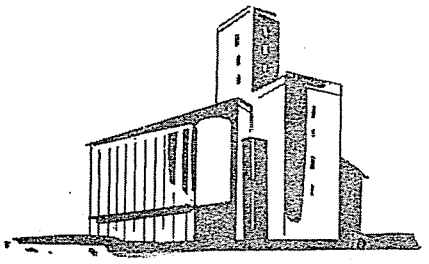
Agricultural Economics Report No. 50 August, 1966



An Analysis of....

North Dakota Cooperative Grain Elevators

PERRY V. HEMPHILL
AND
FLOYD G. ANDERSON

Department of Agricultural Economics
Agricultural Experiment Station
North Dakota State University
Fargo, North Dakota

TABLE OF CONTENTS

Part		Page
	HIGHLIGHTS	1
I.	NORTH DAKOTA COOPERATIVE ELEVATORS	4
	Introduction	4
	Objectives of the Study	4
	Survey Procedure and Data Sources	4
II.	GENERAL PERFORMANCE OF GRAIN COOPERATIVES	6
	Corporate and Cooperative Features	6
	Membership	7
	Management	8
	General Performance	10
	Method of Sale	12
	Credit	13
III.	ANALYSIS OF AUDIT DATA OF GRAIN COOPERATIVES	15
	Measuring Financial Status	15
	Elevator Operations, 1961-63	16
	The Balance Sheet	17
	The Income Statement	17
	Working Capital Analysis	18
	Current Ratio	18
	Liquid Ratio	18
	Inventory to Net Working Capital	19
	Sideline Sales to Accounts Receivable	19
	Fixed Capital Analysis	20
	Total Liabilities to Net Worth	20
	Net Worth to Total Liabilities	21
	Fixed Assets to Net Worth	21
	Net Worth to Total Assets	21
	Fixed Assets to Fixed Liabilities	22
	Operational Analysis	22
	Investment Earnings	22
	Net Income to Net Worth	22
	Net Income to Total Assets	23
	Net Income to Net Assets	23
	Expense Relationships	23
	Expense to Total Income	24
	Wages to Operating Expense	24
	Sales to Wages	25
	Service Sales to Wages	25
	Bushel Sales to Elevator Capacity	25
	Margin Analysis	27
	Grain Margin	27
	Sideline Markup	28

TABLE OF CONTENTS (CONTINUED)

Part		Page
	Sales Relationships	29
	Service Sales Relationships	30
	Regional Dividends	32
IV.	COMPARATIVE RATIO ANALYSIS	33
V.	CAPACITY, INCOME, AND COST RELATIONSHIPS	40
VI.	COOPERATIVE CHANGES - 1922-24 COMPARED TO 1961-63	47
	Introduction	47
	Working Capital Changes	50
	Fixed Capital Changes	51
	Operational Changes	51
	Investment Changes	51
	Expense Changes	52
	Margin Changes	53
	Sideline Changes	53
	Income Source Changes	54
	APPENDIX	56
	RATIO ANALYSIS PROCEDURE	57
	Ratio Analysis	57
	Working Capital Analysis	57
	Fixed Capital Analysis	57
	Operational Analysis	58
	Business Volume Analysis	58
	STATISTICAL ANALYSES OF INCOME AND EXPENSE	58
	Income Analysis	58
	Results of the Analysis	59
	Expense Analysis	60

LIST OF TABLES

Table		Page
1	Grain Margins Desired and Realized, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	11
2	Sideline Margins Desired and Realized, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	11
3	Ratios Used to Show Financial Ranking, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	15
4	Cooperative Elevators' Composite Balance Sheet, Average of 1961 Through 1963	16
5	Cooperative Elevators' Composite Profit and Loss Statement, Average of 1961 Through 1963	17
6	Working Capital Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	18
7	Fixed Capital Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	20
8	Investment Profitability Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	22
9	Expense Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	24
10	Elevator Grain Margins Realized, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	27
11	Sideline Margins, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	28
12	Proportion of Elevator Income Derived from Specified Sources, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	29
13	Regional Dividends, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	32
14	Working Capital Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	33
15	Fixed Capital Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	35
16	Investment Profitability Ratios, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	36

LIST OF TABLES (CONTINUED)

Table		Page
17	Relationship Between Margins and Relative Volumes of Specified Grain Handled	38
18	Relationship Between Margins and Relative Percentages of Total Sideline Sales	39
19	Savings and Expense Changes, 23 Cooperative Elevators, 1961 Through 1963, North Dakota	46
20	Comparative Balance Sheet for 23 Cooperative Elevators, Average of 1922-24 and 1961-63	48
21	Comparative Profit and Loss Statement for 23 Cooperative Elevators, Average of 1922-24 and 1961-63	49
22	Working Capital Comparisons, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	50
23	Fixed Capital Comparisons, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	51
24	Investment Profitability Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	52
25	Expense Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	52
26	Grain Margin Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	53
27	Sideline Margin Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	54
28	Sideline Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	54
29	Income Relationships from Specified Sources, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	55
30	Service Relationship Changes, 23 Cooperative Elevators, 1922-24 and 1961-63, North Dakota	55

LIST OF FIGURES

Figure		Page
1	Relationship of Intensity of Use to Elevator Efficiency for 23 Cooperative Elevators, North Dakota, 1961-62-63	26
2	Percentage Relationships of Income Sources for 23 Cooperative Elevators, North Dakota, 1961-62-63	31
3	Relationship of Grain Volume Handled to Operating Costs Per Bushel, 22 Cooperative Elevators, North Dakota, 1961-62-63 . . .	41
4	Relationship of Licensed Capacity to Operating Costs Per Bushel, 23 Cooperative Elevators, North Dakota, 1961-62-63	42
5	Relationship of Intensity of Use to Operating Costs Per Bushel, 23 Cooperative Elevators, North Dakota, 1961-62-63	43
6	Relationship of Licensed Capacity to Capacity Turnover for 23 Cooperative Elevators, North Dakota, 1961-62-63	44
7	Relationship of Bushels Received to Operating Expense for 22 Cooperative Elevators, North Dakota, 1961-62-63	45

HIGHLIGHTS

Perhaps the greatest problem facing today's management is knowing what changes are needed to keep pace with a dynamic economy such as ours. Increased farm commercialization, changes in government farm programs, and adjustments within the grain marketing framework have forced many adjustments upon the local cooperative grain marketing associations.

These adjustments have resulted in a trend toward larger, more integrated type operations for many associations, while others have modified their operations to a lesser degree. As a result, some of the associations were experiencing financial difficulties, while others were yielding relatively good returns.

Elevator size of the cooperative elevators studied varied greatly. Licensed storage capacities ranged from 87,000 bushels to 539,000 bushels. Grain receipts per year ranged from 117,000 bushels to 2,124,000 bushels. Yearly savings after expenses had a range of $2,000 to $54,000. Even among associations of relatively the same size, large variations were noted in net savings.

Financial strength of the elevators also varied greatly. The strongest associations had very desirable ratio values for all measures, while many ratio values of the weakest ones indicated financial difficulties.

The working capital ratios indicated many of the associations had a very limited creditor safety margin. Although 50 per cent of the elevators did meet the desired current assets to current liabilities standard of 2:1, nearly 25 per cent lacked sufficient liquid assets to offset current liabilities.

Credit policies may be lax in some instances. The ratio of sideline sales to accounts receivable averaged only 4:1, while the desired value is 6:1. However, 50 per cent of the elevators were well over the desired standard, while a few of the weaker ones were well below.

Fixed capital analysis indicated a generally weak total liabilities to net worth position for the average of the associations. About 35 per cent of the associations have a larger amount of liabilities than members' equities. Some of these had liability amounts which were more than double their net worth values. Most of these liabilities were current which makes the situation even more serious.

The large proportion of current liabilities suggests a lack of working capital. Working capital shortages were judged to be serious when the ratio of fixed assets to net worth exceeded 8:1. The desired standard for this measure is 6:1 or less, thus freeing at least 30 per cent of the net worth for working capital. Some associations relied heavily upon a commission company for their working capital to the extent that creditor investment was higher than member investment.

None of the associations had excessive amounts of long-term liabilities. The desired standard of 2:1 for the fixed assets to fixed liabilities ratio was exceeded by all the elevators.

The average rate of return, as measured by the net savings to net worth ratio, was very good. The percentage rate of return ranged from a low of 4 per cent to a high of 23 per cent. One third of the associations had returns which were below the desired standard of 9 per cent. When the returns to total assets are measured, a similar condition exists with the average for the associations exceeding the desired standard of 6 per cent.

Expense levels for the firms varied considerably. Expense to total income ranged from a low of 45 per cent to a high of 93 per cent. Salaries accounted for an average of 34 per cent of the operating expenses ranging from 29 per cent to 42 per cent.

Comparing bushel sales to elevator capacity gave an average turnover rate of 2:1. This measure ranged from a low of 9:1 to a high of 4:1, with the middle sized group of elevators generally having the highest rate of turnover. Elevator efficiency was found to be related more with capacity than with the turnover rate.

Overall grain margins ranged from 4 to 13 cents per bushel to give an average of 6 cents for all grain sold. Sideline markups averaged 8 per cent per $1.00 of sale ranging from a high of 16 per cent to a slight loss.

Total gross operating margins of the elevators are derived from four general sources:

1. Grain sales.
2. Government storage payments.
3. Sideline sales.
4. Service sales.

Grain sales accounted for 51 per cent of the total gross margin; CCC income, 32 per cent; sidelines, 8 per cent; and service income, 9 per cent of the total gross margin.

Sixty per cent of the associations sell a part or all of their grain through a regional cooperative association. The dividends they received from the regional ranged from a low of 3 per cent to a high of 47 per cent of their total net income.

A statistical analysis was used to determine the causes of variations in incomes and expenses which existed between elevators appearing to be quite similar. Only 82 per cent of the income variations could be attributed to the various sales divisions, while 97 per cent of the expense variations were explained by the different divisions.

Grain sale methods varied depending upon manager preference, market conditions, and type of grain. The type of sale most used was selling to arrive or on track sales. This type of sale provides a very good hedge against changes in price and premium payments. Hedging as a means of price protection is still being used to some degree by about one-third of the managers.

Cooperative members do not always give full patronage to their elevator. It was estimated that about 75 per cent of the members fully patronized their local association. Membership patronage varied greatly with some elevators receiving nearly all of their patrons' business. In some cases a patron may belong to more than one cooperative elevator association.

Average age of the managers was 40 years. Individual ages ranged from 26 to 66 years. These managers were all assisted by at least one helper. Thirty-five per cent of the managers had more than one helper, some of whom were employed only during the rush periods.

Less than one-half of the managers were members of the North Dakota Grain Dealers Association.

The elevators surveyed were generally in good repair. Some of the managers expressed a desire for newer, more modern equipment for grain cleaning and feed processing. Larger and longer scales were desired for some elevators.

The average net worth or member investment for the associations consisted of:

1. Membership stock and stock credits, 43 per cent.
2. Allocated reserves, 37 per cent.
3. Surplus, 13 per cent.
4. Undistributed net savings for the operating year, 7 per cent.

When comparing the two time periods, 1922-24 and 1961-63, many changes have taken place. Grain receipts have more than doubled (2.6 times). Storage capacity is now five times greater. Grain sales, when compared to the licensed storage capacity, were only 51 per cent. This reduction in turnover rate is due to increased plant size and the effect of government storage programs. Government storage payments were nonexistent in the earlier period, while they now make up 32 per cent of the total gross margin.

It was found that nearly every association having more than 80 per cent of its net worth in the form of fixed assets also had excessive amounts of short-term liabilities.

Working capital for many associations is limited by over extension of patrons' credit. Patrons' accounts receivable for the elevators averaged $13,556. These accounts receivable were equal to 28 per cent of the net worth of the associations. The average age of the total receivable was found to be 95 days, which is in excess of the desired 60-day maximum.

Grain handling costs per bushel decreased as increased amounts of grain were handled. Larger sized elevators having low capacity turnover rates had lower unit costs than did smaller elevators with high turnover rates. Total elevator costs, when calculated on a per bushel basis, are more easily lowered by increasing elevator size than by increasing the rate of capacity turnover.

Elevator earnings or net savings are not wholly dependent upon the percentage relationships of the major income sources. Some elevators relied heavily upon income from grain sales as their major source of operating margin, while others received 57 per cent of their margin from government storage payments.

Sideline incomes, as a percentage of the total income, were not as variable as were grain and storage incomes.

Part I

NORTH DAKOTA COOPERATIVE ELEVATORS

Introduction

Grain cooperatives play an important role in the marketing of North Dakota's grain crops and in providing services for the farmer, such as storage, merchandise sales, feed processing, seed cleaning, and chemical sales.

Because of the risks or uncertainties involved, necessary changes or adjustments sometimes are not made. At other times unwise practices may be undertaken by management in an attempt to remain competitive. The key to successful managerial decisions is an analysis of facts concerning the problem.

Objectives of the Study

This study is designed to help the cooperative manager compare the status of his elevator with that of other cooperatives. This study will therefore:

1. Provide a background for management decisions.
2. Study financial status and operation of cooperative elevators.
3. Determine desired ratio values.
4. Rank elevators according to financial strength.
5. Study changes which have occurred since previous studies.

Auditors, managers, and directors can use this base to analyze present operations, to determine future enterprises, or to avoid problems encountered by others.

Survey Procedure and Data Sources

Most of the data used for analysis came from yearly audits, accounting records, and interviews with managers and auditors. Also useful were statistical records of both the state and federal governments as well as data collected from previous studies.

Through the use of ratio analysis[1] the relative financial strength of each elevator was measured. Optimum ratios were determined and statistical analysis used to measure trends, economies of size, and efficiencies.

---

[1]Ratio analysis is the separating of any whole into its parts to determine their nature, proportion, function, or relationship. This can be accomplished with ratios which express by proportions a fixed relation between two comparable things.

Data from 25 cooperative elevators scattered throughout the state were used. These elevators were selected because they had been included in previous studies conducted as far back as 1918 and intermediate years. The data from two of those selected could not be used, as one had ceased operation and the other was rebuilding after a fire.

Data from a three-year production period were used to eliminate fluctuations that may have occurred due to differences in crop yields, changes in volume, or other abnormal business conditions. An average of these three periods provides the basis for a standard operating year, thus yielding a more accurate analysis.

The analysis of these data included:

1. An appraisal of the cooperative performance and the business structure of these associations by centering the work around working capital analysis, fixed capital analysis, analysis of capitalization structure, analysis of financial results of operation, volume of business analysis, analysis of services and sideline volume, and an overall study of cooperative features of these associations.

2. Standards of performance relating to the above factors were revised and brought up to date.

3. The tabulations were prepared in groupings as well as a total in order that the auditor, manager, directors, and members of each cooperative may compare the results of their elevator's operation with the average operation of all the elevators.

Part II

GENERAL PERFORMANCE OF GRAIN COOPERATIVES

Corporate and Cooperative Features

The 23 elevators surveyed were organized between 1910 and 1919 with the majority of the charters drawn up from 1916 to 1919. Seven of these have renewed their charters since organization, and five have been reorganized. Two of those reorganized are now using a revolving fund system.

All of the elevators have amended their bylaws to conform to the new federal tax laws. Three of them have increased their capitalization, while others have made only minor bylaw changes.

When asked if the present setup or organization was satisfactory, none of the managers indicated a need for any extensive changes or reorganization of the cooperative.

Most of the cooperatives paid interest on capital or membership stock. Fixed limits of interest paid on the stock ranged from a high of 8 per cent to a low of 4 per cent. Three of the firms have no limits on their stock interest, and two stated that they paid no interest on member stock. Those associations having no stated limit on the amount of interest payable on membership or capital stock must stay within the legal limit of 8 per cent to be classed as a cooperative.

Amount of stock which one member can hold also varies considerably. Some cooperatives limit the number of shares per member, while others set a dollar limit on the amount of stock which can be held. Dollar limits ranged from $200 to $1,000, or a percentage of the total amount of common stock.

All these cooperatives permit only one vote per member, with variations concerning proxy and mail voting. Most of those permitting proxy voting allowed only a specified number per person, and some permitted it only on specified motions. Voting by mail is allowed by about one-half of the firms, with some allowing it only if stated in the motion.

Nearly all of the cooperatives' bylaws require that members be producers or at least users of the products handled. In many cases, if the member is a nonproducer for one, two, or three years, his common stock is automatically retired or transferred to preferred stock.

Transfer of stock in most cases must have approval of the board of directors, with the association having the first option to buy. Here again there is wide variation as to the length of time a member can be a nonpatron before his stock is cancelled or bought by the cooperative.

The number of members required for a quorum at a stockholders' meeting also varied among the associations. Some specified a certain number or a percentage of the total membership. Others required a certain percentage of the first 100 members plus a percentage of the remaining members.

Patrons' net earnings are either invested in the firm or returned to them in several ways. If the patron is not a member, the earnings apply toward membership or common stock. Once a member, the earnings are allocated to the general reserve, patronage dividends, stock interest, cash payment, or preferred stock. Two of the cooperatives surveyed use the revolving fund method to distribute net savings.

Membership

The membership of the cooperatives studied averaged 289 members per association. Membership numbers per elevator ranged from a low of 121 to a high of 912 members. Some elevator managers reported less than one-half their members as active. The members were reported to be all active patrons in 26 per cent of the associations.

It was found that 91 per cent of the members were active patrons. Inactive patrons are those who seldom patronize the cooperative or who have become nonproducers or nonresidents.

It was estimated that about 75 per cent of the members of the elevators reporting give full patronage to their local association. In some cases, it was estimated that nearly all of the members' business was given to the elevator. One elevator, however, reported that only 25 per cent of its members fully patronize their cooperative. In some cases, a patron may belong to more than one cooperative; therefore, he cannot give full patronage to one association.

The proportion of large producers who give all or a part of their business to the local cooperative also varies. In one case, only 42 per cent of the larger farmers patronized the local cooperative. Other managers, however, reported that the local association was patronized to some extent at least by all of the farmers in its trade area.

Most elevators have been reducing the amount of nonproducer or nonresident stock or membership certificates carried on their books. This type of stock results when a member quits farming, moves from the trade area, fails to patronize the cooperative, or is deceased.

When a member becomes inactive, his voting stock or certificates should be retires as provided for in the bylaws of the cooperative. Most of the bylaws of the associations studied include provisions whereby voting stock or certificates can be retired when the member becomes inactive. This provision apparently has not been exercised, as many elevators indicated they are attempting to decrease the amount of inactive voting stock carried on their books. Four of the cooperative managers said nonproducer, nonresident stock was increasing even though their bylaws provide for its elimination.

Accumulation of inactive stock may be the result of poor membership record keeping habits or the desire to postpone the cost of retirement. Retirement of all accumulated inactive stock at once could put a financial strain upon some associations. When a membership is terminated, the member is entitled to his fair value of his property rights in the association less

any indebtedness due the elevator. This value consists of his shares together with any dividends or patronage refund credited to him. Usually payment is made in cash, although some bylaws state that it can be in shares of preferred stock or in revolving fund credits.

Inactive stock accumulations may endanger a cooperative's tax exempt status under certain conditions. According to Section 521 of the Internal Revenue Code of 1954 and 1962, "substantially all" of an association's capital stock must be owned by producers who market products or purchase supplies through the cooperative. Such a requirement must be met if the association is to qualify for allowable income tax deductions. What is meant by "substantially all" depends upon the circumstances of each case. To gain tax exempt status, the association is required to show that ownership of its capital stock has been restricted as far as possible to actual producers.

Management

The cooperative elevator, as with any other type of business, needs skilled management and able employees if it is to be a successful marketing agent.

Management of a cooperative begins with the electing of directors who act as a policy-making board. They employ a manager to carry through these policies, and he in turn hires employees to assist him in his duties.

The survey found no consistency as to the type of farmers elected to serve as directors. Some associations elect young active farmers, while other cooperatives have retired farmers serving as directors. Most cooperatives elected directors for three-year terms. Two of the associations, however, elected their directors for terms of two and three years. Some of the organizations believe there should be a gradual turnover of elected officials, as a director cannot be elected to succeed himself. Others limit a director to a specified number of terms, while some of the elevators have no such restrictions.

Nearly all of the elevators have regularly scheduled board meetings. These meetings are scheduled once every month, every two months, or once every three months, with unscheduled meetings when needed. One association followed no regular meeting schedule; they met when they felt there was business to conduct. Attendance at regularly scheduled directors' meetings was nearly perfect, as only two of the surveyed associations reported less than perfect attendance at their meetings.

Compensation for the directors ranged from a specified amount per year to a certain payment per meeting, plus mileage. One cooperative pays its directors according to the position they hold on the board in the order of president, secretary, treasurer, or director, respectively.

The directors hire a manager to carry out the policies they propose and supervise all the ordinary business of the cooperative. Salaries which the managers receive ranged, as a rule, from $6,000 to $12,000 per year. These managers all had from one to seven full-time helpers to assist them, but only 40 per cent of them had the assistance of a bookkeeper.

Fifteen of the elevators employed only one full-time helper or second man. The remaining elevators generally hired two or three helpers. Bookkeepers, when hired, sometimes are on a part-time basis.

Salaries of the second man and helpers averaged about $4,300 per year, with a range from $3,000 to $8,000 yearly. Often these salaries were supplemented with a bonus or commission. Bookkeepers, when on a part-time basis, received upward of $1 per hour with some receiving $600 per year.

All of the present managers had elevator experience before assuming their present positions. The average time they had served as second man was five years, while two-thirds of them had managed other elevators from 1 to 14 years.

Retirement of the previous manager was one of the main reasons given for the hiring of the present manager. Acceptance of another occupation or a management position elsewhere was also listed as a major factor.

Average age of the present manager was slightly over 40 years. The ages range from 26 years to 66 years. Variation was also noted in the amount of formal schooling these managers had completed. Thirty per cent of the managers had no more than eight years of schooling. Forty per cent of them had high school training, and 30 per cent had advanced schooling, such as business college.

Less than half of the elevators were members of the North Dakota Grain Dealers Association. Those who do belong said they received services, such as bonds, information, and legal advice from the association. Sixty per cent of the elevators, however, did make use of a central cooperative sales agency, such as the Grain Terminal Association. Some of the elevators purchased many of their sideline products through a central distribution association, such as Mid-land Cooperative or Farmers Union Central Exchange.

The general attitude of the members, directors, and the managers toward the central cooperative grain selling agency varied greatly. Members, directors, and management of some associations favored selling through the central sales agency, while in others there was general opposition. Opposition was often attributed to the political affiliations of the regional association.

When considering the entire membership of the cooperatives which were studied, it was found that slightly more than half of the members favored selling through the regional cooperative. A small percentage of them were neutral, but in most cases the members were definitely aligned or opposed to the regional.

The directors of nine of the elevators were in favor of selling through the regional, while the directors of seven did not favor regional sales. The directors of the remaining seven elevators were indifferent as to type of sales outlet.

When the managers were asked if they favored selling through the central sales agency, 10 said they did, while five were opposed to the idea. The remaining managers were neutral, stating that it depended upon whether

the cooperative could serve them better than some independent selling agency. In many cases, the manager sold the grain through several agencies in an attempt to satisfy all members including those who belonged to different farm organizations.

General Performance

The elevators surveyed were generally in good condition except a few which need some modernization. Some of the plants have recently been remodeled or have new additions housing the office and merchandise areas. Those in need of improvements are quite old and need new office and sideline space. Some managers felt they could make good use of new grain cleaning and feed processing equipment. The item most desired in the older plants is a new scale capable of handling larger trucks.

Nearly half of the cooperatives studied have no local competitors; 10 of them have competitors who are privately owned or line elevators. Two of the cooperatives have more than one local competitor.

When asked about the intensity of the local competition, five of the managers said it is keen, four reported it is moderate, and in two cases it is light.

Competition from nearby stations is reported to be quite keen in nine of the instances and only moderate for the other elevators.

Producers' grain bypassing the elevator through direct shipment to the processor is no real problem. Some of the managers reported small amounts of oats and barley were being directly shipped by truck to feed processors; the amount, however, was insignificant.

Shipping grain by truck instead of rail is done in some instances depending upon existing conditions. Some elevators are advantageously located on a route used by commercial truckers, and the grain is used as a "backhaul" to defray expenses. Although trucks usually haul for a lower rate, they are more costly to unload, and they cannot be held for resampling as can a rail shipment.

Marketing margins on grain and sideline sales which the management desired to achieve varied greatly. The grain margins desired and the average achieved are shown in Table 1. Desired sideline margins and the average taken are shown in Table 2.

Only two elevators indicated their desired margin on fertilizer, which was 2.5 per cent. Fertilizer sales are somewhat of a problem sideline for many managers. Often it is sold as a service product with a low markup, and in many cases it is sold on credit. One manager stated that 80 per cent of his accounts receivable are from fertilizer sales.

Many of the associations have their yearly audits prepared by a representative of a commission company. A few of them employ private auditors who audit the books of several local elevators. The auditor may also allocate the patronage dividends for the year. However, nearly one-third of the

TABLE 1. GRAIN MARGINS DESIRED AND REALIZED, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Type of grain	Desired margin		Average realized margin
	High	Low	
	cents per bushel		
Wheat	7	3	7
Durum	8	3	9
Flax	15	10	9
Barley	8	3	5
Oats	7	1	4
Rye	8	3	5

TABLE 2. SIDELINE MARGINS DESIRED AND REALIZED, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Type of sideline	Desired margin		Average realized margin
	High	Low	
	per cent of sales		
Merchandise	15	10	10
Feed	15	4	6
Fertilizer	--	--	5
Coal	15	5	10

associations assigned the task of dividend allocations to the manager or the manager and the board of directors.

Auditing of the association's books is done several times a year in most cooperatives. Ten of the firms have their books audited every month, while the others have it done quarterly or at least once every six months.

The majority of the cooperatives prepare a monthly trial balance, income and expense statement, and monthly balance sheets for their own records. Some, however, make such checks only once every six months, while three of them do not make use of these business examinations between the yearly audits.

Inventories of the cooperatives are taken annually. This is done by the board of directors and the commission company's field man in four of the associations. All the other elevators studied, except for one, require that some of the board members be present to check the accuracy of the inventory.

Method of Sale

When an elevator purchases grain from a producer, there is usually a time lapse before it is sold at the terminal market. During this time the manager usually needs to protect the elevator from any loss due to a price drop which might occur. Several different methods are employed which offer virtually the same protection.

Hedging, a system of counterbalancing investments, was once the leading source of protection. With this system the manager sells in the futures market an amount approximately equal to that purchased from the producer. Then, if the price changes in the cash market, a corresponding gain or loss will be realized in the futures market. This type of protection is being replaced by what is generally referred to as "selling to arrive."

Selling to arrive is a very good hedge against changes in price and premium payments. When using this method, the manager calls the commission company which negotiates an immediate sale of the grain he has purchased from the producers. Selling the grain at the elevator rather than after it reaches the terminal shifts the risk of a price change to the buyer.

When selling to arrive, a contract is entered into which specifies the type and quality of grain, delivery date, and other details. The grain is sold at current terminal prices with the elevator paying freight, commission, sampling, and other costs. A somewhat similar method of selling is known as selling "on track."

When selling on tract, the buyer rather than the seller pays the various handling costs incurred from the time the grain leaves the elevator until it is sold. As such, the price paid for the grain is F.O.B. the country elevator.

Sometimes the grain is sold "spot cash" at the elevator. Although seldom used, it is a means by which millers, feed processors, and terminal buyers bypass the grain exchange. If such a sale is used to sell grain just delivered by the producer, no hedge is needed by the elevator. If, however, the grain is to be held for a period of time, some means of price protection may be desired.

Grain that is held by the elevator to be consigned at a later date may be protected through the use of a hedge if there is any chance of a price drop. At one time nearly all of the grain was consigned to a commission firm for sale, and hedging by the elevator managers was a common practice. Today, however, less than half the managers do any hedging.

The survey indicated that about one-third of the managers did hedge closely. Others hedged only when they thought it might be advantageous to hold the grain a while and when they needed some price protection. Five of the managers did no hedging, with one stating that he did not know how to hedge.

Many of the managers have the commission company do all the hedging for them. If the grain is not sold to arrive, the manager calls the commission company and informs him of the type and amount of grain to be hedged.

Hedging, as a means of price protection, is being replaced by selling at the elevator; however, it is doubtful that it will be completely eliminated at the elevator level, as some managers feel hedging is necessary for good grain merchandising. Three of the managers interviewed do their own hedging on grain which is not immediately sold.

Although it is somewhat unusual, one manager stated that he seldom does any hedging nor does he use some other price protection device. His elevator is located in an area which produces high protein wheat, and hedging does not give protection on premium payments. It was his opinion that he could gain more profit for the patrons by consigning the grain at a proper time to take advantage of normal price differentials.

Credit

Agricultural changes have greatly increased the demand for farmer credit. Before the advent of power machinery, farm chemicals, and processed feeds, cash outlays by farmers were not as large as they are today. Present day farmers, however, are making use of ever increasing amounts of production credit from many sources. The cooperative in many cases has become an important credit source for feeds, chemicals, and merchandise.

Many cooperatives fear they will lose much of their business volume if they do not grant open credit, while others feel it is a convenience service needed to meet competition. The question today then is not one of cash or credit, but one of how much credit and the type of policy to use in its collection.

Credit extension may often become a costly item for the association. An obvious cost is the loss from bad debts. Other direct costs which are unmeasurable are often greater than uncollectable debts. These costs include bookkeeping, collection fees, and interest on the capital tied up in the accounts. Indirect costs result from a shortage of working capital which is needed to cover costs of inventory, payroll, and other operating expenses. Working capital shortages may even prevent discount buying, thus decreasing operating margins and patronage dividends.

Many of the elevators surveyed had satisfactory credit policies, as was indicated by the ratio of sideline sales to accounts receivable. Forty-five per cent of the associations had at least $6 worth of sideline sales for each $1 of accounts receivable, which indicates the average age of the receivables is about 60 days.

The other 55 per cent, however, had what might be undesirable credit situations. The ratio of sideline sales to accounts receivable for the entire group of elevators averaged only 3.8:1. This would indicate an average age of 95 days for the receivables. The aggregate accounts receivable average of the elevators was $13,556, which was 28 per cent of the net working capital or 10 per cent of the current assets.

According to the estimates given by the managers, 6 per cent of the receivables were over two years old or considered dead. Twenty-four per cent were slow or one to two years old. Most managers felt that at least 90 per

cent of the outstanding receivables will eventually be collected if economic conditions remain good.

To minimize the risks which may be incurred when credit is overextended, the board of directors should establish a sound credit policy for the manager to follow. Through the combined efforts of the directors and the manager, credit extension can be controlled.

As an aid to credit control, an association can work closely with financing agencies providing credit for the patrons. The association thus provides a much needed service while minimizing credit losses. Under the program each patron needing credit, together with the manager, determines the approximate amount of credit that will be needed for the coming production season. The cooperative then prepares a patron note which is accepted by the financing agent for servicing and collecting.

When a patron's account reaches a predetermined age or amount, depending upon the association's credit policy, it is transferred to the financing agency for full collection. The account then becomes property of the agency and is charged against the patron's note. Under this arrangement the only liability incurred by the association is that it guarantees repayment of the note to the financing agency. Associations are therefore careful in their selection of patrons eligible for credit accounts.

An association can also supply credit to its patrons through the sponsorship of rural credit unions. The credit unions secure their lending funds from:

1. Savings from members.
2. Deposits by the cooperative.
3. Loans from local banks.
4. Surplus funds of other credit unions.

The establishment of a credit union within an association is sometimes difficult, as it requires active participation by the membership and good leadership. Seldom does the manager have the time to instigate a credit union; therefore, the responsibility falls upon the directors or other interested members.

Part III

ANALYSIS OF AUDIT DATA OF GRAIN COOPERATIVES

Measuring Financial Status

A ranking system was needed to measure the financial status of the cooperative elevators. For this, 10 ratios were selected to examine fixed capital, working capital, operational results, and volume relationships.

When the ratios were computed, the average value of each of the 10 individual relationships was found. An explanation of ratio analysis procedure is provided in the appendix. The individual ratio values for each elevator were then subtracted from the average, and it was determined by what percentage they were above or below the average ratio of the elevators surveyed.

The elevators were then ranked from one to twenty-three according to the size of the individual ratios and an average ranking obtained. These accumulated ratings were then used to rank the firms according to financial strength.

When ranked according to financial strength, the top two firms were above average for all 10 ratios. The next six elevators have ratio values which are above average for at least seven of the ten ratios used to determine financial strength.

A somewhat similar relationship was found among the elevators with the lowest ratio values. The two lowest firms are below average for all 10 ratios. None of the bottom six elevators have more than two ratios which are above average, and these are above by less than 20 per cent of the average ratio value.

Table 3 lists the ratios which were used to rank the elevators according to financial strength. The high, low, and average value for each ratio is also given.

TABLE 3. RATIOS USED TO SHOW FINANCIAL RANKING, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Highest value	Lowest value	Average value
Liquid ratio	3.5:1	.2:1	1.1:1
Net worth to total liabilities	18.0:1	.3:1	1.5:1
Net worth to total assets	.9:1	.2:1	.6:1
Income to net worth	.2:1	.03:1	.1:1
Net income to total assets	.2:1	.02:1	.1:1
Net income to net assets	.2:1	.02:1	.1:1
Net working capital	$188,068	-$18,868	$48,249
Sideline sales to receivables	25.4:1	.9:1	3.8:1
Capacity turnover	3.9:1	.9:1	2.2:1
Expenses to income	.5:1	.9:1	.7:1

When analyzing the various groups of ratios, the elevators and their respective values will be listed according to their overall financial strength rating. This ranking may place an exceptionally strong ratio among some weaker values as it is the aggregate of ratios which determines their overall position.

Elevator Operations,[1] 1961-63

Great variations in capacity, grain volumes, operating margins, and net incomes were found among the elevators studied. Licensed storage capacities of the elevators ranged from 87,000 bushels to 539,000 bushels. The average amount of grain received per year was 117,000 bushels for the smallest elevator and 2,124,000 for the largest. Gross margins before expenses ranged from $18,800 to $160,000, while the net gains after expenses had a range of $2,000 to $54,000.

Maximum return to the owner-patron is the goal of each cooperative association. The elevator of each association was operated in a way the management felt the goals of the membership could be best fulfilled. Hence, each association has conducted its elevator operations somewhat differently. Some associations have expanded their grain storage facilities; others have merged with or purchased nearby elevators, while some have made relatively minor changes. The decisions which were made concerning changes or adjustments have proven profitable for some associations, while others may be experiencing financial difficulties.

The study will attempt to determine what type of elevator organization is needed to obtain maximum benefits for the cooperative members. The principal tool used in analyzing the operations of the associations was a ratio analysis of the yearly audit. The following section gives a brief description of the major items taken from the audit for the analysis. The data presented in the following financial statement are averages for the 23 elevators studied (Tables 4 and 5).

TABLE 4. COOPERATIVE ELEVATORS' COMPOSITE BALANCE SHEET, AVERAGE OF 1961 THROUGH 1963

Current assets		Current liabilities	
Cash	$ 9,167	Outstanding drafts	$ 22,309
Patron accounts receivable	13,556	Current payable	56,462
Other receivables	69,838	Customer credits	1,542
Other	38,734	Other	2,733
Total current	$131,295	Total current	$ 83,046
Other assets		Deferred liabilities	
Prepaid expense	$ 714	Notes and other	$ 12,853
Investments	4,751	Total liabilities	$ 95,899
Miscellaneous	1,214	Net worth	
Total other	$ 6,679	Membership stock	$ 24,327
Fixed assets		Stock credits	39,699
Real estate	$ 111	Patron reserves	54,586
Plant and equipment	105,988	Net savings	10,218
Total fixed	$106,099	Surplus	19,344
Total assets	$244,073	Total net worth	$148,174
		Liabilities and net worth	$244,073

The yearly audit or the final financial statement for the operating year is usually divided into two parts. The first (Table 4) is known as the balance sheet or the statement of the association's financial position. The second part (Table 5) is the income statement or profit and loss statement which indicates earnings or losses for the operating year.

TABLE 5. COOPERATIVE ELEVATORS' COMPOSITE PROFIT AND LOSS STATEMENT, AVERAGE OF 1961 THROUGH 1963

SALES			
Grain sales			
	Bushels (395,386)	Gross margin	$28,282
Sideline sales			
	Dollars ($51,895)	Gross margin	4,473
CCC sales			
	Handling and storage		17,551
Service sales			
	Local storage, cleaning, grinding, miscellaneous		5,196
Gross margin			$55,502
GENERAL EXPENSES			
Salaries and wages	$12,733		
Operating expense	8,532		
Insurance, bonds, and license	4,151		
Taxes	3,025		
Total general expense			$28,441
Operating gain			$27,061
OTHER EXPENSES			
Interest and bad debts	$1,682		
Depreciation	7,133		
Total other expense			$ 8,815
NET GAIN			$18,246
Regional patronage refunds			2,042
TOTAL GAIN BEFORE DISTRIBUTION			$20,288

The Balance Sheet

The balance sheet indicates the resources and liabilities of the association. It consists of assets, liabilities, and the net worth values. The balance sheet derives its name from the fact that what is owned by or owed to the association (assets) must equal what the association owes to its creditors (liabilities) plus what it owes to its owners (net worth).

The Income Statement

The income statement, which is often called the profit and loss statement (Table 5) shows the source and amount of income as well as the expenses of the association. The items listed give a breakdown of the source and

amount of income from each sales division, a listing of various operating expenses, and the gain or loss incurred before distribution of income.

Working Capital Analysis

The first group of capitalization ratios to be analyzed pertains to an association's liquidity or ability to meet current obligations. A summary of the ratios is given in Table 6.

TABLE 6. WORKING CAPITAL RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Desired standard	Composite average (sample)	Range elevator (sample)
Current assets to current liabilities	2:1	1.5:1	.6:1 to 6:1
Current assets minus sideline inventories to current liabilities	1:1 or greater	1:1	.2:1 to 4:1
Current assets minus current liabilities	No set standard	$48,249	($18,868) to $111,067
Inventory to net working capital	Less than 90%	25%	3% to 89%
Sideline sales to accounts receivable	6:1 or greater	4:1	.9:1 to 25:1

Current Ratio

This is one of the most basic ratios used in financial statement analysis to determine the margin of protection current creditors have in a given firm. The generally accepted standard of $2 worth of current assets for every $1 of current liabilities is not fulfilled for the average of the elevators sampled. It was found that 11 of the associations did not meet the desired standard of 2:1. One elevator has only 57 cents worth of current assets for each $1 of current liabilities, a situation which gives creditors no safety margin. Nearly one-third of the elevators, however, did have a very substantial safety margin which ranged from 2.0:1 to 5.7:1.

Liquid Ratio

Closely related to the current ratio, the liquid ratio is sometimes thought to give a truer indication of an association's current position.

The liquid ratio excludes the effect of inventories and compares the cooperative's liquid assets (cash, receivables, and marketable securities) to its current liabilities. The liquid ratio (sometimes called the "Quick Ratio" or "Acid Test") is often used when prices are declining or inventories are hard to move, thus making cash conversion difficult for current debt payments.

The average liquid ratio value was actually fractionally above the desired standard of 1:1. This ratio measure indicates a somewhat better safety margin than was shown by the current ratio. Six of the eleven cooperatives showing an undesirable current position show a satisfactory liquid position.

Net working capital represents the members' investment in the current assets. The members' average investment for the 23 elevators was $48,249, ranging from a high of $188,068 to a negative value of $18,868. The negative value indicates that the creditors have much more invested in the current assets than do the members. When such a situation exists, the creditors have no repayment margin; hence, they may directly or indirectly influence control of the firm's operation decisions.

Inventory to Net Working Capital

This ratio shows what percentage of the net working capital is in the form of inventories. Only one of the 23 elevators approached the undesirable position of having more than 90 per cent of its working capital in the form of merchandise inventories. None of the others had more than 55 per cent of their working capital tied up in merchandise inventories. Grain inventories were excluded from the ratio as they can be disposed of readily if current obligations become pressing. Generally speaking, inventories should be less than 90 per cent of the net working capital, as cash and receivables may not cover maturing current obligations.

Sideline Sales to Accounts Receivable

The last of the working capital ratios in Table 6 compares the sideline sales to the accounts receivable of an elevator. Generally, all credit sales are the result of sideline sales; therefore, an attempt should be made to keep the ratio above the desired 6:1 value. While the average value of 4:1 for the elevators (Table 6) is far below the desired standard, slightly more than two-thirds of the elevators had a ratio which was 5:1 or larger, a value which may be considered satisfactory. When the ratio nears the 1:1 value or lower, there are undoubtedly many accounts from previous years being carried on the books.

Two of the associations had values of approximately 1:1, which clearly indicates an undesirable credit policy. A further check of the accounts receivable of these two associations was made. This was done by comparing accounts receivable to total current assets. The accounts receivable for both associations were less than 10 per cent of their current assets.

The sideline sales to accounts receivable ratio is often used to determine the age of the total receivables. This is done by dividing the number of days in the year (365) by the ratio value. When a ratio value of 6:1 is

used, the average age of the receivable is about 60 days, the maximum time receivables should be allowed to remain uncollected. The average age of the total receivables of the elevators surveyed was 95 days, an indication of undesirable credit policies.

The accounts receivable of an elevator generally follow a seasonal trend, reaching a high following the spring planting and a low after the fall harvest. Those elevators having an audit date between these two periods rather than at the end of the year will have a tendency to indicate a less desirable credit ratio than those whose fiscal year ends after harvest.

Fixed Capital Analysis

A second set of capitalization ratios was used to determine the condition of a firm's fixed capital or the amount of security it possesses. A summary of these measurements is given in Table 7.

TABLE 7. FIXED CAPITAL RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Desired standard	Composite average (sample)	Range elevator (sample)
Total liabilities to net worth	.5:1 or less	.7:1	.1:1 to 3:1
Net worth to total liabilities	2:1	1.6:1	.3:1 to 18:1
Fixed assets to net worth	.6:1 or less	.7:1	.4:1 to 1.3:1
Net worth to total assets	.6:1	.6:1	.4:1 to .9:1
Fixed assets to fixed liabilities	2:1	8:1	2.2:1 to no liabilities

Total Liabilities to Net Worth

The relationship of the indebtedness of an association to its net worth is indicated by the first of these measures. The desired standard of .5:1 indicates liabilities should not exceed one-half the value of the net worth.

The average ratio value of the 23 elevators (.7:1) indicates a generally weak net worth position. More than half of the associations, however,

had a very desirable net worth position, while eight of them had liabilities which were more than members' equity. Three of the elevators had liability amounts of more than double their net worth values. The major portion of these obligations were current, indicating an extremely undesirable capitalization position. If a large proportion of these liabilities had been non-current or deferred, the situation would be less serious.

Net Worth to Total Liabilities

This ratio is merely an inversion of the previous relationship. This one indicates the members' equity, whereas total liabilities to net worth ratio indicated the creditors' equity in the total assets. The desired standard of 2:1 indicates the members should have at least twice as much as the creditors invested in the total assets. Eleven of the associations had a ratio value lower than the desired standard, and only three of these had a slightly greater investment than did their creditors.

The weak net worth positions indicated by the ratios just considered usually result because of a shortage of working capital which then must be supplied by creditors. This shortage is indicated by the third set of ratio values which determines the amount of investment tied up in fixed assets.

Fixed Assets to Net Worth

This ratio indicates the amount of net worth which is tied up in fixed assets and the amount remaining to serve as working capital. According to the desired standard of .6:1 or less, no more than 60 per cent of the net worth (capital stock, stock credits, reserves, and surplus) should be needed to cover the book value of the fixed assets. The excess of 40 per cent would then be available to serve as working capital.

The average ratio value for the 23 elevators of .7:1 indicates a general shortage of working capital. Sixty per cent of the associations did not have the desired ratio of fixed assets to net worth. It was found that nearly every elevator which has over 80 per cent of its net worth tied up in fixed assets also had undesirable ratio values in the two liability ratios used to measure a firm's security. Three of the elevators studied had fixed assets values which exceeded their net worth values; therefore, it is expected that all of their working capital would have to come from creditors unless borrowed funds were used to finance fixed assets.

Net Worth to Total Assets

This is a comparison used to show the relationship between members' equity and total capital resources used. The desired standard of .6:1 suggests that the members should supply at least 60 per cent of the elevators' capital resources. The elevators' average of .6:1 for the group would seem to indicate a satisfactory net worth to assets position. However, 33 per cent of the elevators did not measure up to the desired standards, while the 10 leading associations had sufficient net worth to account for better than 70 per cent of the total assets.

Fixed Assets to Fixed Liabilities

The relationship of fixed assets to fixed liabilities was used to complete the fixed capital analysis. The desired standard for the ratio is 2:1, which was exceeded by all the associations. None of the elevators had mortgages or deferred payables that exceeded 50 per cent of their fixed assets.

Many of the associations using a limited amount of long-term financing have excessive amounts of short-term liabilities. This was perhaps due to a lack of available working capital, which results when an excessive amount of the net worth is tied up in the form of fixed assets. From the analysis it would seem advisable that some of the associations should finance a greater share of their fixed assets with long-term liabilities, thus leaving more of the net worth to serve as working capital.

Operational Analysis

To test the profitability of the association's operational procedure, two groups of ratios are used. The first measures profitability as related to investment, while the second group considers expense relationships.

Investment Earnings

The investment ratios will be considered first. A summary of the measures is given in Table 8.

TABLE 8. INVESTMENT PROFITABILITY RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Desired standard	Composite average (sample)	Range elevator (sample)
Net income to net worth	.09:1 or greater	.12:1	.04:1 to .23:1
Net income to total assets	.06:1 or greater	.07:1	.02:1 to .19:1
Net income to net assets	.09:1	.11:1	.04:1 to .21:1

Net Income to Net Worth

This is a measure of the return on member investment. It is sometimes called the measure of profitability. The minimum standard of .09:1 or a 9 per cent return on each invested dollar is considered necessary to permit patronage allocations and reserve accumulations. Average return for the

associations was 12 per cent, a very desirable rate of net income. The range extended from a low of 4 per cent to a high of 23 per cent. Eight of the associations had earnings that were below the desired standard. Two of these earned only a 4 per cent return on their net worth.

Return on membership investment or net worth can sometimes be misleading due to incorrectly valued factors used to compute the ratio value. Erroneous income values may result if the elevators' assets have been overvalued or if insufficient depreciation figures are used. Income values may also be incorrect if, for example, proper reserves for bad debts are not maintained or if ending inventories are overvalued. To overcome this difficulty, it may be wise to measure the return on total investment or total assets.

Net Income to Total Assets

This measure of return on total investment is sometimes considered the final measuring stick of profitability. It is a ratio which indicates the firm's capacity to earn savings for both its long- and short-term investments. These are the earnings which justify credit policies and patronage refunds or dividends.

When considering the return on the entire investment, the desired standard is .06:1 to give a 6 per cent return. Again the average return for all the 23 associations is above the desired standard. Eight of the elevators do not meet with the standard, with one having a return of only 2 per cent. Fifteen of the cooperatives have returns which exceed the desired 6 per cent, with one reaching a high of 19 per cent.

The significance of comparing the net income to total assets rather than to net worth is exemplified by comparing the two ratio results. The results of the first ratio, net income to net worth, may appear desirable when an association uses substantial amounts of credit. The second ratio, net income to total assets, considers the use of credit, and the ratio value becomes much lower if large amounts of credit are used.

Net Income to Net Assets

This measure is used to determine the rate of earnings on long-term investments. Net assets are total assets minus current liabilities, a value which is equal to an association's net worth plus its long-term borrowed capital. When using this ratio, noncurrent debt is considered a part of the net worth or capital structure of the cooperative. The desired standard for this ratio is .09:1 or a 9 per cent return. Average ratio value for the elevators was 2 per cent above the standard, ranging from a low of 4 per cent to a high of 21 per cent.

Expense Relationships

The second group of ratios used to analyze the profitability of the cooperative's operations is summarized in Table 9.

TABLE 9. EXPENSE RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Desired standard	Composite average (sample)	Range elevator (sample)
Expense to total income	.70:1 or less	.67:1	.45:1 to .93:1
Wages to operating expense	.35:1	.34:1	.29:1 to .42:1
Sales to wages	No set standard	54.5:1	26.3:1 to 81.7:1
Service sales to wages	No set standard	4.44:1	1.05:1 to 10.44:1
Bushel sales to elevator capacity	2:1 or greater	2:1	.9:1 to 4:1

Expense to Total Income

When used as a measure of efficiency, total expense to total income is the most important of the expense ratios. The desired ratio value of .70:1 or less suggests a margin of 30 per cent should be an elevator's goal. The average of the elevators studied was 67 per cent, which leaves a desirable margin. The range of expenses to income was great from a low of 45 per cent to a high of 93 per cent. Those elevators having the lowest expense relationships were financially ranked with the strongest of the group, while those with the highest expense ratios were ranked as the weakest.

While the expense to income ratio does measure an elevator's efficiency, it is not necessarily an indicator of the association's earning power. Earning capacity is also affected by an association's business volume and plant size. Efficiency, however, appears to have a closer correlation with plant size than with relative business volumes.

Wages to Operating Expense

Sometimes used as a basis for wage rates, this ratio suggests wages should account for about 35 per cent of the elevators' operating expenses. Average wage to expense ratio value for the elevators was 34 per cent, ranging from a low of 29 to a high of 42 per cent. While it may be true that adequate wages are a criteria for profitable operation, no correlation could be established between wage levels and elevator efficiency.

Many factors may affect employee efficiency and wage rates. These may include the various proportions and types of sales, condition of plant and

facilities, and number of employees used. Undoubtedly some of the employees of the top ranking firms have higher salaries than those of the lower ranked firms, as the ratio is based upon a much larger expense base; and the number of employees is often the same.

Sales to Wages

Another measure of employee efficiency is the sales to wages ratio. The results of this ratio did not appear to be correlated with wage rates or elevator efficiency. The average sales per $1.00 of wages was $54.50, ranging from a low of $26.00 to a high of nearly $82.00.

Service Sales to Wages

Service sales usually require a considerable amount of labor; therefore, it is sometimes desirable to establish a relationship between the two. Again, no correlation could be established between this ratio value and the others observed. Although the two employee efficiency relationships lacked consistency, they may be useful to an individual elevator when used to determine yearly changes or trends.

Bushel Sales to Elevator Capacity

Commonly known as the turnover ratio, it is used to determine the degree to which the grain handling facilities are utilized. A turnover rate of 2:1 or greater is considered necessary for efficient operation. Average rate of turnover for the elevators studied was 2:1, ranging from a low of .9:1 to a high of 4:1.

When the elevators were divided into three size groups according to licensed storage capacities, it was found that the average turnover rate was greater for the middle sized group than for either the small or large sized groups.

Elevator efficiency (expense to income measure) was found to be poorly correlated with turnover rates. Several of the elevators having high turnover rates also had high expense as compared to income. It could be concluded from the analysis that elevator efficiencies are more dependent upon plant capacities than turnover rates.

A relationship of the sales turnover rate, expense to income percentage, and elevator capacity is shown in Figure 1. Observation of the figure reveals a generally lower expense rate for the larger elevators even if their turnover rate is relatively low. It will be noticed that the smaller elevators have high expense rates even with high turnover rates.

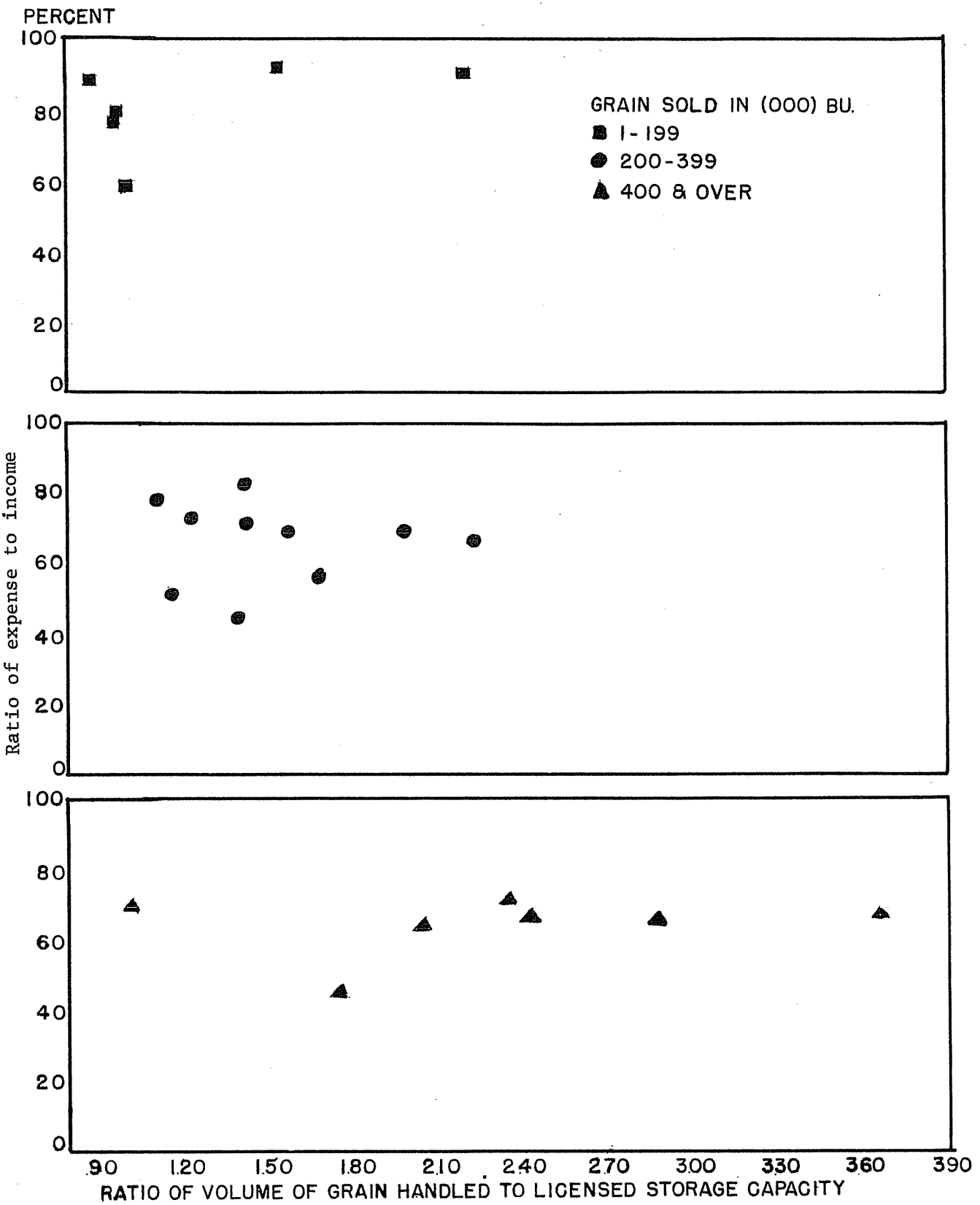


Figure 1. Relationship of Intensity of Use to Elevator Efficiency for 23 Cooperative Elevators, North Dakota, 1961-62-63.

Margin Analysis

Two groups of measures are used to analyze operating margins. The first determines the margins of the grains handled, and the second measures the markup of the sidelines sold.

Grain Margin

Grain margin variations were great among the elevators (Table 10). Perhaps the most significant measure of the group is the total grain margin. This overall margin ranged from a low of 4 cents per bushel to a high of 13 cents per bushel. The average margin was 6 cents per bushel for all grain sold during the three-year period.

TABLE 10. ELEVATOR GRAIN MARGINS REALIZED, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Type of grain	Average	Low	High
	----- cents per bushel -----		
Wheat	7	3	17
Durum	9	2	19
Flax	9	(1)	21
Barley	5	1	12
Oats	4	2	11
Rye	5	3	17
Other[a]	4	1	12
Total grain	6	4	13

[a]Beans, corn, and millet.

There did not seem to be any relationship between realized margins and the type of farming area or the sectional location of an elevator within the state. Some associations had fairly high margins on all grains, while others had relatively large variations among the types of grains. Also noted was the lack of correlation between an elevator's financial strength rating and its total grain margin.

Grain margin variations could not be attributed to any one of the observed factors as they are affected by a combination of forces. Margins are determined by the risks involved, estimated costs, competitive position, and the manager's grain merchandising ability. Degree of competition, however, did seem to have a bearing on the margins realized. It was noted that of those elevators faced with keen competition only one had a margin which was much above the average. None of the elevators which had relatively high margins experienced more than average to moderate competition from local or nearby stations.

The facilities which an elevator has for grain upgrading may also be a factor in determining the margin realized. Some managers said they do a considerable amount of cleaning and mixing of their grain to achieve higher selling prices. Others stated they were hampered by lack of working space or facilities to do much upgrading of the grains.

Differences in the amounts of grain cleaning done by the elevators were noted by comparing the gross margins received from screenings sales to the gross margins received from all grain sales. It was found that screenings sales ranged from 2 per cent of the total to 30 per cent of the total grain sales. The average gross income from screenings sales was 15 per cent of the gross grain income.

Sideline Markup

The most important measure to observe is the one indicating the realized margin for all sidelines, excluding those of the oil department. The overall markup ranged from a high of 16 cents per dollar of sale to a slight loss on sideline sales (Table 11). Average sideline margin for the group was 8 per cent, which is slightly low considering the costs involved with this type of sale.

TABLE 11. SIDELINE MARGINS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Sideline	Markup		
	Average	Low	High
Merchandise	10	(5)	15
Feed and salt	6	2	12
Seeds	8	(5)	13
Fertilizer	5	(4)	6
Twine	9	1	17
Coal	10	4	16
Total margin	8	(0.1)	16

The most important reason for a high margin is the fact that nearly all patrons' accounts receivable are a result of sideline sales. A substantial margin is needed to cover the cost of carrying these accounts and uncollectable receivable losses. Another reason for a substantial margin is the cost of handling these items. Many of them are seasonal and must be stocked in anticipation of demand, which sometimes leaves the elevator with a slow moving inventory. Other costs include storage and handling of some of the more bulky or perishable items.

Only one association had a negative overall sideline margin, a condition which looks even more perilous when other specific ratios of that elevator are observed. The sidelines sales to accounts receivable ratio value

of this elevator is only .97, a value which indicates the association's yearly sideline sales are less than its accounts receivable.

The operations of the oil departments were separated from the elevator operations where possible. This could not be done with three associations, as the oil department was an integral part of their records system. Two whose oil sales accounted for less than 5 per cent of their total sideline sales had markups of 8 and 14 per cent. The third elevator, which had oil department sales accounting for 77 per cent of its sideline sales, had a margin of 22 per cent. Oil sales for this elevator averaged slightly more than $60,000 per year.

Sales Relationships

Income sources for an elevator can be placed into four general classes as follows: grain sales, government storage payments, sideline sales, and service sales. The contribution of each class towards the total gross income of an association varies considerably as can be noted in the summary of income relationship ratios as shown in Table 12.

TABLE 12. PROPORTION OF ELEVATOR INCOME DERIVED FROM SPECIFIED SOURCES, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Specific ratio	Average	Low	High
		per cent	
Grain income to total income	51	23	76
CCC income to total income	32	10	57
Sideline income to total income	8	(0.3)	36
Service income to total income	9	2	21

Grain sales are the leading source of income for the elevators, making up 51 per cent of the total gross margin. Income from grain sales ranged from a low of 23 per cent of the total to a high of 76 per cent. Income from grain sales ranged from a low of 23 per cent of the total to a high of 76 per cent. Income from government-stored grain ranked second to grain sales for 19 of the elevators. Four of the elevators received a larger share of their gross margin from Commodity Credit Corporation payments than they did from grain sales. The average amount of income received from CCC payments accounted for 32 per cent of the gross margin.

The average amounts of the gross margin received from sidelines and services were 8 and 9 per cent, respectively. There were, however, large variations within both of these income sources with gross sideline margins ranging from a negative value to a high of 36 per cent of the total gross margin. Service incomes showed slightly less variation with a range from 2 to 21 per cent of the total margin.

A graphical presentation of percentage relationships of the various income classes is given in Figure 2. The associations are presented here according to importance of grain income. The presentation clearly indicates the different management decisions under which the various elevators operate. Some of the associations obtain the major portion of their gross margin from grain merchandising rather than from grain storage. Other associations have built large storage facilities; and, consequently, they receive a larger share of their gross margin from storage payments than they do from grain merchadising.

Service Sales Relationships

Service sales of an elevator are often considered necessary to attract and maintain patronage. Service activities include cleaning, trucking, grinding, drying, and other activities the elevator may be equipped to perform. The three leading service incomes, as measured by the per cent of total service sales, are local storage, cleaning, and grinding. None of these contributed more than one-third of the total service income. Service margins for the 23 elevators ranged from a low of 2 per cent of the elevators' total gross margin to a high of 21 per cent. All of the elevators had service income from one source or another, although many performed only two services.

The gain or loss incurred in performing a service is much more difficult to measure than it is for grain or sideline sales. The profitability of a service may depend upon the time of season it must be performed. If its performance makes use of surplus labor or equipment, it may be very profitable; at other times, however, it can become quite costly. Profitability of service operations may at times be secondary to customer convenience and retention.

Some of the services, such as local storage and cleaning, make use of existing facilities, which lowers their cost considerably. Special mills and handling equipment must be installed for some services, such as feed grinding. These facilities cannot be used in the merchandising of grain; thus, their fixed cost per unit of service is high. Several managers felt their grinding service was unprofitable but necessary to meet competition from other elevators.

The classes of service sales listed as "miscellaneous and other" may seem somewhat misplaced, but in a sense they are a service. Items, such as interest, rent, current railroad claims, and miscellaneous services, are all listed as service activities to facilitate accounting.

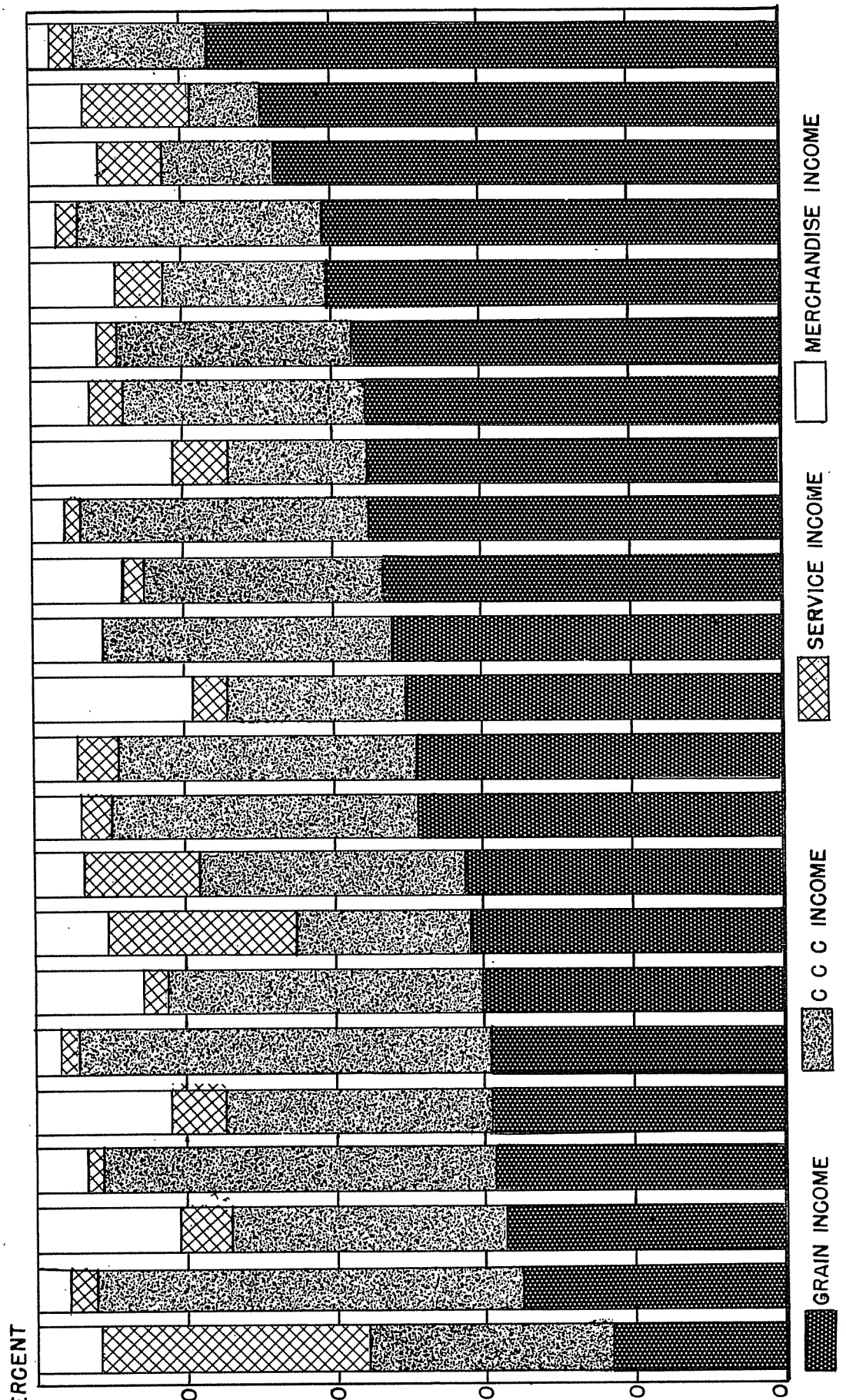


Figure 2. Percentage Relationships of Income Sources for 23 Cooperative Elevators, North Dakota, 1961-62-63.

Regional Dividends

The last group of ratios to be considered relates dividends received from the regional cooperative to elevator income. Although many local cooperative elevators do not sell their grain through a regional, 65 per cent of the associations surveyed sold at least a part or all of their grain through a regional cooperative association. A summary of the regional sales dividends is given in Table 13.

TABLE 13. REGIONAL DIVIDENDS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Item	Average	Low	High
Percentage of total income	10	3	47
Percentage of net gain	11	5	90

The percentage of the total income which was received from the regional cooperative ranged from a low of 3 per cent to a high of 47 per cent for those elevators selling through the regional. When examining these rations, consideration must be given to the fact that many elevators sell only a part of their grain through the regional.

The percentage that the regional dividends are of the elevator's net gain is fairly significant in some cases. Without the dividend, one elevator would have operated at a near loss. Regional dividends were also significant sources of income for several other elevators.

These dividends can be considered a part of the income as they are earnings received from grain sales. They may, however, be a delayed return on grain sales of a previous year depending upon the regional's repayment schedule or fiscal year. The use of a three-year period in calculating the ratios should eliminate most of the error.

Several reasons were given for not selling all the grain through the regional. Many managers said they split their sales between the regional and other commission companies to avoid dissension with the members who are opposed to policies of the regional. Some managers desired to sharpen competition for their grain by selling to several firms, while others said they sold according to the directive of the board of directors.

Part IV

COMPARATIVE RATIO ANALYSIS

An aggregate listing of working capital ratios, fixed capital ratios, and realized margins is given in this section. To more clearly indicate in Table 14 the general financial conditions of the elevators, the ratio values are placed above or below the generally accepted desired standard. The number of each elevator is shown in parentheses following each ratio value in Table 14.

TABLE 14. WORKING CAPITAL RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

A Current ratio	B Liquid ratio	C Inventory to net working capital	D Sideline sales to accounts receivable
5.7 (3)[a]	3.5 (1)	.03 (4)	25.4 (12)
4.2 (1)	2.5 (3)	.05 (11)	10.1 (1)
4.0 (17)	2.4 (4)	.08 (9)	10.1 (10)
3.7 (10)	2.2 (11)	.08 (16)	7.5 (6)
2.8 (9)	2.2 (17)	.10 (18)	7.4 (8)
2.7 (2)	2.0 (9)	.12 (13)	6.9 (13)
2.7 (4)	1.9 (10)	.14 (7)	6.7 (16)
2.4 (13)	1.8 (8)	.14 (22)	6.4 (5)
2.3 (8)	1.8 (13)	.15 (5)	6.2 (11)
2.1 (6)	1.6 (2)	.18 (20)	---
2.0 (5)	1.6 (16)	.21 (8)	6.0 -1[b]
---	1.4 (6)	.22 (14)	---
2.0 -1[b]	1.3 (7)	.23 (1)	5.9 (2)
---	1.3 (18)	.23 (3)	5.8 (7)
1.9 (7)	1.2 (20)	.23 (6)	5.6 (4)
1.9 (6)	1.1 (14)	.23 (10)	5.3 (18)
1.5 (19)	1.1 (19)	.30 (17)	5.0 (3)
1.4 (11)	1.0 (5)	.50 (12)	3.8 (19)
1.4 (14)	---	.50 (23)	3.7 (22)
1.4 (18)	1.0 -1[b]	.51 (2)	3.6 (9)
1.4 (20)	---	.53 (19)	2.4 (15)
1.4 (23)	.8 (12)	.55 (21)	1.7 (20)
1.2 (21)	.8 (21)	.89 (15)	1.5 (17)
1.1 (12)	.5 (15)	---	1.4 (14)
1.1 (15)	.5 (23)	Less than .90[b]	1.0 (21)
.6 (22)	.2 (22)	---	.9 (23)

[a]Elevator numbers indicated in parentheses.

[b]Desired standard.

The first group of ratio values to be compared is the working capital ratios shown in Column A.

Examination of the current ratio values indicates that nearly half of the associations met or exceeded the generally accepted standard of $2 worth of current assets for every $1 of current liabilities. Only one elevator is in an undesirable position of having current assets less than current liabilities. Such a position gives the creditors a greater investment in the current assets than the owners or members of the association have.

Ratio values indicating the "acid test" for liquidity are given in the second column, B. The use of this measure indicates that only five of the associations lacked an adequate safety margin for their creditors.

The third set of ratio values, Column C, indicates that none of the elevators had an excessive amount of their working capital tied up in sideline inventories. Only one elevator carried a relatively large amount (.89) of sideline inventories.

A comparison of the credit policies of the elevators is undertaken in the last set of ratio values, Column D. The strength of an association's credit policy can be noted by the magnitude of its ratio value. Sixty per cent of the associations had ratio values below the 6:1 desired standard. Several of the associations, however, did have desirable credit policies as is indicated by their large ratio values.

Liability relationships are indicated by the first two, A and B, ratio value listings of Table 15. Only 12 of the associations studied met the desired standard of .5:1 or less for the relationship of total liabilities to net worth. Another eight had liabilities in excess of their net worth values, and three others had liabilities which were more than double that of the owners of the cooperative. Nearly all of the liabilities of these firms were current or nondeferred. Eleven of the associations had no deferred or long-term debts. Those that had long-term liabilities had safety margins well in excess of the desired 2:1 standard.

The generally accepted standard of having no more than 60 per cent of an association's net worth in the form of fixed assets, Column C, was met by only 40 per cent of the associations. Among those associations falling below the standard, it was found that when the fixed assets to net worth ratio exceeded 80 per cent the liabilities to net worth relationship was often also undesirable. This comparison can be observed with elevators 11, 12, 14, 15, and 22.

Elevators 14, 15, and 22 all had fixed assets exceeding their net worth values.

Sixty-five per cent of the associations met the desired net worth to total assets (Column D, Table 15) standard of .6:1. One elevator, however, had a net worth value equal to only 20 per cent of its total assets.

The investment profitability ratios of Table 16 show that 65 per cent of the associations received returns which were equal to or greater than the desired standards. These returns in many cases are exceptionally good,

TABLE 15. FIXED CAPITAL RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

A Total liabilities to net worth	B Net worth to total liabilities	C Fixed assets to net worth	D Net worth to total assets
			1.0 (3)
			.9 (1)
			.9 (7)
.1 (3)[a]	18.0 (3)		.9 (10)
.1 (10)	8.3 (10)		.9 (17)
.2 (1)	6.8 (17)		.8 (2)
.2 (7)	6.6 (1)	.4 (4)	.8 (4)
.2 (17)	6.5 (7)	.4 (8)	.8 (5)
.3 (2)	4.1 (5)	.4 (17)	.8 (9)
.3 (4)	4.0 (9)	.4 (21)	.8 (13)
.3 (5)	3.9 (13)	.5 (1)	.8 (19)
.3 (9)	3.7 (2)	.5 (2)	.7 (6)
.3 (13)	3.2 (4)	.5 (9)	.7 (8)
.4 (6)	2.9 (6)	.6 (6)	.6 (16)
.5 (8)	2.2 (8)	.6 (13)	.6 (23)
---	---	---	---
.5 -1[b]	2.0 -1[b]	.6 -1[b]	.6 -1[b]
---	---	---	---
.6 (16)	1.7 (16)	.7 (3)	.5 (11)
.7 (23)	1.5 (23)	.7 (10)	.5 (15)
.9 (22)	1.1 (22)	.7 (23)	.5 (21)
1.1 (21)	.9 (21)	.8 (5)	.5 (22)
1.2 (11)	.8 (11)	.8 (16)	.4 (12)
1.5 (18)	.7 (18)	.8 (18)	.4 (14)
1.8 (14)	.6 (12)	.8 (19)	.4 (18)
1.8 (12)	.6 (14)	.8 (20)	.2 (20)
2.4 (19)	.4 (19)	.9 (7)	
2.9 (20)	.4 (20)	.9 (11)	
3.2 (15)	.3 (15)	1.0 (12)	
		1.0 (14)	
		1.1 (15)	
		1.3 (22)	

[a]Elevator number indicated in parentheses.

[b]Desired standard.

TABLE 16. INVESTMENT PROFITABILITY RATIOS, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

A Net income to net worth	B Net income to total assets	C Net income to net assets
.23 (14)[a]	.19 (1)	.21 (1)
.21 (1)	.17 (5)	.21 (5)
.21 (5)	.13 (2)	.16 (2)
.18 (15)	.11 (3)	.16 (14)
.16 (2)	.11 (4)	.15 (4)
.15 (4)	.11 (6)	.15 (6)
.15 (6)	.11 (7)	.15 (15)
.14 (8)	.10 (8)	.13 (8)
.13 (12)	.09 (15)	.12 (3)
.12 (3)	.08 (9)	.12 (7)
.12 (7)	.08 (10)	.11 (12)
.12 (11)	.08 (14)	.10 (9)
.10 (9)	.07 (13)	.09 (10)
.09 (10)	.06 (11)	.09 (11)
.09 (13)	.06 (19)	.09 (13)
---	---	---
.09 -1[b]	.06 -1[b]	.09 -1[b]
---	---	---
.08 (16)	.05 (12)	.07 (16)
.08 (18)	.05 (16)	.07 (19)
.08 (20)	.04 (20)	.07 (22)
.07 (19)	.04 (22)	.06 (18)
.07 (22)	.04 (23)	.06 (20)
.06 (23)	.03 (17)	.06 (23)
.04 (17)	.03 (18)	.04 (17)
.04 (21)	.02 (21)	.04 (21)

[a]Elevator number indicated in parentheses.

[b]Desired standard.

ranging up to 19 per cent when measured on the elevators' total assets. Very low returns, however, were obtained by some cooperatives. These lower returns were as low as 2 per cent of the total assets.

The relative amounts of deferred liabilities used by an association can be quickly observed by comparing the first, A, and last, C, columns of the table. The net assets measure, C, considers long-term liabilities as if they were a part of an association's invested capital. Due to the small amount of long-term liabilities used, the values are nearly identical with those of the first, A, column. A big difference is noted, however, in the two values of elevator No. 14. This association has deferred liabilities equal to 48 per cent of its net worth. When comparing the first and last ratios, A and C, it was found that 15 of the elevators had no long-term

liabilities. Most of the associations had quite similar values for both ratios, due to the small amounts of deferred liabilities used by them. One association (No. 14) did, however, have a large difference because it used a substantial amount of deferred credit.

A complete listing of income items along with their various margins and percentage contributions for each association is given in Tables 17 and 18 of the following pages. A more realistic observation can be made by listing both the margin and percentage contributions together. Margin values alone may be meaningless until it is known whether the contribution of the item is large or small.

Some elevators could possibly realize a higher income with different grain margins. Perhaps the margin on wheat could be raised slightly without a proportional decrease in volume, thus increasing income. Depending upon the competitive position, volumes of some of the other grains may be increased if margins are lowered through price increases to the farmer. Elevators in an undesirable position of having to compete with other firms located within the same town may be forced to compete keenly on grain margins, however.

An examination of the sideline margins and their contributions can be used to aid in formulating competitive policies. A recent study of country grain markets indicates that only about 20 per cent of the managers used higher prices to compete. The other 80 per cent emphasized nonprice services, such as low sideline margins, services at cost, or loyalty to the firm.

While it is true that sideline margins should be relatively high to cover the high cost of merchandising, their use as a competitive device should not be overlooked. When sideline sales are used to attract and continue a farmer's grain business, their individual margins should be closely watched to avoid losses.

A margin record should be kept of each group of items. This will aid in the analysis of sideline margins. Some items when sold at a low margin would undoubtedly attract more business than would another. Lumping all sidelines together, as some of the firms have done, does not permit easy analysis.

TABLE 17. RELATIONSHIP BETWEEN MARGINS AND RELATIVE VOLUMES OF SPECIFIED GRAIN HANDLED

Elevator number	Wheat		Durum		Flax		Barley		Oats		Rye		Other	Total grain margin
	Margin	vol.	Margin	vol.	Margin	vol.	Margin	vol.	Margin	vol.	Margin	vol.	vol.	
	Cents	Per cent	Cents	Per cent	Cents	Per cent	Cents	Per cent	Cents	Per cent	Cents	Per cent	Per cent	
1	12	41	14	17	13	1	12	32	--	--	6	9	--	11.6
2	13	32	14	4	12	12	5	39	4	10	8	3	--[a]	8.6
3	13	17	16	4	19	8	4	18	3	34	4	8	11	6.5
4	17	19	19	24	21	11	8	30	6	15	10	1	--[a]	12.9
5	4	49	2	16	6	6	4	19	2	6	7	4	--	3.9
6	10	26	9	10	7	9	2	38	3	10	5	7	--	5.5
7	10	33	11	4	11	16	7	30	6	14	11	1	2	8.9
8	6	64	12	4	(17)[b]	--[a]	7	14	5	3	6	15	--	6.6
9	12	14	11	26	7	7	4	36	6	12	9	5	--	8.2
10	5	45	8	14	12	13	6	19	7	9	17	--[a]	--	6.5
11	7	54	8	7	2	1	3	30	5	4	7	4	--	5.9
12	6	21	4	8	6	10	5	52	3	9	5	--[a]	--	4.7
13	3	92	--	--	21[b]	--[a]	6	4	12	--[a]	6	4	--[a]	5.1
14	9	29	14	4	13	3	5	50	3	14	--	--	--	6.4
15	8	28	8	5	6	7	6	12	2	30	3	16	2	5.1
16	13	7	6	31	9	9	1	39	3	12	11	2	--	4.5
17	9	41	6	15	4	12	6	26	11	4	17	2	--[a]	7.5
18	6	36	11	1	11	11	1	41	2	9	4	2	--[a]	4.7
19	6	10	6	21	13	13	3	27	7	16	5	13	--	6.2
20	6	60	12	4	10	--[a]	5	11	2	2	5	23	--	5.6
21	6	25	14	6	(1)	8	2	42	2	16	7	3	--	3.6
22	12	13	21	16	5	5	1	7	6	39	9	8	12	9.0
23	3	57	26	1	12	24	8	7	4	9	17	2	--	6.0
Average	7	32	9	10	9	8	5	33	4	12	6	5	--[a]	6.1

[a]Less than 1 per cent.

[b]Less than 200 bushels handled.

TABLE 18. RELATIONSHIP BETWEEN MARGINS AND RELATIVE PERCENTAGES OF TOTAL SIDELINE SALES

Elevator number	Merchandise Margin	Merchandise vol. Per cent	Feed & salt Margin	Feed & salt vol. Per cent	Seeds Margin	Seeds vol. Per cent	Fertilizer Margin	Fertilizer vol. Per cent	Twine Margin	Twine vol. Per cent	Coal Margin	Coal vol. Per cent	Total sideline Margin	Oil dept. Margin
	Cents		Cents		Cents		Cents		Cents		Cents		Cents	Cents
1	8	39	3	5	15	4	3	49	8	3	--	--	5.5	--
2	17	84	9	8	12	6	4	--[a]	2	1	(17)	1	15.9	14
3	7	25	9	21	6	9	6	34	13	2	16	9	7.8	--
4	13	7	8	11	16	9	4	46	11	5	11	22	8.3	--
5	5	100[b]	--	--	--	--	--	--	--	--	--	--	5.3	--
6	7	6	2	25	5	25	6	24	8	5	6	15	4.8	--
7	4	95[b]	--	--	--	--	--	--	--	--	19	5	4.1	--
8	5	63	12	19	11	5	5	2	10	11	38	--[a]	7.3	22
9	8	21	11	14	11	8	6	43	4	4	14	10	8.3	--
10	14	6	6	64	8	16	6	12	17	2	--	--	7.1	--
11	6	100[b]	--	--	--	--	--	--	--	--	--	--	6.0	--
12	11	26	6	7	--	--	6	61	--	--	10	6	7.6	--
13	18	2	5	76	7	15	--	--	3	7	--	--	4.7	--
14	7	24	--	--	--	--	4	72	--	--	15	4	5.5	--
15	4	52	--	--	11	10	1	13	1	1	11	24	6.0	--
16	15	100[b]	--	--	--	--	--	--	--	--	--	--	14.6	--
17	2	29	3	29	(5)	10	(4)	4	14	10	4	18	2.9	--
18	8	19	8	16	7	4	6	60	5	1	--	--	6.7	8
19	4	4	7	32	8	10	6	42	7	3	12	9	7.0	--
20	7	42	4	19	4	6	2	24	12	9	--	--	5.4	--
21	(5)	25	--	--	(3)	10	1	57	8	2	6	6	(0.1)	--
22	9	3	7	61	13	10	--	--	--	--	9	26	8.3	--
23	12	100[b]	--	--	--	--	--	--	--	--	--	--	11.8	
Average	10	42	6	13	8	5	5	32	9	2	10	6	8.0	21

[a]Less than 1 per cent.

[b]No breakdown of sidelines.

CAPACITY, INCOME, AND COST RELATIONSHIPS

Elevator costs are often related to the amount of grain handled by the elevator. Such a relationship has merit when the contributions of the various income sources are compared. The average contributions by the four sources of income were: grain sales, 51 per cent; CCC sales, 32 per cent; sideline sales, 8 per cent; and service sales, 9 per cent.

The cost per bushel of grain handled generally decreases as the capacity of the elevator increases. Per bushel costs were also found to decrease as the plant was more intensely used. Intensity of use was measured by relating the capacity of the elevator with the amount of grain handled. This intensity of use measure is often termed capacity turnover.

The cost per bushel ranged from a high of 15 cents to a low of 4 cents per bushel of grain received. A graphical presentation of the relationship is given in Figure 3. The relationship of per bushel costs and bushels received indicates a downward trend in cost as the amount of grain handled increases.

The generally lower cost per bushel of the larger elevators can be seen in the presentation of Figure 4. This presentation relates cost per bushel and licensed storage capacity of the elevators. It was noted that the costs per bushel were generally higher for those having the smaller licensed capacities. These costs, however, were affected by the grain volume handled as well as by the capacity of the individual elevators.

A graphic presentation of the intensity of use (turnover rate) and the cost per bushel of grain handled is shown by Figure 5. As the turnover rate increases, the cost per bushel of grain received generally decreases, due perhaps to the fact that the fixed costs are spread over a larger number of bushels.

When comparing the capacity turnover and the licensed storage capacities of the elevators, no significant relationship was observed (Figure 6). It can be concluded from this that the lower cost per bushel achieved by the larger elevators is due to elevator capacity rather than a high turnover rate (Figure 3).

Expenses were plotted in relation to the grain receipts of the elevators to determine if any definite relationship existed. No relationship was evident from the presentation that would indicate decreasing costs to elevator size or amount of grain received (Figure 7).

Net savings of an elevator are sometimes thought to vary in relation to total sales volume. This, however, is not always true as the major income sources of the elevators are not always of the same proportions. Income sources can be placed into four general divisions:

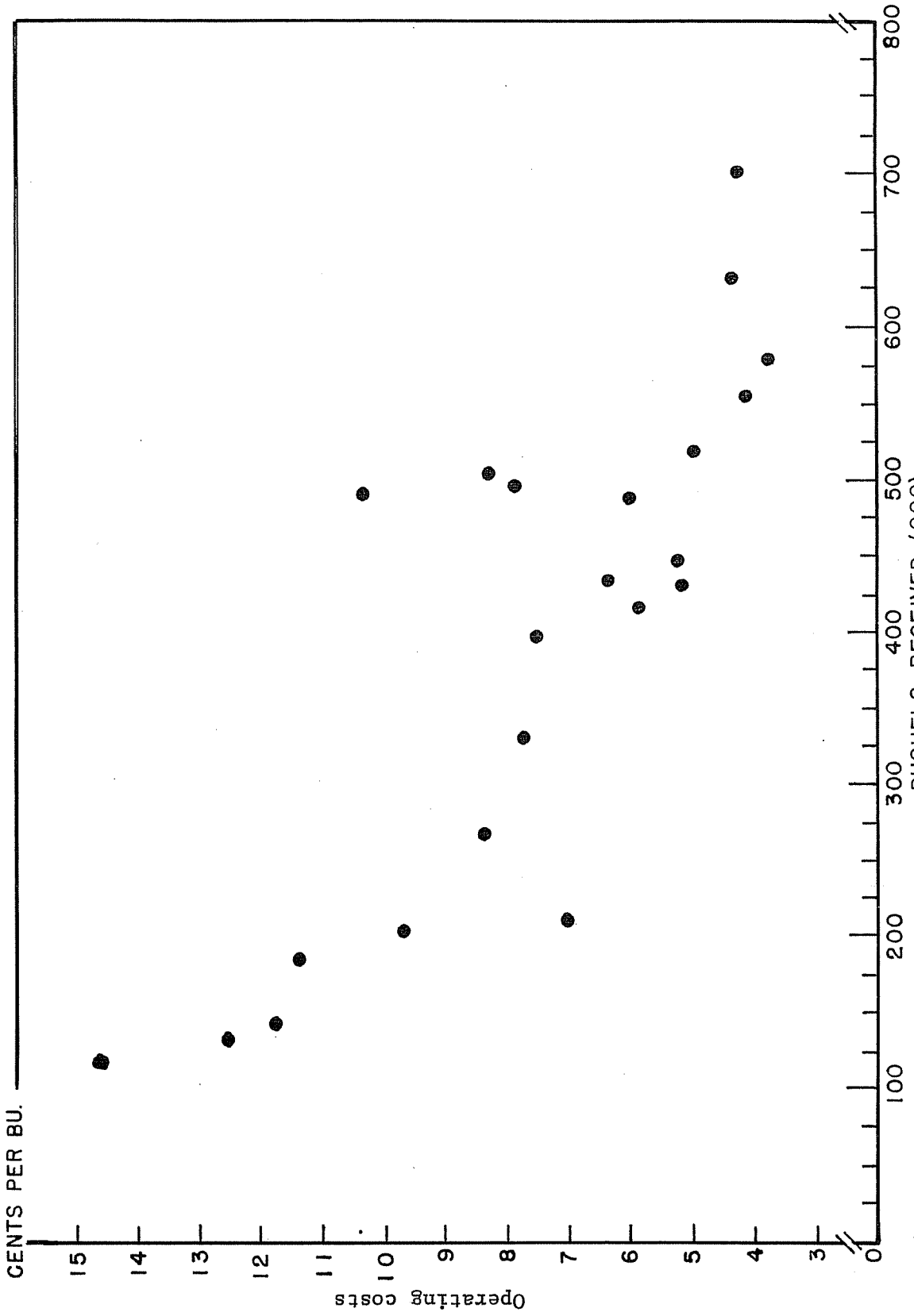


Figure 3. Relationship of Grain Volume Handled to Operating Costs Per Bushel, 22 Cooperative Elevators, North Dakota, 1961-62-63.

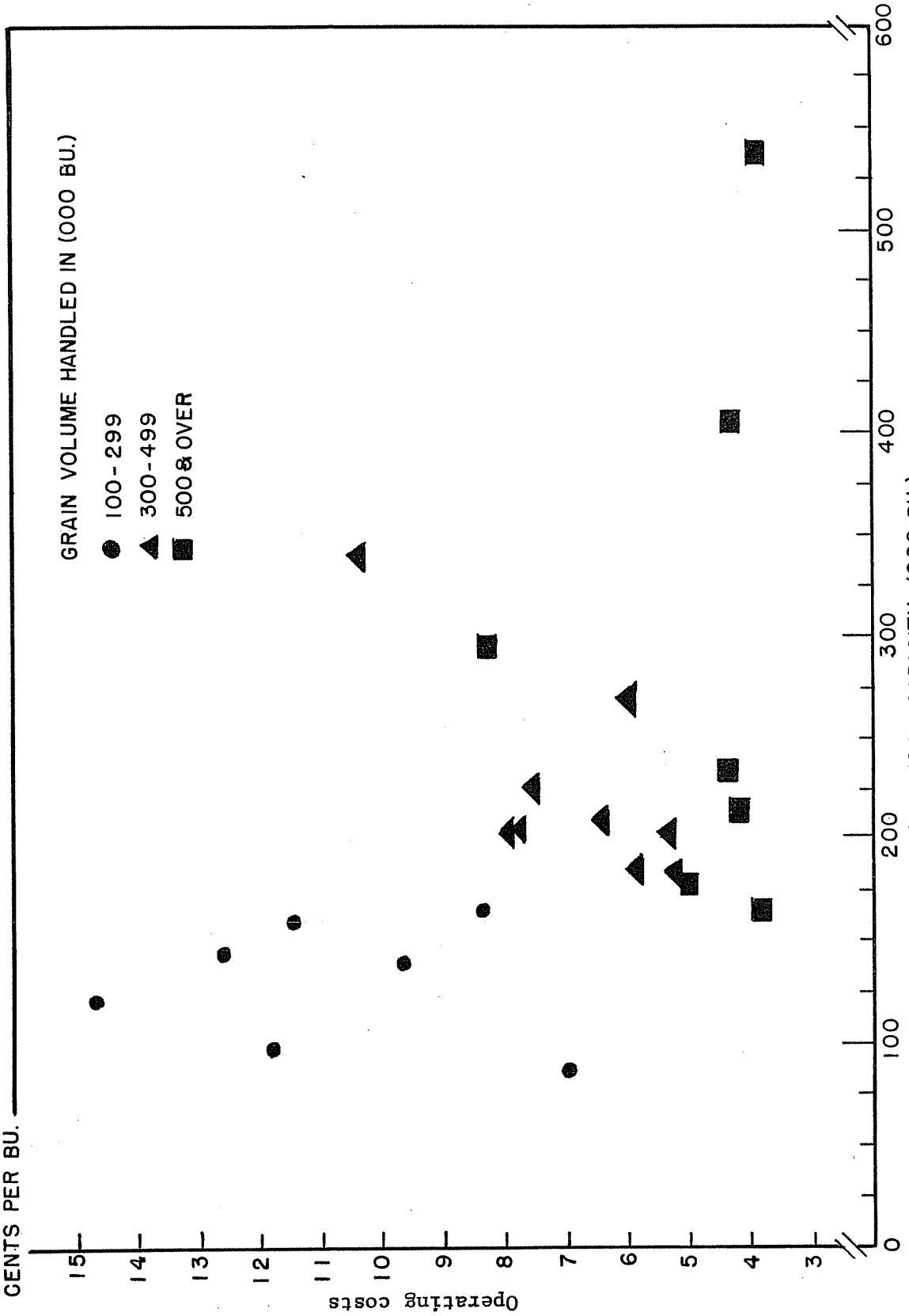


Figure 4. Relationship of Licensed Capacity to Operating Costs Per Bushel, 23 Cooperative Elevators, North Dakota, 1961-62-63.

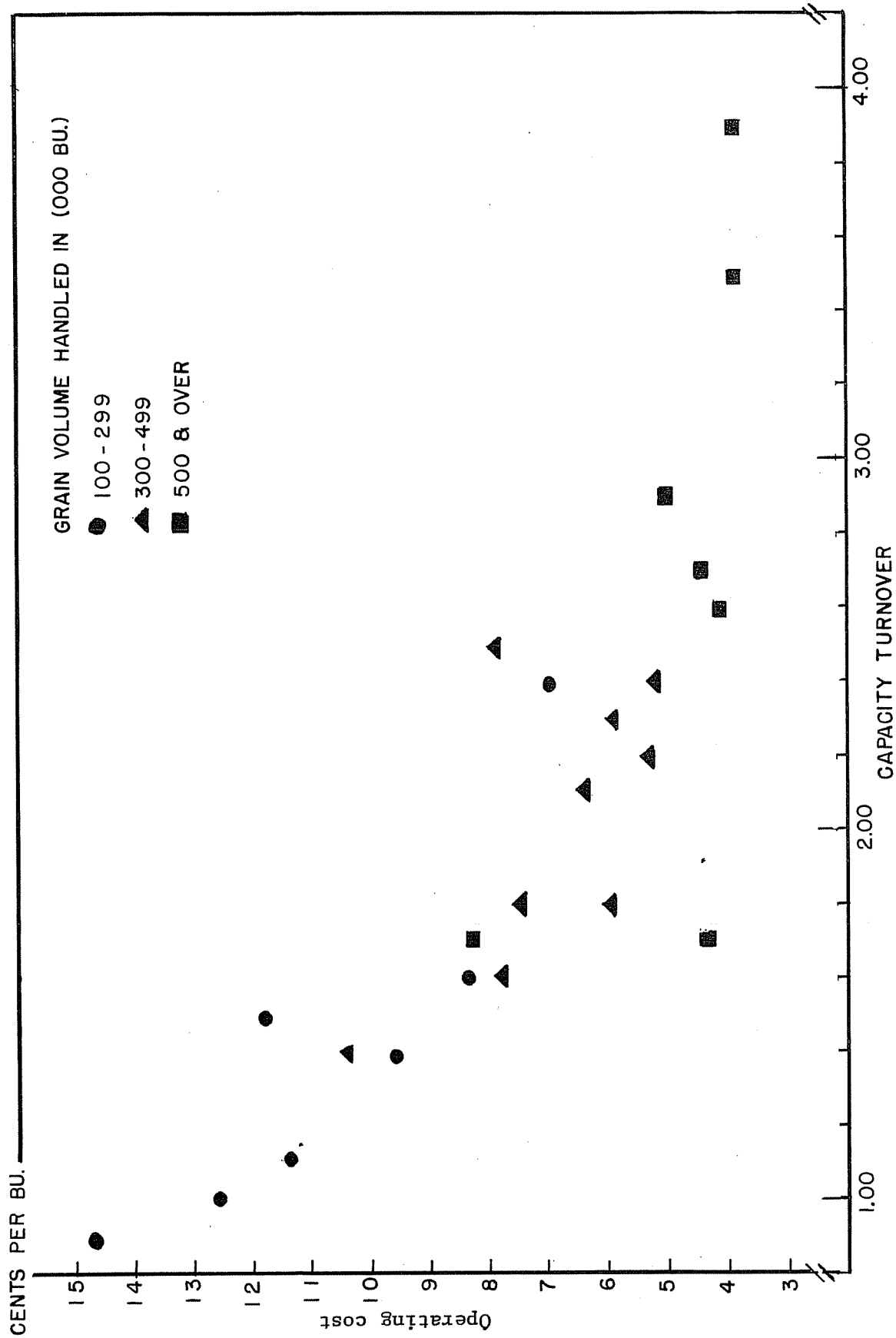


Figure 5. Relationship of Intensity of Use to Operating Costs Per Bushel, 23 Cooperative Elevators, North Dakota, 1961-62-63.

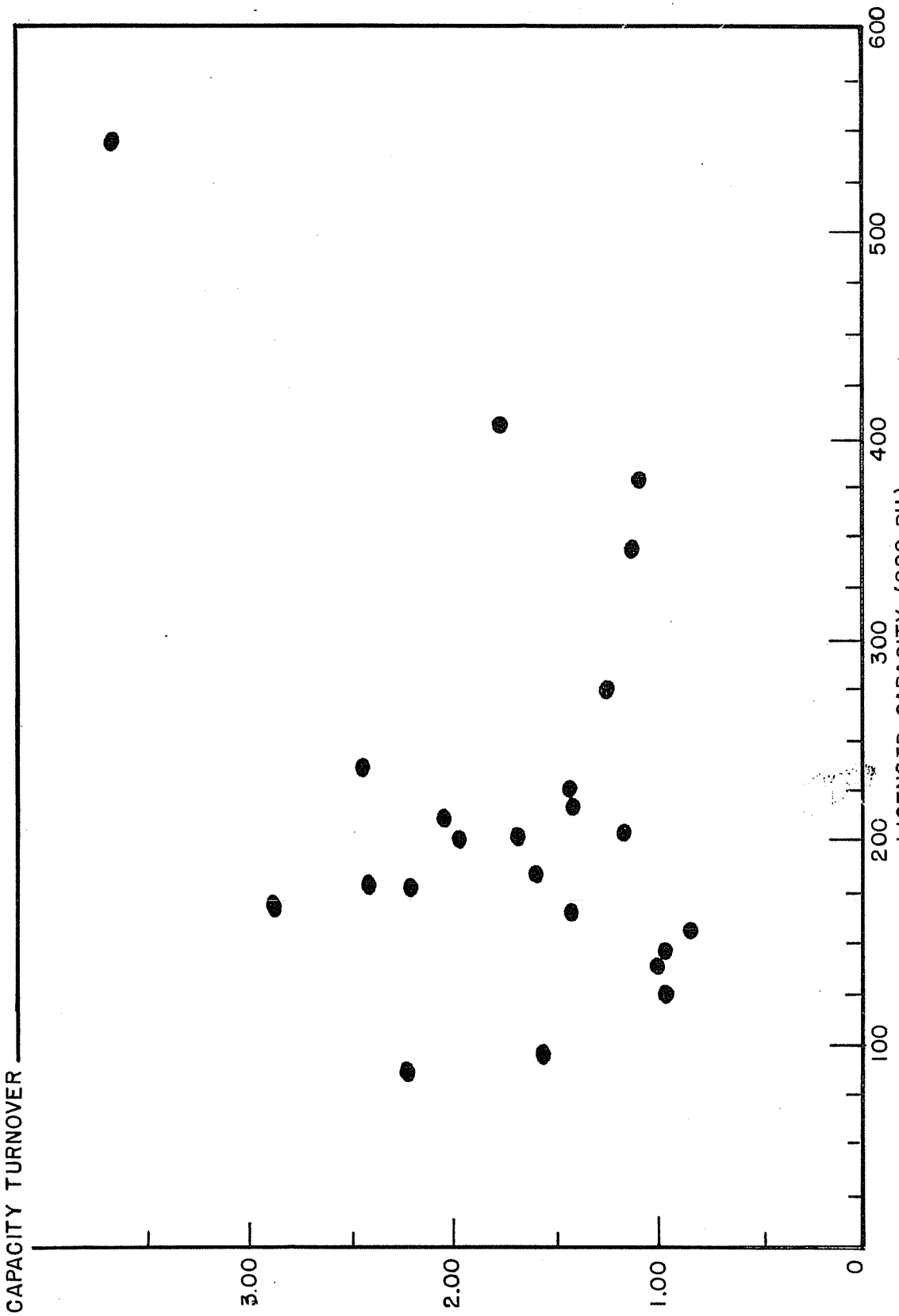


Figure 6. Relationship of Licensed Capacity to Capacity Turnover for 23 Cooperative Elevators, North Dakota, 1961-62-63.

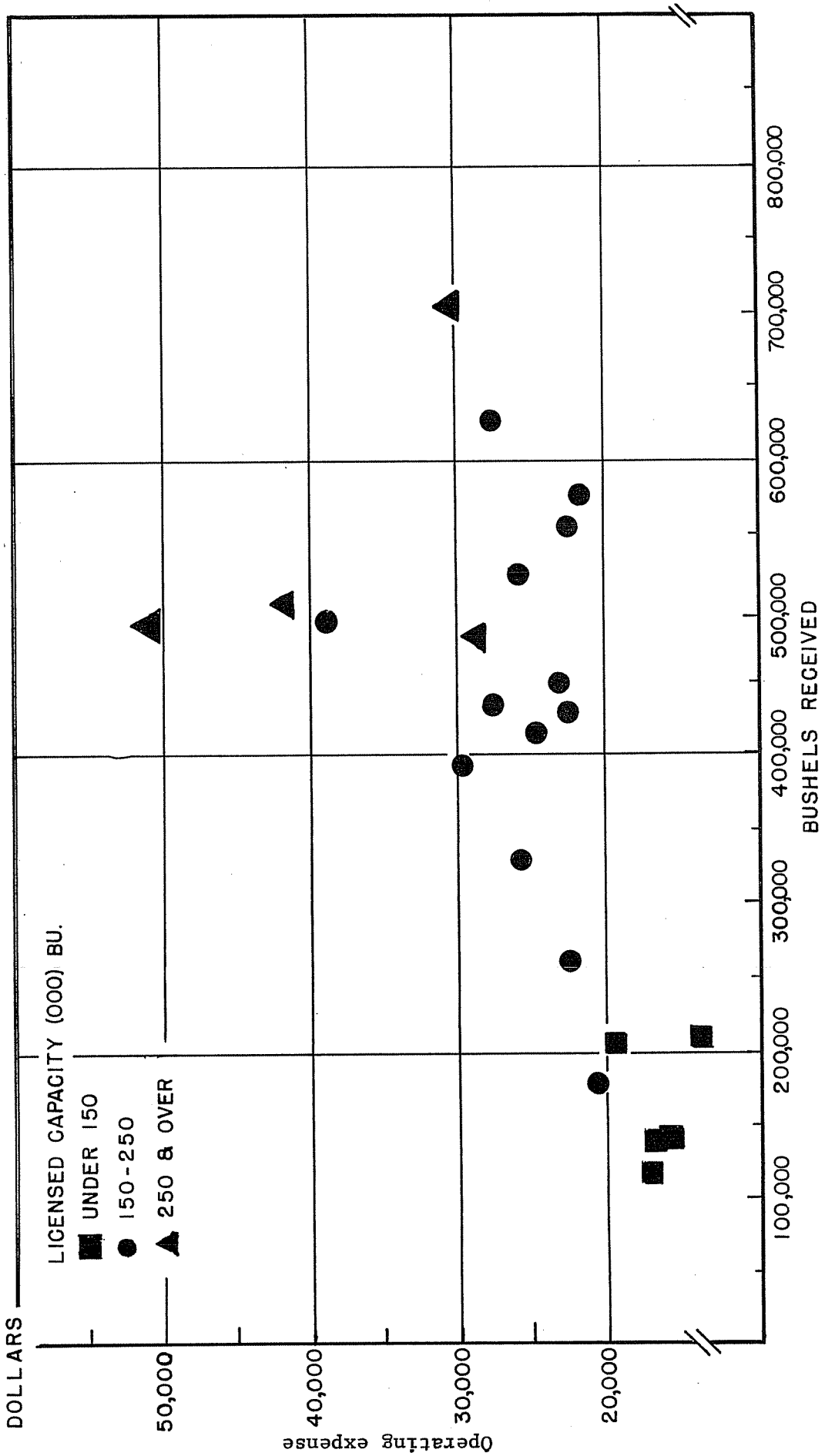


Figure 7. Relationship of Bushels Received to Operating Expense for 22 Cooperative Elevators, North Dakota, 1961-62-63.

1. Grain sales.
2. Government storage payments.
3. Sideline sales.
4. Service sales.

Some elevators receive the major proportion of their gross margin from grain sales, while others rely heavily upon government storage payments. As a result, wide variations were noted in total gross sales and net savings.

Net savings (operating income) ranged from a low of $4,393 to a high of $76,640, while gross sales ranged from $228,349 to $3,674,935. Income and expense variations were noted even among elevators which were approximately the same size. Two elevators having the same incomes had total sales volumes which differed by $56,985. Similar differences were noted in total expenses of the elevators. Again, two elevators having the same amount of operating expenses had sales volumes which differed by $176,121.

Statistical tests were conducted in an attempt to measure the individual contribution each major sales division makes to an elevator's net savings and total expense (Appendix). The analysis indicated the approximate contributions of each sales division.

The findings of the equations which were used are of some significance. For every $1 increase in the total sales of the four major income sources, net savings (income) and expenses were increased as shown in Table 19.

It was found that service sales by themselves were not statistically significant for the prediction of elevator income. They were, however, highly correlated with increases in grain and sideline sales. It would appear from the analysis that service sales are perhaps used to solicit and maintain patronage. This can also be noted by observing their effect upon elevator expenses.

TABLE 19. SAVINGS AND EXPENSE CHANGES, 23 COOPERATIVE ELEVATORS, 1961 THROUGH 1963, NORTH DAKOTA

Income source	Savings increase per dollar of gross sale	Expense increase
	cents	
Grain sales	1.1	1.2
Storage income	57.5	16.6
Service income[a]	27.4	144.8
Sideline sales	11.6	5.4

[a]Not statistically significant for predicting net savings.

Part VI

COOPERATIVE CHANGES - 1922-24 COMPARED TO 1961-63

Introduction

A study of the organization, operating methods, incomes, and costs for farmers' elevators was conducted during the 1920's. Many changes have taken place in the cooperative grain marketing field since this study was conducted. A comparison of this early time period and present day operations was undertaken by using the financial records of the same 23 cooperative elevators for both time periods.

Changes were determined by comparing aggregate averages for the two time periods and through the use of ratio analysis. It was found that grain receipts have increased 2.6 times since the earlier time period, while elevator capacity is now 5.0 times as great. The greater increase in capacity is due to government storage programs and faster grain movement into the elevators during the harvest season.

Capacity turnover, as measured by comparing bushel sales to elevator capacity in 1961-63, was only 51 per cent of what it was in the 1920's. The lowered turnover rate is largely attributed to the large amounts of grain held in storage for the Commodity Credit Corporation and to the increased size of the elevators.

Incomes or the net savings realized for the elevators have greatly diminished since the earlier period. The returns to total assets for the 1961-63 period were only 7 per cent as compared to 18 per cent for the 1922-24 period.

A comparative balance sheet and profit and loss statement for the two time periods are shown in Tables 20 and 21. The data used for these comparisons are an aggregate average for the elevators. These data, therefore, represent an average composite elevator for the 23 studied.

Comparisons of the two time periods indicate substantial increases in the assets, liabilities, and net worth items of the balance sheet (Table 20). These items have increased six to seven times since the earlier period. These increases may be somewhat misleading due to the monetary inflation which has occurred since the 1920's.

A comparison of the ratios for both time periods was made to overcome the effects of inflation. The use of ratio analysis eliminates the effect of elevator growth and inflation; thus it gives a true indication of absolute changes which have occurred.

Capitalization changes were very minor. The only significant change in the fixed capital measure was that liabilities as a per cent of net worth have increased by about 1 per cent. Examination of the working capital ratios indicates a somewhat tighter credit policy was in effect during the earlier period.

TABLE 20. COMPARATIVE BALANCE SHEET FOR 23 COOPERATIVE ELEVATORS, AVERAGE OF 1922-24 AND 1961-63

Item	Average 1922-24	Average 1961-63
	- - - - dollars - - - -	
ASSETS		
Current assets		
Cash	1,188	9,167
Patron accounts receivable	2,360	13,556
Other receivables	7,112	69,838
Other	5,455	38,734
Total current	16,115	131,295
Other assets		
Prepaid expense	153	714
Investments	2,579	4,751
Miscellaneous	548	1,214
Total other	3,280	6,679
Fixed assets		
Real estate	356	111
Plant and equipment	14,312	105,988
Total fixed	14,668	106,099
Total assets	34,063	244,073
LIABILITIES		
Current liabilities		
Outstanding drafts	847	22,309
Current payable	8,463	56,462
Customer credits	35	1,542
Other	1,510	2,733
Total current	10,855	83,046
Deferred liabilities		
Notes and other	1,841	12,853
Total liabilities	12,696	95,899
Net worth		
Membership stock	14,515	24,327
Stock credits	116	39,699
Patron reserves	162	54,586
Gain for year	767	10,218
Surplus	5,807	19,344
Total net worth	21,367	148,174
Liabilities and net worth	34,063	244,073

TABLE 21. COMPARATIVE PROFIT AND LOSS STATEMENT FOR 23 COOPERATIVE ELEVATORS, AVERAGE OF 1922-24 AND 1961-63

Item	Average 1922-24	Average 1961-63
	dollars	
SALES		
Grain sales	10,928	28,282
Sideline sales	1,210	4,473
CCC sales	---	17,551
Service sales	1,132	5,196
Gross margin	13,270	55,502
GENERAL EXPENSES		
Salaries and wages	3,059	12,733
Operating expense	1,744	8,532
Insurance, bonds, and license	456	4,151
Taxes	484	3,025
Total general expense	5,743	28,441
Operating gain	7,527	27,061
OTHER EXPENSES		
Interest and bad debts	864	1,682
Depreciation	623	7,133
Total other expense	1,487	8,815
NET GAIN	6,040	18,246
Regional patronage refunds	---	2,042
TOTAL GAIN BEFORE DISTRIBUTION	6,040	20,288

Changes in the return to member investment or net worth and to total assets have been great. The returns for the 1922-24 period were more than twice as great as they were for the 1961-63 period. Returns to total assets for the 1922-24 period were 18 per cent, while for 1961-63 they were only 7 per cent.

Expense changes were also notable. Expenses were 54 per cent of the total income for 1922-24. During the 1961-63 period they were 67 per cent of the total income. This lower expense in 1922-24 may be the major factor in the higher return to net worth and total assets.

Only minor changes were found for individual grain and sideline margins. The total grain margin realized for each time period was the same. Total sideline margin has decreased by 1 per cent since the 1922-24 period.

Elevator income sources have changed. During the earlier period, government grain storage programs were nonexistent, while during the 1961-63

period they accounted for 32 per cent of the gross margin. A corresponding decrease was noted in the contribution of grain income to the total. The importance of sideline and service incomes was relatively the same.

The following section gives a listing of the ratios used to analyze changes that have occurred. A brief description highlighting the changes is also included with each group of measures.

Working Capital Changes

The first group of ratios to be compared pertains to the cooperatives' working capital (Table 22). Examination of the first two ratios, A and B, used to determine the margin of protection current creditors have in the elevators indicates no change between the two time periods.

TABLE 22. WORKING CAPITAL COMPARISONS, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific ratio	1922-24	1961-63
Current assets to current liabilities (A)	1.5:1	1.5:1
Current assets minus sideline inventories to current liabilities (B)	1:1	1:1
Current assets minus current liabilities (C)	$5,260	$48,249
Inventory to net working capital (D)	30%	25%
Sideline sales to accounts receivable (E)	5:1	4:1

The third measure of Table 22, C, which represents the members' investment in the current assets, shows a considerable change. The average working capital has increased from $5,260 to $48,249 per elevator. This increase may be attributed to several things, such as increased size of operation, the need for larger amounts of working capital, and the effect of inflation. Perhaps one of the greatest reasons for the difference in working capital is the fact that six of the elevators of the 1920 period had negative working capital values, while only one of the 1960's had a negative value. A negative value is an indication that creditors have more invested in the current assets than do the members.

Inventory stocks of sidelines were relatively the same for the two time periods as is indicated by the fourth, D, set of ratio values.

A somewhat tighter credit policy was in effect during the 1922-24 period as is indicated by the higher value of the last ratio set, E. The ratio value of 5:1 for the earlier time period is almost equal to the desired standard of 6:1, while the present value of 4:1 is undesirably low.

Fixed Capital Changes

The second group of comparative ratios, as listed in Table 23, relates the changes which have taken place in the capitalization of the associations.

TABLE 23. FIXED CAPITAL COMPARISONS, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific ratio	1922-24	1961-63
Total liabilities to net worth (A)	.6:1	.7:1
Net worth to total liabilities (B)	1.7:1	1.6:1
Fixed assets to net worth (C)	.7:1	.7:1
Net worth to total assets (D)	.6:1	.6:1
Fixed assets to fixed liabilities (E)	8:1	8:1

No significant changes were noted in the fixed capital analysis of the two time periods. The greatest change was in the first measure (total liabilities to net worth). Liabilities as a per cent of net worth have increased by about 1 per cent since the 1922-24 period.

Operational Changes

Two groups of ratios were used to show the changes that have taken place in the operational procedures of the two time periods. The first compares profitability as related to investment, while the second compares expense relationships.

Investment Changes

The return to investment changes are the first to be compared as shown in Table 24.

TABLE 24. INVESTMENT PROFITABILITY CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific ratio	1922-24	1961-63
Net income to net worth (A)	.28:1	.12:1
Net income to total assets (B)	.18:1	.07:1
Net income to net assets (C)	.26:1	.11:1

The first ratio, A, a measure of the return on members' investments, indicates a large reduction in return to each invested dollar. The return to investment for the 1961-63 period was only 12 per cent as compared to the 28 per cent return of the 1922-24 period.

The return to total assets ratio, B, likewise shows a much larger percentage return for the earlier period. The range for the earlier period was from a low of nothing for one elevator to a high of 28 per cent for three associations. The range for the 1961-63 period was from 2 per cent to 19 per cent.

The wide range of earnings and the relatively high average returns during the 1922-24 period are perhaps due to changes in structure and performance. The assets of the 1922-24 period amounted to only 14 per cent of the 1961-63 assets, while the grain, sidelines, and service sales were proportionately much larger. This, together with a lower rate of expense, would yield a much higher rate of return to total assets.

Expense Changes

Table 25 lists the second group of changes to be compared; they indicate expense relationships.

TABLE 25. EXPENSE CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific ratio	1922-24	1961-63
Expense to total income (A)	.54:1	.67:1
Wages to operating expense (B)	.42:1	.34:1
Sales to wages (C)	64:1	55:1
Service sales to wages (D)	4:1	4:1
Bushel sales to elevator capacity (E)	4:1	2:1

When a comparison of the most important expense ratio, A, is made, it can be seen that expenses have risen considerably since the 1922-24 period. The lower expense rate may partially explain the higher rate of return of the earlier period.

Expenses for the earlier period were perhaps kept lower through greater plant utilization. The turnover rate for grain sales was nearly twice as great as is shown by the ratio values of the last measure, E. The use of the turnover rate to measure plant utilization may be somewhat misleading due to the large amounts of government grain now stored in the elevators. Elevator capacity is now five times as great as it was during the 1922-24 period.

Margin Changes

Two groups of ratios are used to show the differences in operating margins of the two time periods. The first group indicates the changes in grain margins, while the second shows differences in sideline margins. A summary of grain margin differences is shown in Table 26.

The total grain margin for both time periods was found to be the same. Changes were noted, however, in the margins of the individual grains.

TABLE 26. GRAIN MARGIN CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific grain	1922-24	1961-63
	- - cents per bushel - -	
Wheat	7	7
Durum	6	9
Flax	10	9
Barley	3	5
Oats	4	4
Rye	5	5
Total grain	6	6

Sideline Changes

Sideline margin changes are shown in Table 27. The percentage that each item was of the total sales is shown in Table 28.

TABLE 27. SIDELINE MARGIN CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Type of sideline	Percentage of total sideline sales for markup	
	1922-24	1961-63
Merchandise	12	10
Feed and salt	8	6
Seeds	6	8
Fertilizer	--	5
Twine	10	9
Coal	9	10
Total margin	9	8

Changes in the margin taken on sidelines (Table 28) have been minor, with a total sideline change of only 1 cent per $1 of sales. Great changes were noted in the percentage each item was of the total sideline sales. The greatest change has been in coal sales with a decrease of 51 per cent. Twine sales have also decreased since the 1922-24 period. Percentage increases were noted in merchandise sales and fertilizer. Fertilizer, of course, is an added sideline since the earlier period.

TABLE 28. SIDELINE CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Type of sideline	Percentage of total sideline sales for	
	1922-24	1961-63
Merchandise	13	42
Feed and salt	13	13
Seeds	2	5
Fertilizer	--	32
Twine	11	2
Coal	61	6
Total	100	100

Income Source Changes

Income sources for an elevator can generally be placed into four categories as listed in Table 29. The four divisions are grain sales, government storage payments, sideline sales, and service income. During the 1922-24 period, only three of these divisions existed as government storage programs were not in effect.

TABLE 29. INCOME RELATIONSHIPS FROM SPECIFIED SOURCES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific class	1922-24	1961-63
	- - - per cent of total - - -	
Grain income to total income	82	51
CCC income to total income	--	32
Sideline income to total income	9	8
Service income to total income	9	9

The greatest change has occurred in the importance of grain income to the total gross margins of the elevators. Grain income for the 1922-24 period accounted for 82 per cent of the total operating margins of the associations. This has been reduced to only 51 per cent for the 1961-63 period, while a corresponding increase was noted in income from government storage programs. The importance of sideline and service incomes to the total has changed very little since the earlier period, remaining at about 9 per cent of the total.

Service income as a percentage of the elevators' total gross income has not changed any for the two periods. Changes have occurred, however, among the items which contribute to service income (Table 30).

TABLE 30. SERVICE RELATIONSHIP CHANGES, 23 COOPERATIVE ELEVATORS, 1922-24 AND 1961-63, NORTH DAKOTA

Specific service	Per cent of total dollar sales for 1922-24	1961-63
Local storage	63	33
Cleaning	2	28
Grinding	4	23
Miscellaneous	31	16

Local storage was the most important source of service income for both periods. Its importance has, however, declined greatly from the earlier period when it accounted for over 60 per cent of the elevators' service income. This decrease may well be a result of the government storage programs now in effect and also to the increased capacity of farm storage.

Significant increases were found in the amount of cleaning and grinding done by the elevators. Increased amounts of grain cleaning done for the farmers are due largely to the better equipment the elevators now have and also the farmers' desire for more services. The desire for more services is indicated by the increase in feed grinding or rolling done by the elevators since the earlier period.

APPENDIX

RATIO ANALYSIS PROCEDURE

Ratio Analysis

A comparison of one specific amount with another is used to analyze a firm's business condition. Such a comparison results in a percentage figure or ratio highlighting some particular phase of the operation.

To fully understand a ratio one must know how it is used and computed. Although many different ratios can be used in analyzing a certain business phase, only those which most clearly indicate the financial condition of the elevators studied were used. The financial status and operation of the associations were analyzed by the use of the various ratios.

The ratios were divided into four groups:

1. Working capital analysis.
2. Fixed capital analysis.
3. Operational analysis.
4. Business volume analysis.

In analyzing the various aspects of the firms, only certain ratios were used to compare, rank, or answer specific questions.

Working Capital Analysis

The ratio used to test the firm's working capital, that is, the testing of a cooperative's liquidity or its ability to meet current obligations, is, for example:

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

One of the most basic indexes used to analyze a financial statement is the current ratio. This ratio compares current assets to current liabilities and determines the margin of protection current creditors have in the firm.

Fixed Capital Analysis

An analysis of fixed capital is desirable to measure a firm's ability to meet long-term obligations. Such an analysis determines the firm's security and ability to obtain funds if needed for expansion. For example:

$$\text{total liabilities to net worth} = \frac{\text{total liabilities}}{\text{net worth}}$$

The ratio shows the relationship of the indebtedness of the association to its net worth or creditor's equity in the total assets. When using this ratio, it is advisable to determine what amount of the liabilities are current. If a large proportion is noncurrent or deferred, the amount of security need not be as large as would be required if they were mostly current.

Operational Analysis

A third set of ratios is needed to test the profitability of an association's operational procedure. This set can be divided into two basic groups to measure profitability as related to investment and profitability as related to sales. The first group consists of ratios which measure returns to specific portions of the investment. For example:

$$\text{net income to net worth} = \frac{\text{net income}}{\text{net worth}}$$

This measures the amount of net income realized on each $1 of net worth or member's equity in the assets. This is one of the most common profitability ratios used.

The second group of operational ratios measures the profitability of sales operations. The following measures are used to determine the profitability of elevator operations. These measures are generally referred to as "operating ratios", and they determine how much of the total income each phase of the association's operations contributes to the total gross income. For example:

$$\text{grain income to gross income} = \frac{\text{grain income}}{\text{gross income}}$$

Business Volume Analysis

Analysis of working capital, fixed capital, and operational results will indicate many characteristics of a firm's business condition. However, to obtain a complete picture or understanding of the operations of the cooperative grain elevator, the use of several ratios showing a breakdown of various operations may be useful. For example:

$$\text{importance of each grain} = \frac{\text{bushels each grain}}{\text{total bushels}}$$

STATISTICAL ANALYSES OF INCOME AND EXPENSE

Incomes and expenses of the elevators studied varied greatly, depending upon the percentage contribution each major sales division was of the total. An attempt was made to determine the aggregate contribution of each division.

Income Analysis

Net income of an elevator is often thought to be closely related to total sales volume. This may generally be true, but when the incomes and total sales of the individual elevators are examined, a wide range of differences is found.

Total gross sales ranged from a low of $228,349 to a high of $3,674,935, while net savings (operating income) ranged from $4,393 to $76,640. An example of the variations can be noted by examining two elevators which had the same incomes, yet the total sales volumes differed by $56,985. The operating incomes used for these calculations did not include charges for interest payments, bad debts, or depreciation, as they are not affected by the operations of the elevator.

Total sales is a variable figure upon which to base an analysis as the total is an aggregate of several separate income sources. Each of these sources does not contribute proportionately to the net income; therefore, it is desirable to measure the individual contributions of each division. Grain sales, CCC income, service income, and sideline sales were considered as separate income sources or divisions in the analysis.

The statistical analysis employed indicates what percentage of each division's sales goes toward the firm's net income.[2] It does not explain all of the variations between gross sales and net income. Accuracy of the analysis is affected by many unmeasured factors which exist between firms and the unrealistic assumptions of the equation.

The equation assumes that income increases as a constant proportion of increases in total sales. It is possible that there are economies of size or scale, and that competitive conditions may alter the importance of the various sales divisions. Perhaps the most intangible difference is management efficiency, or the ability to obtain maximum returns from a given sales volume. A firm's efficiency may also be affected by its size, condition of the plant, or location.

The null hypothesis to be tested is that all the regression coefficients are equal to zero; therefore, the relationships which exist between the various sales divisions and an elevator's net income are due to chance alone. Several tests were also applied to the regression coefficients to test their statistical significance.

Results of the Analysis

It was found from the results of the analysis that three of the four regression coefficients were significantly different from zero at the 5 per cent level; therefore, the null hypothesis was not accepted. In other words, only one sales division was related to the firm's net income by chance. The remaining three could be relied upon as valid predictors of net savings.[3]

---

[2] A stepwise linear regression analysis was used. Independent variables were X_1 = gross income from all grain sales; X_2 = government payments received for storage of CCC grain stocks; X_3 = gross income received for service activities; X_4 = gross income from all sideline sales. Y, or the dependent variable, was the net savings of the elevator.

[3] The equation derived from the analysis appeared as:

$$Y = 2921.84 + .01071(X_1) + .57533(X_2) + .27412(X_3) + .11630(X_4)$$
$$\qquad\qquad (.00342) \qquad (.16749) \qquad (.46378 \qquad (.05177)$$

where the figures in brackets are the standard errors of the corresponding slope or regression coefficient.

Not all of the income variations of the elevators sampled could be accounted for by the regression analysis. The four independent variables included in the analysis accounted for 82 per cent of the variation in net savings. That is, approximately 82 per cent of the variation in net savings could be explained by the combined variation of the independent variables.[4] Unaccounted variations result from the intangible factors previously mentioned and variables not included in the analysis.

The equation indicates that for the elevators studied net savings (income) increased 1.1 cent for every $1 increase in grain sales, 57.5 cents for every $1 increase in storage income, 27.4 cents for every $1 increase in service income, and 11.6 cents for every $1 increase in sideline sales. Only the service income variable did not prove statistically significant.

Service income does, however, have an indirect effect upon the income of an elevator. It was found that service income was significantly related to sideline sales and grain sales. A variable which is highly related to other independent variables does not contribute to the explanation of the variation in the dependent variable when included in the analysis.

Expense Analysis

Wide variations also existed between gross incomes and total expenses of the elevators studied.[5] Here again an example can be made of two elevators having nearly identical operating expenses but slightly different total sales volumes.

To determine which of the sales divisions accounted for the greatest variation in expenses, a similar statistical method as above was employed. The independent variables used for the analysis are the same as those used to analyze income variations. The dependent variable is total expenses.

Expenses cannot be expected to change in constant proportion to sales volume. With increases in volume, specialization of labor and equipment is expected to decrease costs, thus reducing the cost per unit of volume. Fixed costs of the plant and equipment are also expected to be less per unit of sales as volumes increase.

According to the results obtained from the analysis, about 97 per cent of the variations in total expense could be explained by the combined variations in sales divisions or independent variables.[6]

The analysis indicates that for the elevators surveyed, total expenses increase 1.2 cents for every $1 increase in grain sales, 16.6 cents for every $1 increase in storage payments, 144.8 cents for each $1 increase in service

---

[4]The standard error of the estimate was $7,253.

[5]Expenses do not include interest payments, bad debts, or depreciation charges.

[6]The standard error was $3,107.19.

income, and 5.4 cents for each $1 increase in sideline sales.[7] All variables were found to be significant or reliable indicators of predicting change. Further it was found that services increased total expenses more than they added to the gross sales of an elevator. Although they may appear unprofitable, services are often essential as a competitive device for soliciting and maintaining patronage. The added cost of providing services may well be offset by increased sales of other divisions.

---

[7]The derived equation was:

$$Y = 7596.139 + \underset{(.00146)}{.01246(X_1)} + \underset{(.07175)}{.16594(X_2)} + \underset{(.19868)}{1.44802(X_3)} + \underset{(.02218)}{.05435(X_4)}$$