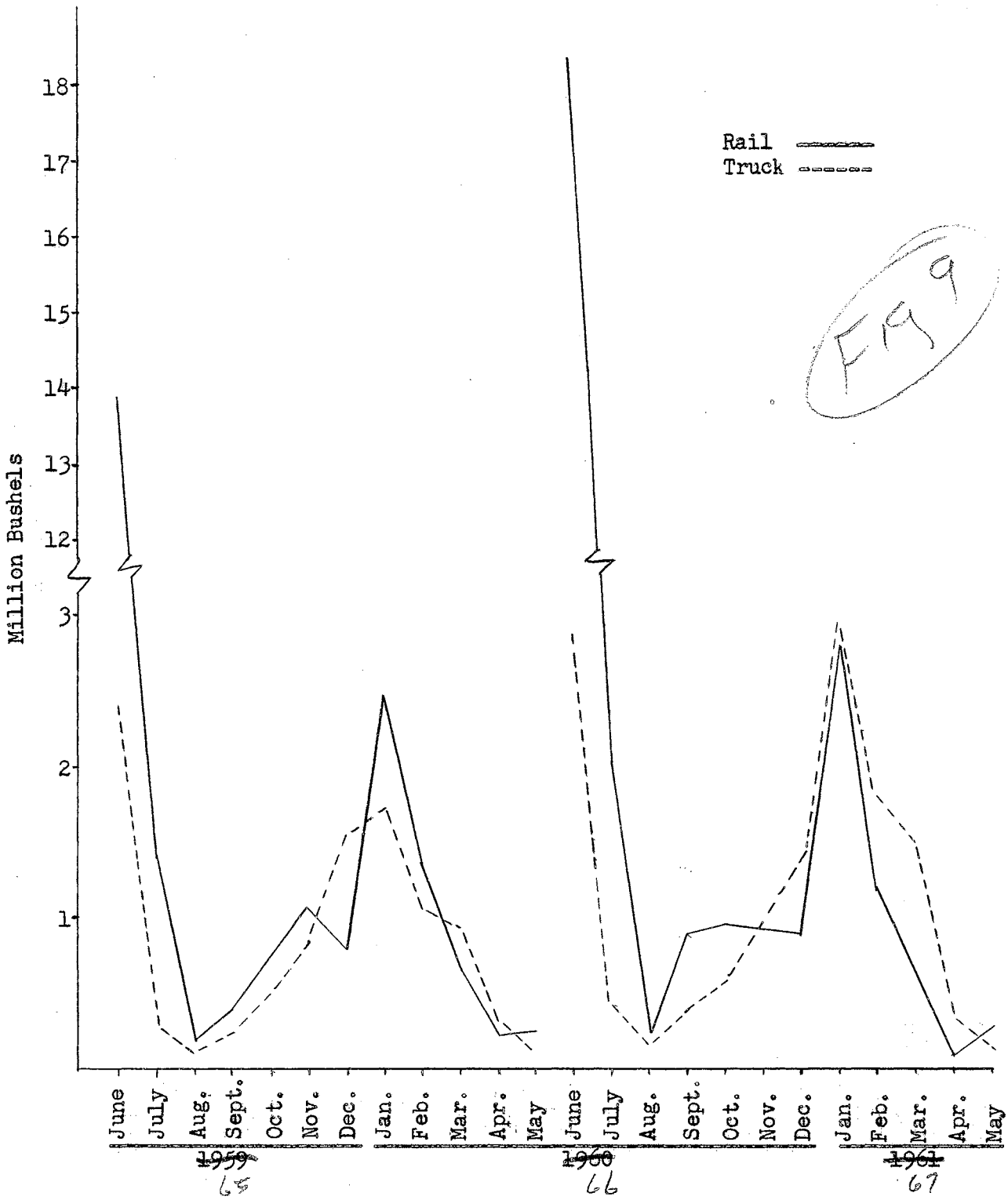

Figure 5-1. Volume of Wheat Moved by Motor Truck and by Railroad During Different Months from Western Oklahoma ~~1959-60 to 1960-61~~ 1965-66 to 1966-67

Both methods of shipment showed decreasing volumes of wheat shipment until August of both years when only 177,000 bushels in 1959 and 242,000 bushels in 1960 were shipped by rail. Truck volumes were similar with 144,000 and 163,000 bushels reported in August during these years. From August of both cropping years until January of the same cropping years, truck shipments continued to increase. In January 1960, 1,729,000 bushels were hauled by truck, and in 1961, this figure was 2,949,000 bushels. January 1960 was still part of the 1959 cropping season as was January 1961 part of the 1960 season.

Rail shipments for these same periods showed a troughing effect in December during both 1959 and 1960. Expansion of shipments then occurred until the relatively high shipments of 2,434,000 and 2,779,000 bushels were reached in January of the cropping years. High volumes of wheat shipment generally occur in January because prices of wheat are high, and wheat that has been held until after the end of the tax year, December 31, is sold. From the large shipments during January of both cropping seasons, shipments of wheat by both methods decreased as stocks of grain were removed to make room for the new crops of the following year. Removal of wheat before the next harvest is especially necessary when an elevator handles a high volume of wheat as compared to its storage capacity. Wheat may also be held in storage at the local elevator until the size of the forthcoming crop is estimated. If the crop appears to be large, all stored wheat might be shipped out to make room for the high anticipated volume.

Fixity of Methods

There is a greater fixity associated with wheat shipments by truck than by railroad. Comparing the high yield crop year 1960-61 (114,756,000 bushels for the 33 counties) with the low yield 1959-60 season (84,879,000 bushels) this fixity can be studied. During harvest periods for both years trucks were apparently utilized to the fullest extent possible. Only 444,000 more bushels were hauled by trucks in June of 1960 than June of 1959. The railroads absorbed the majority of the harvest period shipping volume for both years. During June of 1959, 13,955,000 bushels were reported shipped by rail (Table V-9). This was almost seven times the volume hauled by truck during the same period. During June 1960, 18,363,000 bushels were reported sent by rail. This was also almost seven times the truck volume for the same period. The actual difference in rail shipments for June of the two years was 4,308,000 bushels. After the harvest rush, the two methods of shipment did not vary greatly in the actual volumes of wheat transported. This indicates trucks are used to a higher degree of capacity after harvest is over than rail cars. Although boxcars are available to absorb most of the harvest rush, their use throughout the remainder of the year does not approach the harvest volumes.

Summary

Railroads continue to be the dominant mode of transportation of wheat in Oklahoma although the amount handled by them dropped from three-fourths to two-thirds of the total amount shipped during the period June 1958 to May 1961. The northern sector of the state utilizes railroads to a

TABLE V-9

VOLUMES OF WHEAT SHIPPED BY MOTOR TRUCK AND BY RAILROAD DURING DIFFERENT MONTHS FROM WESTERN OKLAHOMA, 1959-60 to 1960-61

Month	1959-60		1960-61	
	Rail (bushels)	Truck (bushels)	Rail (bushels)	Truck (bushels)
June	13,955,000	2,420,000	18,363,000	2,864,000
July	1,418,000	313,000	2,048,000	444,000
August	177,000	114,000	242,000	163,000
September	403,000	222,000	888,000	398,000
October	740,000	496,000	946,000	563,000
November	1,037,000	827,000	912,000	978,000
December	775,000	1,536,000	878,000	1,371,000
January	2,424,000	1,729,000	2,779,000	2,949,000
February	1,318,000	1,050,000	1,200,000	1,779,000
March	614,000	937,000	623,000	1,519,000
April	223,000	334,000	94,000	328,000
May	234,000	90,000	262,000	121,000
Total	23,318,000	10,068,000	29,235,000	13,477,000
Grand Total	33,386,000		42,712,000	

greater extent to ship wheat than does the southern sector.

The country elevators received the same net return for domestic sales of wheat to Oklahoma terminals as was received for export sales because the higher shipping rates of domestic sales offset the higher sale price. Oklahoma terminals were the destination of most of the rail shipments from country elevators of Oklahoma. The Texas Gulf ports were the second most popular destination for western Oklahoma wheat shipments. To be classified as a Texas Gulf shipment, the terminal facilities of Oklahoma had to be by-passed. Such wheat shipments moved directly from local elevators to the Texas Gulf. Flour mills, the Louisiana Gulf and other points received a small amount of Oklahoma rail shipments. Because of the system of transit privileges allowed from any point in the western part of the state during the time of study, the various areas from which the wheat was shipped had little effect upon the percent of wheat shipped to Oklahoma terminals. The percent of wheat shipped among areas to Enid facilities was similar for all areas except the panhandle sector. Also, all areas reported approximately equal percentages of total shipments to the Texas Gulf, except from the locality surrounding the Enid terminal facilities, and again, the panhandle counties. The transit privileges made Oklahoma terminals equally accessible to all parts of the state. This equal accessibility resulted in high utilization of terminal facilities when shipments were by railroad. This holds true for all sectors except the panhandle where poor connections by railroad to terminal facilities of Oklahoma are a strong influence causing wheat shipments to by-pass Oklahoma.

Railroads handled much greater volumes of wheat during harvest time than did motor trucks. For the remainder of the year, after harvest,

the amount of wheat transported by the two methods were approximately equal. The amount of wheat shipped by truck did not decrease as much as the amount by rail after harvest. This indicates that trucks are utilized more closely to full capacity throughout the year than are railcars.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The objective of this study was to analyze changing transportation patterns of wheat movement between the local elevator and the final market. This included determining the extent of wheat movement by truck in western Oklahoma. The area chosen for analysis was thirty-three counties of western Oklahoma from which 94 percent of the state's wheat production came. The wheat shipping seasons of 1958-59, 1959-60, and 1960-61 were the years studied.

It was found that most of Oklahoma's wheat crop was eventually destined for Texas Gulf ports. Rail shipments generally went either to Houston or Galveston, while the majority of truck shipments went to Houston. Several differences besides the actual mode of transportation existed between the two methods of shipment of wheat. One difference was in the rate structure of the methods. Normally, only one rate prevailed from an area for truck rates, while two rates existed for rail movements of wheat. Rail shipments were either by the domestic rate or the export rate. Truck rates were generally five or six cents per bushel lower than the rail export rate, and 15 to 17 cents per bushel below the rail domestic rate. Other differences included transit privileges, allowed for rail but not for trucked shipments. Regulations of truck and rail shipments of wheat differed according to the policies of the Interstate Commerce Commission. Truck shipments of wheat were deemed agriculturally

exempt commodities, and thereby their rates were exempt from Interstate Commerce Commission regulations when hauled by agriculturally exempt unfranchised truckers. Rail shipments did not enjoy such rate-regulatory exemptions. Truck rates were free to fluctuate, while rail rates were relatively rigid.)

The road system of western Oklahoma is laid out according to the rectangular survey system of land measurement. This system results in a square marketing transportation pattern in western Oklahoma. Because truck rates are directly related to distance, a theoretical network of equal distance areas from the Texas Gulf to western Oklahoma was set up by utilizing the theory of the square market area pattern. Allowances were made for diagonal highways of Texas, which did not follow a square pattern.

Local elevator managers reported the greatest advantage of shipping wheat by truck was the lower truck transportation rates than rates of rail. The second greatest advantage of trucks was that they were often available at harvest, when there might be a shortage of boxcars. The greatest disadvantage of trucks was that not enough them were available at harvest to remove the wheat as rapidly as it came to the elevator. This was especially true for elevators which handled high volumes of wheat in relation to their storage capacities. The second greatest disadvantage of trucks was the undependability of motor truck operators when offered more money for their services elsewhere. Most elevator managers considered facilities at the Houston-Galveston area adequate to handle shipments of wheat by truck.

The amount of wheat hauled by motor trucks during the three years of analysis increased from one-fourth to one-third of the total shipments.

The southern one-third of the state employed trucks to a greater extent than did the rest of the state. The northern part of the state shipped the lowest amount of wheat by truck. No wheat from roughly the southern one-third of the state moved to Oklahoma terminals by truck. Eighty-eight to 99 percent of the truck shipments from this southern section of the state went to the Texas Gulf. For the 33 counties of study, approximately 75 percent of all truck shipments went to the Texas Gulf area; only 15 to 18 percent went to Oklahoma terminals. Therefore, it appears that if trucks are employed to a greater degree, more wheat will by-pass the Oklahoma terminal facilities and move directly to Gulf markets.

As the capacity of country elevators increased, the percentage of their truck shipments moving directly to the Texas Gulf increased. The capacity of elevators from the southern part of the state was smaller than that in the northern areas. Since large elevators in the northern areas, because of size, tended to by-pass terminals, and small elevators in the southern areas, because of location, by-passed terminals, an adverse effect on Oklahoma terminal facilities was created.

As there are only two methods by which wheat is shipped from Oklahoma country elevators, amounts of wheat going by rail from various areas are the inverse of truck shipments - the southern part of the state ships the lowest amount of wheat by rail and the northern areas the greatest. The area of the state from which rail shipments originate apparently has little effect upon their destination points. The elevator managers interviewed reported the majority of their rail shipments were destined for Oklahoma terminals. The system of transit privilege allowed by railroads resulted in the moving by rail of large volumes of wheat to Oklahoma terminals from all areas of the state. Although two bids were commonly

given for rail shipments of wheat (tied to the two rates - to the Galveston-Houston area), the net price received by the two bids was approximately the same. This was because the difference between the bid prices equaled the difference between the rate changes.

During harvest season, a far greater amount of wheat is shipped by rail than by truck. During the remainder of the year, the amount of wheat shipped by the two methods is approximately equal. This indicates there is a greater uniformity of truck use than of rail use. Railroads ship large amounts of wheat at harvest season compared to the remainder of the year.

A SELECTED BIBLIOGRAPHY

Boyer, J. A. Southwest Lines Freight Tariff 5655G. Export Grain Tariff.

Hudson, William S. and Earl K. Henschen. The Transportation and Handling of Grain By Motor Truck in the Southwest. United States Department of Agriculture. Washington D. C., 1952.

Kahn, Fritz R. Principles of Motor Carrier Regulations, Wm. C. Brown Company, Pub. Dubuque, Iowa, 1958.

Larson, Adlowe and Tom W. Yates. "Trucking of Wheat From Oklahoma Country Elevators," Oklahoma Current Farm Economics, Vol. 34, No. 4, December, 1961.

Leftwich, Richard H. The Price System and Resource Allocation, Rinehart and Company Inc., New York, 1955.

Lösch, August. The Economics of Location, Translated by William F. Waglom, Yale University Press, New Haven, 1954.

United States Code Title 49, Section 303(b).

Westmeyer, Russel E. Economics of Transportation, Prentice Hall Inc., New York, 1952.

Williams, Earnest W. The Regulation of Rail-Motor Rate Competition, Harper and Bros. Publishers, New York, 1958.

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