REGIONAL ELEVATOR SURVEY: GRAIN TRANSPORTATION AND INDUSTRY TRENDS FOR GREAT PLAINS ELEVATORS

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INTRODUCTION

Local grain elevators are a critical juncture in the grain marketing system. These facilities, estimated to be more than 8,000, accumulate grain in quantities that make longer-distance markets economically feasible.[1] In this role, they provide various marketing, production, and crop conditioning services. The prices offered and investment decisions made by elevator operators signal trends or changes in the producer-to-consumer marketing patterns. Identifying and understanding these signals is important to rural infrastructure planning and agricultural sector development.

Objective

One potential means for gaining insight into the current state of the elevator industry, and into expectations for future trends, is through a survey. The objective of this study is to profile the transportation and industry characteristics of the elevators located in the Great Plains region of the United States. Transportation characteristics consider farm-to-elevator procurement and outbound elevator-to-market movements. In addition, elevator managers were asked to describe their operations and offer opinions regarding importance of issues pertinent to the future of the elevator industry.

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[1]The population of "licensed grain storage facilities" includes local grain elevators, terminal grain facilities, export facilities, and processing plants with adjacent storage. Therefore, a more applicable definition of the "local grain elevator" population may be the USDA Uniform Grain & Rice Storage Agreement participants (UGRSA). The UGRSA allows elevators to handle Commodity Credit Corporation (CCC) grain. Under the UGRSA elevators submit agreements to license individual facilities. Approximately 8,000 to 9,000 UGRSA agreements are completed each year (USDA).

Survey Development and Application

The Upper Great Plains Transportation Institute extended an invitation to nine state elevator organizations in developing and distributing the survey. The purpose was two-fold. First, survey costs would be lowered as state organizations incurred survey mailing costs, allowing the inclusion of a larger region in the project. Second, the state organizations suggested that response from a mailing done by their organizations may elicit a higher response rate than a mailing done by a third party.

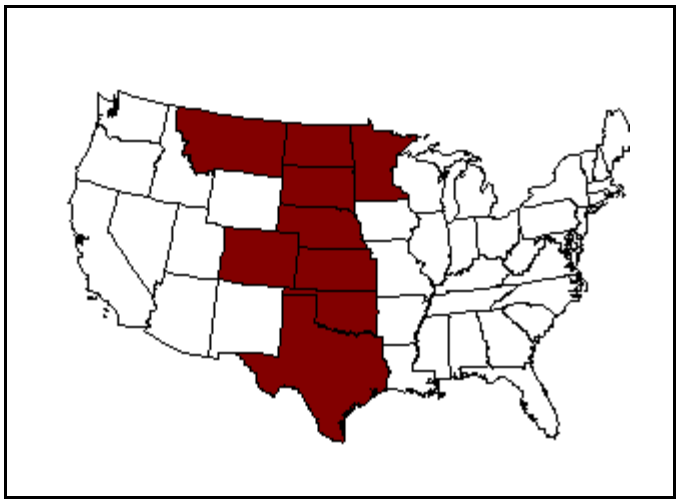

Figure 1. States Participating in the Regional Elevator Transportation Survey

A survey was drafted by the Upper Great Plains Transportation Institute, with the assistance of nine state elevator organizations. A group letter from organizations participating in the survey also was composed as a supplement to the survey mailing. To encourage participation, respondents were offered the opportunity to receive a copy of the survey results. Nine state elevator organizations, including Colorado, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas, cooperated in a test

mailing of the survey in December 2000. To test the survey, each state organization was asked to distribute surveys to two members of their board. Based on these responses, the Upper Great Plains Transportation Institute made minor revisions to survey content and format. The final mailing of the revised survey, along with the group letter and results request card, was completed by state organizations in February 2001.[2] The state organizations mailed a total of 2,604 surveys to their members. A total of 518 usable survey responses were returned by elevators from the nine participating states.[3] This level of response is satisfactory considering the length and scope of the survey.

Table 1. Distribution of Survey Responses, by State

State	Surveys Mailed	Responses Received	Response Rate
Colorado	119	30	25%
Kansas	428	89	21%
Minnesota	190	57	30%
Montana	119	27	23%
Nebraska	380	68	18%
North Dakota	428	103	24%
Oklahoma	285	50	18%
South Dakota	180	34	19%
Texas	475	60	13%
Total	2,604	518	20%

[2]South Dakota distributed surveys in June 2001.

[3] Two respondents indicated they were flour mills. These responses were eliminated from the analysis.

Response rates from individual states range from a high of 30 percent from Minnesota elevators, to a low of 13 percent from Texas elevators. Responses were received from 25, 24, and 23 percent of the elevators in Colorado, North Dakota, and Montana, respectively. Response rates were slightly lower, between 21 and 18 percent, for Kansas, South Dakota, Nebraska, and Oklahoma.

ELEVATOR INDUSTRY CHARACTERISTICS

Understanding and predicting grain marketing patterns begins with a basic knowledge of industry characteristics. Some key characteristics considered in defining the elevator industry in the Great Plains were activity, size, and business structure. This information provides some background for understanding variations in elevator marketing and investment decisions.

Grain Storage and Handle

Other factors such as size, non-grain merchandising activities, truck ownership, and rail access also may provide insights into potential impacts of local and national agricultural policy changes. Elevator size may be indicated by storage capacity and average annual grain handle. Average capacity for survey respondents is 2,217 thousand bushels and average handle is 4,577 thousand bushels. As expected, a greater deviation from the mean is indicated for handle than for capacity, as the standard deviation for handle is 12,114 thousand bushels and for storage is 3,902 thousand bushels. Elevators in South Dakota report the highest annual grain handle, with an average 8,520 thousand bushels. Among states considered in the study, the lowest per facility is in Montana at 2,573 thousand bushels per

year. Texas facilities report the highest average storage capacity, with 3,264 thousand bushels per facility. The lowest storage capacity, as with handle, is in Montana. Elevators in Montana report just more than one-half a million bushels of storage capacity – 503,815 bushels, on average.

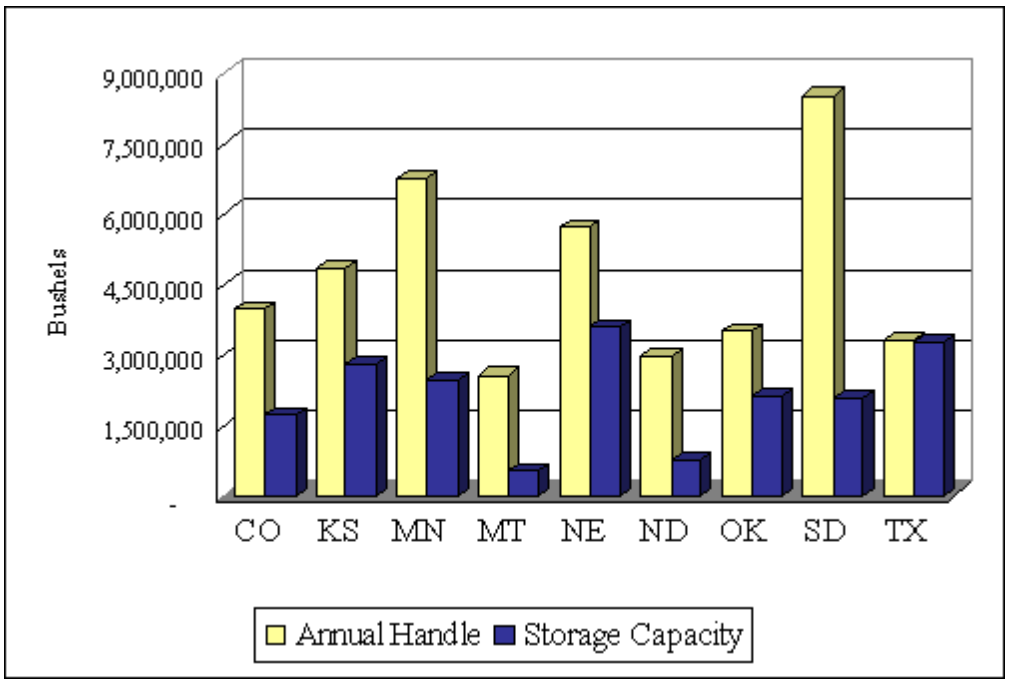

Figure 2. Elevator Handle and Capacity, Average by State

Storage capacity is considered a basic elevator characteristic. Thus, differences and similarities in elevator transportation and marketing characteristics, based on storage capacity, may provide insight into the industry. Elevators are grouped among four ranges of storage capacity so elevator transportation and marketing patterns can be assessed, based on storage capacity. The four ranges for capacity are:

			Distribution of Respondents
Capacity A	=	0 to 489,999 Bushels	125
Capacity B	=	490,000 to 999,999 Bushels	122
Capacity C	=	1,000,000 to 2,199,999 Bushels	129
Capacity D	=	2,200,000 Bushels and Greater	126

Intensity of use and overall activities of facilities may be indicated not only by volume, but also by the number of times a facility turns its storage capacity in handling grain volumes during the year. Based on statewide summaries of handle and storage capacity, elevators turn over their storage capacity 2.7 times per year. Elevators in Montana are the most intense users of capacity, turning volume 5.1 times per year. Montana turns its storage capacity 2.2 times more than the average for all states considered in the survey. South Dakota is second highest among states, considering turnover ratio, as the elevators in the state turn their 2,081 thousand bushels of storage more than 4.1 times per year. North Dakota has a similar rate of turnover as their average annual handle of 4,043 thousand bushels generates average turnover of storage capacity equal to 4.0.

Minnesota is at the average for all states with its 2.7 turnover ratio, as its facilities handle an average 6,754 thousand bushels each year. Turnover ratios for Kansas, Oklahoma, and Nebraska are similar at 1.8, 1.7, and 1.6, respectively. On average, each facility in Kansas handles 4,868 thousand bushels per year. Oklahoma elevators each handle an average 3,512 thousand bushels. Average handle in Nebraska is higher at 5,713 thousand bushels per

year. As illustrated, elevator size can vary depending on characteristics used to describe the elevator industry.

The efficiency of individual facilities in states and the concentration of volume in these facilities varies. A measure of average turnover ratios (weighted by handle) among elevators in each state is provided to account for these variations. Elevators in Montana have the highest turnover, with an average of 7.8. Turnovers range from this high to a low of 2.2 for Nebraska elevators. Elevators in Oklahoma and Texas are second and third, turning volumes over six times each year. The rather large difference between the state and weighted

Table 2. Turnover Ratio, for State and Individual Elevators

State	*Responses*	State Turnover[1]	Weighted Average for Elevators in State[2]
Colorado	*28*	2.3	4.8
Kansas	*87*	1.8	2.9
Minnesota	*57*	2.7	3.5
Montana	*25*	5.1	7.8
Nebraska	*65*	1.6	2.2
North Dakota	*95*	4.0	5.6
Oklahoma	*48*	1.7	6.5
South Dakota	*30*	4.1	4.1
Texas	*55*	1.0	6.2
Average		2.7	4.1

[1] Total State Handle/Total State Storage Capacity

[2] Average of Individual Elevator Turnover Ratios, Weighted by Handle

average turnovers for these states suggest that volume tends to be concentrated in fewer, more active facilities, with a large population of relatively less active low volume facilities maintaining a substantial segment of the storage capacity. These characteristics are important

to consider in discussing impacts of policies and market phenomenon that promote elevator rationalization and on-farm storage investments.

Rail Access and Truck Ownership

In addition to the influence of product sales and application services on the elevator industry, rail access, and truck ownership are important factors in understanding grain merchandising decisions of managers. Given its qualities of relatively high homogeneity and low product value, grain typically is most efficiently handled in bulk quantities. It is assumed that most elevators in the survey region had rail access when they were established, as railroads used these facilities to gather grain delivered from the local area by horse and wagon. Advancements in technology and marketing, as well as business decisions of railroads and producers, have contributed to a rationalization of rail and elevator networks. One-quarter of elevators responding to the survey reported having no direct access to rail. For those facilities with access to rail, a key factor in understanding economics in marketing decisions is the level of access.

The level of access is termed "shipper size" for purposes of this report. The definition of shipper size is based on the track space an elevator has for spotting a delivery of rail cars. Five levels of shipper size are defined, based on the rate differentials railroads offer in public rate tariffs. The shipper size definitions are:

No Rail	=	No Rail Access
Single Car	=	1 to 24 Cars
Multicar	=	25 to 49 Cars
Unit Train	=	50 to 99 Cars
Shuttle	=	100 Cars or More

Single car shippers form the largest component of the elevator industry, based on number of facilities, with 35 percent of elevators reporting ability to spot 1 to 24 rail cars. No rail facilities were second, in number, among levels of shippers size, as noted previously, with 25 percent. The prevalence of multicar and unit train facilities were similar, as 14 and

Table 3. Distribution of Elevator Shipper Size, by State

State	*Responses*	No Rail	Single Car	Multicar	Unit Train	Shuttle
Colorado	*30*	17%	50%	10%	17%	7%
Kansas	*88*	32%	52%	9%	1%	6%
Minnesota	*57*	26%	32%	14%	15%	12%
Montana	*25*	7%	40%	0%	48%	4%
Nebraska	*65*	29%	26%	10%	19%	14%
North Dakota	*97*	19%	28%	22%	25%	6%
Oklahoma	*49*	36%	36%	16%	4%	8%
South Dakota	*32*	53%	6%	9%	18%	15%
Texas	*57*	30%	40%	23%	5%	1%
All	*516*	28%	35%	14%	15%	8%

15 percent of the facilities could spot the larger trains, respectively. Shuttle train, a relatively new level of shipper size, is available at 8 percent of the elevator locations, based on survey responses.

Single car facilities are the most prominent shipper size for seven of the nine states. In the two remaining states, Nebraska and South Dakota, no-rail elevators are most common among elevators, considering shipper size. These states also have the largest percentage of facilities attributed to the shuttle type shipper. Fourteen percent of Nebraska respondents and 15 percent of South Dakota respondents have track space to spot delivery of 100 rail cars or more. Montana and North Dakota elevator industries have the largest investment in unit train facilities, considering numbers among the alternative shipper sizes. Factors such as distance to market, rail competition, and truck capacity influence the elevator decisions to invest in rail capacity. Structure of the elevator industry, considering rail access, varies among states queried in the survey (Table 3). Level of rail access and its relationship to elevator marketing patterns is considered in detail later in the report.

Truck ownership also may be influential in elevator marketing patterns. Based on survey responses, 44 percent of elevators in the nine-state region own at least one semi-truck and trailer. For facilities with at least one truck, truck ownership peaks at 87 trucks. The average number of trucks among these facilities is four. Truck ownership is a consideration in discussing local grain marketing patterns.

Non-Grain Sales and Services

Grain merchandising is not the only activity of elevators, as providing other products and services may allow an elevator to spread risk by diversifying business interests, attracting and retaining customers, and better managing its human resources. Involvement in other activities may influence the marketing decisions of elevators. For instance, if an elevator is a

supplier of bulk fertilizer, the fertilizer may offer a back haul opportunity for truck deliveries of grain to other markets. The three agricultural products/services considered in this survey are chemical product sales, fertilizer product sales, and product application services.

Table 4. Elevator Operations that Include Product and Service Sales, Each State

State	*Responses*	Chemical Sales	Fertilizer Sales	Application Services
Colorado	*27*	43%	47%	40%
Kansas	*88*	75%	79%	66%
Minnesota	*57*	75%	72%	67%
Montana	*25*	52%	48%	41%
Nebraska	*65*	56%	60%	49%
North Dakota	*97*	63%	67%	45%
Oklahoma	*49*	86%	88%	74%
South Dakota	*32*	82%	79%	76%
Texas	*57*	50%	52%	32%
Average	*518*	66%	68%	54%

Approximately two-thirds of the respondents sold chemical and fertilizer products. Slightly more than half, 54 percent, offered application services for the products. Based on the products and services considered in the survey, Oklahoma elevators indicated the most diversity. Approximately 86 and 88 percent of respondents sell chemicals and fertilizer, respectively, and 74 percent provide application services. Colorado elevators indicated less diversification than other states with approximately 45 percent of elevators selling chemical and fertilizer products, and 40 percent providing application services.

Business Structure

Six main forms of business organization were identified as potential for elevator business structure: closed corporation, line-house of major grain company, line-house of regional grain company, locally owned and controlled corporation, partnership, and sole proprietor. A majority of the respondents, 52 percent, reported to be operating as locally owned and controlled cooperatives. The next most common business structure is closed corporation at 146, or 28 percent of the elevators operate under this business structure (Figure 3). Approximately 6 percent of the respondents were sole proprietorships. Eight percent of the elevators reported to be line-houses of major grain companies (4 percent) or regional

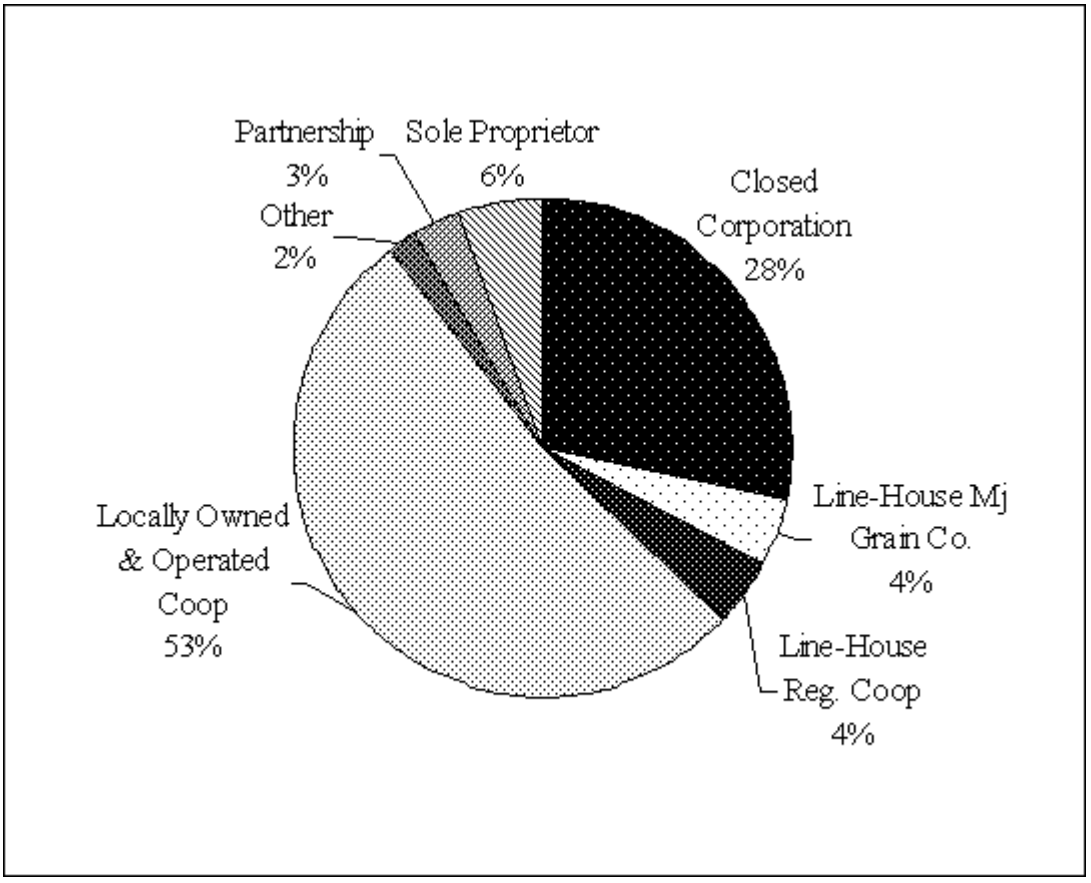

Figure 3. Elevator Business Structure

cooperatives (4 percent). Partnership structure is least common among the six business structures with 16 respondents, or 3 percent, functioning under this arrangement. In addition, a few elevators did indicate they were organized as limited liability corporation structures by listing L.L.C. as "Other" business structure in Question 8.

Ownership structures for elevators in each state vary. In Colorado, two-thirds of the elevators are divided evenly between the locally owned cooperative and closed corporation alternatives. Among elevator facilities in Kansas, 59 percent are locally owned and controlled cooperatives. Thirty percent of the elevators in Kansas are closed corporations. Elevator operators in Minnesota reported to operate under three business structures: local cooperative, sole proprietorship, and closed corporation. Three-fourths of the elevators are local cooperatives, with the balance split 21 and 4 percent between the closed corporation and sole proprietor structures, respectively. Montana deviates from other elevators when business structure is characterized, with line-houses of major grain companies the most common response. Closed corporation and line-house of major grain companies are next in frequency, with 44 percent of the elevators divided equally between these structures. Locally owned cooperatives, the most common overall survey response, is fourth among prevalence of business structures in Montana elevators.

North Dakota elevators report a strong presence of locally owned and controlled cooperatives, 48 percent. Closed corporation is second in frequency among business operating structures at 22 percent. Line-house of major grain companies and sole proprietorship each account for 10 percent, respectively. Similar business structures are found in Nebraska with 47 percent of the respondents reporting to be local cooperatives and

32 percent closed corporations. The next most common structure in Nebraska is line-house of major grain companies at 7 percent A majority of elevators in Oklahoma reported to be locally owned and controlled cooperatives, 67 percent. Closed corporation is the next most common form of ownership. None of the elevators in Oklahoma are line-houses for regional or major grain companies.

South Dakota elevators operate primarily as locally owned and controlled cooperatives, based on survey responses with 79 percent reporting this structure. Elevators in Texas, as with Colorado, report closed corporation as the most prevalent form of business structure (48 percent). Locally owned cooperatives are next among the business structures of Texas elevators at 32 percent. The similarities and distinctions among elevator business structures in each state provide a piece of information that is useful in understanding how policy might affect elevator networks among states in the region west of the Mississippi River.

Table 5. Business Structure of Elevators, by State

State	*Responses Received*	Closed Corporation	Line-House of Mj. Grain Co.	Line House of Regional Grain Co.	Locally Owned & Operated Cooperative	Partnership	Sole Proprietorship	Other
Colorado	*30*	**33%**	17%	3%	**33%**	3%	6%	3%
Kansas	*89*	29%	1%	0%	**59%**	3%	3%	3%
Minnesota	*57*	21%	0%	0%	**75%**	0%	4%	0%
Montana	*27*	22%	**29%**	22%	19%	4%	4%	0%
Nebraska	*68*	32%	7%	4%	**47%**	1%	6%	1%
North Dakota	*103*	23%	3%	10%	**48%**	6%	10%	1%
Oklahoma	*49*	27%	0%	0%	**67%**	2%	4%	0%
South Dakota	*34*	14%	3%	0%	**80%**	0%	3%	0%
Texas	*60*	**48%**	0%	3%	32%	3%	8%	5%

GRAIN MOVEMENT

Three major grains considered in this project are corn, soybeans, and wheat. These grains accounted for more than 90 percent of U.S. grain and oilseed production in recent years (NASS). Therefore, understanding the marketing characteristics and shipment patterns associated with these commodities provides an excellent base for discussing policy and infrastructure needs of the rural grain sector.

Survey respondents from the Great Plains region reported an aggregate annual grain handle of 2.5 billion bushels. This volume is equal to approximately 16 percent of the total U.S. grain production. Among the survey responses, corn accounts for the largest volume among the commodities, followed by wheat and then soybeans. The average handle per

elevator is 4,979 thousand bushels. The bushel total is comprised of 36 percent corn, 35 percent wheat, 14 percent soybean, and 15 percent other commodities. Composition of bushels for individual states, based on survey responses, is summarized in Appendix A

As these bushels move from field to consumer, the elevator plays a key role in linking supply and demand. The shipment characteristics of the elevator industry are considered in two segments. The first segment is the farm-to-elevator or procurement move. The second segment is the elevator-to-user distribution. The user may be associated with processing, feeding, or exporting the raw grain product. These two segments are distinct, surrounded by unique equipment and infrastructure demands and market phenomena, yet are interrelated in their goal to move product to market in an efficient and economical manner.

Grain Procurement

With regard to the farm-to-elevator movement, elevators were asked to define the distribution of origins for the grain they accumulate. They also were asked to describe the truck equipment farmers used for deliveries from the farm origin to the elevator. In addition, they were asked if they purchased grain FOB (free on board) the farm. The elevator is responsible for the delivery from farm-to-elevator for FOB farm grain purchases.

Elevators reported that they gathered more than one-half the bushels handled from within 15 miles of their elevator. On average, elevators purchase 33 percent of the grain they handle from a draw area defined by an eight-mile radius around the elevator. Twenty-three percent is delivered from an area between eight and 14 miles from the elevator. Approximately 16 and 12 percent are drawn from radii of 15 to 29 miles and 30 to 44 miles, respectively. Elevators drew 16 percent of the bushels they handle from a region beyond 45 miles of their facility. A distribution of bushels, by commodity, for elevators in each state's draw area is included in Appendix B.

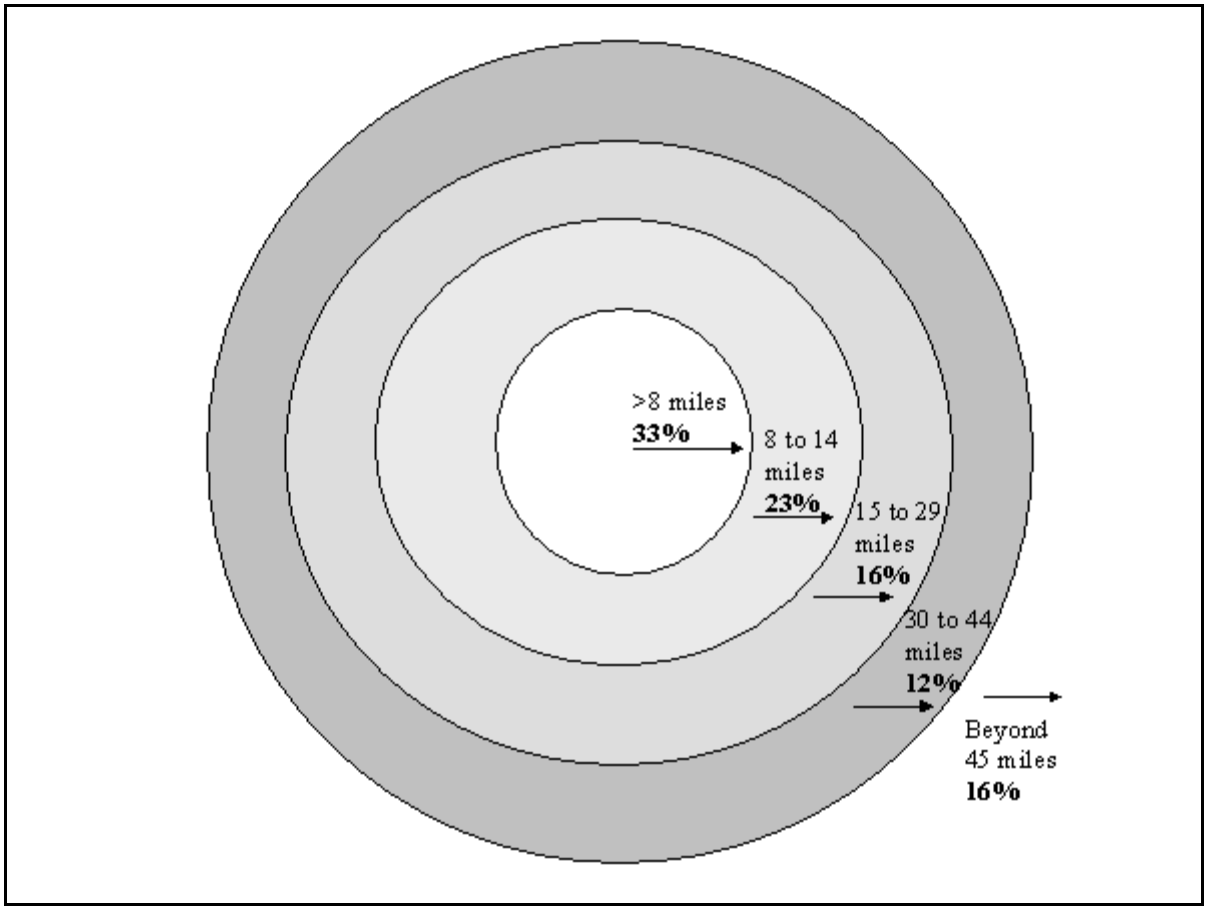

Figure 4. Distribution of Elevator Handle, by Delivery Distance

Regarding FOB farm purchases, elevators reported 11 percent of the grain they buy is handled via this type of purchase. The prevalence of this form of grain procurement varies among states, accounting for 6 to 24 percent of the grain handle reported by respondents. Colorado elevators report the greatest prevalence of FOB grain procurement, as 24 percent of the total bushels handled by elevators are secured through FOB purchases. Texas and Kansas elevators report the least disposition to use FOB farm grain procurement, as only 6 percent of bushels are purchased through this type of agreement. FOB purchases may allow local planners to work with the industry in planning and traffic management.

Table 6. Inbound Grain - FOB Purchases as a Percent of Grain Handled, by State

	Respondents	FOB Purchases
Colorado	*27*	24%
Kansas	*88*	6%
Minnesota	*57*	13%
Montana	*25*	13%
Nebraska	*65*	10%
North Dakota	*97*	14%
Oklahoma	*49*	19%
South Dakota	*32*	9%
Texas	*58*	6%
All	*498*	11%

Proximity to grain handled is an important component in determining infrastructure needs. To further assess this factor, grain drawn from within a 14-mile radius of the elevator

is considered a local market draw and compared to grain draw from beyond the 14-mile radius as a peripheral market. Considering the differences in proximity to draw area across elevators, based on state, storage capacity, and shipper size, draw areas are found to be significantly different among elevator groups based on state (Chi=35.4, $\propto$=.00) and shipper size (Chi=15.6, $\propto$=.00). A significant relationship is not found between proximity to grain handled and storage capacity (Chi=.29, $\propto$=.96).

Eighty percent of the elevators responding to the survey gathered a majority of the grain they handled from an area within 14 miles of their facility. More elevators in Kansas draw a majority of their bushels from the local market (within 14 miles) than elevators of other states in the survey, based on responses. For Kansas responses, 93 percent of the elevators report that they draw a majority of the grain handled from a 14-mile radius. Minnesota elevators also reported relatively close proximity to bushels handled, with 91 percent of the respondents drawing a majority of bushels from their local market area.

Deliveries to Montana elevators are least likely to be of distances under 15 miles, as less than half (43 percent) of these elevators reported that they accumulated a majority of the grain handled from origins within 14 miles. Elevators in South Dakota, North Dakota, Colorado, and Texas are more dependent on peripheral market, compared to the average of all respondents, drawing 68 to76 percent of the grain they handle from an area within 14-miles of their facility. Elevators in Oklahoma and Nebraska are more dependent than the average, on the local draw area, as 81 and 83 percent, respectively, of elevators draw a majority of the grain handled from origins within 14-miles of the elevator.

Table 7. Share of Elevators Drawing Majority of Grain Handled from Local Market (within a 14-Mile Radius of Elevator), by State

	Respondents	0 to 49% of Grain Handled	50 to 100% of Grain Handled
Colorado	*21*	24%	76%
Kansas	*80*	8%	92%
Minnesota	*55*	9%	91%
Montana	*21*	57%	43%
Nebraska	*64*	17%	83%
North Dakota	*84*	25%	75%
Oklahoma	*43*	19%	81%
South Dakota	*34*	32%	68%
Texas	*51*	24%	76%
All	453	20%	80%

Survey results suggest that shipper size, based on rail capability, also is related to the spans of an elevator draw area. More than 80 percent of no-rail, single car, and multicar elevators report that they draw a majority of the grain handled from the local market, within 14 miles of the facility. Approximately one in four unit train facilities depend on the peripheral market for a majority of the grain handled. Shuttle facilities are the elevator group least likely to be dependent on a local draw area, as 40 percent of these respondents drew a majority of the grain handled from origins beyond 14 miles of their elevator.

Table 8. Share of Bushels Drawn from within a 14-Mile Radius of Elevator, by Shipper Size

State	*Respondents*	0 to 49%	50 to 100%
No Rail	*120*	16%	84%
Single Car	*155*	16%	84%
Multicar	*67*	19%	81%
Unit Train	*69*	28%	72%
Shuttle	*40*	40%	60%
All	*451*	20%	80%

The equipment employed in inbound grain deliveries also has important implications for infrastructure needs and local market patterns. A majority (54 percent) of the grain delivered to elevators responding to this survey arrived via semi-truck and trailer. Tandem axle equipment accounted for the next largest share, 25 percent, of inbound grain deliveries, considering equipment.

Single axle trucks are attributed 12 percent of the inbound bushels. Tri-axle and other equipment, such as grain carts, are used in 6 and

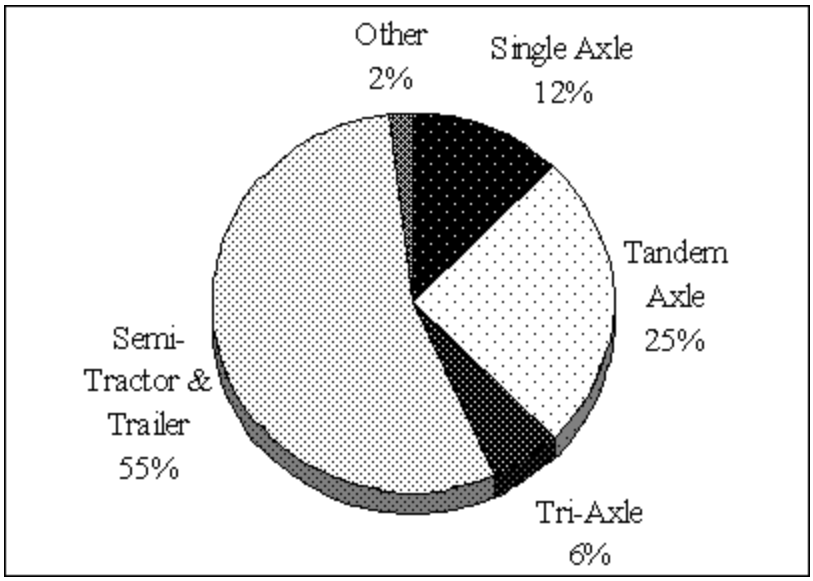

Figure 5. Composition of Equipment Employed for Grain Deliveries Made to Great Plains Elevators

2 percent of inbound grain delivery, respectively. A summary of procurement equipment statistics is provided in Appendix C.

Table 9. Equipment Employed in Inbound Grain Deliveries, Distribution of Bushels by State

	Respondents	Single Axle	Tandem Axle	Tri-Axle	Semi-Tractor & Trailer	Other
Colorado	*27*	6%	16%	7%	70%	0%
Kansas	*87*	16%	29%	2%	52%	0%
Minnesota	*57*	12%	27%	7%	51%	4%
Montana	*25*	12%	15%	3%	70%	0%
Nebraska	*65*	18%	30%	1%	46%	4%
North Dakota	*97*	11%	27%	19%	41%	2%
Oklahoma	*48*	11%	24%	12%	52%	0%
South Dakota	*32*	10%	26%	4%	59%	2%
Texas	*58*	5%	12%	1%	76%	6%
All	*496*	12%	25%	6%	54%	2%

Because the inbound component is important for local planning, it is important to recognize differences within the rather large Great Plains region. For additional assessment of inbound grain deliveries, those respondents reporting that they receive a majority of deliveries via semi-truck and trailer were compared to responses reporting that less than 50 percent of their inbound grain deliveries are made via semi-truck and trailer. Variance in inbound semi-truck trailers among deliveries is statistically significantly at the 99th percentile, considering state (Chi=65.56, $\propto$=.00), storage capacity (Chi=14.7, $\propto$=.00), and shipper size (Chi=17.1, $\propto$=.00) of recipient elevator.

More than 80 percent of the respondents in Colorado, Montana, and Texas reported that a majority of the grain handled was delivered via semi-truck and trailer. In contrast, only 32, 36, and 41 percent of the elevators in Minnesota, North Dakota, and South Dakota, respectively, report a majority of the grain handled is delivered with semi-truck and trailer. The use of semi-trucks and trailer for inbound grain deliveries has important implications for the elevator industry and local infrastructure planners. These higher capacity trucks allow producers to increase the spans of the market they consider in grain delivery due to economies associated with hauling more bushels over longer distances.

Table 10. Inbound Grain Delivery made via Semi-Truck and Trailer, by State

	Respondents	0 to 49% Inbound via Semi	50 to 100% of Inbound via Semi
Colorado	*28*	18%	82%
Kansas	*86*	59%	41%
Minnesota	*56*	68%	32%
Montana	*27*	19%	81%
Nebraska	*68*	50%	50%
North Dakota	*101*	64%	36%
Oklahoma	*48*	42%	58%
South Dakota	*34*	41%	59%
Texas	*59*	19%	81%
All	507	48%	52%

Considering a relationship between elevator storage and equipment used for inbound deliveries, truck size and elevator storage capacity are positively related. A majority of elevators with less than 2.2 million bushels of storage capacity report that less than half of the

grain received is delivered via semi-tractor and trailer. In contrast, two of three elevators with storage capacity greater than 2.2 million bushels attributed more than half the grain they receive to semi-tractor and trailer delivery equipment.

Table 11. Inbound Grain Delivery made via Semi-Truck and Trailer, by Capacity

	Respondents	0 to 49% Inbound via Semi	50 to 100% of Inbound via Semi
1 to 489,999 Bushels	*119*	56%	44%
490,000 to 999,999 Bushels	*122*	53%	47%
1,000,000 to 2,199,999 Bushels	*129*	51%	49%
2,200,000 or More Bushels	*123*	33%	67%
All	493	48%	52%

Shipper size, based on rail loading capabilities, is the final relationship considered in the inbound equipment discussion. As illustrated in the following table, a positive relationship exists between shipper size and capacity of inbound delivery equipment. For no-rail and single car elevators, 56 and 54 percent of respondents, respectively, report that grain is delivered to their elevator with equipment other than the semi-tractor and trailer. Nearly two in three of the multicar and unit train respondents report that a majority of grain receipts are via semi. Shuttle equipped facilities report slightly greater prevalence of semis in grain deliveries made to their elevators, as 33 percent report a majority of the inbound grain loaded on semis.

Table 12. Inbound Grain Delivery made via Semi-Truck and Trailer, by Shipper Size

	Respondents	0 to 49% Inbound via Semi	50 to 100% of Inbound via Semi
No Rail	*136*	56%	44%
Single Car	*180*	54%	46%
Multicar	*70*	37%	63%
Unit Train	*78*	37%	63%
Shuttle	*40*	33%	67%
All	504	48%	52%

Grain Distribution

Primary elevator activities are centered on the distribution of raw grain product. It is important to understand current market flows and the parameters that influence them. Respondents provided insight into marketing decisions by describing their marketing activities, discussing factors that influence modal decisions for outbound grain and detailing certain aspects of rail and truck alternatives.

Modal distribution of grain shipments originating from elevators in the nine-state region is dominated by rail and truck. Based on survey responses, railroads handle 51 percent of annual shipments, truck 45 percent, and barge the remaining 4 percent. Distribution among the modes varies by commodity. Trucks handle a majority of the corn (52 percent) and other commodity (53 percent) bushels, while railroads are hired to transport the largest share of soybeans (48 percent) and wheat (52 percent). Barges are attributed with moving 1, 9, 22, and 15 percent of the corn, soybeans, wheat, and other commodities, respectively.

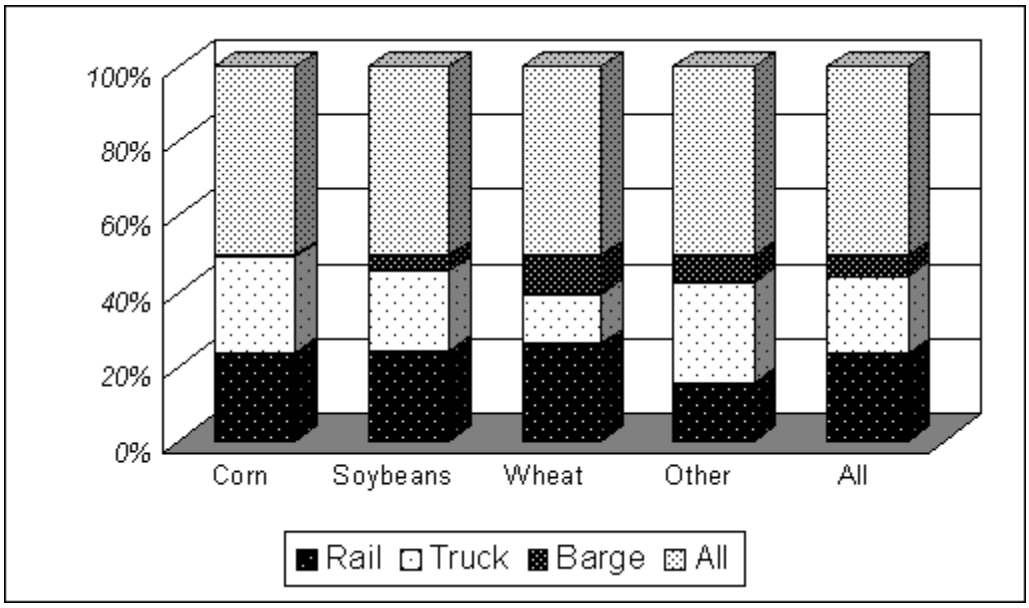

Figure 6. Mode for Grain Shipments, by Commodity

Distinguishing modal selection factors provides valuable information regarding distribution patterns associated with individual elevators. Modal selection was considered by categorizing shippers into four groups, those shipping 0 to 24, 25 to 49, 50 to 74, and 75 to 100 percent of their grain via rail. The relationship between rail activity and three basic characteristics: size - measured by storage, rail capability - measured by shipper size, and location - measured by state, are considered. Survey response results suggest that each of the factors should be considered in assessing modal distribution. Each of these variables has a statistically significant relationship to level of rail shipping in all grain shipments. The propensity of an elevator to choose rail is significant for each variable considered - storage capacity (Chi=26.1, $\propto$=.01), shipper size (Chi=115.3, $\propto$=.00), and state (Chi=205.1, $\propto$=.00) - at the 99th percentile.

Table 13. Mode for Grain Distribution, by Capacity

	Respondents	Rail	Truck	Barge	000 Bushels
1 to 489,999 Bu.	*125*	34%	52%	2%	131,736
490,000 to 999,999 Bu.	*122*	41%	44%	14%	252,908
1,000,000 to 2,199,999 Bu.	*129*	49%	50%	1%	458,544
2,200,000 or More Bu.	*126*	53%	44%	3%	1,394,093
All		51%	45%	4%	2,237,281

Storage capacity and rail shipments are positively related, as indicated in Table 13. Respondents with less than 490,000 bushels market approximately one-third of the grain handled via rail, while respondents with more than 2.2 million bushels of storage market more than one-half (53 percent) of the grain handled via rail.

Level of rail access and proclivity to market grain via rail are positively related, based on survey responses. This relationship is expected, as previous investment in rail access and observed rail pricing strategies favor larger shipment sizes. Shuttle train facilities, assumed to have the largest investment in rail shipping capacity, market 81 percent of the grain handled through the rail system. Unit train shippers, also with substantial rail investments, ship approximately two-thirds of the grain in rail cars.

Table 14. Mode for Grain Distribution, by Shipper Size

	Respondents	Rail	Truck	Barge	000 Bushels
No-rail	*143*	6%	80%	13%	326,954
Single Car	*181*	21%	77%	1%	412,203
Multicar	*73*	44%	53%	0%	323,829
Unit Train	*78*	63%	34%	2%	506,945
Shuttle	*41*	81%	15%	4%	707,200
All	*516*	51%	45%	4%	2,277,131

As a whole, the balance of the elevator population markets less than half the grain via rail, instead favoring the truck alternative. These modal tendencies do vary significantly among elevators in each of the shipper size groups. No-rail shippers reported little use of rail in marketing the volume they handle. Approximately 6 percent of the grain handled is delivered to customers via rail. Because these facilities have no direct access to rail, it is assumed that this volume is being transferred to another facility where it can be loaded on to rail cars.

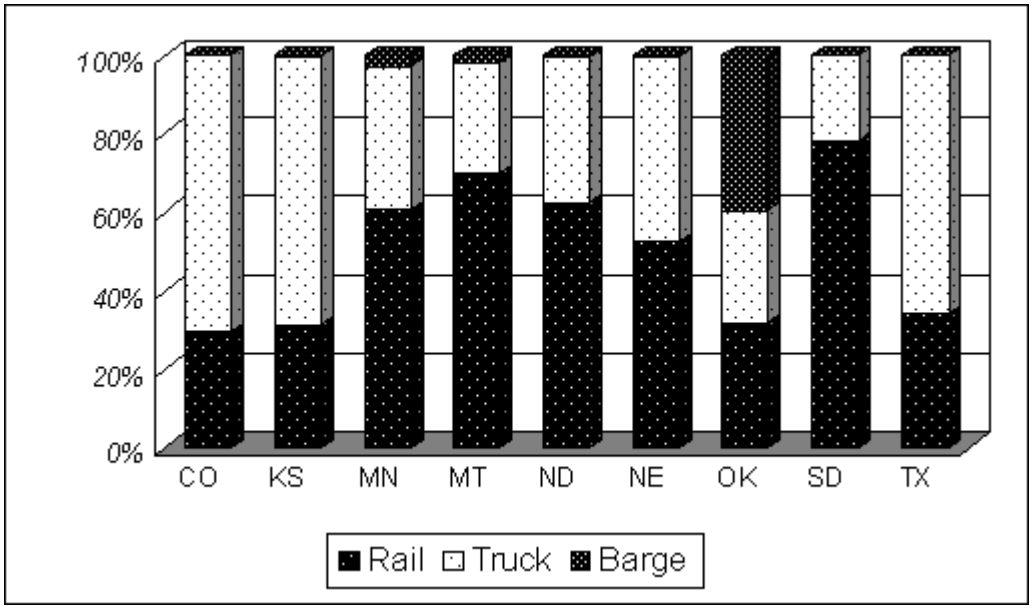

Figure 7. Modal Distribution of Grain Shipments, by State

The relationship between location of elevator and use of rail in marketing grain is illustrated in Figure 7. The location is defined by state. Bushels originated by elevators in South Dakota are most likely be marketed via rail, compared to modal distributions among the nine states. Based on survey responses, 78 percent of the grain originated by South

Dakota elevators is marketed via rail. Montana, Minnesota, North Dakota, and Nebraska elevators also utilize rail frequently in marketing the grain they handle — 72, 60, 61 and 53 percent, respectively — of the grain originated is shipped to destination via rail. Elevators in Colorado, Kansas, Oklahoma, and Texas report that they market less than half the bushels they handle via rail. Rail share of elevator shipments originated in these states ranges from 29 to 32 percent, based on survey responses. It should be noted that each of the characteristics discussed should be considered in making general statements regarding modal shipments of grain from the Great Plains region. The use of modes for shipping individual commodities at the state level is detailed in Appendix D.

Factors Influencing Modal Selection

Modal selection for grain shipments made be influenced by many factors. To better understand the relative importance of these factors in the decisions made by elevators, respondents were asked to rank the influence of four key factors: availability of equipment, rates, receiver freight requirements, and reliability of service; in their choice to use barge, truck, or rail for outbound grain shipments. Based on responses, rates are the most influential factor in the modal decision. Rates have an average ranking of 4.3 on a scale of 1 to 5, with 1 indicating the factor is "not influential" and 5 indicating the factor is "very influential." Eight-two percent of respondents gave rates a rating of 5, suggesting rates are a major factor in modal selection. Availability of equipment and reliability of service rank second and third among the factors, at 4.1 and 4.0, respectively. Approximately 8 and 11 percent of respondents feel that equipment and service are of less than average importance in selection

of a mode for grain shipments. Receiver requirements received an average rank of 3.4 on the five point scale. Fewer than half of the respondents reported receiver requirements having more than an average influence on their selection of mode for marketing grain. Based on survey responses, the selection of mode for shipping was influenced by several key criteria.

Table 15. Factors Influencing Modal Selection for Grain Shipments

Factor	Rating (Rate: 1 = not influential, 5 = very influential)					
	Average	1	2	3	4	5
Availability of Equipment	4.0	6%	5%	16%	29%	44%
Rates	4.3	3%	3%	12%	22%	60%
Receiver Freight Requirements	3.4	12%	12%	26%	19%	30%
Reliability of Service	4.1	4%	4%	14%	32%	46%

n=471

Direct Sales

One factor to consider in establishing marketing patterns across grains and regions is the share of grain sold direct. Direct sales refers to business transactions an elevator completes with a processor or livestock feeder, rather than sales made through a third party grain broker. The direct sales by an elevator (1) provides local planners with better information regarding the route, (2) may allow local planners some latitude in working with the local elevator to better utilize infrastructure, (3) provides some insight into the strength of the local market as a buyer of grain, and in more general terms, (4) establishes another factor for differentiating the marketing characteristics associated with grain shipments. Based on survey responses, 46 percent of the grain marketed by elevators in the Great Plains Region is

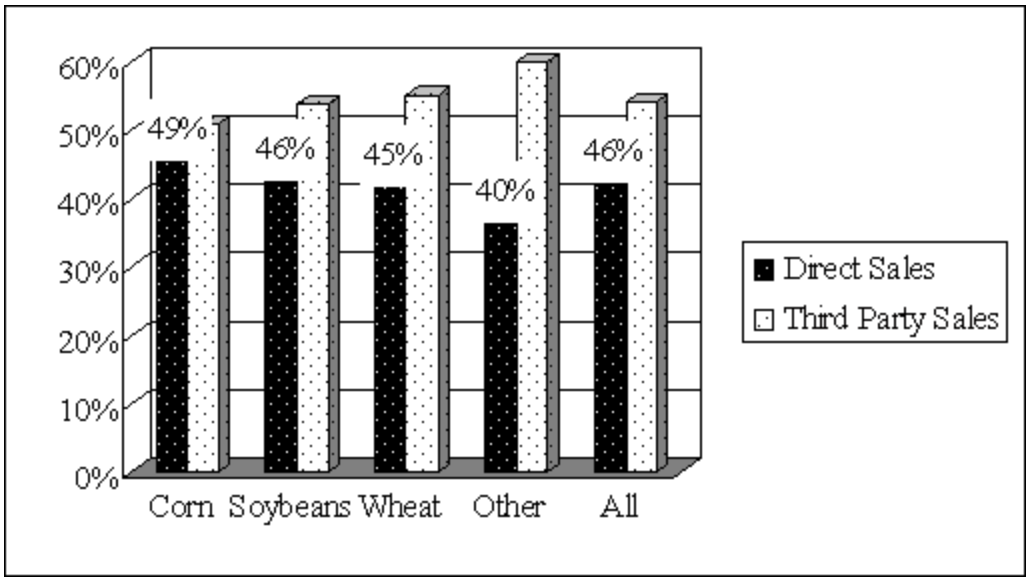

Figure 8. Direct Sales as Share of All Sales, by Commodity

sold through direct sales. The share marketed via direct sales does vary slightly across commodities, ranging from a high of 49 percent for corn to a low of 40 percent for other commodities.

Variation in use of direct sales in marketing among states is evident in Figure 9. Direct sales, as a percent of all grain sales, ranges from 30 to 71 percent among the nine states. Elevators in Oklahoma market the largest share of bushels via direct sales. South Dakota elevators are a close second, selling 67 percent of the grain they handle directly to processors or feeders. Montana elevators report the least proclivity to sell directly to buyers, selling less than one-third of the grain they handle directly to a processor or feed market. An overview of the use of direct marketing by states for individual commodities is provided in Appendix E.

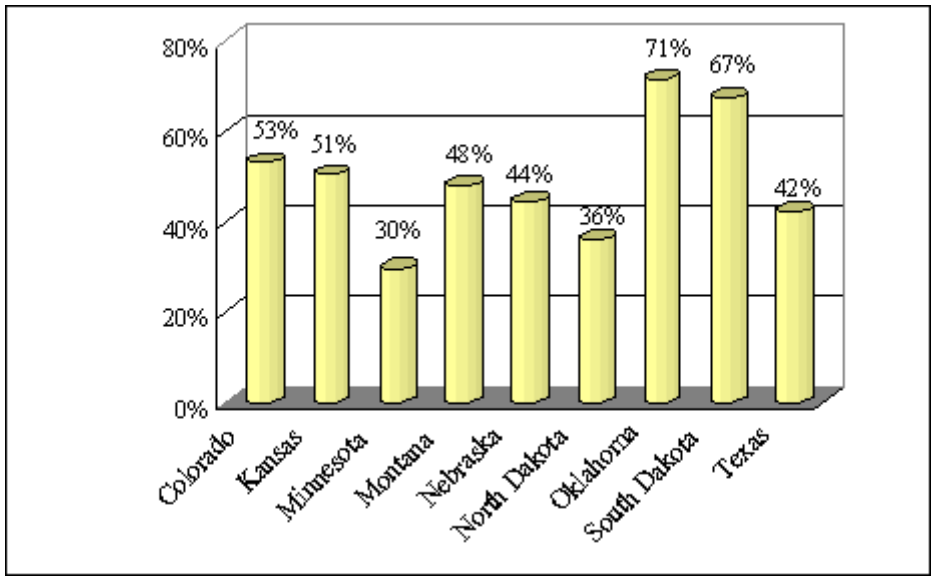

Figure 9 Direct Sales in Marketing, Among States

Local Truck Market

Trucks provide important functions in the grain market as they are employed to accumulate quantities at elevators, distribute grain to local markets, and enhance flexibility of the grain marketing network with their more liquid human and equipment resources. Elevators were asked to describe adequacy of truck services for outbound shipments and provide information about truck rates. With regard to truck service, elevators rated the adequacy of truck service during harvest and non-harvest periods and the degree of competition among truckers in their local market. Availability of trucks during harvest is rated 3.2 on a scale of 1 to 5, 1 indicating poor and 5 indicating excellent. Availability during non-harvest is rated higher at 4.4. The degree of competition among truckers is rated better than average for the Great Plains region, at 3.9.

Rates were collected for harvest and non-harvest truck movements of 50, 100, and 200 miles. Harvest and non-harvest distinctions were made (1) due to the overall increase in demand for truck services during harvest, and (2) the shift of producer-owned trucks from the custom-haul market to harvest activities during harvest. A quarterly profile of rates may have gathered the same information, but with differences in timing of harvest, the harvest/non-harvest differentiation was selected.

Respondents using trucks to market grain reported an average rate of 47 cents per hundredweight per mile during harvest, and 44 cents per hundredweight per mile the balance of the year for a 50-mile trip. The seasonal rate differential is evident in the longer hauls. In addition to the seasonal effect, the rate per mile has an inverse relationship to distance. The truck rates for the 100-mile haul average 40 cents per hundredweight per mile during harvest

Table 16. Local Truck Rates

	50 miles	100 mile	200 miles
		$/cwt per mile	
Harvest	$0.0047	$0.0040	$0.0032
Non-Harvest	$0.0044	$0.0036	$0.0030

and 36 cents per hundredweight per mile outside the harvest season, based on survey responses. The rates for the 200-mile haul are the lowest among the rates. Rates for this distance also exhibit the least response to harvest pressures. Hauls of 200 miles average 32 cents per hundredweight per mile during harvest, with a two cent per hundredweight per mile discount during non-harvest periods. State level truck rates are included in Appendix F.

Rail Freight

Employment of rail capacity by elevators in marketing grain varies by location and across commodities. Respondents reporting direct access to rail were asked about management rail freight, rail car ordering programs, and the rail carrier service. As aforementioned, three-fourths of the elevators responding have access to a railroad. Among these facilities, 86 percent have access to a single carrier. For facilities with access to multiple carriers, 10 percent report access to two railroads, 3 percent have access to three carriers and 1 percent has access to four or more rail carriers.

Rail Freight Management

Rail equipment may be owned or leased by the railroad, the elevator, or a third party. The track network is owned by the railroad and operations are handled by railroad labor. Rail shipment is initiated by an elevator placing an order directly with the railroad or through a third party. Survey responses indicate that 41 percent of the elevators in the Great Plains region manage and purchase their own rail freight, ranging from a high of 64 percent of North Dakota elevators to a low of 22 percent of Texas elevators. In-house management and purchase of rail freight may indicate the level of resources elevator management dedicates to rail marketing efforts.

Table 17. In-house Management and Purchase of Rail Freight, by State

	In-house
Colorado	30%
Kansas	33%
Minnesota	44%
Montana	52%
Nebraska	41%
North Dakota	64%
Oklahoma	34%
South Dakota	32%
Texas	22%
All	41%

Elevators managing and purchasing freight in-house were asked about their use of alternative rail ordering programs. Five types of rail car orders can generally be placed with a railroad: tariff, shorter-term railroad auction, longer-term freight contracts, nearby orders, and shuttle agreements. The availability of programs and program guidelines vary with each rail carrier. Tariff cars refer to car orders placed directly with the railroad for service under the common carrier obligation. Service for these orders is provided by the railroad at the published tariff rate. The tariff rate, which is public information, generally sets the baseline for rail grain rate structures. A market premium or discount does not apply for these orders and service is not guaranteed. Shippers are assessed a penalty if cars are delivered and not loaded by the elevator. Shorter-term railroad auctions allow shippers to order cars from the railroad, usually four to six months in advance, with service guarantees. Longer-term freight

contracts are agreements with the railroad for a specified level of service each month. For instance, an elevator agrees to purchase service of a monthly 25-car train for 12 months. This service is guaranteed. The final alternative considered is the shuttle agreement in which the elevator agrees to ship a shuttle size (100 cars plus) train in a cycle for a specified number of trips. The shuttle agreement includes origin and destination efficiency requirements. A market premium or discount may apply for non-tariff orders and non-performance penalties apply for shipper and carrier. The proportion of shippers reporting use of each of the rail car ordering programs is provided in Figure 10. Use of the tariff program is most common, as more than one-third of respondents reported that they had ordered a share of rail cars under this option. The shorter-term rail auction and secondary market are next in frequency of use among respondents as 25 and 21 percent report use of these options, respectively. Longer-term contracts are used by approximately10 percent of the elevators that manage and

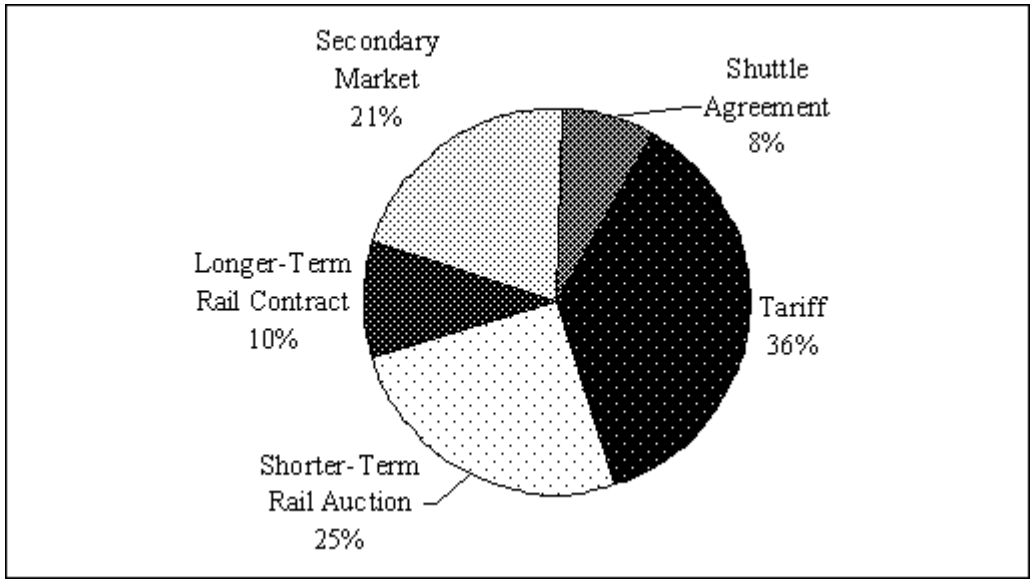

Figure 10. Share of Shippers Using Alterative Rail Programs, for Shippers In-House Purchase and Management of Rail Freight

purchase their own rail freight. Shuttles, least common among the programs, is used by approximately 8 percent of the elevator subset. The less common occurrence of the longer-term contracts and shuttle agreements are expected due to the risk associated with volume requirements and upgrade investments.

Beyond frequency of use for the alternative car programs, the volume shipped under each program may provide insight into elevator marketing practices and trends in the industry. For the respondents reporting that they manage and purchase their own rail freight, the shuttle option accounted for the largest share of bushels - nearly one-third of the volume reported by respondents. Shorter-term rail auctions, which guarantee rail service, is second among volume moved under the alternative rail programs, with 22 percent of the volume. The tariff program and secondary market, the more liquid, often less risky options, are each attributed with 17 percent of the volume. Longer-term rail contracts form the final segment in the volume, with 13 percent. These longer-term contracts should be considered in conjunction with shuttle volumes, as both require commitment of volume and service for an extended period. These agreements may dampen the cyclical characteristics of rail grain shipments.

Rail Service

Given the important role the rail industry plays promoting an efficient and economically successful Great Plains elevator industry, elevators were asked to rank four key service factors and then rate their primary rail carrier in these service areas. The four service components are: availability of marketing and sales personnel, timely delivery of equipment,

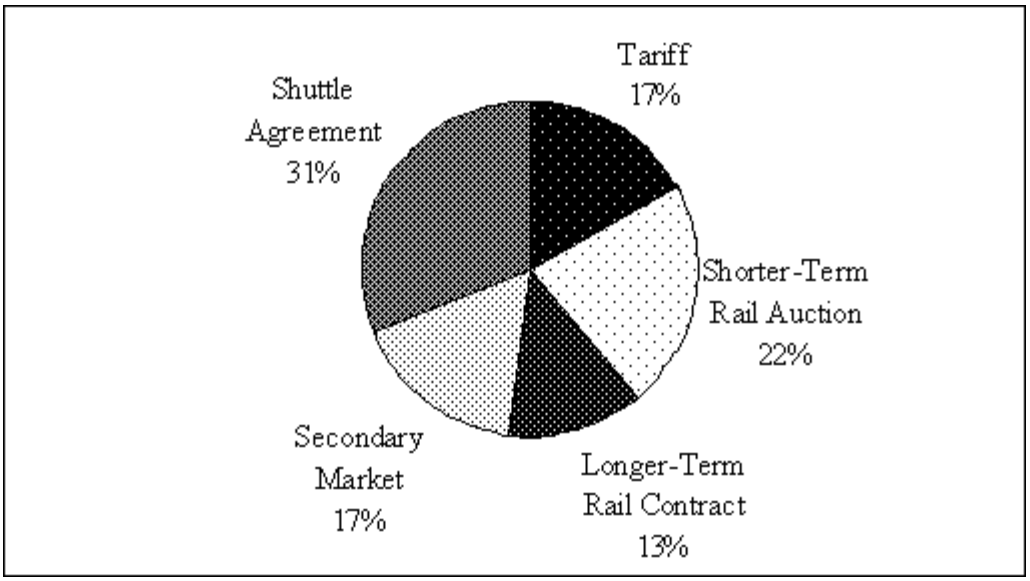

Figure 11. Distribution of Bushels Among Alternative Rail Programs, for Shippers with In-House Management and Purchase of Rail Freight

availability of order information, and condition of equipment. Among these factors, timely delivery of equipment receives the highest average ranking with 1.4. In the ranking, 206 or 79 percent of the respondents ranked this factor as highest in importance among the four factors. Availability of order information and condition of equipment received the second and third rankings, as both averaged 2.6. Availability of marketing personnel is last among service factors, with an average ranking slightly lower at 2.7.

Rail carriers received slightly better than average ratings for each of the four service factors. Respondent rating of the factors spanned a narrow range. Based on these ratings, condition of equipment is the least sufficient among service variables at 3.1. Timely delivery of equipment and information regarding the order are second and third, with ratings of 3.4 and 3.5. Railroads receive their highest ratings for availability of personnel. This factor is, however, ranked last in importance among the four variables. This information suggests that railroads are providing adequate service, with the ratings of individual elevators varying with expectations and their experiences with railroad performance.

Table 18. Ranking and Rating of Rail Service Factors by Rail Shippers

		Rating Average and Response Distribution *(Rate: 1 = poor, 5 = excellent)*					
Ranking		Average	1	2	3	4	5
1	Timely delivery of equipment	3.4	12%	13%	30%	34%	11%
2	Condition of equipment	3.1	6%	13%	42%	33%	7%
2	Availability of order information	3.5	5%	10%	35%	38%	11%
4	Availability of marketing and sales personnel	3.6	9%	16%	29%	28%	18%

n=259
Rating weighted by rail bushels

ELEVATOR INDUSTRY EXPECTATIONS

The elevator industry continues its metamorphosis, adjusting to changes in the agricultural production and consumer sectors. As local and national policies are assessed and investments are considered, insight into the future of this industry may allow decision makers to be proactive in addressing needs of the industry and those affected by it. Elevators were asked to provide opinions regarding issues relevant to grain industry logistics. By encompassing the view of these active industry participants, researchers, policy makers, and resource owners might more efficiently and effectively meet future industry needs.

Table 19. Factors Influencing Modal Selection for Grain Shipments

Issue	Rating Average and Response Distribution *(Rate: 1 = not important, 5 = very important)*					
	Average	1	2	3	4	5
Rail Mergers	3.6	10%	9%	19%	31%	31%
Grain Company Mergers	4.4	3%	3%	17%	39%	38%
Availability of Barge Capacity	2.7	34%	12%	21%	20%	13%
Availability of Rail Capacity	3.7	7%	6%	22%	37%	28%
Truck Weight Limits	3.8	2%	6%	28%	34%	30%
Local Processing/Feeding	3.7	4%	10%	22%	35%	30%
Access to Market Information	4.1	1%	3%	19%	40%	36%
Government Policy	4.2	2%	2%	15%	34%	48%
Financing	3.8	3%	7%	28%	31%	30%

n=459

Elevators rate the merger of grain companies as the most important industry issue. This issue received an average rating by respondents of 4.4 on a five point scale, with the scale ranging from 1 for 'not important' to 5 for 'very important'. Approximately 77 percent of the respondents thought this issue was more important (rated 4 or 5). Second in importance to elevators are future government policy, with an average rating of 4.2. Although this issue is second, based on rating, it is the issue that received the greatest proportion of responses in the ratings of 4 and 5. Proportion of the ratings in these two categories suggest elevators view the issue as of more than average importance to their industry. Next among issues is access to market information. This issue too, may be attributed to some degree to government, as government has an important role in collecting and disseminating much of the publicly available grain market information.

Several issues are rated between average importance, 3 and 4. Truck weight limits and financing are among the issues, both rated 3.8 by the respondents. Local processing/feeding, rail capacity, and rail mergers received similar average ratings of 3.7, 3.7 and 3.6, respectively. The mid-range ratings of these issues may be attributed to the variation in individual elevator characteristics and market environments that are more or less impacted. The least important issue, based on survey responses, is the only issue to be rated at less than average importance – barge capacity. A majority of respondents (56 percent) rated this issue as less important by indicating an importance of 1 or 2 on the 5-point scale. These statistics offer a broad indicator of issues influencing grain industry logistics. The average rating of the issues, for each of the states, are presented in Appendix G.

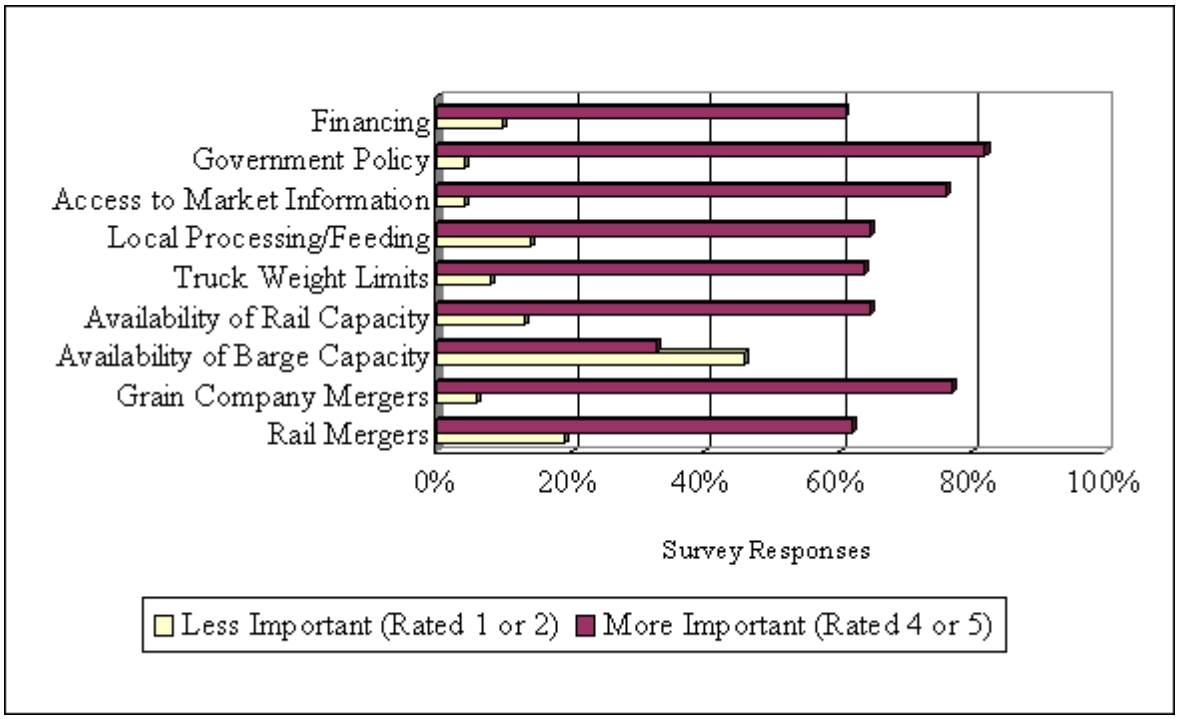

Figure 12. Distribution of Elevator Rating of Industry Issues

In addition to rating the issues listed in the survey, several respondents included other issues they view as important to the future of grain industry logistics. These issues include:

- large farms/farmer owned semis
- biotechnology
- export markets
- short line railroads
- rail line abandonment
- shuttles
- container grain shipments
- specialty grains

This supplement to the initial list of issues forms a rather comprehensive scope of the phenomenon that Great Plains elevators identify as important to the future of their industry. Overall opinions of elevators, and the more local ratings of issues, should be considered in local, regional, and national policy and resource decisions.

SUMMARY

Local grain elevators are at a critical juncture in the grain marketing system. These facilities, estimated to number more than 8,000, accumulate grain in quantities that make longer-distance markets economically feasible. The objective of this study was to profile the transportation and industry characteristics of elevators in the Great Plains region of the United States. The information gathered in this effort is important in future policy and investment decisions that directly and tangentially impact the elevator industry.

With the cooperation of nine state elevator organizations, 2,604 surveys were mailed to elevators in the Great Plains region, stretching from North Dakota to Texas. A total of 518 usable survey responses were returned, rendering results statistically valid at the 95th percentile. The survey elicited information regarding elevator characteristics, activity, and expectations.

Defining and understanding elevator characteristics is an essential activity for productive discussions regarding the current state and future of the industry. Storage capacity and annual handle averaged 2,217 and 4,577 thousand bushels. An indicator of elevator activity is the ability of a facility to turn storage capacity (turnover). Turnover ratios ranged from 2.2 to 6.5 for each state based on weighted averages for elevators in each state. These averages varied by state, rail access level, and location.

As rail activity is important to the Great Plains grain industry, respondents were asked to provide information in this area. A majority, 72 percent, of the respondents have access to a railroad at their facility. The level of access, which has implications for rates and services, is concentrated in that group of elevators with limited ability to receive rail cars.

Approximately 49 percent of the elevators with access to rail are able only to receive and load from 1 to 24 cars. At the other end of the rail access spectrum, approximately 8 percent of the rail equipped facilities are able to receive and load at least 100 rail cars.

Regarding non-grain characteristics, business structure and other activities were considered. The most common business structure among respondents was the locally owned and operated cooperative. The closed corporation was second in frequency among the business structures. A majority of the elevators responding to the survey reported that their operations included agronomic product sales and application services.

An extensive set of questions were directed at profiling the elevator marketing and transportation activities. Survey respondents reported an aggregate annual handle of 2.5 million bushels. The bushel total was comprised of corn (36 percent), soybeans (14 percent), wheat (35 percent), and other commodities (15 percent). One-third of the bushels were gathered from within an 8-mile radius of the elevator. More than one-half of the origins for bushels are included when the radius is expanded to 16 miles. Semi-tractor and trailers are used to deliver half of these bushels to the elevator, based on survey responses.

Outbound grain movements are shared primarily by railroad (51 percent) and trucks (45 percent), with barges handling a much smaller fraction (4 percent). Distribution among the modes varies by commodity. Trucks handle a majority of the corn (52 percent) and other commodity (53 percent) bushels, while railroads are hired to transport the largest share of soybeans (48 percent) and wheat (52 percent). Barges are attributed with moving 1, 9, 22, and 15 percent of the corn, soybeans, wheat, and other commodities, respectively.

Many factors affect the modal distribution in the grain industry. Rates were identified as the most influential factor in respondents' selection of a mode in marketing grain. Reliability and availability of equipment are next among the four factors considered as influential in mode selection. In addition to these broad parameters, characteristics of the local truck market and rail freight also were considered as important in grain marketing patterns.

The final task in this project was to ascertain expectations of the participants regarding issues pertinent to their industry. Elevators rate the merger of grain companies as the most important industry issue. Second in importance to elevators is future government policy. Next is access to market information. This issue too may be attributed in some degree to government, because government has an important role in collecting and disseminating much of the publicly available grain market information.

The information presented in this report establishes a baseline for discussing current issues and trends in the Great Plains grain industry. Elevators provide crucial roles in the grain market industry through activities such as accumulation, conditioning, and communication, which make transactions between grain producers and consumers more efficient. The results of this report may be valuable in encouraging policies and investments that will enhance the future of the elevator industry and the producers it serves.

APPENDIX A. COMPOSITION OF GRAIN SHIPMENTS FOR EACH STATE, BASED ON SURVEY RESPONSES

	Corn	Soybean	Wheat	Other	Bushels
Colorado	50%	0%	39%	11%	106,664,000
Kansas	21%	15%	42%	22%	428,576,696
Minnesota	64%	28%	7%	1%	384,813,932
Montana	3%	0%	84%	14%	64,330,000
Nebraska	9%	8%	44%	38%	286,707,392
North Dakota	68%	14%	12%	6%	371,324,000
Oklahoma	3%	6%	77%	14%	172,096,647
South Dakota	49%	27%	20%	3%	272,331,694
Texas	39%	2%	29%	29%	192,486,415

APPENDIX B. ELEVATOR DRAW AREA, BY COMMODITY AND STATE

Table B-1. Distribution of Origins for Corn Bushels Handled by Elevators, by State

	Respondents	8 miles or less	8 to 14 miles	15 to 29 miles	30 to 44 miles	45 miles or more
Colorado	*27*	26%	30%	17%	7%	20%
Kansas	*87*	48%	28%	16%	5%	3%
Minnesota	*57*	43%	29%	17%	8%	4%
Montana	*25*	7%	21%	34%	28%	10%
Nebraska	*65*	59%	22%	11%	6%	2%
North Dakota	*97*	39%	28%	20%	6%	5%
Oklahoma	*48*	18%	19%	16%	3%	42%
South Dakota	*32*	28%	23%	25%	17%	8%
Texas	*58*	24%	27%	25%	13%	12%
All	*496*	43%	26%	17%	8%	6%

Table B-2. Distribution of Origins for Soybean Bushels Handled by Elevators, by State

	Respondents	8 miles or less	8 to 14 miles	15 to 29 miles	30 to 44 miles	45 miles or more
Colorado	*27*	16%	46%	14%	11%	13%
Kansas	*87*	26%	18%	13%	17%	25%
Minnesota	*57*	41%	32%	17%	7%	4%
Montana	*25*	-	-	-	-	-
Nebraska	*65*	53%	26%	12%	7%	2%
North Dakota	*97*	42%	25%	20%	6%	4%
Oklahoma	*48*	18%	14%	8%	11%	49%
South Dakota	*32*	26%	22%	26%	17%	9%
Texas	*58*	19%	31%	34%	13%	3%
All	*496*	36%	25%	18%	11%	10%

Table B-3. Distribution of Origins for Wheat Bushels Handled by Elevators, by State

	Respondents	8 miles or less	8 to 14 miles	15 to 29 miles	30 to 44 miles	45 miles or more
Colorado	*27*	20%	26%	23%	17%	14%
Kansas	*87*	29%	24%	13%	10%	12%
Minnesota	*57*	37%	35%	23%	4%	1%
Montana	*25*	17%	21%	22%	16%	25%
Nebraska	*65*	33%	20%	17%	8%	22%
North Dakota	*97*	27%	24%	18%	10%	20%
Oklahoma	*48*	31%	17%	13%	9%	28%
South Dakota	*32*	20%	22%	29%	20%	9%
Texas	*58*	18%	18%	21%	13%	31%
All	*496*	29%	22%	18%	11%	19%

Table B-4. Distribution of Origins for Other Commodity Bushels Handled by Elevators, by State

	Respondents	8 miles or less	8 to 14 miles	15 to 29 miles	30 to 44 miles	45 miles or more
Colorado	*27*	25%	28%	19%	11%	17%
Kansas	*87*	47%	27%	13%	6%	7%
Minnesota	*57*	33%	40%	16%	7%	4%
Montana	*25*	18%	25%	29%	16%	12%
Nebraska	*65*	51%	27%	14%	6%	2%
North Dakota	*97*	17%	18%	14%	10%	40%
Oklahoma	*48*	21%	15%	10%	11%	41%
South Dakota	*32*	15%	20%	27%	22%	15%
Texas	*58*	25%	30%	21%	7%	16%
All	*496*	30%	24%	15%	9%	22%

APPENDIX C. TRUCK TYPES USED IN GRAIN DELIVERIES TO ELEVATOR, BY STATE

Table C-1. Equipment Employed in Inbound Corn Deliveries, by State

	Respondents	Single Axle	Tandem Axle	Tri-Axle	Semi-Tractor & Trailer	Other
Colorado	*27*	6%	15%	9%	71%	0%
Kansas	*87*	16%	30%	3%	51%	0%
Minnesota	*57*	12%	26%	5%	52%	4%
Montana	*25*	8%	77%	0%	81%	0%
Nebraska	*65*	19%	32%	2%	43%	5%
North Dakota	*97*	8%	34%	14%	43%	0%
Oklahoma	*48*	7%	22%	12%	59%	0%
South Dakota	*32*	11%	26%	4%	57%	2%
Texas	*58*	5%	13%	1%	79%	2%
All	*496*	13%	27%	4%	54%	3%

Table C-2. Equipment Employed in Inbound Soybean Deliveries, by State

	Respondents	Single Axle	Tandem Axle	Tri-Axle	Semi-Tractor & Trailer	Other
Colorado	*27*	3%	9%	37%	50%	0%
Kansas	*87*	11%	19%	1%	68%	0%
Minnesota	*57*	12%	29%	7%	50%	4%
Montana	*25*	-	-	-	-	-
Nebraska	*65*	21%	32%	2%	41%	4%
North Dakota	*97*	9%	41%	14%	35%	0%
Oklahoma	*48*	12%	29%	23%	36%	0%
South Dakota	*32*	11%	26%	4%	57%	2%
Texas	*58*	5%	13%	3%	78%	1%
All	*496*	13%	27%	5%	52%	3%

Table C-3. Equipment Employed in Inbound Wheat Deliveries, by State

	Respondents	Single Axle	Tandem Axle	Tri-Axle	Semi-Tractor & Trailer	Other
Colorado	*27*	6%	14%	6%	73%	0%
Kansas	*87*	16%	29%	2%	53%	0%
Minnesota	*57*	9%	34%	19%	38%	1%
Montana	*25*	11%	15%	3%	71%	0%
Nebraska	*65*	9%	18%	0%	72%	0%
North Dakota	*97*	13%	28%	12%	43%	3%
Oklahoma	*48*	11%	24%	10%	55%	0%
South Dakota	*32*	8%	24%	3%	64%	0%
Texas	*58*	5%	12%	1%	70%	12%
All	*496*	11%	24%	6%	57%	2%

Table C-4. Equipment Employed in Inbound Other Commodities Deliveries, by State

	Respondents	Single Axle	Tandem Axle	Tri-Axle	Semi-Tractor & Trailer	Other
Colorado	*27*	10%	31%	0%	59%	0%
Kansas	*87*	21%	34%	3%	41%	0%
Minnesota	*57*	12%	23%	11%	47%	7%
Montana	*25*	15%	20%	1%	64%	0%
Nebraska	*65*	21%	31%	1%	44%	3%
North Dakota	*97*	9%	20%	30%	40%	1%
Oklahoma	*48*	11%	26%	17%	46%	4%
South Dakota	*32*	6%	17%	4%	73%	0%
Texas	*58*	4%	11%	1%	80%	3%
All	*496*	13%	24%	12%	50%	1%

APPENDIX D. MODAL DISTRIBUTION OF GRAIN SHIPMENTS, BY COMMODITY AND STATE

Table D-1. Modal Distribution of Outbound Corn Shipments, by State

	Rail	Truck	Barge	Bushels
Colorado	1%	99%	0%	53,344,560
Kansas	5%	95%	0%	90,165,595
Minnesota	62%	35%	3%	246,624,409
Montana	2%	98%	0%	1,621,100
Nebraska	58%	42%	0%	26,613,094
North Dakota	50%	50%	0%	251,208,080
Oklahoma	15%	85%	0%	5,104,000
South Dakota	82%	18%	0%	133,406,464
Texas	2%	84%	0%	74,476,367

Table D-2. Modal Distribution of Outbound Soybeans Shipments, by State

	Rail	Truck	Barge	Bushels
Colorado	23%	77%	0%	139,000
Kansas	16%	80%	0%	64,350,624
Minnesota	59%	38%	2%	107,726,023
Montana	-	-	-	-
Nebraska	88%	12%	0%	24,233,644
North Dakota	33%	67%	1%	53,032,420
Oklahoma	0%	11%	88%	10,527,000
South Dakota	77%	24%	0%	74,032,884
Texas	40%	59%	0%	4,765,305

Table D-3. Modal Distribution of Outbound Wheat Shipments, by State

	Rail	Truck	Barge	Bushels
Colorado	72%	28%	0%	41,490,000
Kansas	49%	51%	0%	179,309,863
Minnesota	59%	36%	1%	26,227,500
Montana	78%	22%	3%	53,937,300
Nebraska	74%	22%	0%	126,863,968
North Dakota	89%	12%	0%	43,209,000
Oklahoma	38%	28%	32%	133,058,006
South Dakota	77%	23%	0%	55,731,437
Texas	74%	25%	0%	56,704,893

Table D-4. Modal Distribution of Outbound Other Commodity Shipments, by State

	Rail	Truck	Barge	Bushels
Colorado	11%	89%	0%	11,690,440
Kansas	33%	66%	0%	94,750,615
Minnesota	12%	88%	0%	4,236,000
Montana	47%	52%	0%	8,771,600
Nebraska	41%	58%	1%	108,996,685
North Dakota	58%	42%	0%	23,874,500
Oklahoma	8%	25%	63%	23,407,641
South Dakota	48%	52%	0%	9,160,909
Texas	27%	66%	0%	56,539,850

APPENDIX E. DIRECT SALES OF GRAIN SHIPMENTS FOR EACH STATE, BASED ON SURVEY RESPONSES

	Corn	Soybean	Wheat	Other	All
Colorado	57%	77%	44%	69%	53%
Kansas	62%	44%	56%	34%	51%
Minnesota	29%	31%	32%	15%	30%
Montana	7%	-	51%	35%	48%
Nebraska	57%	74%	48%	32%	44%
North Dakota	34%	19%	63%	44%	36%
Oklahoma	50%	3%	78%	69%	71%
South Dakota	73%	63%	71%	15%	67%
Texas	33%	63%	58%	39%	42%

APPENDIX F. LOCAL TRUCK RATES, BY STATE[1]

	50 miles	100 mile	200 miles
		$/cwt per mile	
Colorado			
Harvest	n.a.	n.a.	n.a.
Non-Harvest	n.a.	n.a.	n.a.
Kansas			
Harvest	$0.0048	$0.0038	$0.0030
Non-Harvest	$0.0041	$0.0035	$0.0027
Minnesota			
Harvest	$0.0046	$0.0041	$0.0032
Non-Harvest	$0.0046	$0.0041	$0.0030
Montana			
Harvest	n.a.	n.a.	n.a.
Non-Harvest	n.a.	n.a.	n.a.
Nebraska			
Harvest	$0.0042	$0.0028	$0.0019
Non-Harvest	$0.0038	$0.0026	$0.0019
North Dakota			
Harvest	$0.0049	$0.0048	$0.0038
Non-Harvest	$0.0049	$0.0043	$0.0036
Oklahoma			
Harvest	$0.0039	$0.0033	n.a.
Non-Harvest	$0.0056	$0.0035	n.a.
South Dakota			
Harvest	$0.0045	$0.0036	$0.0029
Non-Harvest	$0.0039	$0.0032	$0.0026
Texas			
Harvest	$0.0059	$0.0039	$0.0032
Non-Harvest	$0.0058	$0.0039	$0.0031

[1] Results may not be statistically significant.
n.a. not available

APPENDIX G. FACTORS INFLUENCING MODAL SELECTION FOR GRAIN SHIPMENTS, BY STATE

Issue	Rating (Rate: 1 = not important, 5 = very important)									
	Avg	CO	KS	MN	MT	NE	ND	OK	SD	TX
Responses	***459***	*26*	*77*	*52*	*25*	*56*	*91*	*45*	*3.6*	*54*
Rail Mergers	**3.6**	3.7	3.4	3.7	4.2	3.3	3.8	3.3	4.0	4.0
Grain Company Mergers	**4.4**	4.0	3.9	4.2	**4.4**	4.0	3.9	4.0	2.3	4.2
Availability of Barge Capacity	**2.7**	2.4	2.5	3.6	2.3	2.3	2.7	2.7	3.3	2.5
Availability of Rail Capacity	**3.7**	3.7	3.6	4.1	4.0	3.7	3.8	3.7	4.1	3.8
Truck Weight Limits	**3.8**	3.0	3.7	3.8	3.5	3.5	4.2	4.0	**4.2**	4.1
Local Processing/Feeding	**3.7**	3.6	3.8	3.9	3.4	**4.2**	3.5	3.5	4.1	3.9
Access to Market Information	**4.1**	3.9	**4.2**	4.1	4.1	4.0	4.0	4.2	4.1	4.1
Government Policy	**4.2**	**4.4**	**4.2**	**4.3**	4.0	**4.2**	**4.2**	4.3	4.1	**4.4**
Financing	**3.8**	3.7	3.7	3.9	3.1	3.6	3.9	3.9	3.8	3.9

REFERENCES

National Agricultural Statistics Service, United States Department of Agriculture, Washington, D.C., On-Line Databases, various years.