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**The Organization of  
Country Markets  
For Grain  
in North Dakota**

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**STAFF CONFERENCE ROOM**

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THE ORGANIZATION OF COUNTRY MARKETS  
FOR GRAIN IN NORTH DAKOTA

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and Jerome W. Hammond<sup>1</sup>

INTRODUCTION

Many changes that affect the operation of country grain elevators, directly or indirectly, are taking place in North Dakota agriculture. Important structural changes include consolidation of grain firms, shifts in elevator location, changes in elevator and firm capacity, and the changing roles played by central and local markets. These structural changes have influenced the competitive practices and behavior of firms operating within the industry. The behavior of firms will, in turn, have an important influence on the performance of the industry.

These changes have important implications for firms operating in the industry as well as for farmers and consumers. North Dakota farmers are concerned with the efficiency of the grain marketing industry because they must compete with other grain producing areas in the United States and with other nations to a greater and greater degree. Consumers are concerned with the efficiency of the grain marketing industry because, in the final analysis, they bear most of the costs of inefficiencies.

Country grain elevators serve as the initial link in the movement of grain from the farm, through the marketing system, and into the hands of consumers. Country grain elevators are primarily engaged in receiving grain from farmers by truck or trailer for future delivery to a secondary elevator, terminal, or processor. Country elevators are widely distributed throughout the grain producing regions of North Dakota and the United States. These country elevators perform many services necessary in grain marketing, such as storing, grinding, and mixing for feed purposes, grading and blending or segregating good grain and poor grain. They also serve as retail feed and farm supply outlets.

Country elevators, as considered in this study, are establishments which:

1. Handle at least 10,000 bushels of grain per year.
2. Receive over 50 per cent of their supply of grain directly from farmers.
3. Sell at least 50 per cent of their supply in the form of grain.

Looking at the North Dakota grain industry, we find that elevator numbers have decreased greatly over time. To indicate the magnitude of changes in elevator numbers in North Dakota, a list of licensed elevators was compiled for various years from 1953 to 1962 (Table 1). An elevator, in this study, refers to all the facilities available at one location under the central control of

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<sup>1</sup>Velde is former Graduate Research Assistant, Taylor is Professor, and Hammond is former Assistant Professor of Agricultural Economics.

one firm. Total elevator numbers decreased from 936 in 1953 to 797 in 1962, a decrease of 139 elevators or almost 15 per cent. During this same period North Dakota total grain production of major crops remained fairly constant. In 1953 the average elevator handled approximately 180,000 bushels, whereas in 1962 the average elevator handled approximately 365,000 bushels. This represents over a 100 per cent increase in the average volume of grain handled per elevator.

### Objectives

The overall purpose of this study was to determine the causes and results of changes in market structure of the grain industry at the country elevator level. These changes will be analyzed primarily from the point of view of North Dakota. The more specific objectives were as follows:

1. To determine the importance of major changes in market structure at country points in North Dakota and central markets for grain.
2. To determine the importance of behavioral characteristics of country elevators in purchasing grains, market policies, the response of elevators to competitor market policies, and the presence or absence of predatory practices.
3. To measure industry performance in terms of output efficiency, the extent of excess capacity, the extent of excess profits, and the impact of structural changes on performance.
4. To ascertain if the legal type of elevator organization affects firm behavior and performance.

The number and size of country elevators, the degree of loyalty, service differentiation and market knowledge, and the conditions of entry and exit are three major structural factors which greatly determine the competitive conditions under which firms operate. The degree to which market structure changes have occurred and the resulting influence on the conduct of elevators are of primary importance. The conduct of firms greatly influences the efficiency of market performance by the industry. Efficient market performance by firms and the industry as a whole is the ultimate goal of society. Therefore, the degree to which changes in market conduct can be ascertained and the effect on the performance of the industry are of great importance.

### Sources of Data and Sampling Procedure

Several sources of data were used for information presented in this study. Numbers of elevators and firms, type of firm organization, and size of elevators and firms in terms of licensed storage capacity for North Dakota for the years 1953 and 1957-1962 were calculated from information in the Farmers Grain Dealers Association of North Dakota Directory. The number of licensed

elevator operations does not mean that all plants that hold licenses handle grain, but it seems to be a fairly good approximation. Some elevators may be used primarily for storage facilities or handling seed products.

A postcard questionnaire was mailed to 176 firms to determine legal type of business organization. Type of business organization was cross-checked in the files of the Office of the Secretary of State at Bismarck, North Dakota.

A line elevator was classified as a firm owning more than 10 elevators with central offices in a major terminal market. A cooperative elevator was a firm which qualifies as defined by the Capper-Volstead Act. The Farmers Union Grain Terminal Association is a multi-plant firm and is organized as a cooperative. The Grain Terminal Association was arbitrarily included in the cooperative groups.

A questionnaire was designed to obtain sample data necessary to determine and measure the various characteristics and changes in the market structure, conduct, and performance of country elevators. Country elevators were classified into four groups: proprietary (proprietorships and partnerships), local corporations, line elevators, and cooperatives. A 10 per cent random sample was selected from each group. In all, 77 country elevator questionnaires were used in this study. Some elevators that cooperated during the interview refused to give financial information. In other cases this information was not available. As a result, reliable financial information was obtained from only 52 out of 77 questionnaires for the years 1961 and 1962. Elevators in all areas of the state were included in the sample.

Financial data from country elevators were obtained from annual audit reports for most elevators, but for some local cooperatives this information was obtained from the annual report they submit to their farmer patrons. Commission firms present audit reports for associated elevators. Each commission firm presented reports in varying forms.

Additional information on central market activities and competitive behavior was obtained by personal interviews with commission firm and line elevator company personnel in Minneapolis and St. Paul. This was necessary because several elevators in the sample were line elevators, and many questions were not answered adequately by managers of these plants. These questionnaires were designed to facilitate and provide a cross-check on responses obtained at the country elevator level. The questionnaire also provided information on the degree and influence of vertical and horizontal integration and the influence of changes in the central market on the market structure of country elevators. Because of the small number of commission and line elevator firms, six of the eight line firms operating elevators in North Dakota were interviewed. Four commission firms, including three nonvertically integrated, were interviewed.



TRENDS IN THE INDUSTRY

Market structure refers to those organizational characteristics which determine the relationship of sellers in the market to each other, of sellers to buyers, and of established sellers to other actual or potential competitors.<sup>2</sup> Economic theory suggests that the degree and effectiveness of competition among country elevators (sellers) will be greatly influenced by the degree of concentration in the industry. The country grain industry has undergone significant changes in concentration for the 10-year period 1953-1962. Mergers have taken place at the local level, and many small elevators have withdrawn from the industry.

Number and Size of Elevator Plants

There has been a fairly consistent trend of decreasing number of elevators since 1923. There were 1,832 licensed elevator plants in North Dakota in 1923.<sup>3</sup> The average decrease in number of elevators was 1.41 per cent per year for the 40-year period 1923-1962. The average decrease in number of elevators was 1.49 per cent per year for the 10-year period 1953-1962. In 1953 there were 936 country elevators in North Dakota (Table 1). In 1962 there were 797 country elevators. This represents a decrease of 139 elevators in 10 years (almost 15 per cent)--an average of almost 14 elevators per year. The effect of 14 elevators withdrawing from local communities each year has had a significant impact on the degree of concentration and competition at the local community level.

TABLE 1. TOTAL CAPACITY, NUMBER OF ELEVATORS, AND AVERAGE CAPACITY PER ELEVATOR, NORTH DAKOTA, 1953 AND 1957-1962

Year	Total Capacity thousand bushels	Number of Elevators	Average Capacity Per Elevator thousand bushels
1953	63,964	936	68.3
1957	86,925	869	100.0
1958	95,725	850	112.6
1959	117,135	838	139.8
1960	120,540	833	144.7
1961	124,086	820	151.3
1962	122,735	797	154.0
Net change 1953-1962	57,771	139	85.7

Source: North Dakota Grain Dealers Association Directories, 1954, 1958-1963.

<sup>2</sup>Bain, Joe S., Industrial Organization, Wiley and Sons, Incorporated, New York, New York, 1959, p. 7.

<sup>3</sup>Benton, Alva H., and Peightal, M. F., Farmers' Elevators in North Dakota, Bulletin 206, North Dakota Agricultural Experiment Station, North Dakota Agricultural College, Fargo, North Dakota, February, 1927, p. 9.

At the same time that the number of elevators decreased, the total licensed capacity increased. Total licensed capacity increased from 63,964,000 bushels in 1953 to 122,735,000 bushels in 1962 (Table 1). This represents an increase of 57,771,000 bushels in 10 years and an increase from 68,300 bushels to 154,000 bushels average capacity per elevator (12.5 per cent).

The unit used to measure country elevator size in this study is bushels of licensed storage capacity. A significant correlation between licensed storage capacity and number of bushels handled was found for the 1961-1962 period and for the 1962 year for the sample of elevators (70 elevators responding). For the 1961-1962 period the correlation was significant at the 5 per cent level, and it explained 85 per cent of the variation.

The average increase in total capacity from 1953 to 1962 was 9.03 per cent per year. Part of the increase in total licensed capacity from 1953 to 1962 was due to the Commodity Credit Corporation storage program, which increased the rate of payment to elevators to build storage facilities with a guaranteed per cent occupancy during the 1950's. In 1960 the CCC storage program reduced rate payments and no longer guaranteed occupancy to country elevators. Without additional government actions on grain storage the rate of increased licensed storage capacity is likely to level off and possibly decline in the future. Total licensed storage capacity decreased from 1961 to 1962.

#### Number and Size of Firms

The size of elevator firms is also measured by the amount of licensed capacity each firm controls. A firm, in contrast to an elevator (plant), is an enterprise controlling one or more elevators (plants). A firm may also control more than one level of grain merchandising and/or processing.

There were 524 firms in 1953 and 499 firms in 1962 owning country elevators in North Dakota (Table 2). This represents a small reduction of 4.8 per cent when compared with the reduction in the number of elevators. The number of single elevator firms decreased by 3.8 per cent. The number of multi-plant elevator firms decreased by 8.7 per cent. An analysis of the data presented in Table 2 illustrates that of 139 elevator reductions from 1953 to 1962, 121 (87 per cent) were from multi-plant firms. Thus, the reduction in elevators is largely the result of a reduction in plants operated by the multi-plant firms. Concentration in regard to number of elevators controlled by the largest firms has decreased for the 10-year period 1953-1962 (Table 3).

The concentration of capacity controlled by the largest firms in the industry also decreased from 1953 to 1962 (Table 4). The largest four firms controlled 26.2 per cent of total capacity in 1953 and 21.2 per cent in 1962. The largest eight firms controlled 32.9 per cent of total capacity in 1953 and 26.0 per cent in 1962. The largest 20 firms controlled 39.4 per cent of North Dakota's total country elevator capacity in 1953 and 33.9 per cent in 1962. Looking only at the country elevator level of grain merchandising and the correlation found between volume handled and licensed capacity, it appears that the relative share of grain handled by the largest 4, 8, and 20 firms in the grain industry has decreased for the 10-year period 1953-1962.

TABLE 2. DEGREE OF CONCENTRATION OF ELEVATOR OWNERSHIP, NORTH DAKOTA, 1953 AND 1962

North Dakota's Elevator Firms	<u>Number of Elevators</u>		Net Changes
	1953	1962	
Largest 4 firms <sup>a</sup>	279	205	-74
Largest 8 firms	348	246	-102
Largest 20 firms	385	281	-104
Total number of firms	524	499	-25
Total number of elevators	936	797	-139
Total number of single plants under one ownership	478	460	-18
Number of multi-plant firms	46	42	-4

<sup>a</sup>Ranked on the basis of licensed storage capacity.

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.

TABLE 3. CONCENTRATION OF NUMBER OF ELEVATORS CONTROLLED BY LARGEST FIRMS, NORTH DAKOTA, 1953 AND 1962

North Dakota Country Elevator Firms	<u>Percentage of Country Elevators</u>		Per cent Increase
	1953	1962	
Top 4 firms <sup>a</sup>	29.8	25.7	
Top 8 firms	37.2	30.9	
Top 20 firms	41.1	35.3	
All multi-plant firms	48.9	42.7	
	<u>Average Capacity per Firm</u> thousand bushels		
Top 4 firms <sup>a</sup>	4,189	6,500	55.2
Top 8 firms	2,634	3,988	51.4
All multi-plant firms	608	1,059	74.2
All firms	122	246	101.6

<sup>a</sup>Ranked on the basis of capacity.

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.

TABLE 4. PROPORTION OF COUNTRY ELEVATORS CONTROLLED BY FIRMS, BY CAPACITY, NORTH DAKOTA, 1953 AND 1962

North Dakota Country Elevator Firms	Percentage of North Dakota Country Elevator Capacity	
	1953	1962
Top 4 firms <sup>a</sup>	26.2	21.2
Top 8 firms	32.9	26.0
Top 20 firms	39.4	33.9
All multi-plant firms	43.7	36.2

<sup>a</sup>Ranked on the basis of capacity.

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.

Legal Types of Business Organization

Changes in number and size of elevators have had an important influence on the number and size of plants operated under the various legal types of business organization. The number of proprietary and line elevators has decreased from 1953 to 1962, while the number of local corporations and cooperatively organized plants has increased. These trends are illustrated in Table 5. The decrease in the number of proprietary type elevators is due to an increase in the number of incorporations of these firms and small firms going out of business. Much of the increase in number of corporate type firms is due to the incorporation of proprietary type firms. Most of the changes in number of elevators controlled by cooperative firms are due to changes in number of plants owned by the Farmers Union Grain Terminal Association. The number of line elevators decreased from 297 to 176--121 plants or almost 41 per cent in 10 years.

TABLE 5. NUMBER OF ELEVATORS BY LEGAL TYPE OF FIRM ORGANIZATION, NORTH DAKOTA, 1953 AND 1957-1962

Type of Firm Organization	1953	1957	1958	1959	1960	1961	1962
	number of elevators						
Proprietary	120	107	102	98	98	95	84
Local Corporations	135	132	133	133	133	132	144
Line	297	240	214	204	199	192	176
Cooperative	384	390	401	403	403	401	393
Total	936	869	850	838	833	820	797

Source: North Dakota Grain Dealers Association Directories, 1954, 1958-1963.

The per cent of elevators and licensed capacity controlled by legal type of firm organization has also changed significantly for the 10-year period. The total licensed storage capacity and number of elevators controlled by proprietary and line firms decreased, while corporation and cooperative licensed storage capacity and number of elevators increased. The extent of these changes is shown in Tables 6 and 7, respectively.

TABLE 6. PERCENTAGE DISTRIBUTION OF COUNTRY ELEVATORS BY TYPE OF FIRM ORGANIZATION, NORTH DAKOTA, 1953 AND 1957-1962

Type of Firm Organization	1953	1957	1958	1959	1960	1961	1962
	per cent						
Proprietary	12.8	12.4	12.0	11.7	11.8	11.5	10.5
Corporation	14.4	15.2	15.6	15.9	15.9	16.1	18.1
Line	31.8	27.6	25.3	24.3	23.9	23.5	22.1
Cooperative	41.0	44.8	47.1	48.1	48.4	48.9	49.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: North Dakota Grain Dealers Association Directories, 1954, 1958-1963.

TABLE 7. TOTAL CAPACITY BY TYPE OF FIRM ORGANIZATION, NORTH DAKOTA, 1953 AND 1957-1962

Year	Proprietary		Corporation		Line Private		Cooperative	
	Thous. Bu.	Per cent	Thous. Bu.	Per cent	Thous. Bu.	Per cent	Thous. Bu.	Per cent
1953	6,342	9.9	10,082	15.8	18,041	28.2	29,499	46.1
1957	8,756	10.1	13,846	15.9	22,279	25.6	42,044	48.4
1958	8,756	9.2	13,846	16.5	21,122	23.1	48,148	51.2
1959	10,233	8.8	22,430	19.2	23,229	19.8	61,183	52.2
1960	10,298	8.5	23,404	19.4	23,155	19.3	63,683	52.8
1961	10,571	8.5	23,959	19.3	22,946	18.5	66,610	53.7
1962	10,960	7.9	25,110	20.5	21,922	17.9	66,058	53.8

Source: North Dakota Grain Dealers Association Directories, 1954, 1958-1963.

The average licensed storage capacity of all elevators in 1953 was 68,300 and was 154,000 in 1962. Table 8 shows the average storage capacity per elevator by type of firm organization. All types of firms have increased their average storage capacity. The average capacity per elevator for proprietary and line elevators was below the average for all elevators for 1953 to 1962, while corporation and cooperative average capacity per plant was above the average for all elevators in 1953 and 1962.

TABLE 8. AVERAGE CAPACITY PER ELEVATOR BY TYPE OF ORGANIZATION, NORTH DAKOTA, 1953, 1958, AND 1962

Type of Firm Organization	1953	1958	1962
	thousand bushels		
Proprietary	52.8	85.8	130.4
Corporation	74.7	104.1	174.4
Line	60.7	98.7	124.6
Cooperative	76.8	120.1	168.1
For all elevator plants	68.3	112.6	154.0

Source: North Dakota Grain Dealers Association Directories, 1954, 1958, and 1963.

Trends in Elevator Numbers Per Location

Changes in the number and size of elevators have had a significant effect on the location of plants. The decrease in the total number of elevators from 1953 to 1962 came primarily from "locations" with two or more elevators (Table 9).<sup>4</sup> The number of locations with five elevators decreased from two in 1953 to none in 1962. The number of locations with four, three, and two plants also decreased from 1953 to 1962. Although the total number of locations with two or more elevators decreased from 250 to 180 (-70), the number of one-elevator locations increased from 359 to 386 (58.9 per cent to 68.3 per cent) from 1953 to 1962 (Table 10).

The major trend appears to be toward one-elevator locations with the exception of major central locations such as holding and inspection points. For example, at Minot, North Dakota, which is both a holding and inspection point, the number of elevators increased from three in 1953 to four in 1962.

There were nine locations in North Dakota other than holding points and grain inspection points where the number of plants increased during the 10-year period 1953-1962. The number of elevators increased by 10 in these locations. Relocation of elevators due to rising waters of the Garrison Reservoir accounts for an increase in elevators in three locations. Examples of other locations where the number of elevators increased are: Carrington, Hatton, Langdon, and Manvel.

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<sup>4</sup>Locations refers to all points where country elevators are located.

Changes in Number of Buyers  
from Country Elevators

The degree and effectiveness of competition among country elevators (sellers) is significantly influenced by concentration of buying firms within the industry.

TABLE 9. NUMBER AND PROPORTION OF MULTI-PLANT LOCATIONS, NORTH DAKOTA, 1953 AND 1962

Number of Elevator Per Location <sup>a</sup>	Locations				Net Change	Per cent
	1953		1962			
	Number	Per cent	Number	Per cent		
5	2	0.3	0	0	-2	-0.3
4	14	2.3	9	1.6	-5	-0.7
3	43	7.1	32	5.6	-11	-1.7
2	191	31.4	139	24.6	-52	-6.8
1	359	58.9	386	68.2	+27	+9.3
Total number of Elevator Locations	609	100.0	566	100.0	-43	0

<sup>a</sup>Locations refers to all points where country elevators are located.

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.

TABLE 10. TOTAL CAPACITY OF MULTI-PLANT LOCATIONS, NORTH DAKOTA, 1953 AND 1962

Number of Elevators Per Location	Total Capacity Per Location			
	1953		1962	
	Thousand Bushels	Per cent	Thousand Bushels	Per cent
5	538	0.8	0	0
4	3,529	5.5	10,935	8.9
3	8,677	13.6	18,329	14.9
2	25,361	39.7	43,752	35.7
1	25,859	40.4	49,719	45.5
Total	63,964	100.0	122,735	100.0

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.

### Increased Concentration of Commission Firms

The number of commission firms that operate only as commission firms and are not vertically integrated into terminal operations, country elevators, processing, etc. has decreased from approximately 10 in 1953 to 3 in 1962 for the Minneapolis market. The number of commission firms, including those vertically integrated with terminals, country elevators, etc. has decreased from approximately 15 in 1953 to 10 in 1962.

The survey of commission firms revealed that the major reasons for fewer commission firms were:

1. Less grain available to commission firms.
2. Greater credit needs of country elevators.
3. More grain being shipped by truck.

The reasons for less grain volume transacted through commission firms is that more grain was marketed through CCC. A trend towards a bid market rather than a consignment market resulted in more grain purchased directly by terminal elevators and processors. Much of this grain by-passes the Minneapolis Grain Exchange.

Greater credit needs of country elevators resulted in their switching accounts to the larger and financially stronger commission firms. This forced the remaining smaller commission firms to merge with the larger commission firms and also to merge with integrated terminal operations.

Commission firms do not handle grain transactions shipped by trucks unless they originate the trucks. A greater volume of grain is being shipped by trucks in recent years. The shipment of grain by trucks in North Dakota was 5 per cent for the 1956-1957 crop, 7 per cent for the 1957-1958 crop, and 14 per cent for the 1958-1959 crop.<sup>5</sup> The country elevator survey (71 responses) indicates that total grains shipped by truck from North Dakota for the 1962-1963 crop year was about 25 per cent.

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<sup>5</sup>Taylor, Fred R., and Nelson, David C., Truck Shipment of Grain from North Dakota Elevators, Agricultural Economics Report No. 17, Department of Agricultural Economics, North Dakota Agricultural Experiment Station, Fargo, North Dakota, May, 1960, p. 1.



### Concentration of Grain Buying Firms

The number of buyers of grains decreased for the 10-year period 1953-1962.<sup>6</sup> This increased concentration occurred because of larger firms purchasing smaller firms, some smaller firms dropping out of business, and, in some cases, mergers by larger firms. The officers of commission and line firms were asked to estimate the degree to which the number of buyers of grain decreased. Administrative officers estimated that the number of buyers of all grains in general decreased from 10 to 25 per cent between 1953 and 1962. The effect of such increased concentration tends to decrease the degree of competition among buyers of grains.

However, concentration is only one variable that affects the degree of competition. Competition among buyers of grains may actually have increased, even though concentration has increased. The degree of competition may have increased because of changes in use of transportation facilities and communication facilities.

Competition between grain buyers may have increased because of greater competition between railroads, trucks, ships, and barges. Greater competition in the transportation industry has reduced grain freight rates in some areas. The reduction of grain freight rates in some areas has changed the traditional price structure which may have given some firms an established advantage over others. The lowering of freight rates has also opened up new markets for grains from North Dakota. For example, a ship traveling from Duluth to Germany must travel only a few miles further than a ship traveling from New York to Germany. A freight reduction to the West Coast from North Dakota would open new markets for grains to Asian countries--especially Japan. Lower freight rates (by truck) from North Dakota to southern states have resulted in more shipment of feed grains to this area. As a result of changes in the traditional freight rates, modes of transportation, and the opening of new markets, buyers of grain from country elevators have been forced to compete more on the basis of price. The surveys of country elevators, commission firms, and main offices of line firms revealed that grain from North Dakota is moving in a greater number of directions. This was especially true for feed grains which travel by truck, barge, and rail in several directions. This results in wider markets and more competition for grain originating at country elevator points.

Competition between grain buyers may also have increased because of improved and greater use of faster communication facilities, such as telephone, telegraph, and teletype machines. These changes have increased the spread of available market information among grain buyers and among managers of country elevators. The only essential for a market is that buyers (grain) and sellers (country elevators) be in constant touch with each other. Therefore, improved methods of communication and their greater use widen the markets and increase competition among grain buyers.

It appears that the effect of these factors on competition may have been great enough to have offset increased concentration among grain buyers. The above generalizations do not rule out the possibility that increased concentration in a specific industry may have decreased competition for a particular grain.

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<sup>6</sup>United States Senate, Concentration in American Industry, Report of the Subcommittee on Antitrust and Monopoly to the Committee on the Judiciary, 85th Congress, 1st Session, Washington, D. C., 1957, pp. 315, 383, 384, and 406.

## FACTORS AFFECTING INDUSTRY NUMBER, CONCENTRATION, AND PLANT SIZE

Concentration for country elevators has decreased. Both the number of sellers (elevators) and the number of buyers have decreased. Before proceeding further, it is appropriate to determine what general forces affect concentration and number of sellers (elevators). This study is specifically interested in those forces applicable to country elevators.

### Industry Technology

An important characteristic of the country elevator segment of the grain marketing industry is the nature of its technological progressiveness. The survey of country elevators revealed that there were no major technological innovations in the industry for the 10-year period 1953-1962. However, there were gradual improvements in dockage testing equipment, grain cleaners, leg elevators, scales, rodenticides, aeration and fumigation of stored grains, movement of grain horizontally by compressed air, etc. Improved technical grading equipment (used to separate large kernels from small and allowing better grain to be sold at premiums) and protein testers helped managers to purchase grains from farmers more accurately. However, these two improvements have been adopted only by a few larger, more centrally located country elevators. In the past, grading of grain into various sizes and testing protein content were functions performed primarily by terminal markets.

### Economies of Multi-Plant Firms

In addition to economies of plant size, firms may also find that additional economies of size may exist by growing large enough to manage and operate more than one optimum size plant. In any case, firms in the grain industry, as in other industries, have acquired a total productive capacity which is a multiple of an optimum size plant. Economies of multi-plant firms, unlike the economies of larger plants, are likely to be due to economies of (1) large-scale management, (2) large-scale distribution, and/or (3) large-scale buying from suppliers (pecuniary economies).

The survey of the main offices of line elevators indicated that each of the above were possible reasons for the existence of multi-plant operations. If these economies are available, increasing the size of the firm beyond one optimum size plant will lower per unit costs of handling grain and distribution of sidelines. However, the officers of line elevators stated that costs per bushel for their elevators were not lower than single optimum size plants. They stated that, although there were some economies of multi-plant operations, other diseconomies such as higher communication costs appear to offset the economies.

### Average Costs of Multi-Plant Firms

The average cost per bushel by legal type of firm organization varies considerably (Table 11). Because of differences in accounting procedures conclusive inferences cannot be drawn from Table 11. But, given the limitations of the average cost per bushel data, the data indicate that average cost per bushel is certainly not lower and may even be higher for line elevators (multi-plant operations) than for other single plant firms. The great majority of non-line firms would be single elevator firms. This conclusion tends to substantiate the information given by administrative personnel of the large line elevator firms.

TABLE 11. AVERAGE COST PER BUSHEL BY TYPE OF FIRM ORGANIZATION, NORTH DAKOTA, 1962

Type of Firm Organization	Number of Plants Reporting	Average Cost Per Bushel
		cents
Proprietary Corporations	3	8.40
Line	7	10.92
Cooperative	10	11.45
	32	6.64
Total	52	7.90

Source: Survey of country elevators, 1963.

It appears that the tendency for the largest firms (all multi-plant firms) to decline has been due to diseconomies of the multi-plant operation. However, higher per bushel costs for line elevators may be partly due to inability to attract large enough grain volumes for the individual elevators in the short run. Line elevator companies generally had smaller sized elevators than the average for all elevators. This, of course, was not true for all line elevator firms. An analysis of differences in efficiency between the very largest business firms and somewhat smaller (but still large) firms in various industries, though not conclusive, indicates that the very large firms are in general neither perceptibly more nor less efficient than firms which are simply large.

#### Planning Readjustments in the Industry

Because many elevators have not taken advantage of available short-run economies, many plant locations may achieve greater cost savings by reorganizing elevators in the area. In locations where there are two to four plants, large cost savings can be made by consolidation of operations into larger volume plants of more economic size. More than one less-than-optimum size

elevator in one location causes excessive overlapping in the procurement of grain. At any rate, the lower costs associated with fewer and larger plants is the basic underlying force causing small inefficient firms to either drop out of business or merge (be purchased) with a larger firm.

Country elevator managers stated that smaller elevators generally do not quit or merge until they are virtually forced to cease operations. This method may not be the lowest cost procedure in obtaining the same end. The potential cost savings from reorganizing elevators into fewer and larger plants may be considerably greater than the potential cost savings made possible by operating at the optimum point on the particular short-run average cost curve.

#### Significance of Optimum Size to Degree of Concentration

Differences in optimum size are extremely significant in determining the minimum degree of elevator concentration which is required for an industry to attain maximum efficiency. In this case efficiency is measured only by plant size. A larger share of the grain market handled by an elevator of minimum optimum size would result in fewer elevators needed to handle the industry volume. For example, if one elevator of optimum size could handle 10 per cent of all grain produced in North Dakota, then only 10 elevators could exist in the industry under perfectly competitive conditions.

This study found that an elevator of approximately 450,000 to 750,000 bushels licensed storage capacity is the optimum size plant in terms of lowest per bushel costs. This elevator would need to obtain 1,850,000 to 2,000,000 bushels of grain to attain an optimum short-run operation. A greater volume for this size plant might lower costs even more. The degree licensed storage capacity is used to store and handle CCC grain is an additional important factor in building a plant of this size. The degree to which labor and facilities are more fully employed in sideline activities is also an important factor in obtaining lowest costs.

An elevator of this optimum size will handle approximately 0.7 to 1.2 per cent of North Dakota's total grain volume depending upon the size of crop that year. Therefore, if an elevator of optimum size is able to handle 1.0 per cent of the total volume available in North Dakota, 100 such plants would be able to handle the available grain most efficiently in terms of lowest cost per bushel. However, this does not take into account the desires of farmers in terms of the distance they would be willing to haul grain and the increased cost per bushel to them in hauling longer distances.

This study does not advocate that there should be only 100 elevators compared with 797 in 1962. But the evidence does point to a definite reduction in the number of plants needed to most efficiently handle the available grain. A more realistic goal might be to reduce the number of small inefficient elevators to the point where all excess capacity is eliminated.

The country elevator survey indicated 36 per cent excess grain handling capacity in 1962 (Table 12). If we assume the small inefficient elevators are

eliminated first, then 510 elevators (797 minus 36 per cent of 797) could handle the available grain in North Dakota with potential savings for farmers. A reduction of 287 (797-510) elevators would not significantly increase transportation costs to farmers. The number of locations with one or more elevators was 566 in 1962 (Table 9). It appears that a short-run goal to reorganize (decrease the number of elevators to about 510) is quite reasonable and would improve industry efficiency without significantly raising transportation costs to farmers.

Many of the remaining plants would still not be of optimum size. At any rate, the evidence indicates that one large elevator in most multi-plant towns could handle the available grain at lower costs per bushel. The exception would be in larger, more central locations, such as grain inspection points, holding points, and possibly a few larger communities.

TABLE 12. LICENSED STORAGE CAPACITY, VOLUME CAPACITY, EXCESS STORAGE CAPACITY, AND EXCESS VOLUME CAPACITY FOR 72 NORTH DAKOTA ELEVATORS

Plant Size <sup>a</sup>	Number of Reporting Elevators	Total Licensed Storage Capacity	Total Volume Handled in 1962	Excess Handling Capacity in 1962 <sup>b</sup>	Excess Licensed Storage Capacity <sup>c</sup>
thousand bushels			per cent		
25-95	24	8	10	39	15
96-160	40	26	29	37	22
161-460	22	24	22	43	25
261-460	8	15	13	34	23
461-1,200	6	27	26	29	45
Totals:					
Per cent	100	100	100	36	28
Number	72	13,800,000	30,440,000	23,815,000	3,930,000

<sup>a</sup>Measured by licensed storage capacity.

<sup>b</sup>Per cent volume that could be handled over 1962 volume.

<sup>c</sup>Excess licensed storage capacity if no government storage program existed for country elevators, calculated as a per cent of 1962 licensed capacity.

Source: Survey of country elevators, 1963.

The Survivor Technique as  
a Measure of Efficiency

The pursuit of efficiency as a determinant of concentration is based on the proposition that there are systematic forces at work which induce firms to strive towards the most efficient size or some size within the range of

efficient sizes. Only under the conditions of pure competition is theory able to predict that sellers will be forced to attain optimum sizes in the long run. As a result, the degree of seller concentration will automatically be consistent with maximum efficiency. The real issue involved is whether or not competition will force firms in the industry to attain optimum sizes to survive.

Stigler, in a paper on The Economies of Scale for the National Bureau of Economic Research, suggests the survivor technique as an alternative to the actual cost method used previously in this study.<sup>7</sup> Other methods are objectionable for one or more of the following reasons:

1. They demand data which are unattainable from many firms.
2. The data obtained vary in accounting procedure (such as depreciation).
3. Difficulty in obtaining up-to-date information.
4. Some data are incapable of precise measurement (such as income).

The survivor technique avoids the problems of resource valuation and the hypothetical nature of technological studies. According to the survivor technique, if the market share of a given class falls, it is considered relatively inefficient and in general is more inefficient the more rapidly the share of a given class falls. Based on this hypothesis, an efficient size plant is one which survives all the forces affecting competition in the industry. These forces may be government regulations, unstable markets, rapid innovation, or great variation in crop production.

#### Application of Survivor Technique to the Country Grain Industry

Country elevators were classified by size on the basis of licensed storage capacity and the share of industry licensed storage capacity. The share of industry licensed storage capacity for each class was calculated for the years 1953 and 1962 (Table 13).

Plants of 15,000 to 50,000 licensed storage capacity declined substantially during this period. Elevators from 51,000 to 100,000 bushels licensed capacity also declined in relative importance. On the basis of the survivor technique, it is concluded that these elevators are generally quite inefficient. Thus, the survivor technique substantiates the previous conclusion that a reduction of about 287 small inefficient elevators is a reasonable goal.

Plant size classes from 101,000 to 200,000 and 201,000 to 400,000 bushels licensed capacity increased substantially both in number of plants and the

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<sup>7</sup>Stigler, George J., "The Economies of Scale," The Journal of Law and Economics, Vol. I, October, 1958, pp. 54-71.

per cent of licensed capacity controlled. The remaining two larger classes showed moderate increases in per cent licensed capacity. Plant survivor data for plants larger than 100,000 bushels licensed capacity suggests that these plants are relatively more efficient.

It should be noted that there were no plants in the class size of 601,000 to 1,600,000 bushels licensed capacity in 1953. Actual cost data illustrated optimum economies of plant size were between 450,000 and 750,000 bushels licensed capacity, and plants of larger than 750,000 bushels licensed capacity are likely to incur diseconomies of size. But, based on the survivor technique, it would appear that there are no diseconomies of size for plants greater than 750,000 bushels licensed capacity. However, this may be drawing an incorrect conclusion, since further evidence for plants of this class size needs to be analyzed before one can say whether economies or diseconomies of plant size exist. The larger plants may have been built in anticipation of being more efficient and handling more volume. Only more time and a means of comparison will indicate if they are efficient enough to survive. A future decrease in the per cent of licensed capacity and number of plants for these size plants would indicate possible inefficiencies or diseconomies of size.

TABLE 13. FREQUENCY DISTRIBUTION OF COUNTRY ELEVATORS, BY LICENSED STORAGE CAPACITY, NORTH DAKOTA, 1953 AND 1962

Class Interval Capacity thousand bushels	1953			1962		
	Number of Elevators	Per cent Elevators	Total Licensed Capacity	Number of Elevators	Per cent Elevators	Total Licensed Capacity
15-50	344	36.7	13,161	66	8.3	2,536
51-100	478	51.2	33,458	219	27.5	17,201
101-200	104	11.1	13,900	360	45.2	51,524
201-400	8	0.9	2,550	127	15.9	33,128
401-600	2	0.1	895	11	1.4	5,213
601-1,600	0	0	0	14	1.7	13,133
Total	936	100.0	63,964	797	100.0	122,735

Source: North Dakota Grain Dealers Association Directories, 1954 and 1963.



INDUSTRY INTEGRATION, DIVERSIFICATION, PRODUCT  
DIFFERENTIATION, ENTRY, AND EXIT

Economies of Vertical Integration

Horizontal integration occurs by expansion of business volume in a given plant or the owning of more than one plant performing the same handling process. Firms may also grow through vertical integration. Vertical integration is simply a form of business organization in which firms perform two or more handling processes.

In the grain industry of the United States some firms have vertically integrated into all possible levels of grain merchandising: (1) the country elevator level (grain procurement), (2) terminal elevator merchandising level, and (3) grain exporting level. Firms which perform all levels of grain merchandising have incorporated commission firms' services into their operations. Some vertically integrated grain firms have integrated even further into flour milling, soybean processing, feed processing, and other grain processing services. Some grain firms have also integrated into farm supply distribution (sidelines).

Motives for Vertical Integration

The survey of administrative personnel of the large line elevator firms indicated that their motive for integration at the country elevator merchandising level was to enable better procurement of grain. They stated that "the trend was towards a few efficient grain firms who want a pipe line of grain behind them in order to keep a flow of grain from producers to consumers." The quality of various grains varies considerably throughout North Dakota due to local weather conditions. The integration of large grain firms into the country elevator merchandising level allows these larger firms to obtain the quality of grain desired. It enables them to know what quality of grain is available at various locations and what price they need to pay in order to fulfill their buyers' desires.

For the firms which are integrated into feed processing, flour milling, or other grain processing operations, a multi-plant operation at the country elevator level facilitates the procurement of grain at lower costs and enables the firm to know existing market conditions to a greater degree than could be realized by such a processor purchasing grain through an independent commission firm. For example, an integrated line elevator and feed processing operation could lower costs by grading grains into high and low quality. The low quality grains would be used for feed processing and the high quality for other processing for human consumption, such as cereals, cake mixes, etc. If this separation of grains is performed at the country elevator level rather than the terminal market, it saves the cost of shipping processed feeds back into rural areas. The decentralization of feed processing has increased in recent years primarily for this reason. A multi-plant elevator operation also provides an excellent outlet for processed feeds.

Lower costs of procurement and increased market knowledge are also major reasons for the merging of terminal elevators, millers (and other processors), commission firms, and multi-plant operations at the country elevator level. This results in much grain movement by-passing the Minneapolis Grain Exchange even though they use it as a pricing mechanism.

Commodity Credit Corporation activities gave incentive to farmers, as well as country elevators, to build storage facilities for grain. The increased action of farmers to build storage facilities for grain gave them a choice which allowed them more control over their product. This action has gradually resulted in a shift in market competition for grain from the Minneapolis Grain Exchange to the country elevator and to some degree even further towards the farmer.

Competition in the transportation industry (between trucks, rails, barges, and ships) has upset traditional patterns of price and grain movement. This, in turn, has caused greater competition among country elevators and other larger grain firms in the procurement of grain at the lowest cost. For example, alternative modes of transportation may give a country elevator or a larger integrated firm the opportunity to compete at the same or lower transportation costs than fixed rail rates allowed. Since trucks prefer to travel on "good" highways, country elevators located on these highways versus those elevators located on "poor" roads may incur lower costs.

Greater use and improvement of communication facilities have allowed the shift of competition for grain to the country elevator to proceed at a faster and more efficient rate.

The proceeding changes have encouraged vertical integration into all levels of grain handling and in some cases have included the integration of grain processing operations. Thus, the primary motive for the combining of those former independent levels of grain merchandising and processing is to ensure a smoother pipe line of grain from producers to consumers. This conclusion does not rule out the profit motive which gives business firms the needed incentive to proceed.

#### Diversification by Country Elevators

The basic service rendered by country elevators is the purchasing of grains from farmers. However, country elevators were providing more auxiliary services in 1962 than in 1953. Elevators have become a center for farm supplies and their related services.

The degree to which elevators were diversified into related services is illustrated in Table 14. Some of the major services provided were: cleaning, treating, feeds, fertilizer, chemicals, seeds, feed grinding, coal and general merchandise, etc. There were 37 cooperatives in the study, and in these elevators most of the decisions relative to adding or deleting services were made by elected directors or by farmers themselves. It seems safe to assume that the services offered by cooperative elevators reflect the desires of farmers.

It was a consensus of managers that, "if they could provide services desired by farmers, the elevator would receive their grain business." One

hundred per cent of the 68 elevator managers responding to this question indicated a major reason for diversifying was to encourage patronage. Managers of eight (12 per cent) elevators stated that most of their services were offered at or very near cost in an effort to encourage more patronage. Fifteen per cent of the managers indicated fuller use of labor was at least part of their reason to diversify into related services. In the final analysis, increased income was the primary reason for diversifying. The survey of line companies' officers indicated that their primary reason for diversifying into related services and sidelines is to increase income. It was a consensus among line companies that "diversifying allowed their elevator plants to lower per unit costs; that it increased income without increasing cost proportionately."

TABLE 14. NUMBER OF ELEVATORS PROVIDING THE FOLLOWING SERVICES (77 RESPONSES), NORTH DAKOTA, 1962

Services	Number of Responses	Per cent	Services	Number of Responses	Per cent
Cleaning	67	87	Salt	9	12
Treating	62	81	Fieldmen	7	9
Feed	53	69	Grain bins	6	8
Fertilizer	53	69	Delivery	6	8
Chemicals	50	65	Educational		
Seeds	47	61	meetings	6	8
Grinding	23	30	Gas and oil	5	6
Coal	21	27	Hardware	4	5
General			Augers and		
miscellaneous			sprayers	3	4
merchandise	19	25	Lumber	5	6
Twine	17	22	Pelleting	3	4
Drying	10	13	Certified seed	2	3

Source: Survey of country elevators, 1963.

Diversification reduces the chances that all areas of the business will be unprofitable at the same time. It therefore enables the firm to survive and grow. An underlying force causing elevators to diversify may be to ensure their survival as a business. If a country elevator, for example, experiences a decreasing volume of grain business, its costs per bushel will rise and the elevator will find itself unable to compete. The elevator manager, owner, or board of directors will then (if not sooner) seek to find other means of ensuring the survival of the business. Diversifying into related farm supply services provides the next best alternative for country elevators experiencing a decreasing volume of business.

Country elevators, as well as horizontally and vertically integrated grain businesses, also wish to diversify even though they are not under a current threat of elimination because it tends to ensure their survival in the long run. The popular business philosophy that "a business which is not growing is dying" causes business to expand by diversifying when other means, such as increasing grain volume, have been obstructed.

Diversifying provides another major advantage to country elevators. Because of the extreme variability in crop production elevators may handle a large efficient volume of grain in years of bumper crops, but they may handle a very small inefficient volume in years of small crops. Therefore, in an effort to spread risk country elevators diversify into related services which are not as variable as the volume of grain handled. The survey of line elevator main offices indicated that large horizontally and vertically integrated firms in the grain merchandising business are diversifying into related services, as well as unrelated services, in an effort to spread risk and ensure the survival of their businesses.

Because the gains and losses from handling sidelines are not easily separated, no attempt was made to determine the cost of handling grains or sidelines separately. However, the following observations were made: The handling of sidelines for some smaller elevators was generally more important than handling of grain. In fact, for some elevators grain handling was a sideline to other departments of business.

#### The Degree of Product Differentiation

The term product differentiation refers to the extent to which outputs (even though very similar) are viewed as nonidentical by buyers. This definition may be extended to account for and include the degree to which buyers view a firm as being different from another even though they are similar; product differentiation may also include buyer service attached to the use or production (handling) of a product. In other words, the sources of product differentiation within an industry are all considerations which induce buyers or sellers to prefer one competing output or outlet to another.

There are three possible sources of product differentiation. The first source is differences in quality or design among competing products. In the country elevator industry the manager can do very little to change the quality of the grains he receives. However, in recent years buyers of grain are becoming more and more conscious of the quality characteristics of grains. These quality characteristics include color, size of kernel, weight per measured bushel, moisture content, shrunken and broken kernels, etc.

Protein content is a quality characteristic which has become very important to wheat and barley buyers in recent years. Protein is not a grading factor, but it is quoted and priced separately as a premium to the basic price for each individual grade of hard red spring wheat.<sup>8</sup>

In recent years buyers of grain from country elevators have been emphasizing quality characteristics of grain. As a result, country elevators have used blending techniques to a greater degree in an effort to up-grade the overall quality of grain handled. Quality characteristics are reflected in market prices. Larger elevators, plants, and firms will probably (due to more grain and better blending facilities) be able to attract a larger number of bids, and it is possible that some bids may be higher. However, the quality

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<sup>8</sup>Taylor, Fred R., and Kurtz, Clinton D., Market Factors of North Dakota Hard Red Spring Wheat, Agricultural Economics Report No. 33, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, March, 1964, p. 1.

of all grains is largely determined by local weather conditions. The degree to which any one elevator can establish a consistent reputation of having "better" quality grain over a competing elevator would be very small.

The second source of product differentiation results from the ignorance of buyers regarding the important characteristics and qualities of the products they purchase. This is more likely to be true of consumer buyers than would be true of business firms buying grain from country elevators. Furthermore, the majority of grain sold by country elevators is sold on the basis of a federal inspection which certifies the quality characteristics of the grain. Therefore, product differentiation due to inadequate market knowledge or misinformed buyers of grains (as a group) from country elevators would be practically nil.

Inadequate market knowledge and misinformed country elevator managers may be sources of product differentiation. The degree of market knowledge of country elevator managers is extremely important because changes in the prices of grains occur every day and possibly several times a day. A change in the price of grain of a few cents can cause great changes in the profitability of country elevators and firms because they generally operate on a profit margin of a few cents.

The degree of market knowledge and information appears to be slightly greater in 1962 than in 1953. There is greater use of telephone, telegraph, teletype, fieldmen, etc., and generally much more communication with country elevator managers in 1962.

Most managers generally accept the advice of a fieldman as to general market information. The larger vertically and horizontally integrated firms are able to do some research on their own. But even these larger firms do not provide their elevator managers with sufficient market information. This leads to the concept of differential usefulness of market information to firms depending on their size and other characteristics. The larger elevators and firms generally make much greater use of available market information than smaller firms. In larger plants the manager usually has additional labor which allows him more time to review and analyze available market information. This is especially true during the harvest period. However, the managers of larger plants will be the first to admit that the industry needs more relevant information.

Perhaps the industry is similar to farms where the number of firms and the margin of profit are small enough so that it does not pay any one firm (some are very large relative to the smallest) to conduct its own research. If such is the case, then cooperation between all grain firms, transportation firms, communication firms, universities, and government is needed to promote and to develop new ideas concerning the dissemination of relevant market information.

The third source of product differentiation occurs where buyers' preferences for certain products are influenced by persuasive sales-promotion activities of sellers by the use of advertising techniques. An important characteristic of product differentiation, therefore, may be due to irrational or emotional influences created by advertising or possibly due to particular "beliefs" of the buyer or seller.

Farmers differentiate between cooperative and private legal types of

business organizations. This response by farmers has an effect upon the market structure of the grain industry. The extent to which this type of differentiation has influenced market structure was not determined. The degree to which it influences market structure from one local competitive area to another varied greatly.

Managers were asked what per cent of the farmers in their areas preferred cooperatives, preferred private, or were indifferent. The responses were: 30 to 35 per cent of the farmers prefer cooperative elevators, and 20 to 25 per cent of the farmers prefer private elevators, even if the price and services were better from other types of firm organization. The remaining 40 to 50 per cent of the farmers were indifferent. That is, they would tend to go to the elevator where they thought the price and services were best.

Another factor affecting the market structure of a local competitive area is the degree of loyalty of farmers to a particular firm, manager, or community. Generally, the degree of loyalty by farmers is to a particular manager. The survey of administrative personnel of line elevators revealed that obtaining a well-liked and personable business manager for their line elevators was one of their major problems. This statement emphasizes the importance of the relationship between managers and farmers.

These considerations generally tend to have about the same effect as product differentiation. That is, it helps to create and develop market shares for particular elevators in their local competitive area.

#### Advertising

Advertising by country elevators is not used to differentiate grains. Rather it is used to acquaint farmers with various sideline services offered by the elevator. Most advertising expenditures are connected with feed, fertilizer, and chemical sales. The opinion was expressed by the majority of managers that their advertising expenditures were used mostly as "good will" and to "support their local community." Ten out of 64 responses stated that they advertised because other elevators in their local competitive area did so.

Of 71 responses, 54 or 76 per cent spent less than \$500 for advertising. Most of these expenditures by elevators were for pencils, calendars, Christmas gifts, or handouts in general. For cooperatives, the annual meeting expense was generally included as advertising expense. One elevator gave Gold Bond stamps with its feed sales. The manager remarked that this advertising technique was very successful. A great majority of managers stated that selling of sidelines and their services, such as fertilizer spreading to farmers, encouraged farmers to sell their grains to the elevator. Therefore, advertising expenses generally associated with sidelines are, to a degree, used to obtain a larger grain volume.

A total of 31 questionnaires contained information on both advertising expenditures and gross sales. The average expenditure on advertising as a per cent of gross sales was 0.064 per cent. This would be classified as an industry with negligible product differentiation due to persuasive advertising by the country elevators.

### Condition of Entry

The condition of entry as a dimension of market structure is important because it has a substantial influence on the conduct and performance of sellers. If entry can be blocked, then firms within the industry may be able to raise prices above minimum average costs and earn excess profits. Therefore, the condition of entry may be measured by defining the advantages that established firms have over potential sellers which may desire to enter. This can be done by measuring the per cent by which established sellers elevate their prices above minimum average costs without inducing new sellers to enter the industry in the long run.

Managers of established elevators and firms stated that farmers' loyalty to their elevator and to the community plus the plants' reputation was the major barrier to entry of new elevators. Another advantage of established elevators listed by managers was high capital investment, although the capital investment required to enter the country elevator industry is not high relative to many other industries in the United States.

Managers were asked to estimate the cost of starting new elevators in their local competitive areas that would be able to compete with existing elevators. Most managers agreed that the minimum size would cost between \$100,000 and \$125,000 and would be of about 100,000 bushels licensed capacity.<sup>9</sup> Managers of larger elevators estimated that the required investment for a new elevator which could compete with them would be between \$250,000 and \$400,000. These elevators had a licensed capacity between 450,000 and 1,200,000 bushels. According to cost data on optimum size elevators the average investment in an optimum size plant varies between \$250,000 and \$300,000.

A third advantage of established elevators mentioned by some managers was the fact their elevator was cooperatively organized. These managers were implying that a cooperatively organized elevator plant had an advantage over the entry of noncooperative or privately organized elevators. This implication is partially substantiated by other data obtained in the country elevator survey. Two elevators in the sample which were not organized as cooperatives operated as cooperative elevators; that is, they gave patronage dividends. One of these firms was a corporation, and the other was owned by farmers. A third elevator which was previously owned by a group of farmers recently reorganized as a cooperative elevator. The reason given for this action by these three managers was that "farmers' demand warranted these changes." The advantage of cooperatively organized elevators is further supported by data on the number of cooperative elevators relative to noncooperative elevators. Forty-one per cent of the total number of elevators in operation in 1953 were cooperatives, while 49.3 per cent of the total number of elevator plants in 1962 were cooperatives (Table 10). Cooperatives controlled 46.1 per cent in 1953 and 53.8 per cent in 1962 of total industry licensed capacity. These data tend to support the hypothesis that farmers have a preference towards cooperatively organized elevators.

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<sup>9</sup>It should be noted that the average size elevator in North Dakota in 1962 was 154,000 bushel capacity.

Most of the managers of smaller elevators felt that their particular elevators had no advantages over potential entries into their competitive areas. We might expect this answer to be fairly accurate, especially considering these firms are potential exits from the industry.

#### Examples of New Competition

The following are examples from the survey of country elevators which partially explain the condition of entry in the industry. Three specific cases were found in the sample where new competition entered a local competitive area. One case was a cooperative which invested \$127,000 (140,000 bushel licensed capacity). This elevator was previously in business at another location about 10 to 15 miles away which was decreasing as a center for farmers to bring grain. The older elevator was to continue in operation, but mainly as a "filler" elevator during the harvest season and for CCC storage purposes. The new elevator (in a new location but in the same general competitive area) found that customer loyalty was quite difficult to overcome the first two to three years but that considerable progress was being made to gain new customers. The manager stated that it was easier to build in a new location as a cooperative than as a noncooperative elevator because capital stock was sold to farmers in the community. And, as a result, farmers took a greater interest in the business and gave their support in the form of patronage. This entry of new competition was in a location where there were two existing elevators, one private and the other cooperative. Both of these established elevators were below average licensed capacity for the industry.

Another case is an established line firm which recently built an elevator in a new competitive area where there were several other established elevators. The firm entering invested over \$300,000. This elevator entered a location where much competition prevailed with both cooperatives and private elevators. The manager stated, "This was as tough a position to enter for a new elevator that could be found." He also stated that competition for patrons was very difficult during the first two to three years but that the elevator was gaining new customers every year. The entry of this new elevator was in a competitive area in which the available volume of grain has been increasing.

A third firm purchased two existing elevators (six miles apart) which had previously ceased operations. These elevators were extremely small, with a licensed capacity of between 25,000 and 50,000 bushels. The manager stated that the reason for purchasing these two elevators was the high margins charged by much larger cooperative elevators in their local competitive area. Farmers had voiced their disapproval of the high margins and were willing to give their patronage to new competitors.

The manager indicated one had a total volume of grain handled of less than 125,000 bushels. This elevator was purchased for \$20,000. Although cost information could not be obtained for this elevator, data from other elevators (Figures 3 and 4) indicate that an elevator of this capacity and volume would be very inefficient relative to an optimum size elevator. However, the elevator was purchased for approximately half the cost to build a new elevator of this size. Other seasonal employment by the manager allowed lower labor costs



to the elevator. These factors probably contributed to lower per bushel costs than might normally occur.

The manager stated that the operations of these two elevators had reduced the operating margins of competitors by 3 cents. Even considering the reason for lower costs, it is expected that established elevators in the competitive areas could handle both elevators' volume at a lower per bushel cost. Data from other elevators indicate that surrounding elevators certainly have excess capacity which could handle the additional volume adequately and at lower costs per bushel (Table 12). The condition of entry in the country elevator industry appears to be characterized by a fairly low capital investment in most cases (relative to most industries), considerable loyalty of farmers to established firms, and some possible advantages of cooperatives over noncooperative elevators. The barriers to entry into the country grain industry would have to be considered low relative to many other industries. The examples of new competition illustrated that both cooperative and private elevators were able to enter local competitive areas without significant difficulty.

#### Condition of Exit

Previously it was determined that an increase in capacity is a necessary condition for entry. It was also determined that capacity might be increased either by the internal growth of a firm by building additional elevators or by the entry of a new firm.

Exit is realized where offers by buyers to purchase and offers by sellers to sell are equal. The demand for old assets is determined by their net productivity to both buyers in the industry and buyers outside the industry. Net productivity refers to the productivity of assets after cost of converting to new uses. To each potential buyer in the country elevator industry the assets of an elevator or firm exiting should be worth the income they will produce discounted over time. Therefore, the value of the assets to potential buyers in the industry will vary greatly. However, the value of assets of an elevator or firm exiting will also depend upon their next best alternative use to buyers outside the grain industry. In the grain industry, because of the nature of the buildings' structures, the alternative uses for elevators are extremely small.

Managers were asked what problems are involved in ceasing the operations of elevators. Managers indicated that the greatest problem was a limited number of buyers for the assets. In most cases, an exiting elevator has no more than one or two potential buyers within the industry. In cases where an elevator wants to exit but is the only elevator at that location there may be no potential buyers within the industry interested in the plant. One manager stated that many elevators planning to quit operations get so heavily in debt that they need a high price to break even. In such a case, since the next best alternative use for the assets is practically nil, the elevator may continue in operation in an effort to reduce its debt.

Another major problem of exiting elevators is commitments to store grain for CCC and farmers. These storage commitments prevent an easy transition from one owner to another owner.

Another possible barrier to exit mentioned by managers is that farmers (because of loyalty, service, convenience, and less competition) may not like to see a nearby plant leave the industry. The extent to which this feeling by farmers is a barrier to exit is not known.

It would seem highly probable that in the country elevator industry incentives for firms to merge are quite great. In the past the reduction in number of country elevators has been due mostly to one firm purchasing another smaller inefficient plant. Country elevator managers were asked whether they preferred to grow by merger or internally. Of 70 responses 60 or 85.7 per cent stated that they preferred to grow internally. The opinion was expressed by country elevator managers that farmers generally were against merger because they felt it reduced competition.

Thus, it is concluded that (1) little alternative use for assets outside the industry, (2) lack of buyers and competition for assets within the industry, (3) storage commitments, and (4) the desire of farmers for continued operation are the major barriers to exit from the country elevator industry.

Although exit is generally considered a reduction in industry capacity, the examples described have not resulted in a reduction of industry capacity as measured by licensed storage capacity. For the period 1953-1962 industry licensed storage capacity increased by 57,771,000 bushels.

The reduction in number of elevators, especially in a local competitive area, has a significant influence on competition. It therefore appears that the reduction in number of elevators is exit even though there is no reduction in industry capacity. Exit of elevators increases the interdependence of remaining elevators which may decrease competition.

## BEHAVIORAL CHARACTERISTICS OF COUNTRY ELEVATORS

Market conduct refers to those acts, practices, and policies which sellers follow in adapting or adjusting to the markets in which they buy and sell. Country elevator managers have gradually shifted their method of selling grains to processors, terminals, and commission firms. The country elevator survey showed that an average of 67 per cent of North Dakota grain is shipped (1) on track, (2) cash at the elevator, or (3) to arrive. Except for grains sold as feed or seed, the remainder is sold (4) on consignment or (5) on spot (Minneapolis cash market) (Table 15).

Greater use is made of the to-arrive method of sale as compared to other methods. Selling to arrive is selling grain at current terminal market price and delivering the grain at a later specified date. The primary reason for increased use of to-arrive sales by country elevators is that it represents a perfect hedge against changes in the price of grain and also against changes in premium payments. Only 16 per cent of the managers indicated that they used hedging practices to any significant degree. This hedging was done almost exclusively with wheat. Hedging grain on the futures market has not always given protection on quality premium payments in the past. However, a recent innovation by the Minneapolis Grain Exchange guarantees a 13.5 per cent or higher protein for wheat deliveries on futures contracts. This innovation may slow the trend towards more to-arrive sales.

In selling on track, the seller accepts a price for the grain loaded in a boxcar at the local elevator. The grain does not need to be in the boxcar to make the sale, but it is the country elevator's (seller's) obligation to load the grain into the car within the agreed upon time. The transportation expenses as well as the risk of price change are the responsibility of the buyer. The price quoted is f.o.b. country elevator. However, the shipper must guarantee quality and pay sampling expenses.

On-track and to-arrive selling are quite similar, with one exception. The to-arrive bid is the price at the terminal; and, as a result, country elevators must pay and deduct freight, commission, and other costs before arriving at a net price.

There are times when grains are worth more if they are for sale by sample at the terminal market. For high quality grain, the buyer will pay more "on spot" for grain. This is generally undesirable for the country elevator manager because he bears the risk of price fluctuation. To shift this risk, the manager must hedge the grain while it is in transit. Many country elevator managers either do not know how to hedge or prefer not to. The futures market has not provided a reliable hedge on premiums which have become a much more important factor in recent years. Another factor causing the spot market to be higher than deferred shipments is there may be an immediate need for a car of grain, and therefore buyers are willing to pay a small premium for grain already in the terminal and available for sale.

The fourth method by which grain is sold is on consignment sales. In consignment sales the commission firm acting as an agent for the country elevator tries to sell the grain at the best possible price. The boxcar of grain may be sold while it is in transit rather than waiting for it to reach

TABLE 15. VOLUME OF GRAIN SOLD TO ARRIVE, ON TRACK, OR SPOT CASH, AND GRAIN SOLD ON CONSIGNMENT OR ON SPOT, NORTH DAKOTA, 1962

Type of Firm Organization	Volume to Arrive, on Track and/or Spot Cash		Volume on Consignment and/or on Spot		To Farmers, Processors	Per cent	Per cent	Number of Elevators Reporting
	Volume	Spot Cash	thousand bushels	thousand bushels				
Proprietary	1,244	725	58	441	78	36	6	7
Corporation	6,146	3,806	62	2,037	303	33	5	13
Line	6,552	4,924	75	1,300	328	20	5	18
Cooperative	16,677	10,644	64	5,214	819	31	5	36
Total	30,619	20,099	67	8,692	1,528	28	5	74

Source: Survey of country elevators, 1963.

the terminal and sell on the spot market. The commission firm may also divert a consigned car to a different market if the price is better. The majority of consignment sales are eventually sold on the spot market.

The survey of line elevator firms indicated that terminal markets are buying more and more grain "cash at the elevator." This type of sale is often referred to as "spot cash" market. In this method of selling grain the country elevator receives a bid from a terminal buyer much the same as an on-track bid. However, the term spot cash at the country elevator generally refers to buyers, such as millers, feed firms, and large grain terminals, who wish to bypass the Minneapolis Grain Exchange.

A comparison of the various methods of selling grains is illustrated in Table 16. The types of sales which are increasing are the to arrive, on track, and cash sales at the country elevator. On consignment and on spot sales are decreasing. Country elevators are using the "bid sales" to a greater extent in recent years in order to shift price risk to the buyer.

TABLE 16. RESPONSIBILITIES OF THE BUYER AND SELLER ACCORDING TO VARIOUS METHODS OF SALES

Method of Sale	Place at Which Price Applies	Price Applies at Time of	Who Pays Freight	Who Bears Price Risk
To arrive	Terminal market	Sale (delivery)	Seller	Buyer
Consignment	Terminal market	Sale (delivery)	Seller	Seller
On track	Country elevator	Sale (delivery)	Seller	Buyer
On spot	Terminal market	Sale (delivery)	Seller	Seller
Cash at the elevator	Country elevator	Sale (delivery)	Buyer	Buyer

A Shift in the Patterns of Marketing Grains

The general character of the market has shifted from an on consignment market to a bid market. This makes the country elevator more the center of competition for procurement of grains. This shift has been gradual in nature and still has a considerable way to go to be complete.

It has been stated by many people in the grain business that the reason for this change has been activities by CCC. This is true to some extent, but the cause goes a little deeper than CCC activities. Commodity Credit Corporation has been in existence since the 1930's. Yet the change has been very slow until recent years. The reason for this change is that CCC provided a choice for farmers. That choice was to sell on the cash market or seal and store grain. Farmers were paid to seal and store grain, which gave them an incentive to build up their capacity to store grain, which is especially important at harvest time. As a result farmers have been storing greater quantities of grain on their farms. They have been waiting for the buyer to come

to them rather than to ship on consignment. This change has also been due to pressure on the part of "on track" buyers who want the grain.

Increased storage capacity and more concern with price differences by farmers have forced grain buyers to come to the country elevator for grain. This, in turn, has forced the country elevator to come to farm bins to obtain grain. Forty-seven per cent of the managers stated that they visited farms in an effort to solicit business. The majority of these managers further stated that they sampled the farmer's grain and made price bids based on quality. Managers also stated that farmers bring in samples of grains to elevators for bids, and this practice has been increasing in recent years. It was reported that some trucks have begun to pick up grains directly from some of the larger farmers. Thus, procurement of grains has had a tendency to shift from the central market at Minneapolis to the country elevator and has had a tendency to shift even further, to the farmer.

#### Determination of Pricing Policy to Farmers

The price of grains offered to farmers by country elevators is based on the Minneapolis prices minus transportation costs, commission charges, and the elevator's operating margins. The only factor country elevators can influence is operating margins. Since the market structure (due to spatial considerations) is characterized by relatively few elevators and many producer-sellers, country elevators have greater bargaining power and, therefore, can vary price to some degree. The degree operating margins can vary depends on local competitive conditions.

The elevators were the price makers, and this made some type of pricing policy necessary. The most common pricing policy was to learn through farmers or call other managers. Sixty-five per cent of the managers stated that they called other managers to learn what prices were being offered to farmers, 36 per cent of the managers both called managers and learned through farmers, and 27 per cent of the managers voluntarily stated that managers in their areas "mutually agreed" on the prices of various grains offered to farmers (Table 17).

It was a consensus of the managers that farmers were generally "quick to let you know" if their price was under other elevators' prices. Even though farmers were "quick to let managers know," it was found that a majority of the managers stated that they depended on information directly from other managers. Prices of grains are quite unstable, so managers had to keep in daily touch with prices offered by competitors (more true during harvest) but telephoned their competitors only when a relatively great change in prices of grains occurred. It was not stated whether these were personal calls to other managers in all cases. One manager stated that he pretended to be a farmer asking about prices.

Managers were asked if there was another elevator in their competitive area which other elevators depended on for information about prices. Thirty-five per cent indicated that there was such an elevator in their competitive area. Seventy per cent stated that these elevators were able to influence the price offered by other elevators. These local price leaders appear to act as reflectors of market conditions.

TABLE 17. METHODS MANAGERS USED TO LEARN ABOUT PRICES OFFERED BY OTHER ELEVATORS, NORTH DAKOTA, 1962

Method Used	Number of Responses	Per cent of Responses
Through farmers	53	71
Call other managers <sup>a</sup>	49	65
Both call managers and through farmers	27	36
Mutual agreement	20	27
No response	2	
Total number of questionnaires	77 <sup>b</sup>	

<sup>a</sup>By telephone.

<sup>b</sup>This total was arrived at by the following equation:  
(53 + 49 - 27 + 2)

Source: Country elevator survey of North Dakota, 1963.

The Importance of Nonprice Factors  
in Procurement of Grain

The greater efficiency of larger plants over smaller plants was generally passed on to farmers in the form of offering more services and patronage refunds by cooperatives. Managers of country elevators were asked if they emphasized a higher price or nonprice services in an effort to obtain a larger volume of business. Eighty-two per cent stated that they emphasized nonprice services. Eighteen per cent said they emphasized higher grain prices to farmers. Three managers stated they emphasized both higher prices and non-price services. The managers, in continuing these services, appear to feel that these services are a more effective way to increase and stabilize volume than to eliminate the services and pay a higher price for grains.

There are two major reasons why managers prefer to compete on a service basis rather than on a price basis. First, because of the small number of competing elevators they are quite sensitive to changes in price and are able to retaliate faster. Therefore, competitors are more likely to meet price changes and thus nullify the effects. Second, farmers' loyalty to a particular manager, elevator, or community and the development of farmer preferences by differentiating legal type of business organization and services offered tends to reduce the sensitivity of farmers to price. This leads to marketing habits by some farmers which tend to stabilize grain volume to elevators.

Unfair Competition

Concepts of fair competition and unfair competition are frequently employed in connection with competitive practices within an industry. These concepts are generally based on ethical considerations and on the common practices of the grain grade. Many attempts have been made by law to define and eliminate unfair competition.

No attempt was made in this study to define "unfair" competition. Managers were asked, "Do you feel your competitors use any unfair business practices?" Of 66 responses, 38 per cent indicated "yes." Managers who answered "yes" were asked what practices they considered unfair.

The practices considered unfair are listed in Table 18. "Overgrading" is the practice of lenient grading of grain. Ninety-six per cent of the managers indicated this practice to be unfair. For example, a manager may give a farmer a No. 2 grade rather than a lower grade which would lower the price paid to a farmer. The higher grade would result from taking less dockage.

Managers also felt that paying a higher price than advertised or "tacitly agreed to" was an unfair practice. Another unfair practice indicated by 28 per cent of the managers was paying a higher price to another elevator's patron in an effort to attract his business. All of the above practices, including extending credit to farmers, are done in an effort to attract more patrons. This is especially true if they are not regular customers. For this reason some farmers find it profitable to "shop around" for the "best deal."

TABLE 18. PRACTICES MANAGERS OF NORTH DAKOTA COUNTRY ELEVATORS CONSIDER UNFAIR, 1962

Unfair Practice	Number of Responses	Per cent
Overgrading	24	96
Paying a higher price than advertised	10	40
Overpay other elevators' customers only	7	28
Extending credit to farmers	2	8
Cooperatives are an unfair business	4	16
Total number of managers responding	25	

Source: Survey of country elevators, 1963.



There is no consistent grading pattern followed by managers from one farmer to another. As a result, even though the price for two or three elevators may be the same, the grade given will influence the net price to the farmers. If, for example, one elevator is offering a higher price to farmers but grading much "stricter," the net effect may mean a lower price to farmers. About 30 elevator managers reported the practice was used in their competitive areas. Although this practice is generally considered unfair by managers, it appears to be a highly effective practice used by managers to establish a personal relationship between themselves and farmers.

It is evident that some managers tended to regard any competitive practice as unfair if it hurt their businesses. Some of the competitive practices considered unfair, such as paying a higher price, operating as a cooperative business, and extending credit, were necessary competitive practices for a dynamic grain marketing industry.

The majority of the practices which managers considered unfair were aimed at overcoming the industry's reluctance to compete on the basis of price. As a result, the efficiency of the pricing system in allocating resources was impaired. The manipulation of dockage, weight, and grade makes it possible for an inefficient elevator to compete on a price and service basis with a more efficient competitor. Eighteen of 74 managers reported that more favorable grading practices were used to encourage larger farmers or more distant farmers to trade with their elevators. The per cent of managers using this practice may be higher than indicated because of a reluctance to admit to the practice.

#### The Influence of Spatial Considerations on Conduct

Spatial considerations are involved in the locational distribution of elevators (buyers) and farmers (sellers). The distance between farmers and elevators affects (1) farmers' knowledge of prices and services, (2) farmers' confidence in elevators' grading policies, and (3) transportation costs from farmers to the elevators.

Elevators tend to be located separately because of their need to obtain a relatively large volume in order to achieve reasonable economies of size. Country elevators had an average of 5.5 competitors. The number of competitors generally varied from 2 to 15 depending upon the number of farmers and how far farmers were willing to haul their grains in each local competitive area. The procurement area for elevators averaged a 14-mile radius for 90 per cent of their volume. Therefore, farmers have a choice between only a few elevators unless they are willing to haul grain large distances. This will increase their cost of transportation, which at some point will be higher than the value farmers place on higher prices, more services, and reliability.

The area within which elevators obtain grains overlaps to a considerable degree. This is especially significant in multi-plant towns. Each elevator has a small range within which it can modify price because of pairing of elevators and farmers. The pairing of elevators and farmers is due to loyalty to managers, communities, and service and spatial differentiation. However, the

interlocking of procurement areas of rival elevators in each local competitive area creates a network of communication which connects all elevators in the market. As a result, the effects of price changes tend to be relayed throughout the market. The resulting market situation for country elevators prevents both independent action and overt collusion. The alternatives most compatible for managers are tacit agreements on price or price wars. The threat of price wars may have caused managers to focus competitive practices and techniques on nonprice services.

A factor which tends to offset decreasing number of elevators and increase competition among country elevators is the increasing number of trucks owned by farmers. There were 55,640 trucks owned by farmers in 1950 and 75,424 in 1960.<sup>10</sup> It seems safe to assume that the size of trucks is increasing also. These factors tend to lower per bushel costs of transportation to farmers. In the survey of country elevators managers reported that farmers are hauling more grain longer distances in recent years. However, this practice was reported more prevalent during winter months than at harvest.

Another factor which tends to offset decreasing elevator numbers is increased farm storage capacity, especially at harvest. During the winter months farmers who have stored their grains have the opportunity to bring samples to several elevators and take bids on their grains. This procedure allows farmers to receive the highest net return without fear of grade or dockage manipulation. It appears that farmers' willingness to purchase more and larger trucks and store grains for bids has offset decreasing elevator numbers to a considerable degree.

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<sup>10</sup>Taylor, Fred R.; Engelking, R. F.; and Heltemes, C. J., North Dakota Agricultural Statistics, Bulletin No. 408 (Revised), Department of Agricultural Economics, Agricultural Experiment Station, Fargo, North Dakota, March, 1962, p. 85.

## COUNTRY ELEVATOR PERFORMANCE

Market performance refers to those economic results that flow from an industry as an aggregate of firms. Market structure and competitive behavior significantly influence the economic and social performance of industries. There are many criteria which can be used to measure industry performance. All measures of performance are difficult to measure empirically. The particular dimensions of performance which are analytically significant vary from industry to industry. The particular dimensions of performance used in this study include: profit rates, operating efficiency, unethical practices, exchange efficiency, and technological progressiveness.

### Profit Ratios

One criterion of performance is the ratio of profits to net worth in the industry. The reasoning is that the elimination of excess profits improves economic welfare of consumers and farmers. However, the rate of this decline in profits among elevators of different sizes is also important. In the long run it could change the structure of the industry and thereby make it less competitive than is socially desirable. For example, if cooperatives continue to earn higher profits as a percentage on equity, they may, in the long run, force other legal types of firm organization out of the industry. This would not be as undesirable as if cooperatives were forced out of the industry, because they tend to operate at cost and return "extra" profits to patrons. Nevertheless, the industry dominated by cooperatives would be undesirable from a social point of view, because rivalry between cooperatives and non-cooperative elevators benefits both farmers and consumers.

One of the profit ratios used to measure market performance is the ratio of net income to net worth. Net income before income taxes was used because it makes a more meaningful comparison where cooperative elevators are included in the sample. Net income to cooperatives before patronage dividends was used in the study. All proprietary, corporation, and line responses were classified as noncooperatives because the number of responses in each group was small.

The ratio of net income to equity shows that cooperatives obtained the largest (12.8 per cent) average returns to equity for the 1961-1962 period (Table 19). Elevators of noncooperative organizations earned average returns of 7.9 per cent on equity for the 1961-1962 period. Data on equity were not available for line elevators.

Profit as a percentage on equity by elevator size is illustrated in Table 20. It appears that the largest elevators (276,000 bushels and over) earned less returns on equity on the average than smaller elevators in 1961 and 1962. However, this may be due to a small number of observations. Larger elevators may also be forced to pay higher prices in an effort to attract larger volumes of grain. The average profit rate on equity was slightly greater for elevators of medium size for the two-year period. The profit ratio for all elevators in 1961 is slightly less than for all elevators in 1962, even though volume handled by elevators was considerably greater in

1962 than in 1961. Therefore, it appears that all elevators operated on larger margins in 1961 than in 1962 because handling larger volumes lowers short-run costs per bushel significantly.

TABLE 19. PROFIT RATE OF NORTH DAKOTA COUNTRY ELEVATORS AS A PERCENTAGE ON EQUITY (BEFORE INCOME TAX) BY TYPE OF LEGAL ORGANIZATION, 1961 AND 1962

Type of Legal Organization	1961		1962		1961-1962 Average Profit Ratio
	Number of Responses	Profit Ratio	Number of Responses	Profit Ratio	
Noncooperative	8	.066	9	.091	.079
Cooperative <sup>a</sup>	24	.122	26	.134	.128
Totals	32	.112	35	.124	.118

<sup>a</sup>Cooperative profits are before patronage dividends.

Source: Country elevator survey, 1963.

TABLE 20. PROFIT RATE OF NORTH DAKOTA COUNTRY ELEVATORS AS A PERCENTAGE ON EQUITY (BEFORE INCOME TAX) BY SIZE OF ELEVATOR BASED ON LICENSED CAPACITY, 1961 AND 1962<sup>a</sup>

Licensed Capacity thousand bushels	1961		1962		1961-1962 Average Profit Ratio
	Number of Responses	Profit Ratio	Number of Responses	Profit Ratio	
76-175	15	.148	17	.113	.129
176-275	13	.125	14	.152	.139
276 and over	4	.073	4	.105	.090
Totals	32	.112	35	.124	.118

<sup>a</sup>Profits include cooperative profits before patronage dividends.

Source: Country elevator survey, North Dakota, 1963.

The same relationship is true for profit rates as a percentage on total assets as was true for profits as a per cent on equity (Table 21). However, data were available for line elevators on profit rates as a percentage of fixed assets. The ratio of profit rates to fixed assets was higher in 1961 than in 1962. Including line elevators in the noncooperative group for profit rates as a percentage of fixed assets did not change the results.

### Excess Profits

Excess profits for an industry can be determined by subtracting an interest rate on investment from the profit rate as a percentage on equity. Excessive profits are defined as a return to net worth above what could be earned by investing in their next best alternative investment available. The investment chosen should be similar in degree of risk. For example, the alternative rate of interest should not be the guaranteed rate available from banks or savings institutions which entails less risk to the investor.

If it is assumed that an interest rate of 6 per cent is the next best alternative return on investment available to the industry, then it appears the industry operated on larger margins than perfectly competitive conditions would allow (Table 19). This conclusion would be more true for cooperatives as a group than for noncooperative business organization. If net income to the industry as a percentage on equity were calculated after income taxes, it would appear that noncooperative elevators as a group are not earning excessive profits and that cooperative elevators are operating on larger margins than necessary.

Previously it was noted that all elevators tend to offer the same price for grains in a local competitive area. Because many cooperatives and some noncooperative elevators are operating on larger margins than are necessary, many smaller, less-than-optimum size elevators are able to compete in the same local competitive area. It is questionable whether a policy of operating on larger margins than are necessary and returning the "extra profit" at the end of the year in the form of patronage dividends should be followed by cooperative elevators. Such a policy tends to maintain inefficient elevators and excessive profits in the industry.

### Excess Capacity

Country elevator managers were asked to consider present facilities of their plants and the volume of grain they handled in 1962. Considering these factors, they were asked to estimate the volume of grain their elevators could handle without too much strain. The excess grain handling capacity for country elevators was 36 per cent in 1962--the largest crop in the history of North Dakota (Table 12). Using the 1961 data, elevator managers indicated that their plants could have handled 50 per cent more bushels. The largest elevators had the smallest excess grain handling capacity.

Much of this excess handling capacity is due to small, inefficient elevators which continue to operate. There were 285 elevators of 100,000 or less licensed storage capacity in 1962. According to the survivor principle these elevators would be considered inefficient as a group. The continued operation of these small inefficient elevators prevents the growth of larger, more optimum size elevators which could handle larger volumes at lower costs per bushel.

Country elevator managers were also asked to estimate how much overcapacity (licensed storage capacity) their elevators would have if no government storage program existed for country elevators. The total excess storage

TABLE 21. PROFIT RATE OF NORTH DAKOTA COUNTRY ELEVATORS AS PERCENTAGE OF TOTAL ASSETS AND FIXED ASSETS (BEFORE INCOME TAX) BY TYPE OF LEGAL ORGANIZATION, 1961 AND 1962

Type of Legal Organization	1961			1962		
	Number of Responses	Profit to Total Assets	Number of Responses	Profit to Total Assets	Number of Responses	Profit to Fixed Assets
Noncooperative	8	.021	20	.064	9	.027
Cooperative <sup>a</sup>	24	.039	29	.157	26	.042
Totals	32	.036	49	.095	35	.039
					52	.107

<sup>a</sup>Cooperative profits are before patronage dividends.

Source: Country elevator survey, 1963.

capacity for all elevators under this condition was 28 per cent in 1962. This figure would probably be much higher if it were not true that much of country elevator capacity used for government storage is "flat" (quonset-type) storage which managers would use for other purposes if no program existed. The largest elevators indicated 45 per cent excess licensed storage capacity if no government storage program existed. The greater excess storage capacity for larger elevators is probably due to less flat storage, although most managers of larger elevators felt they would use their capacity to merchandise grain to a much greater degree if storage programs were not available.

Operating Efficiency--An Industry  
Adjustment Problem

Only 12 per cent of the elevators were operating near optimum efficiency (3 to 5 cents per bushel) in 1962 (Table 22). Allowing for differences in accounting and rates of depreciation, 49.0 per cent of the elevators could be operating near optimum efficiency (3 to 8 cents per bushel). This leaves 16 per cent of the elevators operating at costs per bushel moderately above lowest costs attainable and 35 per cent substantially above lowest attainable costs in the industry.

TABLE 22. PERCENTAGE OF COUNTRY ELEVATORS OPERATING AT  
VARIOUS LEVELS OF EFFICIENCY, NORTH DAKOTA, 1962

Cost Per Bushel <sup>a</sup> cents	Number of Responses	Per cent of Total	Accumulative Per cent
3.0-5.0	6	11.8	11.8
5.1-8.0	19	37.3	49.0
8.1-10.0	8	15.7	64.7
10.1-12.0	6	11.8	76.5
12.1-15.0	7	13.7	90.2
Above 15.1	5	9.8	100.0

<sup>a</sup>Represents total costs of operation 1962-1963 crop year. Note this is the largest crop in North Dakota history.

Source: Country elevator survey, 1963.

The relationship between cost per bushel, elevator size, and short-run utilization of elevator facilities (ratio) is illustrated in Table 23. The elevators with lowest costs per bushel had an average licensed capacity considerably greater than elevators of higher costs per bushel. However elevators of larger licensed capacity also had the largest ratio of volume handled to licensed storage capacity. Again, a larger ratio indicates fuller use of available facilities and therefore better performance

TABLE 23. RELATIONSHIP OF AVERAGE LICENSED CAPACITY (ELEVATOR SIZE) TO INDUSTRY PERFORMANCE, NORTH DAKOTA, 1962

Cost Per Bushel	Number of Elevators	Average Licensed Capacity	Ratio <sup>a</sup>	Total Licensed Capacity	Total Licensed Capacity
cents		thousand bushels		thousand bushels	per cent
3.0-5.0 <sup>b</sup>	6	300.3	2.85	1,802	18.2
5.1-8.0	19	196.5	2.57	3,734	37.7
8.1-10.0	8	173.6	1.95	1,389	14.0
10.1-12.0	6	167.0	1.65	1,002	10.1
12.1-15.0	7	149.3	1.28	1,045	10.6
Above 15.0	5	186.8	.94	934	9.4
<b>Total</b>	<b>51</b>	<b>194.2</b>	<b>2.14</b>	<b>9,906</b>	<b>100.0</b>

<sup>a</sup>Ratio of volume handled to licensed storage capacity.

<sup>b</sup>Represents total costs per bushel of operation for 1962-1963 crop year. Elevators are classified on the basis of costs per bushel.

Source: Country elevator survey, North Dakota, 1963.

The primary reasons for elevators operating at less-than-optimum size appears to be (1) the lack of the price competition for grains at the time of delivery and (2) past structural characteristics of industry.

In the past there was a definite need for many small elevators spaced a few miles apart. Many farmers did not have trucks, and if they did they were very small by today's standards. Therefore, the cost of transporting grain large distances was high. Furthermore, farmers with no storage facilities for their grain were forced to deliver grains during the relatively short harvest season. As farmers purchased newer and larger trucks and increased their storage capacity, and as the progressive elevators built larger elevators, inefficient elevators were gradually forced out of the industry. This eventually reduced the number of elevators to the point where interdependence was recognized. As a result, managers became more reluctant to compete on the basis of price. Increased interdependence led many elevators to compete by differentiating their firms and services.

Many elevators increased size and capacity to handle larger volumes by purchasing elevators forced out of business. Other elevators increased capacity by adding additional annexes. This type of elevator expansion has resulted in many elevators having a series of buildings, bins, equipment, etc. that are quite inefficient relative to new optimum size elevator facilities which are built to handle large volumes.<sup>11</sup>

<sup>11</sup>It should be noted again that these elevators are more efficient only upon receiving larger volumes of grain. Because farmers are paired with particular elevators and communities, and because the industry has a tendency towards excess capacity (Table 12), the building of larger optimum size elevators has not been feasible in the great majority of communities.



In essence, handling inefficiencies by country elevators are problems of industry development and growth. The primary ingredient of industry development is the development of new technologies and their adoption. The rate of adoption of technology will vary by industry. In the farm industry innovation (with government aid) and adoption of new techniques have been rapid in the last two decades. The rapid adoption of technology and more orderly marketing by farmers have forced structural changes in the grain industry--namely, a reduction in number of elevators needed to handle the available grain.

Most of the technological improvements in handling efficiency have been developed outside the grain industry. It is not necessary for the country elevator to innovate in order to have a progressive grain marketing system. In fact, in most cases it would be uneconomical for elevators to research new handling techniques, protein testers, etc.

The adoption of available technology is reflected in the efficiency of elevators in the market. Individually, none of the improvements in equipment are great enough to force the average nonadopting elevator out of the industry. In any case, the reduction in number of elevators has not kept pace with available economies of size in the country elevator industry. The handling of grains from farmers to processors is marketed at roughly 3 per cent of its value aside from transportation costs. As a result, the reduction of costs by innovating and adopting new technology provides very little profit incentive. The reluctance of communities and farmers to cease operations of elevators which are "dead but won't lie down," prevents the industry from reorganizing into larger and more optimum sized plants.

In summary, the preceding analysis of performance of country elevators suggests that lack of price competition and past structural characteristics of country elevators are the primary causes of (1) nearly all elevators operating below grain handling capacity and (2) many elevators operating substantially above lowest costs attainable.

## SUMMARY AND CONCLUSIONS

### Market Structural Characteristics

There were 797 country elevators purchasing grains from farmers in North Dakota in 1962. This was 139 fewer elevators than in 1953. The average decrease of almost 14 elevators per year has had a significant impact on the degree of concentration and competition at the local community level. The procurement areas of these elevators overlapped extensively and thereby formed a network of direct competitive relationships between elevators.

During the same 10-year period total licensed capacity increased 57,771,000 bushels. Average licensed capacity per elevator increased from 63,000 to 154,000 bushels. Most of the increase in licensed storage capacity was due to the Commodity Credit Corporation storage program. Licensed storage capacity was used as the measure of size for country elevators.

There were 524 firms operating country elevators in North Dakota in 1953 and 499 firms in 1962. Approximately 87 per cent of the decrease in number of elevators was by firms owning more than one plant. Concentration in regard to total licensed capacity and number of plants owned by the largest 4, 8, and 20 firms decreased during the 10-year period. If licensed capacity is indicative of volume of business, then it appears that the volume of grain handled by the largest firms has decreased relatively. To determine this relationship, a simple regression analysis was used which showed the correlation between licensed storage capacity and volume of grain handled to be significant ( $R^2 = .85$ ) at the 5 per cent level for the 1961-1962 period.

The number of proprietary and line elevators has decreased, while the number of local corporations and cooperatively organized elevators has increased. The size of proprietary and line elevators increased less than the size of local corporations and cooperatively organized elevators.

The decrease in total number of elevators (139) came primarily from locations with two or more elevators. The total number of locations with two or more elevators decreased by 43 (7 per cent), while the number of one-elevator locations increased by 27 (9 per cent). With the exception of major central locations, such as grain inspection and holding points, the trend appears to be towards one-elevator locations.

Elevators tend to be located separately because large volumes are needed to obtain reasonable economies of size. Each country elevator had an average of 5.5 competitors. The procurement area for elevators averaged a 14-mile radius for 90 per cent of their volume. Each elevator, therefore, has a small range within which it can modify price because of pairing of elevators and farmers. Spatial characteristics contribute to this pairing significantly. It appears that farmers' willingness to purchase more and larger trucks, which enables them to haul longer distances for the same cost, has offset increasing distances between elevators.

There were also important changes in the number of buyers of grain from country elevators. For the 10-year period 1953-1962 the number of commission

firms decreased. The survey of commission firms revealed that the major reasons for fewer numbers were:

1. Less grain available to commission firms.
2. Greater credit needs by country elevators could not be met by smaller commission firms.
3. A large share of the grain shipped by truck bypasses commission firms (25 to 30 per cent of grains were shipped by truck for the 1962-1963 crop).

Short-run cost relationships were measured by comparing per bushel costs to the ratio of volume of grain handled to licensed storage capacity. Short-run economies of handling a large volume are great up to a ratio of 2.5. Costs continue to fall at a slower rate for ratios greater than 2.5. It did not appear that the optimum point on the short-run average cost curve for country elevators was reached by any elevators in the sample. Short-run economies are large due to spreading large fixed and semi-fixed costs over a larger volume. The short-run cost relationship showed that costs decreased from 15 cents per bushel for an elevator with a ratio of grain volume to licensed capacity of 1, to 4 cents per bushel for an elevator with a ratio of grain volume to licensed capacity of 7.

The long-run cost relationship showed that costs decreased from 12 cents per bushel for an elevator size of 100,000 licensed capacity to 4 cents per bushel for an elevator of 450,000 to 750,000 bushels licensed capacity. In general, it appears that factors affecting utilization (short-run economies) are more important in determining lower costs than elevator size.

An optimum size elevator of approximately 450,000 to 750,000 bushels licensed storage capacity would need to obtain a grain volume of 1,850,000 to 2,000,000 bushels to attain lowest costs per bushel. Storing and handling of CCC grains and sidelines are also important factors in attaining lowest costs per bushel. An elevator of optimum size would handle about 0.7 to 1.2 per cent of North Dakota's total grain volume depending upon crop size that year.

In addition to economies of plant size, firms may also find further economies of size by operating more than one optimum size plant. Given the limitations of accounting data, line elevators in general had higher per bushel costs than single elevator operations. But this may be due to a substantial number of less-than-optimum size plants and inability to attract large enough grain volumes in the short run. This conclusion is not true for all line elevator firms.

Another dimension of firm size and growth is vertical integration. Vertical integration by country elevators, terminal elevators, processors, and commission firms appears to facilitate the procurement of grain at lower costs and enables the firm to know existing market conditions to a greater degree. It appears that lower costs of procurement and increased market knowledge are major reasons for the merging of terminal elevators, processors, commission firms, and multi-plant country elevators. These mergers cause more grain to bypass the Minneapolis Grain Exchange, even though it is used as a pricing

mechanism. More grain bypassing the Exchange results in increased buying of grain from country elevators through the use of bid sales, such as to-arrive and on track sales.

Most advertising expenditures by country elevators are connected with feed, fertilizer, chemical sales, etc. Much of the advertising is in the form of general handouts, such as pencils, Christmas gifts, calendars, etc. Advertising associated with sidelines is generally used to attract a larger grain volume. Differentiation due to persuasive advertising by country elevators is negligible.

Farmers differentiate between cooperative and private legal type of business organization. Farmers preferred cooperatives slightly, but it varied greatly from one local competitive area to another. About half the farmers were indifferent and considered price and services only.

Considerable loyalty by farmers to a particular manager, firm, or community was prevalent. Loyalty by farmers tended to create market shares for particular elevators in their local competitive areas.

The condition of entry into the country elevator level of grain merchandising is characterized by a fairly low capital investment (\$250,000 to \$300,000 for optimum size plant), considerable loyalty by farmers to established firms, and some possible advantages of cooperatives over noncooperative elevators. As a whole, the barriers to entry into the country grain industry are low relative to other industries. Both cooperative and privately owned elevators were able to enter local competitive areas without significant difficulty.

The highest sale value obtainable for an exiting elevator's assets is determined by the net productivity of its assets, the number of potential buyers, and the competition among these buyers for the assets. Managers indicated that the greatest problem of exiting elevators wanting to sell was a limited number of interested buyers. Other barriers to exit were little alternative use for assets, storage commitments both to CCC and farmers, and the desire of farmers for continued operation of potential exiting elevators.

#### Behavioral Characteristics of Country Elevators

The survey of country elevators showed that 65 to 70 per cent of North Dakota grain is shipped (1) on track, (2) cash at the elevator, or (3) to arrive. These three types of sales are referred to as bid sales. Except for grain sold as feed or seed, the remainder is sold (4) on consignment or (5) on spot. The greatest change was increased use of the to-arrive method of selling. The major reason for increased use of to-arrive sales was that they represented a good hedge against changes in price of grains and premium fluctuations for country elevators. Bid sales by country elevators also shift the risk of price changes to the buyer.

The general character of the grain market has gradually shifted from a consignment market to a bid market. This shift results in country elevators

becoming more the center of competition for the procurement of grains. Forty-seven per cent of the managers (76 responses) visited farmers to solicit grain business. The majority of these managers sampled and bid on grains in farmers' bins. Managers also reported that many farmers brought samples of grains to elevators for bids. This procedure allows farmers to receive the highest net return without fear of grade or dockage manipulation.

Factors which appear to have the most influence in initiating these changes are:

1. Commodity Credit Corporation payments to farmers to store grain.
2. Greater competition in the transportation industry.
3. Greater use and improvement of modern communication facilities.

Country elevators used various strategies to achieve their procurement goals. These were classified as price and nonprice practices. Few managers used manipulation of price as a means to procure greater volumes because of threat or actual retaliation by competitors. Although farmers were "quick to let the manager know about higher prices offered by a competitor," 65 per cent of the managers called other managers to learn about prices. Thirty-six per cent of the managers both called managers and learned through farmers. Twenty-seven per cent of the managers voluntarily stated that managers in their areas "mutually agreed" on the prices offered to farmers for various grains.

Various service characteristics and loyalty to manager or community were used to differentiate elevators. Each manager appears to convince some of his patrons that he provides a "special" service for him. As a result, some farmers become paired to a particular elevator. This tends to limit "shopping around" for better terms.

Thirty-eight per cent of the managers stated that they considered practices used by their competitors as "unfair." No attempt was made to define unfair competition. Most of the practices considered unfair dealt with lenient grading. However, the practice of paying a higher price than advertised or tacitly agreed to and over-paying competitors' patrons were mentioned several times. It was evident that some managers tended to regard any competitive practices that hurt their business as being unfair. Most practices considered unfair were aimed at overcoming the industry's reluctance to compete on the basis of price.

#### Market Performance

The excess grain handling capacity for country elevators was 36 per cent in 1962--the largest crop in the history of North Dakota. Forty-nine per cent of the elevators operated near lowest costs attainable. This leaves 16 per cent of the elevators operating moderately above lowest costs attainable and 35 per cent substantially above lowest costs attainable.

The profit ratio of net income (before income taxes and patronage dividends) to equity showed that cooperatives obtained returns of 12.8 per cent and noncooperatives 7.9 per cent in 1962. The same relationship is true for profit rates as a percentage of total assets. These ratios would be much more meaningful if information were available over a 5- to 10-year period.

The primary reasons for elevators operating at less-than-optimum size appears to be (1) lack of price competition and (2) past structural characteristics of the industry.

In essence, handling inefficiencies of country elevators is an industry adjustment problem. The adoption of available technology is reflected in the efficiency of elevators in the market. Individually, none of the improvements in equipment are great enough to force the average nonadopting elevator out of the industry. Country elevators have been reluctant to adopt technological improvements, mainly because of very small profit incentive.

The analysis of structure, conduct, and performance leads to the following conclusions: Decreasing elevator numbers has resulted in increased interdependence between elevator managers. Increased interdependence has caused managers to "tacitly agree" not to compete on grain prices. Lack of grain price competition has resulted in the reduction in number of elevators not keeping pace with available economies of size in the country elevator industry. As a result, nearly all elevators were operating far below capacity. Efforts by managers, owners, and boards of directors to obtain larger volumes tended to (1) create excessive overlapping of procurement in many local competitive areas and (2) encourage managers to engage in unethical practices. Because of the small number of direct competitors, spatial characteristics, and differentiation of services, each elevator in a local market situation obtains a partial monopsony. This also tends to inhibit the attainment of available economies of size. The overlapping of procurement in local competitive areas increases costs per bushel to each elevator. However, it gives farmers more choices among elevators. This tends to prevent overt collusion by elevators.

A country elevator cannot automatically handle a larger volume, even if it is known that handling larger volumes and building optimum size elevators will lower costs per bushel. But the lower costs attainable do provide a guide for country elevator firms to review their present and future plant (plants') volume and needs.

#### Policy Recommendations

The decreasing number of elevators may be thought to contribute to less desirable performance now than in the past. But the evidence shows that combining of elevator facilities in multi-plant locations will generally lead to lower costs. Lower costs per unit are generally considered to be a measure of more desirable performance.

Merger also eases the exit of excess capacity through the purchase and dismantling of small, inefficient elevators. In such cases merger should be encouraged. However, fewer elevators may lead to monopoly power.

Although the relationships between country elevators may constitute reasonably workable competition at this point, the trend toward fewer elevators could cause important aberrations from the ideal in the future. In view of this, the following appear to be reasonable policies to encourage greater efficiency while maintaining or increasing competition in the industry:

1. Encourage the cooperation of industry, university, and government agencies:
  - a. To promote the consolidation of smaller elevators into larger and more optimum size elevators.
  - b. To disseminate more relevant market information.
  - c. For the development of technological progressiveness and efficiency of the industry.
2. Require publication of prices, discounts, allowances, commissions, gifts, etc. by elevators to farmers for both grains and major sidelines and prohibit any form of collusion at the local level.
3. Encourage farmers to increase farm storage capacity, hold grain from the market, especially at harvest, and obtain bids on their grains from several elevators.

Proposal 1 will aid managers, owners, and boards of directors to become aware of the advantages of mergers in many local competitive areas. Increased information concerning the direction and magnitude of major changes will facilitate required adjustments by the industry. Technological improvements and progressiveness must be developed through cooperation. An important area for cooperation is research for the development of an improved and more consistent procedure in grading and sampling grain purchased from farmers.

Proposals 2 and 3 will force elevators to compete more on the basis of price. Vigorous enforcement of laws prohibiting local collusion will ensure competition in the future. Apparently, knowledge of elevator purchasing prices is available to managers but is not widely available to farmers. Farmers need to know alternative paying prices if their decisions on where to sell are to be rational. Proposal 3 will also eliminate many grading problems experienced by farmers and will result in more orderly marketing. Present CCC incentives to store grain may have to be raised for farmers. Commodity Credit Corporation storage incentives to country elevators may have to be discouraged further.

The combined effect of these proposals will be to improve competition and efficiency in the industry, even though elevator numbers continue to decrease.