Structure and Operating Characteristics of the North Dakota Grain Elevator Industry

by

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AN OVERVIEW

North Dakota Grain Handling, Transportation, and Merchandising Study

North Dakota's branch line system was developed in the late 1800s and early 1900s primarily for the purpose of moving farm commodities to markets outside the state and to bring freight such as farm inputs and other needed goods to the state's communities. The only other form of surface transportation available for moving bulk freight when the rail network was being developed (excluding some minor river transportation) was the horse-drawn freight wagon. The limited distance that a team of horses and wagon could travel influenced the design of the early branch line railroad network. This development pattern resulted in branch lines that were no more than 10 to 20 miles apart, and even the most remote producing areas were accessible to rail transportation.

Development of the country's grain merchandising system also was influenced by the limited distance a team of horses and wagon could travel, the relative density of the branch line network, and available technology at that time. This resulted in a large number of country elevators spaced only a few miles apart on grain gathering rail lines. Although much of what existed in the past still exists today in the form of the branch line network, economic and technological forces that influenced its development have changed since the turn of the century. Other factors are currently at work that may influence rationalization of the railroad network and the country grain merchandising system.

Factors which will influence the future grain handling transportation and merchandising system include branch line abandonment, implementation of multiple car and unit train grain rates, and capital replacement decisions. Other factors include differing rates of cost increases in the two modes, thereby shifting their competitive relationship. Competition between producing regions

also will influence the future system. Efficiencies gained as a result of changes in marketing systems by competing producing regions will possibly influence a move to obtain those same efficiencies by other producing regions. The changing technology of farm trucks and the improved quality of our highway system makes it possible for producers to move grain much farther today than previously. These forces may very well influence changes in the state's traditional grain merchandising system. Government policies such as railroad deregulation also may have some impact on the system.

As a result of these impending changes that could alter a rather traditional grain handling, transportation, and merchandising system, many private and public decisions will have to be made. These include decisions regarding location, economic viability, size of plant, investment in grain facilities, investment in transportation equipment and infrastructure, efficiencies of merchandising, purchases of farm production equipment, and storage capacity. If such decisions are to be made on an informed basis, it is important that basic information about the industry be developed and published. It was for this reason that the Upper Great Plains Transportation Institute and the Department of Agricultural Economics of North Dakota State University have undertaken a study entitled "North Dakota Grain Handling, Transportation, and Merchandising Study." Cooperators in the study include Burlington Northern Railroad, Farm Bureau, Farmers Union, Grain Terminal Association, North Dakota Agricultural Experiment Station, North Dakota Department of Agriculture, North Dakota Grain Dealers Association, North Dakota Highway Department, North Dakota Public Service Commission, St. Paul Bank for Cooperatives, and the Soo Line Railroad Company. The purpose of this study is to provide relevant information to decision makers in meeting the challenge of a changing business environment in handling, transportation, and merchandising grain in North Dakota.

The study is composed of a number of research projects that will result in 13 separate publications of which this is one. The publications planned for release at varied time intervals are:

- Description of the Existing Country Elevator System
- Cost Analysis of Existing Country and Farm Storage System
- Cost Analysis of Subterminal Elevators
- Existing and Past Patterns of North Dakota Grain Movements
- Description of Rail Rate Structure, Multiple Car Movements, and Rates and Analysis of Shipper Owned Equipment
- Description and Analysis of Exempt Carrier Industry
- Economics of Branch Line Operation
- Farm Truck Costs
- Seasonal Behavior of Marketing Patterns for Grain from North Dakota
- Grain Merchandising
- Marketing Using Delayed Pricing Controls
- Analytical Model for Analyzing Economic Efficiencies of Subterminals
- North Dakota Grain Handling, Transportation, and Merchandising Study: Summary, Conclusions, and Policy Implications

These reports, as they are completed, will be available upon request from the Department of Agricultural Economics or the Upper Great Plains Transportation Institute, North Dakota State University.

STRUCTURE AND OPERATING CHARACTERISTICS OF THE NORTH DAKOTA GRAIN ELEVATOR INDUSTRY

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Introduction

The agricultural sector of the North Dakota economy continues to be extremely productive. In the 1974-75 crop year, 291 million bushels of grain (including oilseeds) were shipped to market from North Dakota grain elevators. The volume shipped by North Dakota producers from statewide grain elevators has grown to 476 million bushels in the 1979-80 crop year, a new record for the state and a 64 percent increase in volume over this five-year period.

The marketing system that moves this grain to market performs the many functions necessary to create economic value for the physical commodity produced on North Dakota farms. The grain is cleaned, stored, graded, priced, sold, and moved in an efficient and progressive sequence of activities. At the central core of this complex but balanced marketing system is the grain elevator.

The system continues to change and evolve as its dynamic environment affects each of the subsectors within the system. Costs of farm storage and grain elevator construction continue to increase; railroads constrict their trackage and offer major rate savings for volume shipments; and rural grain elevators, whether cooperative or private, are concerned about the need for mergers or consolidation of both physical and business entities, causing rural communities to be faced with loss of yet another form of economic activity. These problems are compounded by the trend of increasing production and seasonality of movement in the North Dakota grain industry, causing increased need for storage, merchandising, and transportation

capacity on the part of grain elevators. This increases the number of decisions and the degree of uncertainty surrounding those decisions faced by elevator managers, boards of directors, and owners.

Information on the general status of the grain elevator industry in North Dakota is useful in this decision making process. A review of the financial, physical, and functional structure and conduct of the elevator industry will provide a basis for comparison by managers and owners, provide a perspective on future industry needs for railroad and motor carrier operators, and give state policymakers and regulators insight into the existing performance of the industry. Finally, a description of the elevator industry will allow further in-depth analyses by researchers and managers.

Objectives

The overall objective of this report is to inventory the structure and conduct of the grain elevator industry in North Dakota. Specific objectives are to:

1) Examine the physical plant of the North Dakota grain elevator industry;
2) Review the type and role of functions performed by the elevators;
3) Evaluate the use of transportation services by elevator management; and
4) Examine changes in selected elevator structure and conduct activities over time.

Data Source and Report Approach

Data used in this study were obtained from three separate but associated sources. In 1979, as input to the development of the Rail Plan for North Dakota, a survey of all grain elevators operating on rail lines designated as branch lines was conducted by the Upper Great Plains Transportation Institute. (A copy of that survey questionnaire is provided in Appendix A.) This survey yielded information on 395 private and cooperative elevators operating on these lines.

In the summer of 1980, a supplemental survey was taken of the other licensed and bonded warehouses (grain elevators) in the state (Appendix B). In this survey, 220 elevators were contacted and 190 questionnaires were completed in part or full. Operators of 11 firms were not available at the time of the survey or chose not to participate. These nonrespondents were distributed equally over the state and across ownership and size classifications resulting in little survey bias. Since 98.2 percent of the population was interviewed, it can be expected that identified characteristics from the survey are indeed those of the population with little or no sample error.

The combined survey questionnaires contained information on 568 elevator firms in North Dakota. Item nonresponse varied on the questionnaires so the number of observations for each characteristic, as developed in this report, will vary. These particular surveys revealed the characteristics of the grain elevator industry in 1979-80; they should not be considered a dynamic analysis over time.

A third survey was undertaken in the fall of 1980 in order to offer a more dynamic or changing perspective of the grain industry. This survey consisted of a postcard questionnaire mailed to all elevators in the industry (Appendix C). An 86 percent response, or 506 questionnaires, was received. Nonrespondents again were spread geographically throughout the state. However, since 14 percent did not respond, some sampling error, although small, could occur. Generally, any potential sampling bias can be identified since the characteristics of the nonrespondents were known. Specific information was requested on service per week by railroads, changes in load out capacity, changes in number of owned or leased hopper cars and boxcars, and problems experienced by grain elevators.

The report is presented in six sections. Analysis of the differences and similarities between cooperative and private grain elevator companies is presented in the first section. Physical characteristics of the grain elevators such as capacity, location, age, etc., are examined in the second section. The role and extent of some functions performed in the industry are developed. Elevator use of transportation services then is examined in the fourth section. The final analytical section contains changes in characteristics between the first two questionnaires and the postcard survey. Finally, conclusions and implications of the entire descriptive analysis are offered in the last section.

Elevator Company Ownership

The principal forms of ownership structure of grain elevators in North Dakota are cooperatives or corporate (private). Of the 568 firms responding to the survey, 374, or almost 66 percent, were cooperative elevators with the remaining 194 being privately owned (Table 1). The private companies had a bimodal size distribution relative to the cooperative elevators, e.g., more of the very small elevators (100,000 bushels or less) and more of the very large elevators (800,000 bushels or more) were privately owned. Seventy-eight percent of the cooperative elevators had capacities between 100,000 and 400,000 bushels, compared to 58 percent of the private companies.

The advent of possible abandonment of many of the branch lines in North Dakota increases the importance of the type of rail line available to each elevator. Of the cooperative elevators, 263, or 71 percent, were located on branch lines compared to 114, or 59 percent, of the privately owned elevators (Table 2).

The geographical distribution of grain elevators, by ownership type, is indicated in Table 3 and Figure 1. The cooperative form of ownership

TABLE 1. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY OWNERSHIP TYPE AND STORAGE CAPACITY, 1979-80

Type of Ownership	Capacity (000 Bushels)								
	Less Than 50	551 to 100	101 to 200	201 to 400	401 to 800	801 to 1,600	1,601 to 5,000	5,001 to 50,000	Total
	number of elevators								
Cooperative	13	28	148	144	36	5	0	0	374
Private	16	41	75	37	11	9	1	4	194
Total	29	69	223	181	47	14	1	4	568
Percent of Total Elevators	5	12	39	32	8	2	a	a	
Percent Cooperative By Size	45	41	66	80	77	36	0	0	66

[a]Less than 1 percent.

TABLE 2. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY TYPE OF RAIL LINE AND OWNERSHIP, 1979-80

Type of Elevator Ownership	Type of Rail Line			Percent Branch
	Branch	Main	Total	
	- - number of elevators - -			
Cooperative	263	109	372	71
Private	114	79	193	59
Total	377	188	565	67

TABLE 3. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY TYPE OF OWNERSHIP AND CROP REPORTING DISTRICT, 1979-80

Crop Reporting District	Type of Ownership			Percent Cooperative
	Cooperative	Private	Total	
	- - - number of elevators - - -			
1	55	21	76	72
2	42	10	52	81
3	78	45	123	63
4	20	7	27	74
5	31	27	58	53
6	58	31	89	66
7	22	12	34	65
8	19	10	29	66
9	48	31	79	61
Total	373	194	567	66

is slightly more common in the west (CRDs 1, 4, and 7) than in central North Dakota (CRDs 2, 5, and 8). Also, the northern portions of the state (CRDs 1, 2, and 3) contain a higher proportion of cooperative firms (70 percent) than the central and southern CRDs (63 percent).

As physical condition of a facility deteriorates from age and use, decisions about new investment, consolidation, and merger are necessary. The age of the physical plant in the North Dakota grain elevator industry varies little between cooperatives or private companies; 64 percent of all elevators were over 20 years old and 30 percent were over 50 years old (Table 4). A noticeable difference is that private companies have been relatively more active in construction recently. Twenty-three percent of private elevators are less than four years old compared to 13 percent of the cooperatively-owned elevators.

TABLE 4. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY AGE AND TYPE OF OWNERSHIP, 1979-80

Type of Ownership	Age of Elevator (Years)								
	Less Than 4	4-10	11-15	16-20	21-30	31-40	41-50	51-100	Total
Cooperative	54	32	22	35	60	39	45	124	411
Private	47	10	6	17	26	17	25	61	209
Total	102	42	28	52	86	56	70	185	620
Percent Cooperative	53	77	78	67	70	70	65	67	66

Respondents, who were usually managers, were asked the current value of the elevator facilities. Cooperative elevator respondents estimated that 18 percent of their firms were worth over $800,000 compared to 12 percent of the private companies (Table 5). The prevalence of cooperatives in the "middle size" category noted earlier is reaffirmed here since 45 percent of the cooperatives were valued between $200,000 and $800,000 compared to 24 percent of the privately owned companies. About one-half

TABLE 5. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY VALUE OF ELEVATOR AND TYPE OF OWNERSHIP, 1979-80

Type of Ownership	Value of Elevator (thousand dollars)									
	50 or Less	51 to 100	101 to 200	201 to 400	401 to 800	801 to 1,600	1,601 to 3,200	3,201 to 6,400	Over 6,400	Total
	number of elevators									
Cooperative	79	25	51	89	95	56	12	1	3	411
Private	77	25	31	25	26	13	10	2	0	209
Total	156	50	82	114	121	69	22	3	3	620

of the private companies had their physical plant valued at below $100,000, while only 25 percent of the cooperatives' facilities were valued at $100,000 or less.

Grain elevators in North Dakota provide services to their customers in addition to the basic function of handling and storing grain. Private companies seemed to emphasize handling and storing grain as a revenue source more than cooperatives since over 49 percent indicated they earned 5 percent or less of their revenues from other sources (Table 6). Cooperatives, on the other hand, typically offer a broader array of services to patrons. Only 32 percent of the cooperative firms earned 5 percent or less of their earnings from other sources. This disparity is not so pronounced considering that 75 percent of both the cooperatives and private companies obtained 20 percent or less of their income from services other than storing and handling grain. Interestingly, a small number of private companies dealt heavily with other services since eight firms (4 percent) earned over 60 percent of their revenue from other services.

TABLE 6. PROPORTION OF EARNINGS FROM NONGRAIN SERVICES, BY TYPE OF ELEVATOR OWNERSHIP, 1979-80

Type of Ownership	Percent Earnings From Services							
	5 or Less	6-10	11-20	21-40	41-60	61-80	81-100	Total
	number of elevators							
Cooperative	134	101	78	76	18	3	1	411
Private	103	33	21	29	15	4	4	209
Total	237	134	99	105	33	7	5	620

Leasing or purchasing tractor-trailer units is one means of insuring at least a minimum of transportation capacity will be available to the elevator management. However, neither cooperatives nor private companies used this option to any great extent; only 10 percent of the cooperatives

owned tractor-trailers compared to 20 percent of the private companies (Table 7). The difference was even less noticeable in leased vehicles, since only 2 and 3 percent of the cooperatives and private companies, respectively, leased any tractor-trailer units.

TABLE 7. NUMBER OF ELEVATORS OWNING OR LEASING TRACTOR-TRAILER UNITS, BY TYPE OF ELEVATOR OWNERSHIP, 1979-80

Type of Ownership	Tractor-Trailer(s) Owned						Tractor-Trailer(s) Leased			
	0	1	2	3	4	7	0	1	3	12
	(number of elevators)									
Cooperative	161	10	6	2	0	0	168	2	0	1
Private	79	13	4	2	0	1	90	3	0	0
Total	240	23	10	4	0	1	258	5	0	1

Physical Structure Characteristics

Physical and locational characteristics that describe the structure of the North Dakota grain elevator industry are presented in this section.

Storage Capacity

Storage capacity of North Dakota grain elevators varies greatly, from less than 50,000 bushels to over 5,000,000 bushels (Table 8). The most common size was the 100,000-400,000 bushel capacity. Seventy-one percent of all elevators were in this category. More of the smaller elevators were on branch lines, while the larger size elevators were on main lines. Ninety-two percent of the elevators on branch lines were 400,000 bushels or smaller in size compared to 81 percent on main lines. Eighty percent of the elevators greater than 800,000 bushels were located on main lines.

TABLE 8. STORAGE CAPACITY OF NORTH DAKOTA GRAIN ELEVATORS, BY RAIL LINE TYPE, 1979-80

Type of Rail Line	Storage Capacity (000 bushels)								
	Less Than 50	51-100	101-200	201-400	401-800	801-1,600	1,601-5,000	5,001-50,000	Total
	number of elevators								
Branch	18	47	152	130	27	4	0	0	378
Main	11	20	71	51	20	10	1	4	188
Total	29	67	223	181	47	14	1	4	566
Percent Branch	62	70	68	72	57	29	0	0	67

The number and capacity of elevators located in each Crop Reporting District (CRD) is indicated in Table 9. The size distribution is very even throughout the state except in two general areas. The central part of the state (CRDs 4, 5, 6) had larger elevators than the northern or southern regions. Also, the eastern portion of the state (CRDs 3, 6, 9) had larger elevators than other areas of the state. In both cases this was due to the larger size elevators existing in CRD 6.

TABLE 9. LOCATION OF NORTH DAKOTA GRAIN ELEVATORS, BY STORAGE CAPACITY, 1979-80

Storage Capacity (000 bushels)	Crop Reporting District									Total
	1	2	3	4	5	6	7	8	9	
	number of elevators									
50 or Less	7	2	10	1	2	2	1	0	4	29
51-100	17	11	17	1	4	7	0	7	5	69
101-200	27	18	42	10	20	38	20	9	39	223
201-400	20	19	42	11	22	23	7	11	26	181
401-800	2	2	10	5	4	14	4	2	4	47
801-1,600	3	0	0	0	3	5	2	0	1	14
1,601-5,000	0	0	0	0	1	0	0	0	0	1
5,001-50,000	0	0	2	0	2	0	0	0	0	4
Total	76	52	123	28	58	89	34	29	79	568

A general overview of some past or forthcoming changes in the industry can be obtained by examining the age of various capacity elevators. It

appears that many of the smaller elevators are older than the larger facilities. Fifty-six percent of the facilities with less than 400,000 bushels of storage are over 30 years old while only 25 percent of the facilities over 400,000 bushel capacity are 30 years or older (Table 10). This trend of larger facilities being more recently constructed is reinforced by examining those elevators which were built in recent years. Fifty-one percent of those elevators greater than 400,000 bushels in capacity were built in the last 10 years. Only 39 percent of those elevators that were less than 400,000 bushels in capacity were constructed in the last 10 years. In fact, 25 percent of the larger size category facilities were built in the last five years, but only 14 percent of the smaller size group were constructed within the last five years.

It could be expected that elevators with larger storage capacities would realize more of their earnings from handling and storing grain than from other services. This appears to be the case, since 26 percent of the firms with less than 100,000 bushels of storage capacity received less than 20 percent of their total earnings from handling and storing grain. However, only 11 percent of those larger than 100,000 bushels received less than 20 percent of earnings from handling and storing grain (Table 11). This may not be true for larger size firms as there was no noticeable correlation between size of elevator and firms earning more than 80 percent of their earnings from handling and storing grain.

Elevator Location

The elevators in North Dakota, while spread throughout the state, were heavily concentrated in the Red River Valley area (CRDs 3, 6, and 9) (Figure 1). Crop Reporting District 3 had 123 elevators, 22 percent of the total, while CRDs 6 and 9 had 89 (16 percent) and 79 (14 percent), respectively. Over half, 52 percent, of all elevators were located in

TABLE 10. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY AGE OF ELEVATOR AND STORAGE CAPACITY, 1979-80

Capacity in Bushels	Age of Elevator									
	Less Than 3	4-5	6-10	11-15	16-20	21-30	31-40	41-50	51-100	Total
(000)	number of elevators									
50 or Less	18	1	1	4	5	4	6	17	38	94
51-100	19	3	2	1	5	4	8	6	30	78
101-200	28	3	7	8	17	24	23	33	95	238
201-400	26	8	7	15	21	41	14	27	43	202
401-800	9	1	7	2	6	11	8	2	4	50
801-1,600	3	2	2	0	1	3	2	0	1	14
1,601-5,000	1	0	0	0	0	0	0	0	0	1
5,001-50,000	2	0	0	0	0	2	1	0	0	5
Total	106	18	26	30	55	89	62	85	211	682[a]

[a]Certain characteristics are reported by elevator site. The total number of observations may be greater than the number of elevator firms in the survey.

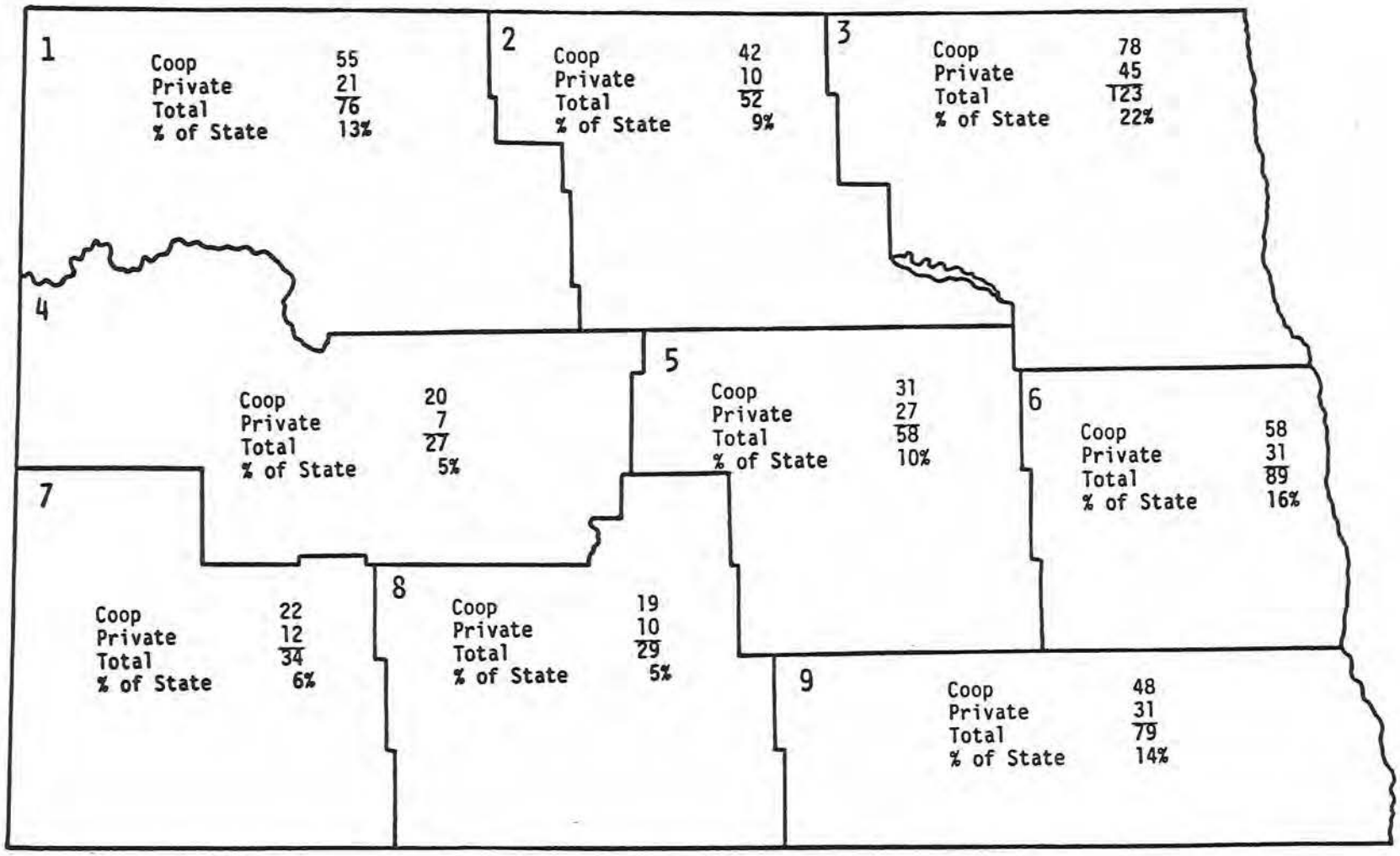

Figure 1. Type of Ownership and Number of Elevators by Crop Reporting District, North Dakota, 1979-80

TABLE 11. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY PERCENT OF EARNINGS FROM STORING AND HANDLING GRAIN, AND STORAGE CAPACITY, 1979-80

Elevator Capacity	Percent of Earnings from Storage and Handling							
	20 or Less	21-40	41-60	61-80	81-90	91-95	96-100	Total
(000 bushels)	number of elevators							
50 or Less	30	2	4	5	10	11	32	94
51-100	15	2	3	19	20	5	14	78
101-200	27	8	17	60	51	46	29	238
201-400	17	5	18	55	64	27	16	202
401-800	5	0	4	14	18	3	6	50
801-1,600	2	0	2	3	2	2	3	14
1,601-5,000	1	0	0	0	0	0	0	1
5,001-50,000	2	0	0	0	0	0	3	5
Total	99	17	48	156	165	94	103	682

the east. The central and western sections of the state contained 24 percent each. The northern part of the state (CRDs 1, 2, and 3) contained almost half of the elevators (44 percent) while the middle and southern sections contained 31 and 25 percent, respectively.

The age distribution of the elevators varied from west to east, with relatively more older facilities located in the west (Table 12). Only 19 percent of the firms in CRDs 4 and 7 were less than 10 years old compared

TABLE 12. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY AGE OF ELEVATOR AND CROP REPORTING DISTRICT, 1979-80

Crop Reporting District	Age of Elevator (years)									
	3 or Less	4-5	6-10	11-15	16-20	21-30	31-40	41-50	51-100	Total
	number of elevators									
1	9	3	3	4	4	4	6	11	32	76
2	7	2	1	1	4	10	3	17	19	64
3	31	0	5	5	15	31	19	15	35	156
4	3	0	4	2	2	2	3	0	12	28
5	12	3	2	0	6	8	4	6	20	61
6	15	4	7	8	10	10	10	8	20	92
7	4	1	1	0	2	3	3	4	16	34
8	6	0	1	2	0	7	1	2	11	30
9	15	4	1	6	9	11	7	7	20	80
Total	102	17	25	28	52	86	56	70	185	621

to 22 percent and 25 percent in the central and eastern parts of the state, respectively. This age difference is supported by examining those facilities over 30 years of age. Sixty-three percent of the facilities in the west were over 30 years of age compared to 53 percent in the central and 43 percent in the Red River Valley area. Examination of the age distribution in the north to south direction did not reveal any significant difference except the middle area (CRDs 4, 5, and 6) had slightly newer facilities than either the north or south regions.

The distribution of elevator value by location in the state is indicated in Table 13. The central portion of the state, CRDs 4, 5, and 6, had slightly higher valued elevators than the other two regions. The elevators in this area were valued at less than $100,000 less often and valued at over $800,000 more often than those in other areas of the state. The distribution from west to east reveals that CRDs 2, 5, and 8 had higher valued elevators than either the east or west; fewer elevators in this region were valued at less than $100,000 and more elevators are valued at greater than $800,000 compared to other regions.

It appears there is some locational variation in the amount of revenue earned by handling and storing grain versus other services (Table 14). Sixty-five percent of the firms in the western three CRDs earned 90 percent or more of their revenues from grain, versus 56 and 59 percent for the central and east areas. The middle portion of the state, CRDs 4, 5, and 6, also depended more on revenue from handling grain than other CRDs.

Age of Elevator Facilities

In addition to the various tabulations of age-related variables presented earlier, several other analyses are interesting. The average age of the elevator facilities was 25 years while over 30 percent of the facilities were over 50 years old (Table 15). In fact, 358 (53 percent) of the elevators were over 30 years of age.

TABLE 13. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY VALUE AND CROP REPORTING DISTRICT, 1979-80

Crop Reporting District	Value of Elevator ($000)									
	50 or Less	51-100	101-200	201-300	401-800	801-1,600	1,601-3,200	3,201-6,400	Over 6,400	Total
	number of elevators									
1	18	11	9	18	14	4	1	0	1	76
2	16	5	9	17	10	3	4	0	0	64
3	47	10	15	25	30	24	2	1	2	156
4	3	3	4	6	8	4	0	0	0	28
5	18	3	7	8	18	4	2	1	0	61
6	22	9	13	12	13	13	9	1	0	92
7	10	0	10	3	4	6	1	0	0	34
8	5	3	6	7	6	2	1	0	0	30
9	18	6	9	18	18	9	2	0	0	80
Total	157	50	82	114	121	69	22	3	3	621

TABLE 15. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY ELEVATOR VALUE AND AGE OF FACILITY, 1979-80

Age of Elevator	Elevator Value ($000)									
	50 or Less	51-100	101-200	201-400	401-800	801-1,600	1,601-3,200	3,201-6,400	Over 6,400	Total
(years)	number of elevators									
3 or less	82	1	3	0	7	8	4	0	1	106
4-5	1	0	0	2	9	3	2	0	1	18
6-10	2	0	2	4	13	3	2	0	0	26
11-15	2	1	3	8	9	4	3	0	0	30
16-20	6	0	9	8	19	10	2	1	0	55
21-30	9	4	5	19	25	18	7	2	0	89
31-40	17	8	10	10	9	7	1	0	0	62
41-50	21	12	8	24	15	5	0	0	0	85
51-100	50	37	47	43	19	11	3	0	1	211
Total	190	63	87	118	125	69	24	3	3	682

TABLE 14. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY PERCENT OF EARNINGS FROM SERVICES OTHER THAN HANDLING GRAIN, AND CROP REPORTING DISTRICT, 1979-80

Crop Reporting District	Percent of Earnings from Nongrain Services							Total
	0-5	6-10	11-20	21-40	41-60	61-80	81-100	
	number of elevators							
1	35	21	5	14	1	0	0	76
2	23	17	17	6	1	0	0	64
3	74	30	17	18	10	3	4	156
4	9	5	9	5	0	0	0	28
5	21	14	11	12	3	0	0	61
6	37	12	14	22	7	0	0	92
7	9	12	8	2	2	1	0	34
8	6	5	4	9	3	3	0	30
9	24	18	14	17	6	0	1	80
Total	238	134	99	105	33	7	5	621

It is obvious that a significant amount of investment has been occurring in North Dakota; 106, or 16 percent, of the elevator facilities are less than three years old. It also is apparent that many of these recent additions have been small in value; 82 of them were valued at less than $50,000. Generally, the value of the elevator was quite unrelated to age, suggesting that size of the facility may understandably be the primary determinant of value.

Some further light is shed on the newer facilities and their value by examining the percentage of revenue that is earned from handling and storing grain (Table 16). It is apparent that operators of the newer facilities did not depend on storing and handling grain to any great extent because they offered and emphasized other services rather than serving as grain merchandisers. As the age of the facilities increased, an increasing dependence on handling and storing grain for revenue generation was noted.

Property Taxes

The physical condition and economic value of elevator facilities result in varying property taxes. These taxes were gernerally in the 0-$4,000 annual cost range with about 10 percent of the elevators paying average taxes

of about $12,000 (Tables 17 and 18). Age did not affect the level of property taxes paid to any noticeable degree, although the increasing value of the elevator facilities was definitely associated with higher property taxes.

TABLE 16. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY PERCENT OF EARNINGS FROM STORING AND HANDLING GRAIN, AND AGE OF ELEVATOR, 1979-80

Age of Elevator	Percent of Earnings							Total
	0-20	21-40	41-60	61-80	81-90	91-95	96-100	
(years)	number of elevators							
3 or Less	73	1	2	4	8	6	11	106
4-5	0	0	1	6	6	1	4	18
6-10	1	0	2	9	10	2	2	26
11-15	3	0	3	5	7	9	3	30
16-20	4	1	1	18	16	7	8	55
21-30	2	6	13	23	25	11	9	89
31-40	3	1	4	14	18	11	11	62
41-50	7	5	4	17	21	15	16	85
51-100	6	3	18	60	54	31	39	211
Total	99	17	48	156	165	94	103	682

Functional Relationships

Volume Turnover

Turnover is an estimate of the utilization of existing storage capacity. Turnover is simply the volume of grain handled within a year divided by the capacity of that facility. A high turnover ratio indicates merchandising activity is very high relative to storage activity. A coefficient near 1.0 indicates storage may be the primary function of the facility.

The turnover performance of grain elevators in North Dakota for 1979-80 is indicated in Table 19. Over 64 percent had a turnover ratio of 3.0 or greater, indicating that farm storage in North Dakota is still extremely important and that the elevator's function continues to be one of receiving and merchandising grain. The western section, CRDs 1, 4, and 7, had fewer of the extremely active elevators but more of the moderately active elevators

TABLE 17. NUMBER OF NORTH DAKOTA ELEVATORS BY PROPERTY TAXES PAID AND AGE OF ELEVATOR, 1979-80

Age in Years	Annual Property Taxes Paid in Dollars						Total
	0-1,000	1,001-2,000	2,001-4,000	4,001-8,000	8,001-20,000	20,001-30,000	
	number of elevators						
1-3	87	6	5	8	0	0	106
4-5	8	3	2	4	0	1	18
6-10	4	8	6	5	3	0	26
11-15	7	6	11	3	2	1	30
16-20	15	12	16	7	3	2	55
21-30	19	14	32	13	10	1	89
31-40	22	14	12	12	2	0	62
41-50	31	27	18	5	1	3	85
51-100	95	63	41	9	2	1	211
Total	288	153	143	66	23	9	682

TABLE 18. NUMBER OF NORTH DAKOTA ELEVATORS, BY PROPERTY TAXES PAID AND ELEVATOR VALUE, 1979-80

Estimated Value	Annual Property Taxes Paid in Dollars						Total
	0-1,000	1,001-2,000	2,001-4,000	4,001-8,000	8,001-20,000	20,001-30,000	
($000)	number of elevators						
50 or Less	156	20	5	7	2	0	190
51-100	42	15	6	0	0	0	63
101-200	26	37	17	6	0	1	87
201-400	20	48	42	6	2	0	118
401-800	23	26	41	24	7	4	125
801-1,600	15	7	27	15	4	1	69
1,601-3,200	6	0	4	7	6	1	24
3,201-6,400	0	0	0	0	2	1	3
6,401-Over	0	0	1	1	0	1	3
Total	288	153	143	66	23	9	682

in the turnover range of 1.0 to 1.5. The Red River Valley elevators showed a wide range of activity, with some elevators having a turnover of 3.0 as well as some with ratios less than 1.0. This suggests a degree of specialization is occurring in the merchandising versus storage function in this region of the state.

TABLE 19. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY TURNOVER RATIO AND CROP REPORTING DISTRICT, 1979-80

	Turnover Ratio								
CRD	0.5 or Less	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	Over 3.0	Total
1	1	2	2	1	7	13	12	38	76
2	2	0	0	2	6	6	3	33	52
3	5	4	0	7	12	7	12	76	123
4	1	1	1	8	3	3	2	9	28
5	5	1	0	4	10	5	8	25	58
6	1	4	0	4	8	6	10	53	89
7	1	0	0	4	5	4	10	10	34
8	0	2	3	3	7	2	5	7	29
9	1	0	3	6	9	10	8	42	79
Total	17	14	12	39	67	56	70	293	568

Relationships between age and value of the elevator and turnover performance are reviewed in Tables 20 and 21. The only identifiable trend is that older facilities had a slightly higher turnover ratio than the newer facilities (Table 20). A similar relationship occurs between value of the elevator facility and turnover performance; the higher valued facilities had a higher turnover than the lower valued facilities. However, neither of the two relationships were very explicit.

TABLE 21. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY TURNOVER RATIO AND ESTIMATED VALUE, 1979-80

Estimated Value	Turnover Ratio								
	0.5 or Less	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-2.6	2.6-3.0	Over 3.0	Total
(000 dollars)	- - - - - - - - - - - - - - - - number of elevators - - - - - - - - - - - - - - - -								
50 or Less	11	3	2	8	15	9	17	60	125
51- 100	9	2	0	3	7	3	11	28	63
101- 200	9	1	2	8	11	6	11	39	87
201- 400	9	4	2	4	12	19	11	57	118
401- 800	12	2	4	7	13	10	14	63	125
801-1,600	9	2	2	3	5	7	4	37	69
1,601-3,200	5	0	0	4	4	2	2	7	24
3,201-6,400	0	0	0	2	0	0	0	1	3
Greater than 6,400	2	0	0	0	0	0	0	1	3
Total	66	14	12	39	67	56	70	293	617

TABLE 20. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY TURNOVER RATIO AND AGE OF ELEVATOR, 1979-80

Age of Elevator (Years)	Turnover Ratio								
	0.5 or Less	.51-.75	.76-1.0	1.1-1.5	1.6-1.0	2.1-2.5	2.6-3.0	Over 3.0	Total
3 or Less	3	2	3	1	4	3	5	20	41
4-5	1	0	0	2	4	1	3	7	18
6-10	4	0	0	1	2	1	3	15	26
11-15	4	0	0	4	4	1	4	13	30
16-20	7	0	1	3	9	4	7	24	55
21-30	13	3	0	6	12	8	4	43	89
31-40	5	2	2	3	5	5	9	31	62
41-50	9	2	3	6	4	11	9	41	85
51-100	20	5	3	13	23	22	26	99	211
Total	66	14	12	39	67	56	70	293	617

It could be expected that a high turnover coefficient, reflecting a great deal of merchandising activity, would require a substantial labor force. The relationship between turnover performance and number of employees, full-time or part-time, is shown in Tables 22 and 23. For both full-time and part-time employment, it is evident that the higher turnover rate was associated with a higher number of employees, reflecting increased labor demand from grain merchandising relative to the storage function. Of those 19 elevators hiring 12 or more full-time employees, all but two companies had turnover ratios of 1.5 or higher.

TABLE 22. NUMBER OF NORTH DAKOTA ELEVATORS BY NUMBER OF FULL-TIME EMPLOYEES AND TURNOVER RATIO, 1979-80

Turnover Ratio	Full-Time Employees					
	2 or Less	3-5	6 8	9-12	13 or More	Total
	- - - - - - - number of elevators - - - - - - -					
.50 or Less	28	30	6	1	1	66
.51-.75	4	8	2	0	0	14
.76-1.0	6	6	0	0	0	12
1.1-1.5	21	11	5	1	1	39
1.6-2.0	27	31	7	1	1	67
2.1-2.5	28	24	2	1	1	56
2.6-3.0	44	22	2	0	2	70
More than 3.0	144	127	13	5	4	293
Total	302	259	37	9	10	617

TABLE 23. NUMBER OF NORTH DAKOTA ELEVATORS BY NUMBER OF PART-TIME EMPLOYEES AND TURNOVER RATIO, 1979-80

Turnover Ratio	Part-Time Employees					Total
	2 or Less	3-5	6-8	9-12	13 or More	
	number of elevators					
.50 or Less	59	4	0	1	2	66
.51-.75	13	1	0	0	0	14
.76-1.0	11	1	0	0	0	12
1.1-1.5	33	4	0	0	2	39
1.6-2.0	62	3	0	0	2	67
2.1-2.5	52	2	0	0	2	56
2.6-3.0	65	2	0	1	2	70
More than 3.0	275	8	1	0	9	293
Total	570	25	1	2	19	617

The source of earning by the elevator firms in North Dakota also was investigated relative to turnover experienced by the firms (Table 24). No significant relationship could be established. It appears that since the storage and grain handling activities were combined and contrasted against other services, the sheer volume of the grain handling masked the effect of any difference between storage and merchandising at the high turnover ratio level.

TABLE 24. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY PERCENT OF EARNINGS FROM STORAGE AND TURNOVER RATIO, 1979-80

Turnover Ratio	Storage Earnings (Percent)							Total
	20 or Less	21-40	41-60	61-80	81-90	91-95	96-100	
	number of elevators							
.50 or Less	2	1	14	20	17	6	6	66
.51-.75	2	1	2	2	4	1	2	14
.76-1.0	1	1	0	1	4	1	4	12
1.1-1.5	0	1	1	11	9	8	9	39
1.6-2.0	2	0	5	17	20	12	11	67
2.1-2.5	1	1	4	16	12	9	13	56
2.6-3.0	6	2	3	18	14	17	10	70
More than 3.0	20	10	19	71	85	40	48	293
Total	34	17	48	156	165	94	103	617

Employees

The relationship between number of full- and part-time employees and other elevator characteristics has been presented earlier in this report. It was expected that the older facilities would be more labor intensive than the more recently built facilities. This relationship does not appear to follow the expected trend (Table 25). No significant differences were found between the number of full- and part-time employees by age of facility. It appears that labor-saving technology of grain handling within an elevator has not changed significantly over the years, at least to any magnitude that could be tested in this report.

It could be further expected that those firms which have relied most on storage of grain rather than provision of other services for generating revenue would not require as large a labor force. However, no identifiable difference was apparent among the elevators utilizing different revenue sources (Table 26). For almost all elevators, the dominant size of the full-time labor force was five or less and the part-time labor force was two or less, with little difference between revenue sources.

Selected Transportation Characteristics

Two important characteristics of elevators relate to the type of rail line that is available to the elevator (branch or main) and the service per week offered on that line to the elevator company. The type of rail line available to the firms in the different Crop Reporting Districts is indicated in Table 27. A total of 566 elevators responded to this question, with 378 (67 percent) located on branch lines and 188 (33 percent) located on main lines. Sixty-eight percent of the elevators in the north (CRDs 1, 2, and 3) and 70 percent of those in the south (CRDs 7, 8, and 9) were located on branch lines, compared to 62 percent for the middle part of the state. A similar relationship existed in an east-west direction; 75 percent of the elevators in the eastern

TABLE 25. NUMBER OF NORTH DAKOTA ELEVATORS BY NUMBER OF FULL- AND PART-TIME EMPLOYEES AND AGE OF ELEVATOR, 1979-80

Elevator Age (Main House)	Full-Time Employees					Part-Time Employees				
	3 or Less	3-5	6-8	9-12	13 and Over	3 or Less	3-5	6-8	9-12	13 and Over
(years)	number of elevators									
3 or Less	83	18	2	1	2	102	1	0	3	0
4-5	4	9	4	1	0	15	2	0	1	0
6-10	6	15	3	1	0	22	2	0	2	0
11-15	11	13	5	0	1	26	3	0	2	0
16-20	19	32	2	0	2	50	3	0	2	0
21-30	19	53	12	3	2	78	5	0	6	0
31-40	30	24	5	1	2	55	3	0	4	0
41-50	48	35	2	0	0	83	2	0	0	0
51-100	147	60	2	2	0	204	4	1	2	0
Total	367	259	37	9	10	635	25	1	21	0

TABLE 26. NUMBER OF ELEVATORS BY NUMBER OF FULL- AND PART-TIME EMPLOYEES AND EARNINGS FROM GRAIN STORAGE, 1979-80

Earnings from Grain Storage (Percent)	Full-Time Employees					Part-Time Employees				
	3 or Less	3-5	6-8	9-12	13 and Over	3 or Less	3-5	6-8	9-12	13 and Over
	number of elevators									
20 or Less	86	10	1	0	2	95	1	0	3	0
21-40	9	5	1	1	1	14	1	0	2	0
41-60	15	21	8	3	1	38	6	0	4	0
61-80	65	76	14	0	1	145	10	0	1	0
81-90	75	81	8	1	0	161	2	1	1	0
91-95	49	42	2	1	0	91	2	0	1	0
96-100	68	24	3	3	5	91	3	0	9	0
Total	367	259	37	9	10	635	25	1	21	0

TABLE 27. NUMBER OF NORTH DAKOTA ELEVATORS BY TYPE OF RAIL LINE AVAILABLE AND CROP REPORTING DISTRICT, 1979-80

Crop Reporting District	Type of Rail Line		Total
	Branch	Main	
	- - number of elevators - -		
1	50	26	76
2	29	23	52
3	93	30	123
4	28	0	28
5	24	34	58
6	56	33	89
7	10	24	34
8	19	9	28
9	69	9	78
Total	378	188	566

TABLE 28. NUMBER OF NORTH DAKOTA ELEVATORS BY AGE OF ELEVATOR AND TYPE OF RAIL LINE AVAILABLE, 1979-80

Type of Rail Line	Age of Elevator (Years)									
	Less Than 4	4-5	6-10	11-15	16-20	21-30	31-40	41-50	51-100	Total
	- - - - - - - - - - - - number of elevators - - - - - - - - - - - -									
Branch	61	7	15	22	37	54	37	44	139	416
Main	39	10	10	6	15	32	19	26	46	203
Total	100	17	25	28	52	86	56	70	185	619

TABLE 29. NUMBER OF NORTH DAKOTA ELEVATORS BY VALUE OF ELEVATOR AND TYPE OF RAIL LINE AVAILABLE, 1979-80

Type of Rail Line	Value of Elevator ($000)									
	50 or Less	51-100	101-200	201-400	401-800	801-1,600	1,601-3,200	3,201-6,400	Over 6,400	Total
	- - - - - - - - - - - - number of elevators - - - - - - - - - - - -									
Branch	100	38	56	75	80	51	13	1	2	416
Main	55	12	26	39	41	18	9	2	1	203
Total	155	50	82	114	121	69	22	3	3	619

part of North Dakota (CRDs 3, 6, and 9) and 64 percent in the western area (CRDs 1, 4, and 7) were located on branch lines. The central part of the state (CRDs 2, 5, and 8) had 52 percent of its elevators located on branch lines.

The relationship between type of rail line and elevator age and value are presented in Tables 28 and 29. A larger proportion of the older elevators were found on branch lines than the newer facilities, suggesting that elevator managers of newer facilities had realized the necessity, or at least marketing advantage, associated with locating on a main line. The location of the elevators did not seem to vary significantly by value of the elevator.

Those elevators located on branch lines owned tractor-trailer rigs more often than the main line elevators (Table 30). Thirty-eight tractor-trailer units were owned by branch line firms compared to 24 units owned

TABLE 30. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF ELEVATOR-OWNED OR LEASED TRACTOR-TRAILER RIGS AND TYPE OF RAIL LINE, 1979-80

Type of Track	Number of Units Owned							Number of Units Leased				
	0	1	2	3	4	7	Total	0	1	3	12	Total
	number of elevators											
Branch	115	15	7	3	0	0	140	124	2	0	0	126
Main	125	8	3	1	0	1	138	134	3	0	1	138
Total	240	23	10	4	0	1	278	258	5	0	1	264

by main line elevators. Main line firms utilized leased tractor-trailer units more than branch line elevators, although leasing tractor-trailer units was seldom used in the industry. Train service per week was examined relative to the percentage of earnings obtained from handling and storing grain rather than selling other services (Table 31). There is a slight tendency for those firms with a higher service frequency to depend on grain storage and handling for revenue, although the relationship was not very strong.

TABLE 31. NUMBER OF NORTH DAKOTA ELEVATORS BY EARNINGS FROM GRAIN STORAGE AND FREQUENCY OF TRAIN SERVICE PER WEEK, 1979-80

Frequency of Train Service Per Week	Earnings from Grain Storage (Percent)							Total
	20 or Less	21-40	41-60	61-80	81-90	91-95	96-100	
	number of elevators							
0	1	0	0	0	0	0	0	1
1	15	1	6	20	19	10	6	77
2	16	5	14	47	47	34	28	191
3	29	3	13	64	55	24	22	210
4	2	0	1	2	2	5	0	12
5	5	0	3	5	4	4	1	22
6	3	0	0	0	1	1	0	5
7	10	6	10	14	29	9	23	101
Total	81	15	47	152	157	87	80	619

Postcard Survey Characteristics

The most recent data source for this study was the postcard survey. This survey produced information not available from the other two sources as well as updating some of the earlier data. This section of the report will review characteristics of specific railroads in North Dakota, frequency of service, and load out capacity of elevators in 1979-80 compared to five years earlier. The sample size of the survey did not include all elevators in North Dakota as indicated earlier, but the coverage was broad, both geographically and by elevator size, so that little or no bias was anticipated.

Railroads in North Dakota

Two major railroads serve North Dakota--Burlington Northern (BN) and Soo Line. Although the final status of the Milwaukee line is undetermined at this time, elevators on these lines will be discussed along with the other railroads. The Milwaukee Road was serving stations in southwestern North Dakota at the time of the postcard survey, but at this writing those stations are served by the Burlington Northern.

The Burlington Northern is by far the most predominant rail line in North Dakota, serving 321 (68 percent) of the 475 elevators responding to the survey (Table 32). The Soo Line had 107 (22 percent) of the total and the Milwaukee

TABLE 32. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY CAPACITY AND SERVING RAILROAD, 1979-80

Railroad	Storage Capacity (000 Bushels)							
	50 or Less	51-100	101-200	201-400	401-800	801-1,600	1,601-5,000	Total
	number of elevators							
BN	16	35	126	108	25	8	3	321
SOO	6	12	44	35	7	3	0	107
MIL	1	3	5	6	5	0	0	20
BN-SOO	0	1	5	4	3	0	0	13
SOO-MIL	0	1	4	6	1	0	0	12
MIL-BN	0	0	0	0	1	0	0	1
BN-SOO-MIL	0	0	0	1	0	0	0	1
Total	23	52	184	160	42	11	3	475

had only 20 elevators (4 percent) located adjacent to its trackage. Some elevators were located on more than one rail line; 13 were located adjacent to BN and Soo trackage, and 12 were located on both Soo and Milwaukee trackage.

The capacity of the elevators did not vary greatly among the railroads; about 44 percent of the elevators along both major railroads (BN and Soo) were larger than 200,000 bushels. The Burlington Northern did seem to serve relatively fewer small elevators and more large elevators compared to the Soo Line.

The number of elevators located on branch lines is larger for the Burlington Northern than other railroads (Table 33). Sixty-one percent of the elevators along the Soo Line tracks and 65 percent of the elevators along the Milwaukee tracks were located adjacent to branch lines. When concerns arise about the future of elevators located along branch lines in the state, these concerns primarily are related to elevators located adjacent to Burlington Northern

trackage, since 69 percent of all elevators located along branch lines are served by the Burlington Northern.

TABLE 33. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY TYPE OF RAIL LINE AND SERVING RAILROAD, 1979-80

Railroad	Rail Line Type			Percent Branch
	Branch	Main	Total	
	- - number of elevators - -			
BN	217	102	319	68
SOO	66	41	107	61
MIL	13	7	20	65
BN-SOO	10	3	13	77
SOO-MIL	7	5	12	58
MIL-BN	0	1	1	0
Total	313	159	472	66

Little difference existed among the elevators' turnover in relation to the railroad serving the elevators (Table 34). Sixty-five percent and 63 percent of the elevators along the BN and Soo Line tracks, respectively, had turnover ratios over 2.5. The same percentages held in relation to the Milwaukee. It should be noted that those elevators located on two rail lines were substantially above 2.5 in turnover activity.

The elevator operators reported their use of ownership and/or leasing of boxcars and hopper cars in 1980 and five years previously. Only 13 reported owning boxcars, and a total ownership of 56 boxcars was reported (Table 35). This was a significant increase in elevator ownership of boxcars from five years previously, when only two elevators reported owning a total of only three boxcars (Table 36). The elevators owning boxcars in 1979-80 generally were located along Burlington Northern tracks (10 out of 13 or 77 percent). In 1975, both elevators owning boxcars were located adjacent to Burlington Northern trackage. However, between 1975 and 1979-80 tremendous growth in boxcar ownership by elevators along Milwaukee lines occurred. In 1979-80, 43 percent of all boxcars owned were by elevators along Milwaukee trackage.

TABLE 34. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY TURNOVER RATIO AND SERVING RAILROAD, 1979-80

Serving Railroad	Turnover Percentage								
	0.5 or Less	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	Over 3.0	Total
	number of elevators								
BN	10	7	7	25	32	31	42	167	321
SOO	2	4	1	5	21	7	15	52	107
MIL	0	0	0	3	3	1	1	12	20
BN-SOO	0	0	0	0	2	2	1	8	13
SOO-MIL	0	0	0	1	0	1	1	9	12
MIL-BN	0	0	0	0	0	1	0	0	1
BN-SOO-MIL	0	0	0	0	0	1	0	0	1
Total	12	11	8	34	58	44	60	248	475

TABLE 35. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS, BY NUMBER OF BOXCARS OWNED AND SERVING RAILROAD, 1979-80

Railroad	Number of Boxcars Owned								Total
	1	2	3	4	5	8	9	10	
	- - - - - number of elevators - - - - -								
BN	1	4	1	3	0	1	0	0	10
SOO	0	0	0	0	0	0	0	0	0
MIL	0	0	0	0	1	0	1	1	3
BN-SOO	0	0	0	0	0	0	0	0	0
SOO-MIL	0	0	0	0	0	0	0	0	0
MIL-BN	0	0	0	0	0	0	0	0	0
BN-SOO-MIL	0	0	0	0	0	0	0	0	0
Total	1	4	1	3	1	1	1	1	13

TABLE 36. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF BOXCARS OWNED AND SERVING RAILROAD, 1975

Railroad	Number of Boxcars Owned		Total
	1	2	
	- - - number of elevators - - -		
BN	1	1	2
SOO	0	0	0
MIL	0	0	0
BN-SOO	0	0	0
SOO-MIL	0	0	0
MIL-BN	0	0	0
BN-SOO-MIL	0	0	0
Total	1	1	2

The number of leased boxcars is presented in Tables 37 and 38. The use of leased boxcars as a means of insuring transportation capacity has greatly increased since 1975. In 1975, only two elevators leased boxcars when a total of only 11 cars were leased. In 1979-80, 50 elevators leased a total of 192 boxcars. The elevators adjacent to Burlington Northern trackage were by far the most common users of leased boxcars; 90 percent of the elevators leasing boxcars were located along BN trackage. Further, 85 percent of all boxcars leased were leased by elevator firms located adjacent to Burlington Northern track.

TABLE 37. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF BOXCARS LEASED AND SERVING RAILROAD, 1979-80

Serving Railroad	Number of Leased Boxcars												Total
	1	2	3	4	5	6	7	8	11	12	13	26	
	number of elevators												
BN	2	30	2	2	4	1	0	0	2	1	0	1	45
SOO	0	0	0	0	0	0	0	0	0	0	0	0	0
MIL	0	0	1	0	0	0	1	1	0	0	0	0	3
BN-SOO	0	0	0	0	0	0	0	0	0	0	1	0	1
SOO-MIL	0	0	0	1	0	0	0	0	0	0	0	0	1
MIL-BN	0	0	0	0	0	0	0	0	0	0	0	0	0
BN-SOO-MIL	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	30	3	3	4	1	1	1	2	1	1	1	50

TABLE 38. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF BOXCARS LEASED AND SERVING RAILROAD, 1975

Serving Railroad	Number of Leased Boxcars		Total
	2	9	
	number of elevators		
BN	1	0	1
SOO	0	0	0
MIL	0	0	0
BN-SOO	0	0	0
SOO-MIL	0	1	1
MIL-BN	0	0	0
BN-SOO-MIL	0	0	0
Total	1	1	2

Hopper car ownership by elevator firms also has increased in recent years (Tables 39 and 40). In 1975, only one responding elevator indicated owning any hopper cars; this elevator owned four cars. By 1979-80, this had increased to 13 elevators and 150 hopper cars. Again, this ownership was primarily due to elevators located adjacent to Burlington Northern trackage (83 percent) and most cars were owned by these elevators (89 percent).

TABLE 39. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF HOPPER CARS OWNED AND SERVING RAILROAD, 1979-80

Serving Railroad	Number of Hopper Cars Owned									Total
	2	3	5	10	11	15	19	20	50	
	- - - - - number of elevators - - - - -									
BN	1	2	3	1	1	0	1	1	1	11
SOO	1	0	0	0	0	0	0	0	0	1
MIL	0	0	0	0	0	1	0	0	0	1
BN-SOO	0	0	0	0	0	0	0	0	0	0
SOO-MIL	0	0	0	0	0	0	0	0	0	0
MIL-BN	0	0	0	0	0	0	0	0	0	0
BN-SOO-MIL	0	0	0	0	0	0	0	0	0	0
Total	2	2	3	1	1	1	1	1	1	13

TABLE 40. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF HOPPER CARS OWNED AND SERVING RAILROAD, 1975

Serving Railroad	Number of Hopper Cars Owned	Total
	4	
	- - - - - number of elevators - - - - -	
BN	1	1
SOO	0	0
MIL	0	0
BN-SOO	0	0
SOO-MIL	0	0
MIL-BN	0	0
BN-SOO-MIL	0	0
Total	1	1

A pronounced change has occurred in hopper car leasing by grain elevators (Tables 41 and 42). One hundred seventy-five elevators leased hopper cars in 1979-80 compared to 31 firms in 1975. In 1975, 229 hopper cars were leased; by 1979-80 this had grown to over 1,700 hopper cars. Again, the elevators located along Burlington Northern track dominated

the use of leased hopper cars; 82 percent of the elevators leasing hopper cars and over 90 percent of the total number of leased hopper cars were located along BN trackage.

TABLE 41. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF HOPPER CARS LEASED AND SERVING RAILROAD, 1979-80

Serving Railroad	Number of Leased Hopper Cars											Total
	1	2	3	4	5	6	7-9	10-14	15-19	22-50	75-99	
	number of elevators											
BN	8	10	16	17	33	13	8	23	7	4	4	143
SOO	0	2	2	0	7	0	2	1	0	2	1	16
MIL	0	1	0	0	2	0	0	0	0	0	0	3
BN-SOO	0	1	1	1	0	0	1	2	0	1	0	7
SOO-MIL	0	0	0	0	1	0	[illegible]	5	0	0	0	6
MIL-BN	0	0	0	0	0	0	0	0	0	0	0	0
BN-SOO-MIL	0	0	0	0	0	0	0	0	0	0	0	0
Total	8	14	19	18	43	13	10	31	7	7	5	175

TABLE 42. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY NUMBER OF HOPPER CARS LEASED AND SERVING RAILROAD, 1975

Serving Railroad	Number of Leased Hopper Cars								Total
	1	2	3	4	5	10	15	50	
	number of elevators								
BN	1	3	3	1	7	5	1	1	22
SOO	0	0	0	0	3	0	0	0	3
MIL	0	0	0	0	1	0	1	0	2
BN-SOO	0	0	0	0	2	0	0	0	2
SOO-MIL	0	1	0	0	1	1	0	0	3
MIL-BN	0	0	0	0	0	0	0	0	0
BN-SOO-MIL	0	0	0	0	0	0	0	0	0
Total	1	4	3	1	14	6	2	1	32

Service Per Week

The merchandising ability of elevators in North Dakota can be affected by the frequency of service provided by serving railroads. The Burlington Northern provided most of the rail service to North Dakota elevators (Table 43). The BN provided 65 percent of the service three or more times per week. Soo Line service was generally two and three times per week while the Milwaukee's frequency of service was almost entirely only once per week in 1979-80.

TABLE 43. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY FREQUENCY OF SERVICE AND SERVING RAILROAD, 1979-80

Serving Railroad	Frequency of Service Per Week								Total
	0	1	2	3	4	5	6	7	
	number of elevators								
BN	2	63	105	72	10	28	18	12	310
SOO	0	9	32	48	3	5	2	2	101
MIL	1	12	1	0	0	0	0	0	14
BN-SOO	0	0	5	2	3	0	1	2	13
SOO-MIL	0	1	5	3	0	2	1	0	12
MIL-BN	0	1	0	0	0	0	0	0	1
BN-SOO-MIL	0	0	0	1	0	0	0	0	1
Total	3	86	148	126	16	35	22	16	452

It can be expected that elevators on branch lines would have less frequent service available to them than elevators located on main lines. This relationship was confirmed by data presented in Table 44. Although elevators along branch lines constituted 67 percent of the total elevators

TABLE 44. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY FREQUENCY OF SERVICE AND RAIL LINE TYPE, 1979-80

Line Type	Service Per Week								Total
	0	1	2	3	4	5	6	7	
	number of elevators								
Branch	6	57	102	82	13	19	14	9	302
Main	1	28	46	44	3	15	8	7	152
Total	7	85	148	126	16	34	22	16	454

providing this information, they accounted for only 62 percent of the elevators receiving service four or more times per week. Sixty-eight percent of branch line elevators received service four or less times a week.

Service provided to North Dakota elevators by the railroads varied significantly from region to region within the state (Table 45). Eighty percent of the elevators in the northern area (CRDs 1, 2, and 3) had received rail service only three times per week or less. Eighty-five percent of the elevators in the southern region (CRDs 7, 8, and 9) received service three times per week or less. The middle part of the state received more frequent service; only 74 percent of these elevators received service less than four times per week.

TABLE 45. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY FREQUENCY OF SERVICE AND CROP REPORTING DISTRICT, 1979-80

CRD	Frequency of Service Per Week								Total
	0	1	2	3	4	5	6	7	
	number of elevators								
1	1	12	24	14	2	3	3	1	60
2	0	8	13	13	2	1	3	1	41
3	1	21	35	26	1	14	6	3	107
4	1	5	6	4	2	1	0	1	20
5	0	5	14	19	1	5	1	4	49
6	1	10	20	20	6	5	5	3	70
7	0	7	12	9	1	1	0	0	30
8	0	4	11	7	1	2	1	0	26
9	3	14	13	14	0	3	3	3	53
Total	7	86	148	126	16	35	22	16	456

The difference in the service available to elevators was more geographically pronounced when looking in an east-west direction. The western elevators appeared to receive less frequent service than those in the central or eastern areas. In the west (CRDs 1, 4, and 7), 85 percent of the elevators received service three times per week or less compared to 80 percent in the central region (CRDs 2, 5, and 8) and 75 percent in the eastern area (CRDs 3, 6, and 9).

Load Out Capacity

The ability of an elevator to load rail cars or trucks quickly increases the oppportunity to participate in rate quotes that have maximum loading time constraints. Elevators provided information on load out capacity, in bushels per hour, for the firm's aggregate facilities. Since many firms had more than one load out area and more than one elevator at a site, the range of load out capacities was quite large.

The 1979-80 load out capacity of North Dakota elevators relative to elevator age is presented in Table 46. The most common load out capacity was 3,000 bushels per hour, while the second, third, and fourth most common load out capacities were 2,000, 5,000, and 2,500 bushels per hour, respectively. Forty-seven percent of the elevators responding to the survey reported having one of these four load out capacities. In fact, 37 percent of the elevators had load out capacities between 2,000 and 3,000 bushels per hour. As suggested above, the range of load out capacities was extremely large, ranging from less than 200 bushels per hour to 32,000 bushels per hour. The age of the facilities generally was related to the load out capacities, in that more of the newer facilities had higher load out capacities. However, this is not a consistent relationship because several of the elevators with high load out capacities were over 50 years old. It is important to note that 23 elevators had load out capacities over 10,000 bushels per hour, 79 elevators had load out capacities over 6,000 bushels per hour, and 109 elevators (almost 24 percent) had capacity to load out 5,000 bushels per hour or more.

Changes in load out capacity occurring from 1975 to 1979-80 can be identified by examining Tables 47 and 48. It is evident that significant changes have taken place; the highest load out capacity in 1975 was only 18,000 bushels per hour compared to 32,000 bushels per hour in 1979-80.

TABLE 46. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND AGE OF ELEVATOR, 1979-80

Age of Elevator	Load Out Capacity (Bushels Per Hour)											Total
	1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	
	number of elevators											
1 - 3	0	3	0	3	9	5	5	1	4	3	1	34
4 - 5	0	1	1	2	2	0	2	2	0	3	3	16
6 - 10	1	2	0	4	5	3	2	2	2	2	0	23
11 - 15	0	0	1	3	9	1	4	0	2	0	0	20
16 - 20	0	0	2	4	13	3	6	3	4	1	4	40
21 - 30	2	2	3	15	15	8	11	3	6	4	0	69
31 - 40	2	2	5	10	8	8	5	4	2	4	0	50
41 - 50	1	1	2	3	13	11	8	3	6	3	7	58
51 - 100	7	9	4	27	40	16	16	12	6	4	8	149
Total	13	20	18	71	114	55	59	30	32	24	23	459

TABLE 47. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND SERVING RAILROAD, 1979-80

Serving Railroad	Load Out Capacity (Bushels Per Hour) 1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
BN	11	12	14	51	82	34	35	18	20	19	14	310
SOO	1	7	3	16	20	14	14	10	8	4	7	104
MIL	0	1	1	3	5	5	1	1	1	0	0	18
BN-SOO	0	0	0	0	4	1	6	0	2	0	0	13
SOO-MIL	1	0	0	0	2	1	3	1	1	1	2	12
MIL-BN	0	0	0	1	0	0	0	0	0	0	0	1
BN-SOO-MIL	0	0	0	0	1	0	0	0	0	0	0	1
Total	13	20	18	71	114	55	59	30	32	24	23	459

TABLE 48. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND SERVING RAILROAD, 1975

Serving Railroad	Load Out Capacity (Bushels Per Hour) 1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
BN	11	17	30	69	79	19	22	0	11	0	7	265
SOO	0	10	15	30	16	9	4	0	8	0	3	96
MIL	0	1	1	7	5	2	1	0	0	0	0	17
BN-SOO	0	0	0	6	2	2	1	0	0	0	0	11
SOO-MIL	1	1	0	1	2	1	2	0	1	0	0	9
MIL-BN	0	0	1	0	1	0	0	0	0	0	0	2
BN-SOO-MIL	0	0	0	0	0	0	0	0	0	0	0	0
Total	13	29	47	113	105	33	30	0	20	0	10	400

In 1975, only 30 elevators (7.5 percent) reported load out capacities of 6,000 bushels per hour or greater. By 1979-80, 79 elevators (17 percent) had load out capacities of that size. This change in size distribution is further apparent when considering that 51 percent of the load out capacities were below 2,000 bushels per hour in 1975; by 1979-80, only 27 percent were in this range.

It is interesting to note that most of the elevators with new larger load out capabilities were adjacent to Burlington Northern trackage. Again, those elevators located along Burlington Northern lines had slightly higher load out capacities than the other railroads; this relationship was found in both periods.

The load out capacity of elevators located along branch lines compared to those located along main lines is presented in Tables 49 and 50. A slight increase was noted in the number of elevators with higher load out capacities located along main lines compared to those adjacent to branch lines. The percentage of main line elevators with load out capacity greater than 6,000 bushels per hour increased from 7.3 percent in 1975 to 13.7 percent in 1979-80. Additionally, in 1975 the most common load out capacity was 2,000 bushels per hour; by 1979-80 this had increased to 3,000 bushels per hour. Also, the most common load out capacity for elevators along main lines in 1979-80 was 6,000 bushels per hour compared to 3,000 bushels per hour for branch line elevators.

The relationship between load out capacity and turnover is presented in Table 51. There did not appear to be a significant relationship between turnover and load out capacity. Relatively few of the elevators with low turnovers had high load out capacity. This relationship was true in both time periods although it was less pronounced in 1975 (Table 52).

TABLE 49. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND TYPE OF RAIL LINE, 1979-80

Type of Rail Line	Load Out Capacity (Bushels Per Hour)											
	1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
Branch	7	11	14	48	83	33	39	11	25	17	16	304
Main	7	7	4	23	31	22	19	19	7	7	7	153
Total	14	18	18	71	114	55	58	30	32	24	23	457

TABLE 50. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND TYPE OF RAIL LINE, 1975

Type of Rail Line	Load Out Capacity (Bushels Per Hour)											
	1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
Branch	8	17	32	73	67	20	24	0	12	0	7	260
Main	5	11	14	40	38	13	6	0	7	0	3	137
Total	13	28	46	113	105	33	30	0	19	0	10	397

TABLE 51. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND TURNOVER RATIO, 1979-80

Turnover Ratio	Load Out Capacity (Bushels Per Hour) 1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
.5 or Less	0	0	1	2	3	2	1	3	0	0	0	12
.51-.75	0	1	1	2	0	2	1	2	1	0	1	11
.76-1.0	1	1	1	0	2	1	1	0	0	0	1	8
1.1-1.5	1	2	1	8	4	7	2	1	3	2	1	32
1.6-2.0	3	2	3	6	16	8	7	4	2	3	2	56
2.1-2.5	0	1	1	10	11	7	4	2	3	3	0	42
2.6-3.0	3	1	1	7	16	5	6	4	6	3	4	56
More than 3.0	5	7	9	36	62	23	37	14	17	13	14	237
Total	13	15	18	71	114	55	59	30	32	24	23	454

TABLE 52. NUMBER OF NORTH DAKOTA GRAIN ELEVATORS BY LOAD OUT CAPACITY AND TURNOVER RATIO, 1975

Turnover Ratio	Load Out Capacity (Bushels Per Hour) 1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	Total
	number of elevators											
.5 or Less	0	0	2	2	4	0	1	1	0	0	0	10
.51-.75	0	1	1	3	3	1	0	1	0	0	0	10
.76-1.0	1	1	1	2	1	1	0	0	0	0	0	7
1.1-1.5	1	1	2	13	6	2	2	0	1	0	0	28
1.6-2.0	2	6	5	12	13	6	3	3	1	0	0	51
2.1-2.5	0	1	5	11	11	5	1	0	0	1	0	35
2.6-3.0	2	2	6	13	11	5	4	1	1	0	2	47
More than 3.0	7	17	25	56	57	13	19	6	4	2	5	211
Total	13	29	47	112	106	33	30	12	7	3	7	399

Ownership of elevators by cooperatives versus private firms also was investigated for any differences in load out capacity (Tables 53 and 54). Little difference was evident between cooperatives and private firms, although cooperatives seemed to possess higher load out capacities than private grain companies in 1979-80. The same relationship held in 1975.

Summary and Conclusions

Significant changes are occurring in the marketing system for North Dakota grain. The grain elevator, both its physical characteristics and marketing functions, is at the core of this marketing system. This study reviewed the financial, physical, and functional structure and conduct of the elevator industry to determine its ability to cope with future changes.

Data used in the study were obtained from three separate but related grain elevator surveys conducted in 1979 and 1980. The first two surveys yielded information on 98.2 percent of the elevators in North Dakota. The third survey was conducted to update previous information and collect additional data concerning changes in load out capacity and use of leased or owned boxcars and hopper cars. An 86 percent response was received so some sampling error was possible. However, since some characteristics of the nonrespondents were known from the previous surveys, any potential sampling bias could be identified.

Of the 568 firms responding to the most recent survey, 374 (almost 66 percent) were cooperatively owned. Seventy-eight percent of these cooperatives had storage capacities between 200,000 and 400,000 bushels, compared to 58 percent for the private companies. Cooperatives were more common in western and northern North Dakota and had been less active in recent construction than the private companies. Cooperatives relied less on handling and storage of grain for generation of income than did the private companies.

TABLE 53. NUMBER OF NORTH DAKOTA ELEVATORS BY LOAD OUT CAPACITY AND TYPE OF OWNERSHIP, 1979-80

Type of Ownership	Load Out Capacity (Bushels Per Hour)											Total
	1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	
	number of elevators											
Cooperative	8	15	7	48	82	36	39	20	21	0	17	293
Private	5	5	11	23	32	19	20	10	11	6	6	148
Total	13	20	18	71	114	55	59	30	32	6	23	441

TABLE 54. NUMBER OF NORTH DAKOTA ELEVATORS BY LOAD OUT CAPACITY AND TYPE OF OWNERSHIP, 1975

Type of Ownership	Load Out Capacity (Bushels Per Hour)											Total
	1-500	501-1,000	1,001-1,500	1,501-2,000	2,001-3,000	3,001-4,000	4,001-5,000	5,001-6,000	6,001-8,000	8,001-10,000	Over 10,000	
	number of elevators											
Cooperative	11	22	31	79	62	25	20	9	6	3	6	274
Private	2	7	16	34	43	8	10	3	2	0	1	126
Total	13	29	47	113	105	33	30	12	8	3	7	400

The capacity of North Dakota grain elevators varied greatly, from less than 50,000 bushels to over 5 million bushels. Most of the smaller elevators were located along branch lines and 80 percent of the elevators larger than 800,000 bushels were located adjacent to main lines. The sizes of elevators were evenly distributed throughout the state, except for CRD 6 which had larger capacity elevators than the average. Many of the smaller elevators were older structures; 56 percent of the smaller facilities were over 30 years old, compared to only 25 percent of the larger elevators.

The elevators, while spread throughout the state, were heavily concentrated in the Red River Valley area; 52 percent of the elevators were located in this area. The northern part of the state (CRDs 1, 2, and 3) had 44 percent of the elevators. Elevators in the west were older than in other areas, while those in the central portion of the state (CRDs 2, 5, and 8) were slightly more valuable.

The average age of the elevator facilities was 25 years with over 30 percent being over 50 years old. Some rebuilding has been occurring--16 percent of the facilities were less than three years old. The newer facilities were smaller and did not depend heavily on storing and handling grain as a major source of earning.

Over 64 percent of the elevators turned their capacity over at least three times in a year, indicating that the elevator's primary function was to merchandise grain rather than just store it. Generally, the older, higher valued elevators had a higher turnover performance.

The number of employees did not vary with age of facility or source of income for the elevator. Little change in basic grain handling technology has occurred.

Sixty-seven percent of the elevators were located along branch lines with more elevators in the middle and central part of the state having access to main lines. More of the older facilities were located along branch lines and more of these facilities owned tractor-trailer units.

The Burlington Northern Railroad serviced 68 percent of the responding elevators. The elevators served by the Burlington Northern appeared to be larger in capacity and were located along branch lines more often than other railroads.

Leasing and ownership of boxcars as a means of insuring capacity to move grain had significantly increased; two elevators owned three boxcars in 1975 compared to 13 elevators and 56 boxcars owned in 1979-80. Leased boxcars increased from two elevators leasing 11 cars in 1975 to 50 elevators leasing 192 boxcars in 1979-80.

Hopper car ownership and leasing also has increased in the grain elevator industry. In 1975, only one elevator owned hopper cars (four). Five years later 13 elevators owned a total of 150 hopper cars. The most pronounced change was in the number of leased hopper cars. In 1975, 32 firms leased a total of 229 hopper cars; by 1979-80, this had increased to 175 elevator firms leasing over 1,700 hopper cars.

The Burlington Northern Railroad provided most of the rail service available to North Dakota elevators. It provided service to 65 percent of the elevators receiving service over three times a week. Elevators along branch lines, as expected, received less frequent service than those adjacent to main lines. The northern, southern, and western areas of the state received significantly less frequent service compared to the eastern and central portions of the state.

Over one third of the elevators had load out capacities between 2,000 and 3,000 bushels per hour. The newer facilities generally had higher load

out capacities than older facilities. Significant increases in load out capacities have occurred over the past five years; most of the elevators increasing their load out capacity during that time were located along Burlington Northern trackage. A greater increase in load out capacity was noted on main lines than branch lines, although the difference is not very pronounced. Fewer of the elevators with low turnovers had high load out capacity. Cooperatives appeared to have slightly higher load out capacities than privately owned companies.

The grain elevator industry in North Dakota is not a homogeneous unit. Significant differences existed geographically and economically. Many of these elevator companies will be facing hard decisions in the future since many facilities are old and located along branch lines. Yet, the industry has not remained complacent or static. Elevators along branch lines or with older facilities have been increasing load out capacity, turnover, and number of owned or leased cars, reflecting an ongoing commitment to economic survival in this changing marketing system.

APPENDIX A

Appendix A

Elevator Characteristics

CARD 1

1. Name of Elevator _____

   Owner _____

   Manager _____

   Elevator Identification Number (1-3) (1) ___ (3)

   County Identification Number (4-5) (4) (5)

   Region Identification Number (6) (6)

2. What is the age of the elevator (main house)? ___ (7-8) years (7) (8)

   Time and type of expansion: (0 = flat; 1 = upright)

   _____ (9) type _____ (10-11) time (9) ___ (11)

   _____ (12) type _____ (13-14) time (12) ___ (14)

   _____ (15) type _____ (16-17) time (15) ___ (17)

   _____ (18) type _____ (19-20) time (18) ___ (20)

   _____ (21) type _____ (22-23) time (21) ___ (23)

   What is the capacity of the main house? _____ (24-30) bushels (24) ___ ___ (27) (28) ___ (30)

   What is the capacity of the annex(s)? _____ (31-37) bushels (31) ___ ___ (34) (35) ___ (37)

3. Number of people employed:

   _____ (38-39) full-time _____ (40-41) dependents ___ (39) ___ (41)

   _____ (42) part-time _____ (43-44) dependents ___ (43) ___ (44)

4. What is the annual payroll of your elevator? (all employees, including manager) $_____ (45-49) (45) ___ (47)

5. What, in your opinion, is the current value of this elevator? (including land and buildings) $_____ (50-56)

What are the annual property taxes paid by your elevator? $_____ (57-61)

6. What is the present rail service on your branch? _____ times per week (62)

7. What is the current exempt truck rate for wheat from your elevator to:

Duluth? _____ ¢/cwt. (63-67)

Minneapolis? _____ ¢/cwt. (68-72)

Pacific Northwest? _____ ¢/cwt. (73-77)

(50) (53) (54) (56) (57) (59) (61) (62) (63) (66) (67) (68) (71) (72) (73) (76) (77)

CARD 2

Elevator Identification Number (1-3)

(1) (3)

8. Are the truck rates inflated due to the rail car shortage? (4) _____ yes = 1 _____ no = 0

If yes, how much above normal rate are you paying? (5-6) _____ ¢/cwt.

(4) (5) (6)

9. How many producers patronize your elevator on a regular basis? _____ (7-10)

During a typical month, how many producers does your elevator bring to town? _____ (11-14)

In your opinion, what percentage of these producers go on into town and perform other business? _____% (15-17)

(7) (10) (11) (14) (15) (17)

10. What percentage of the elevator's earnings originate from: Handling and storing grain _____% (18-20)

Sales of other services and merchandise available _____% (21-22)

(18) (20) (21) (22)

Please check other services and merchandise available
1 = yes; 0 = no

_____Seed for sale (23)	_____Flour (24)	(23) (24)
_____Custom cleaning (25)	_____Oil (26)	(25) (26)
_____Drying (27)	_____Gas (28)	(27) (28)
_____Fertilizer (29)	_____Salt (30)	(29) (30)
_____Chemicals (31)	_____Wire (32)	(31) (32)
_____Lumber (33)	_____Dry Rolling (34)	(33) (34)
_____Feed (35)	_____Steam rollings (36)	(35) (36)
_____Coal (37)	_____General farm supplies (38)	(37) (38)
_____Grinding (39)	_____General merchandise (40)	(39) (40)
_____Twine (41)	_____Other, please specify (42)	(41) (42)
_____Sprayers (43)	_____Other, please specify (44)	(43) (44)
	_____Other, please specify (45)	(45)

Are any of the above goods received by rail? Please indicate the quantity received in 1977 (carloads)

_____Seed for sale (46-47)	_____Oil (48-49)	____ (47) ____ (49)
_____Fertilizer (50-51)	_____L.P. Gas (52-53)	____ (51) ____ (53)
_____Chemicals (54-55)	_____Salt (56-57)	____ (55) ____ (57)
_____Lumber (58-59)	_____Wire (60-61)	____ (57) ____ (61)
_____Feed (62-63)	_____General farm supplies (64-65)	____ (63) ____ (65)
_____Coal (66-67)	_____General merchandise (68-69)	____ (67) ____ (69)
_____Twine (70-71)	_____Other, please specify (72-73)	____ (71) ____ (73)
_____Sprayers (74-75)	_____Other, please specify (76-77)	____ (75) ____ (77)
_____Flour (78-79)		____ (79)

CARD 3

Elevator Identification Number (1-3) (1) ___ (3)

11. Do you beleive that your branch line is a profitable line to the owning railroad company? _____yes=1; _____no=0 (4) (4) (4)

Why?_____

_____

_____

Assume that the railroad has filed an application to abandon your line.

12. As a businessman located on that line, would you protest? (5) _____yes = 1; _____no = 0 (5)

What justification would you cite in your protest? ___

_____

_____

13. If the railroad demonstrated that they were losing money on your branch line would you be in favor of: yes = 1; no = 0

1. Abandon rail service on the line? _____ (6) (6)
2. Businesses and communities purchasing the line? _____ (7) (7)
3. Paying higher freight rates? _____ (8) (8)
4. Eliminating all taxes paid by the railroad on the line? _____ (9) (9)
5. Businesses and communities paying the railroad the amount of the deficit on a yearly basis? _____ (10) (10)
6. Other, please specify? _____ (11) (11)

_____

_____

Of those checked above which would you favor the most? _____ (12) (12)

14. If repairs were necessary to maintain service on your branch line, would you consider sharing the cost of rehabilitating this branch line to continue rail operations? (13) _____yes = 1; _____no = 0 (13)

Assume the line is abandoned.

15. How would your operations be affected?

1. No impact on volume of grain marketings, farm sales, or marketing and transportation costs _____ (14)
(1 = true and 0 = false)

2. A _____percent reduction in grain marketings (15-16)

A _____percent reduction of sales to farms (17-18)

A _____percent increase in marketing costs (19-20) ($__/Year) (21-26)

A _____percent increase in transportation costs (27-28) ($__/Year) (29-34)

a. Number of jobs eliminated _____(35-36)

b. Reduce payroll by $_____ per year (37-42)

3. Cause a one-time capital cost of $_____ (43-48)

4. Close plant entirely _____ (49) yes = 1 _____ (49) no = 0

5. Transship products through elevator located at _____miles away, at an estimated additional cost (50-52)
cost of _____¢/bushel. (53-54)

6. Switch entirely to trucking (55)
(yes = 1; no = 0)
a. Independents (56)

b. Buy private trucks (57)

c. Combination of (a) and (b) (58)

7. Continue to supply farm services only _____ (59)

(14)

(15) (16)

(18)

(20) (21)

(26)

(28) (29)

(31) (34)

(36)

(37) (40)

(42)

(43) (45)

(46) (48)

(49)

(50) (52)

(53) (54)

(55)

(56)

(57)

(58)

(59)

16. In your opinion, could trucks be effectively used as a substitute service for rail in your business? (60) _____yes = 1 _____no =0 (60)

If no, why not? (yes = 1; no = 0)

1. Too costly to use _____(61) (61)
2. Lack the loading capacity _____(62) (62)
3. Not enough trucks _____(63) (63)
4. Undependable service _____(64) (64)
5. Other, please specify _____(65) (65)

_____

_____

17. If your business was forced to close, how severe would the economic impact be on this community (please circle one) (66)

No impact 1 2 3 4 5 Severe impact (66)

Would kill the community? _____yes = 1 (67) _____no = 0 (67) (67)

18. Percent of grain received by your elevator by farmers estimated distance from elevator (radius):

0 - 5 miles	_____percent (68-69)	(68) (69)
5 - 10 miles	_____percent (70-71)	(70) (71)
10 - 15 miles	_____percent (72-73)	(72) (73)
15 - 20 miles	_____percent (74-75)	(74) (75)
Over 20 miles	_____percent (76-77)	(76) (77)
	100 percent	

CARD 4

Elevator Identification Number (1-3) (1) ___ (3)

18. (continued)
Percent of grain received by:

Single axle truck	_____percent (4-5)	___ (5)
Tandem axle truck	_____percent (6-7)	___ (7)
Other, please specify	_____percent (8-9)	___ (9)

19. Number of rail cars:

Owned _____ (10-12) Type _____ (13) How long owned? _____ (14-15)

Leased _____ (16-18) Type _____ (19) How long owned? _____ (20-21)

Type: 1 - boxcar
2 - covered hopper
3 - refrigerated
4 - flat car
5 - gondola
6 - other, please specify _____

Number of tractor-trailer rigs:

Owned _____ (22-24) How long owned? _____ (25-26)

Leased _____ (27-29) How long lease? _____ (30-31)

Number of truck drivers (grain) on your payroll. (Not for hire independents) _____ (32-34)

(10) ___ (12)
(13) ___ (15)
(16) ___ (18)
(19) ___ (21)
(22) ___ (24)
___ (26)
(27) ___ (29)
___ (31)
(32) ___ (34)

APPENDIX B

Appendix B
North Dakota Grain Handling and Merchandising Study

CARD 1

1. Name of Elevator_____
   Owner_____
   Manager_____

   Elevator Identification Number _____ (1-3)

2. What is the age of the elevator (main house)? ____ years (7-8)

   Type and time of expansion: (0 = flat; 1 = upright)

   _____ type (9) _____ time (10-11)
   _____ type (12) _____ time (13-14)
   _____ type (15) _____ time (16-17)
   _____ type (18) _____ time (19-20)
   _____ type (21) _____ time (22-23)

   What is the capacity of main house? _____ bushels (24-30)

   What is the capacity of the annex(es)? _____ bushels (31-37)

3. Number of people employed? ____ full-time (38-39) ____ part-time (42)

   What, in you opinion, is the current value of this elevator? (Including land and building) $_____ (50-56)

   What are the annual property taxes paid by your elevator? $_____ (57-61)

4. What is the present rail service on your branch?
   _____ times per week (62)

5. What is the current exempt truck rate for wheat from your elevator to:

Duluth? _____¢/cwt. (63-67) (63) (67)

Minneapolis? _____¢/cwt. (68-72) (68) (72)

If known, Pacific Northwest? _____¢/cwt. (73-77) (73) (77)

CARD 2

Elevator Identification Number (1-3) (1) (3)

6. What percentage of the elevator's earnings originate from:

Handling and storing grain? _____percent (18-20) (18) (20)

Sales of other services and merchandise available? _____percent (21-22) (21) (22)

Please check other services and merchandise available.
1 = yes; 0 = no

_____seed for sale (23)	(23)	_____flour (24)	(24)
_____custom cleaning (25)	(25)	_____oil (26)	(26)
_____drying (27)	(27)	_____gas (28)	(28)
_____fertilizer (29)	(29)	_____salt (30)	(30)
_____chemicals (31)	(31)	_____wire (32)	(32)
_____lumber (33)	(33)	_____dryrolling (34)	(34)
_____feed (35)	(35)	_____steam rolling (36)	(36)
_____coal (37)	(37)	_____general farm supplies (38)	(38)
_____grinding (39)	(39)	_____general merchandise (40)	(40)
_____twine (41)	(41)	_____other, please specify (42)	(42)
_____sprayers (43)	(43)	_____other, please specify (44)	(44)

CARD 3

Elevator Identification Number (1-3) ____ (1) (3)

7. Percent of grain received by your elevator by farmers estimated distance from elevator (radius):

0 - 5 miles	_____ percent (68-69)	(68) (69)
5 - 10 miles	_____ percent (70-71)	(70) (71)
10 - 15 miles	_____ percent (72-73)	(72) (73)
15 - 20 miles	_____ percent (74-75)	(74) (75)
Over 20 miles	_____ percent (76-77)	(76) (77)
	100 percent	

CARD 4

Elevator Identification Number (1-3) ____ (1) (3)

Percent of grain received by:

single axle truck	_____ percent (4-5)	(4) (5)
tandem axle truck	_____ percent (6-7)	(6) (7)
other, please specify	_____ percent (8-9)	(8) (9)
	100 percent	

Number of tractor-trailer rigs: ____ (22) (24)

Owned _____ (10-12) Leased _____ (27-29) ____ (27) (29)

APPENDIX C

Appendix C

ELEVATOR SURVEY UPDATE:

1. Which railroad services your elevator? (Check the one(s))

   BN_____ SOO_____ MILWAUKEE_____ C & NW_____

2. How many days a week do you have railroad service at your elevator?

   _____

3. What is the load out capacity for your elevator:

   _____bushels per hour (or days) now

   _____bushels per hour, five years ago

4. How many freight cars do you own or lease?

		Present	Five Years Ago
Number Owned -	boxcars	_____	_____
	hopper cars	_____	_____
Number Leased-	boxcars	_____	_____
	hopper cars	_____	_____

5. What do you feel is the most difficult problem facing grain elevators in North Dakota?

   _____

   _____