

**TRENDS IN SIZE, SPECIALIZATION
AND PROFITABILITY OF ELEVATORS
IN WESTERN OHIO**

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Trends in Size, Specialization and Profitability of Elevators in Western Ohio

R. W. WESTERHOLD and D. I. PADBERG¹

INTRODUCTION

Country elevators provide an important link in the grain marketing chain from farmer to ultimate consumer. In 1960, 384,159,000 bushels of grain worth \$429,626,000 were produced on 7,415,000 acres in Ohio. Ohio ranks sixth in the United States in corn production, seventh in production of soybeans and oats, and among the top in production of soft wheat. Ohio ranks ninth in the U.S. in production of all wheat.²

The country elevator was developed as an assembling point for farmers' grain. However, country elevators have expanded through the years into other areas in response to the changing needs of agricultural production and marketing. Today country elevators not only buy and sell farmers' grain but also grind and mix grain with feed supplements and sell farm supplies. Other services include drying and storing farmers' grain, bulk feed delivery, and grain bank operations. Other functions performed by country elevators include trucking, risk bearing, financing, cleaning and treating seeds, and disseminating market information.

The functions and organization of the country elevator industry must change constantly in response to its environment if this industry is to remain healthy and best serve the economy.

Changes in the grain industry in Western Ohio are generated by changes in the farming industry. For example, currently there is a trend toward fewer but larger farms. This smaller number of operators of larger farms will probably behave differently than farmers in the past. The larger farm operator is more likely to be equipped to handle bulk feed than a smaller producer. Therefore, the demand for bulk feed may be expected to increase. On the other hand, larger farm size may enable an operator to bypass the country elevator when purchasing farm supplies.

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²Smith, M. G., F. B. McCormick, Lyle Krock, J. R. Kendall, E. Houghton, and R. L. Vossen. 1963. Ohio Agricultural Statistics. Ohio Agri. Exp Sta., Res. Bull. 933.

Farmers are also becoming more specialized. Production has gone up while the number of producers has declined. Farmers who had grain plus three or four livestock enterprises now concentrate on fewer enterprises. Nevertheless, the total production of grain, oilseeds, livestock, and livestock products has risen substantially and is expected to continue this upward trend.³ This suggests that the elevator manager should adjust his operation in accordance with the trends in specialization in the farming industry.

Another factor which could produce significant changes in the grain industry has been caused by changes in transportation rates and in transportation alternatives available to farmers. For example, the opening of the St. Lawrence Seaway in 1959 reduced the costs of marketing grain and at the same time increased the demand for grain in and around Toledo.⁴

Automation on farms is rapidly increasing. In some instances, this may mean that a new service must be initiated by the country elevator. Bulk feed delivery is an example of a service which many elevators have recently begun to offer their customers.

Farmers' needs for both short and long-term capital have been increasing and are expected to continue in this direction. The credit phases of a country elevator's operation will probably have the status of an important sideline in the future. This should cause the country elevator to become increasingly interested in each customer's total financial plan.

Recently, farmers have begun harvesting their corn with combines. This method enables the farmers to harvest corn faster and under more favorable weather conditions. It also eliminates farm corn crib storage, since the shelled grain usually goes directly to the elevator. This means the country elevator will be forced to take in more grain over a shorter period than in the past.

In summary, the environment surrounding the country elevator industry is in a period of significant change. Production methods and machinery are being replaced constantly. Other changes include the trend toward increased specialization (fewer producers concentrating on fewer enterprises), larger farms, better transportation (better highways and the St. Lawrence Seaway), changing transportation rates, and more automation. Today's farmers are employing better farming methods, better machinery, and more fertilizer, herbicides, and insecticides to produce higher yields of high quality grains.

³Smith, M. G. et. al., op. cit. pp. 8-10, 80-85.

⁴Kiser, H. L. 1963. The Effects of the Changes of Transportation Facilities on the Toledo Grain Market. Unpublished Master's thesis, The Ohio State University, p. 19.

Changes occurring in the farming industry offer a challenge to the elevator industry. Will the elevator industry be able to keep in stride with the changes occurring around it and offer the kinds of functions and services that tomorrow's farmers will demand? This report presents an analysis of the elevator industry and projections which may suggest changes in elevator size, type of business, and profitability in the future.

METHOD AND PROCEDURE

Objectives of this study were to: (1) observe changes in size, type of business, and degree of profitability for a sample of country elevators in Western Ohio from 1958 through 1962; (2) project trends of the future size, specialization, and profitability of the country elevator industry in Western Ohio based on the observed changes during the period 1958 through 1962.

A sample of 90 elevators in Western Ohio was used in this study. Markov processes⁵ were used to project changes in size, specialization, and profitability and to generate an equilibrium distribution for each attribute studied which would be expected to result if the activity continued indefinitely.⁶

The projections developed show the type of industry structure that would result if changes observed during the base period continue through an infinite time period. However, if other changes appear in the industry environment which were not present in the base period, the projections may not accurately forecast the future. This is perhaps one of the main limitations in this type of extrapolation device, although it is present in all extrapolation devices. A basic assumption, therefore, in this type of analysis is that the same type and magnitude of changes occurring in the base period (and no others) will continue through an infinite time period.

Although entry to and exit from the elevator industry were not analyzed in this study, it was assumed that as time passes and elevators grow larger, their numbers will decline.

⁵An explanation of the Markov process is given in the Appendix.

⁶Padberg, D. I. 1962. The Use of Markov Processes in Measuring Changes in Market Structure. *Jour. of Farm Econ.* XLIV (1):189-199.

CHANGES IN SIZE AND GRAIN SALES AS PERCENT OF TOTAL SALES

Changes in size (in terms of total dollar sales) and the percent of total sales composed of grain sales were studied first. The firms were divided into the following nine categories to study changes occurring from 1958 through 1960:

Category	Percent of Total Sales Derived from Grain Sales	Size in Total Dollar Sales
1	0 — 59 percent	Less than \$525,000
2	0 — 59 percent	\$525,000 to \$1,049,999
3	0 — 59 percent	\$1,050,000 +
4	60 — 79 percent	Less than \$525,000
5	60 — 79 percent	\$525,000 to \$1,049,999
6	60 — 79 percent	\$1,050,000 +
7	80 —100 percent	Less than \$525,000
8	80 —100 percent	\$525,000 to \$1,049,999
9	80 —100 percent	\$1,050,000 +

Each of the nine categories was set up so there would be approximately the same number of firms in each category throughout the base period. This was desirable to assure the best estimation of the final equilibrium distribution. In this case, the final equilibrium distribution represents the number of firms which would fall in each of the nine categories after enough time has passed for the changes occurring in the base period to have completely taken place.

It is assumed that the 90 sample firms, which were well dispersed throughout Western Ohio, accurately represented the industry. From these data, it was possible to count the number of sample firms in each category and to divide the number of firms in each category by the total in the sample (90). This gave the percentage of sample firms in each category.

It should be pointed out that there is nothing magical about the divisions among categories. Categories 6 and 9, for example, both contain larger elevators but category 6 contains firms which handle less grain than firms in category 9. While the distinction between firms which obtain 79 percent of their operating income from grain and those which receive 80 percent may seem arbitrary, this classification is useful in identifying varying degrees of specialization. Therefore, this report is more realistic when it speaks of trends or a tendency toward larger elevators handling more grain, etc., rather than in specific percentages of firms in specifically defined categories.

When a final equilibrium distribution was generated for size (in terms of total annual dollar sales) and the percentage of total sales which were grain sales, significant changes appeared likely.

Figure 1 shows changes occurring in the elevator industry in Western Ohio. The four bars in each category represent the percentage of firms in that category in 1958, 1960, 1962, and the final equilibrium distribution.

As shown in Figure 1, if adjustments underway during the base period are given sufficient time, there is a tendency toward larger elevators (categories 3, 6, and 9). There appears to be a trend toward these larger elevators handling more grain, evidenced again by the large percentage of firms falling in categories 6 and 9. This tendency of change is away from the smaller elevators, which handle a sizable amount of supplies, and toward the larger elevators handling a larger proportion of grain.

TRENDS TOWARD SPECIALIZATION

Trends toward specialization seem to be present in the grain industry. However, most evidence concerning these trends has not been quantified. The second part of this study attempted to measure empirically the magnitude of these trends toward specialization.

Total operating income in grain elevators is conventionally subdivided into grain margins, supply margins, and service income. A significant change over several years in the proportion of total operating income derived from any one of these components relative to the other two should indicate trends in specialization. For example, a significant increase over the years in the percent of total operating income derived from grain margins relative to supply margins and service income would point to a change in the type of business being carried on by particular firms. Ultimately, this would indicate a trend toward increased specialization. The firms would be concentrating more on the grain merchandising function than on handling supplies and offering services.

Percentage of Total Operating Income Derived from Grain Margins

The percentage of total operating income derived from grain margins was studied first. The data were analyzed in the same way as the data on size and percentage of total sales composed of grain sales to obtain a final equilibrium distribution. However, the data in this case were broken into six categories rather than nine, since only one attribute was being studied.

Categories set up to study the percentage of total operating income derived from grain margins were:

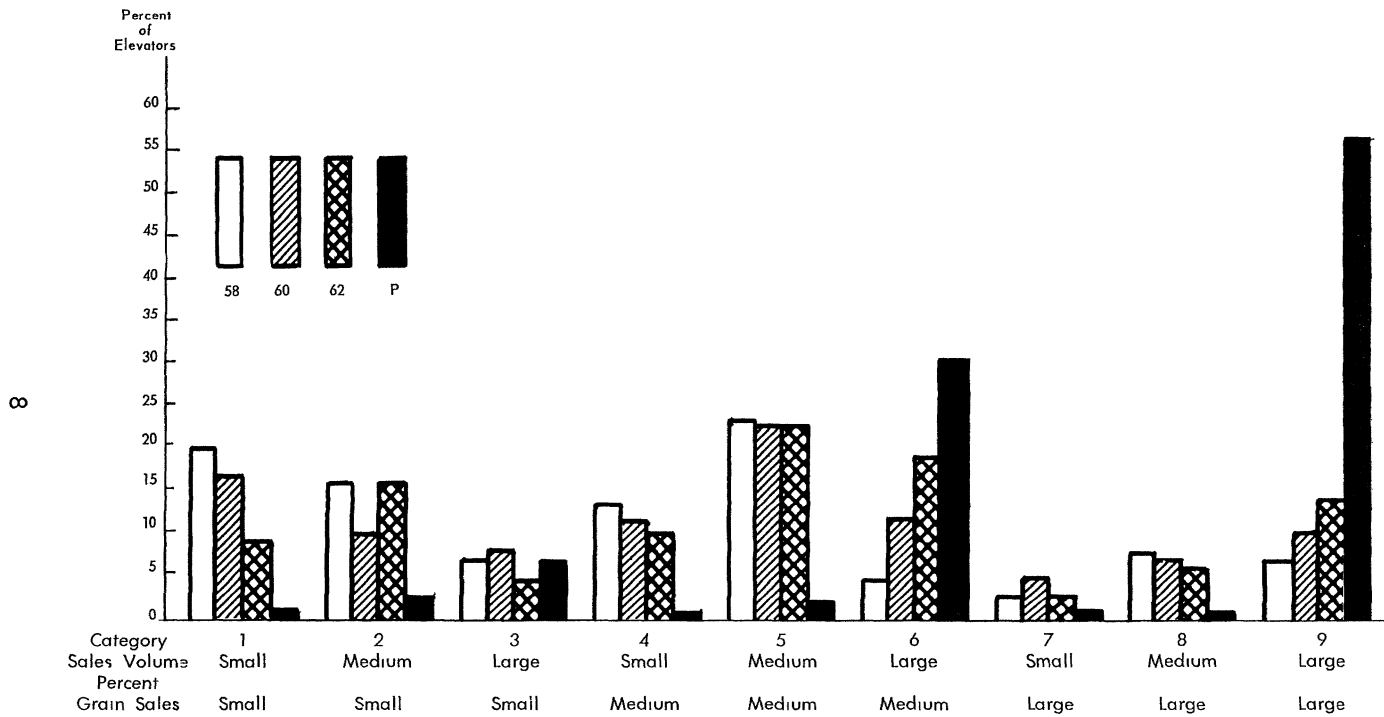


Fig. 1.—Percent of Total Sales Derived from Grain Sales and Size Distribution for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

1. Firms in which less than 10 percent of total operating income was derived from grain margins.
2. Firms in which 10 - 19 percent of total operating income was derived from grain margins.
3. Firms in which 20 - 29 percent of total operating income was derived from grain margins.
4. Firms in which 30 - 39 percent of total operating income was derived from grain margins.
5. Firms in which 40 - 49 percent of total operating income was derived from grain margins.
6. Firms in which more than 50 percent of total operating income was derived from grain margins.

As shown in Figure 2, grain margins will tend to compose a larger proportion of total operating income relative to supply margins and service income in the future. These results are consistent with those presented in Figure 1, which showed that elevators in Western Ohio would be handling more grain relative to farm supplies. Obviously, if the elevator industry handles more grain relative to farm supplies, it follows that these elevators should obtain a larger proportion of their operating income from grain margins. These findings are also con-

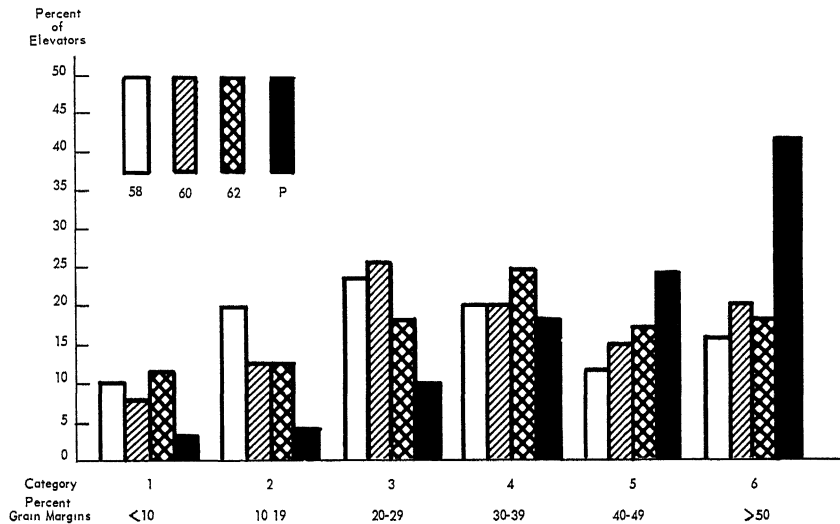


Fig. 2.—Percent of Total Operating Income Derived from Grain Margins for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

sistent with the fact that Western Ohio farmers are tending toward increased grain production.

Figure 2 shows a general trend toward an increasing proportion of total operating income being derived from grain margins. Proceeding from category 1 (in which grain margins make up the smallest proportion of total operating income) through category 6 (in which grain margins make up the largest proportion of total operating income), an increasing percentage of firms falls in each category. Comparing the projection percentage with the percentages for 1958, 1960, and 1962, it is obvious that significant changes have been occurring and appear likely to continue.

Percentage of Total Operating Income Derived from Supply Margins

This analysis consisted of studying changes in the percentage of total operating income composed of supply margins. The categories set up to study this attribute were:

1. Firms in which less than 30 percent of total operating income was derived from supply margins.
2. Firms in which 30 - 39 percent of total operating income was derived from supply margins.
3. Firms in which 40 - 49 percent of total operating income was derived from supply margins.
4. Firms in which 50 - 59 percent of total operating income was derived from supply margins.
5. Firms in which 60-69 percent of total operating income was derived from supply margins.
6. Firms in which 70 percent or more of total operating income was derived from supply margins.

Data in Figure 3 show that a significant downward trend appears likely in terms of percentage of total operating income derived from supply margins relative to grain margins and service income. As the proportion of total operating income derived from supply margins increases, a smaller and smaller percentage of firms falls in the respective categories. The bars in Figure 3 representing 1958, 1960, and 1962 show that this tendency toward handling fewer farm supplies was well underway during the base period.

The findings in this part of the analysis are consistent with those in the earlier parts. Since grain sales will compose a larger percentage of total sales in the future, supply sales obviously must become relatively less. It also follows that with a smaller proportion of supply sales rel-

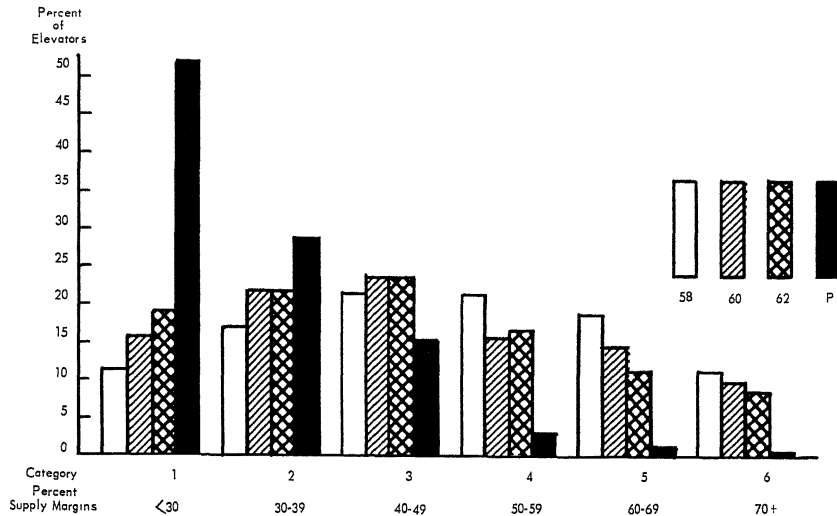


Fig. 3.—Percent of Total Operating Income Derived from Supply Margins for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

ative to total sales, the proportion of total operating income composed of supply margins should also become relatively less.

Percentage of Total Operating Income Derived from Service Income

It must be assumed that if the percentage of total operating income composed of service income rises relative to the percentage derived from either grain or supply margins in certain firms, these firms are offering more services relative to the handling of grain or farm supplies.

Data concerning the percentage of total operating income derived from service income were broken into the following categories:

1. Firms in which less than 10 percent of total operating income was derived from service income.
2. Firms in which 10 to 14 percent of total operating income was derived from service income.
3. Firms in which 15 to 19 percent of total operating income was derived from service income.
4. Firms in which 20 to 24 percent of total operating income was derived from service income.
5. Firms in which 25 to 29 percent of total operating income was derived from service income.
6. Firms in which 30 percent or more of total operating income was derived from service income.

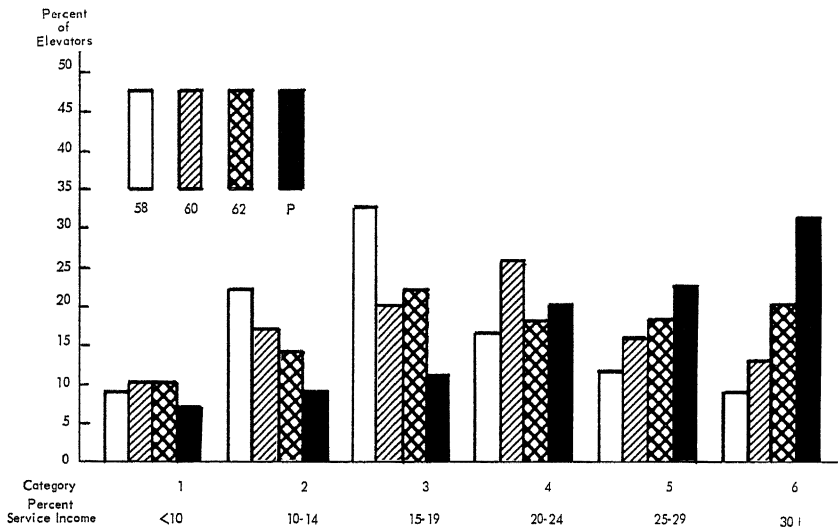


Fig. 4.—Percent of Total Operating Income Derived from Service Income for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

Results of this part of the study are summarized in Figure 4. These results indicate that service income will become a more important component of total operating income in the future. As the proportion of total operating income derived from service income increases (moving from category 1 through category 6), the percentage of firms in each category increases.

Even though service income will tend to increase in importance as a component of total operating income, it still will not be as important as grain and supply margins. This is because of the definitions of categories for grain and supply margins and service income. For example, category 1 of supply margins contains all firms which derived less than 30 percent of their total operating income from supply margins. However, in studying service income, a firm must derive 25 to 29 percent of its total operating income from service income to fall in category 5.

Categories were set up to include approximately the same number of firms in each category for each attribute studied. So the importance of category definitions in studying each attribute cannot be over-emphasized. From this segment of the study, it may be concluded that both grain margins and service income will become relatively more important components of total operating income while supply margins will become relatively less important in the future.

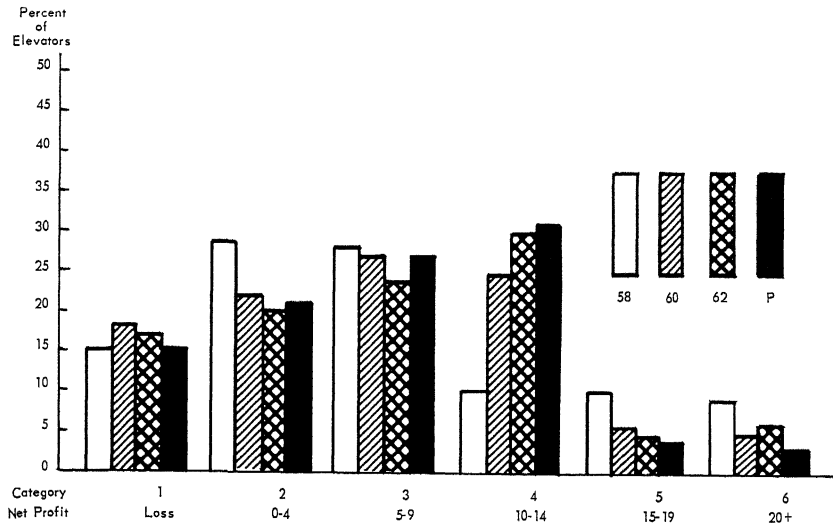


Fig. 5.—Net Profit (in cents) per Dollar Invested for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

PROFITABILITY OF COUNTRY ELEVATORS

This phase of the study analyzed the profit situation of the elevator industry in Western Ohio by observing changes occurring in net profit per dollar invested and net profit per dollar sales from 1958 through 1962 and by generating a final equilibrium distribution in each case.

Categories set up to study net profit per dollar invested were:

1. Firms which lost money.
2. Firms which made from 0 to 4 cents per dollar invested.
3. Firms which made from 5 to 9 cents per dollar invested.
4. Firms which made from 10 to 14 cents per dollar invested.
5. Firms which made from 15 to 19 cents per dollar invested.
6. Firms which made 20 cents or more per dollar invested.

Results of this part of the study are summarized in Figure 5. Slight changes appear to be ahead for the elevator industry of Western Ohio in terms of net profit per dollar invested. However, this does not mean that absolute profits will not increase. Since the trend is for larger elevators, it is natural to assume that investments and sales will be larger. Even with approximately the same rate of profit per dollar invested or per dollar sales, these elevators would be making a larger absolute profit per firm.

Figure 5 shows that little change in the percentage of firms in the various categories appears likely in the future. However, there appears to be a slight decrease in the percentage of firms falling in the two higher profit categories (categories 5 and 6). Generally speaking, however, the elevator industry in Western Ohio faces little change in net profit per dollar invested in the future.

Projections for net profit per dollar of sales were quite similar to those for net profit per dollar invested. The percentages of firms in the respective categories were similar for both attributes. However, the categories were defined differently since sales were considerably higher than investments in the average elevator. It was necessary to break down the categories for net profit per dollar sales into smaller divisions to obtain six categories with about the same number of firms in each category throughout the base period.

Categories set up to study net profit per dollar sales were:

1. Firms which lost money.
2. Firms which made less than 1 cent per dollar sales.
3. Firms which made from 1 to 2 cents per dollar sales.
4. Firms which made from 2 to 3 cents per dollar sales.
5. Firms which made from 3 to 4 cents per dollar sales.
6. Firms which made 4 cents or more per dollar sales.

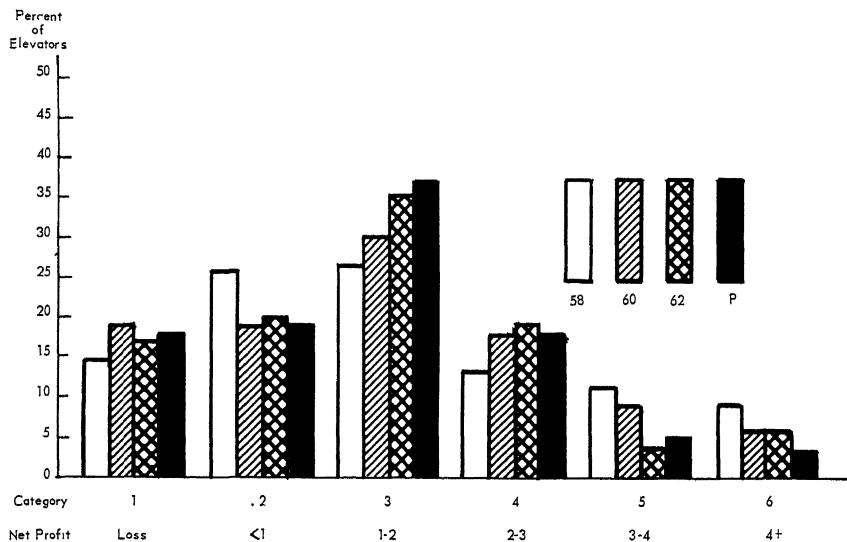


Fig. 6.—Net Profit (in cents) per Dollar Sales for 90 Elevators in Western Ohio, 1958-1962, and Projection of Final Equilibrium Distribution.

According to results shown in Figure 6, insignificant changes appear likely for elevators in Western Ohio as far as net profit per dollar sales are concerned. However, it appears that the majority of elevators in Western Ohio will fall into categories 3 and 4 (which were set up in this study as the two medium profit categories) in the future. It appears that few elevators can hope to fall in the two higher profit categories (categories 5 and 6) in the future.

Therefore, it appears that the elevator industry in Western Ohio will continue to earn approximately the same net profit per dollar sales as at present. More than half of the firms will earn from 1 to 3 cents net profit per dollar sales.

EVALUATION OF FINDINGS

Changes in Size of Country Elevator-Farm Supply Firms

The results obtained in this study which indicate a trend toward larger firms are consistent with changes in the environment of the elevator-farm supply business in Western Ohio. More cash grain is being produced in Western Ohio. Practically all of this grain which is not fed will be channeled through the country elevators. This will mean a larger volume of business for country elevators, thus leading to larger sizes.

Another factor that will tend to cause larger firms is the continual improvement of the highway system in this area. With more highways of better quality, the farmer can shop more for a profitable selling price. This should tend to increase the trading areas of the more efficient firms, encouraging them to grow in size.

According to a recent study, larger elevators are able to derive certain cost economies.⁷ These economies may be internal or external to the individual producing unit. They may also be of a monetary (pecuniary or market) nature or of a physical (technological) nature.⁸

Internal economies are those realized from size adjustments within the individual producing unit. They occur irrespective of adjustments in the industry. An example of internal market economies in the country elevator is the lower price obtained by purchasing large lots of farm supplies. On the selling side, the country elevator may be able to obtain higher prices for the grain it sells to a terminal if the elevator is able to supply a large quantity of a particular grade of grain to the terminal.

⁷Milner, Ross D. 1958. An Analysis of Ohio Grain Elevators. Ohio Agri. Exp. Sta., AE 280, pp. 14, 26.

⁸Heady, E. O. 1961. Economics of Agricultural Production and Resource Use. Prentice-Hall, Inc., Englewood Cliffs, N. J., p 361.

Although external economies are possible as size increases, they probably are not as important in the elevator industry as internal economies. External economies may result as grain production becomes more important in an area. For example, transportation systems may be developed or rates adjusted to give a lower cost for delivering grain both to the country elevator and from there to the terminal market. Thus, it seems apparent that larger firms should be a natural adjustment to environmental changes because they may be able to derive both internal and external cost economies.

Obviously, larger elevators will require more capital both in terms of fixed and operating capital. However, this should present no great problem with the well-developed credit system in the United States. In fact, credit agencies would probably prefer to finance a large, efficient firm rather than a small, inefficient one.

Grain Handling Becoming More Important

The trend toward increased specialization in terms of grain handling seems consistent with the changing environment for several reasons. Increased cash grain production in Western Ohio suggests that an increased volume of grain will be handled. Many farms in Western Ohio are becoming more specialized in both cash grain production and livestock production. This means that farmers who previously fed a large portion of their grain will market this grain. Conversely, farmers specializing in livestock production will be forced to purchase much more grain than previously.

The country elevator is an important link between these two types of specialized farming operations. With either type of specialization, the country elevator will become even more important in the future as an agent for serving the farmers in its area. This is a natural outgrowth of farm specialization. Whenever any firm specializes, it becomes more dependent on its environment.

Freight rates are another factor which will increase the grain handling function of country elevators in Western Ohio. The new system of mileage rates for corn is now in effect and other rate changes will take place in the future. These new mileage rates on corn quote a different rate for every location, thus nullifying the old zone or blanket rates. To compete profitably with truck and barge rates, the railroads have excluded the in-transit privilege under which grain could stop at a terminal elevator and then be moved to its destination at the same rate.

A shift to more point-to-point rates will present several possible courses of action to the country elevators. The first alternative would

be for country elevators to become sub-terminals. This would result in basic changes in the functions performed by these elevators. Traditionally, the primary function of the country elevator has been assembling and shipping grain to a particular terminal. However, with changes in the rate structure, elevators that become sub-terminals will take on some functions of the terminal such as storing, blending, grading, finding buyers, and hedging, in addition to the assembling function.

Elevators that become sub-terminals will have many adjustments to make. For example, point-to-point rates make it possible for country elevators to profitably ship grain to many markets, rather than only one or a few as in the past. This will call for a more thorough knowledge and interest in rates by the country elevator manager.

With elimination of in-transit privileges, it becomes costly to ship grain to terminals and then to the centers of processing and consumption. This may provide the country elevator with an opportunity to store a larger volume of grain more profitably.

As sub-terminals become larger, more blending can be done. As blending becomes more important, so does precise and accurate grain grading. This could cause more federally licensed inspectors to move into these sub-terminals.

With increased handling of grain, the risk increases. Therefore, some country elevators may tend to use the futures market as a method of shifting this risk.

A second alternative for the country elevator would be to attempt to remain at its present size. However, it may be difficult to maintain volume of business, especially if a sub-terminal is located nearby. Sub-terminals may buy some grain from surrounding smaller elevators. In this case, these elevators may actually perform less of the grain marketing function than at present. They may act only as feeders for the sub-terminal. In other cases where a sub-terminal emerges, some smaller elevators may be forced to merge or go out of business completely due to insufficient volume.

Terminals are aware of these changes occurring in the grain industry and they have a large capital investment which they want to protect. So it is likely that the new rate structure will precipitate changes in their organization and operating procedures.

Another factor affecting the organization of grain elevators is the shortened receiving period. The self-propelled combine has increased off-farm storage and shortened the harvest season. This means elevators must take all their yearly purchases of grain into their houses in a few short weeks. In a 1952 Indiana study, these peak harvest periods were

shown to last about 50 days.⁹ However, this period is much shorter today.

At the same time, some operators of larger farms are constructing their own storage for shelled corn. Some farmers are purchasing their own dryers. While the latter trend may tend to reduce the burden on country elevators, they must plan to handle an increasing volume of high moisture corn during harvest.

Supply Handling Becoming Less Important

It appears that handling of farm supplies will become relatively less important in the future than at present. Perhaps one of the most important reasons for this change is the direct selling of feed from the manufacturer to the farmer. Direct selling bypasses the country elevator which has traditionally handled feeds purchased by the farmer.

Most studies in recent years indicate that direct selling will become more important in the future. When Iowa and Indiana feed dealers were asked about changes in volume of feed sold direct to farmers, 44 percent of the dealers in both states indicated that direct selling had increased slowly between 1955 and 1958. Another 11 percent of the dealers in Iowa and 18 percent in Indiana indicated that direct selling had increased rapidly between 1955 and 1958.¹⁰

The trend toward increased specialization in livestock production should result in more direct selling than in the past. The specialized producer often has his own feed mill and can prepare feeds without aid of the grinding and mixing facilities of the country elevator or feed dealer. This puts the specialized producer in a better position to buy his feeds direct from the manufacturer. When the specialized livestock producer does not have his own feed mill, some elevators are equipped to serve him with a portable mill. If the farmer has his own feed, the elevator only grinds and mixes the feeds and is paid for services rendered. This obviously causes a decrease in profit from supply sales but increases service income.

The specialized livestock producer is better informed on the analysis and type of feeds his livestock need. So he has less need for feed information disseminated by the country elevator or feed dealer. Since feed is one of the most important supplies sold by the country elevator, direct selling of feed could significantly reduce feed sales' contribution to total operating income relative to grain sales and service income.

⁹Richey, Perry S. and Thew D. Johnson. 1952. Factors to be Considered in Locating, Planning, and Operating Country Elevators. U. S. Dept. of Agriculture, Marketing Research Report No. 23, p. IV.

¹⁰Vosloh, Carl J., Jr. and V. John Bronsike. 1961. The Changing Feed Industry, Practices in Selected States. U. S. Department of Agriculture, Marketing Research Report No. 506, p. 23.

Innovations and the changing environment have caused the market for some farm supplies to become practically extinct. For example, at one time coal sales made up a sizable portion of farm supply sales. Today coal sales are negligible in most elevators in Western Ohio.

Lumber also seems to be becoming less important in elevator operations. The trend is toward more specialized retailers handling lumber.

Even though grain handling will increase relative to farm supplies, many firms will still handle a sizable amount of farm supplies. Each particular elevator should consider the demand for farm supplies in its trade area and gear its operation accordingly.

Services Becoming More Specialized

According to results obtained in this study, service income will tend to become slightly more important as a component of total operating income. These findings are consistent with those discussed previously.

The main reason for service income increasing in country elevators in Western Ohio is farm specialization. Specialization and division of labor result in interdependence. Applied to areas or locations, the principle of specialization is that each area or location tends to produce one or a few products and to sell its surplus of these. Then the proceeds can be used to buy the other things desired or needed.

Assuming the trend toward specialization in cash grain production continues, a greater need for storage will arise. The farmer, after filling his available storage space to capacity, will turn to the country elevator for additional storage. The continued demand for storage by the Commodity Credit Corporation is another factor to be considered. The trend toward bulk feed also should increase the services offered by elevators.

Even though direct feed sales increase, a sizable amount of feed will still be sold by country elevators. However, a larger proportion of this feed will be sold in bulk and the country elevator will deliver it, thus increasing its service for farmers. The limited use of the portable feed mill also will increase service income.

With overall grain production increasing in Western Ohio and the use of corn combines showing an upward trend, the demand by farmers for grain drying, cleaning and treating of seeds, trucking, and custom fertilizer spreading should also increase rapidly. So the findings indicating that service income will become a more important component of total operating income are quite feasible.

Profitability

No great changes appear likely in terms of net profit per dollar invested or net profit per dollar of sales for country elevators in Western

Ohio. However, a slight trend toward smaller per unit profits in terms of equity or sales appears likely.

SUMMARY

This study presents an empirical measure of the magnitude of the trends in size, specialization, and profitability of 90 elevators in Western Ohio. Markov processes were used to extrapolate measured changes in certain attributes representing size, specialization, and profitability during a base period into a final equilibrium distribution (the future). This final equilibrium distribution in each case represents the projected changes in these attributes, assuming adjustment tendencies continue at the rate observed during the base period.

The results point to larger elevators handling more grain relative to farm supplies. Although this study did not cover entry and exit of firms, it seems likely that there will be a decreasing number of firms in Western Ohio in the future. With the trend toward elevators with sales in excess of \$1 million in sales annually, the trade areas of these elevators must increase. This increasing trade area for certain elevators probably would force some of the less efficient firms out of business.

To measure trends toward specialization, the composition of total operating income was studied. Since total operating income in country elevators is typically broken down into the percentage derived from grain margins, supply margins, and service income, an increase in the proportion of total operating income derived from one of these attributes relative to the other two should point to a trend toward specialization.

According to the results, grain margins will make up a larger proportion of total operating income relative to supply margins and service income in the future. Supply margins will make up a smaller proportion of total operating income in the majority of elevators when the final equilibrium distribution is reached. At the same time, service income will make up a somewhat larger proportion of total operating income.

Changes ahead in the profit situation appear insignificant. The present net profit per dollar invested or net profit per dollar sales will remain about the same. However, total absolute profits should increase since the trend is toward larger elevators. Even with approximately the same rate of profit, larger firms will earn larger absolute profits with larger investments and sales.

According to this study, the tendency seems to be for larger elevators to earn about the same per unit profits. These elevators will receive an increasing proportion of their total operating income from grain margins and service income relative to supply margins in the future.

APPENDIX

Markov processes are used to evaluate changes in the distribution of firms within an industry. The general operation of this model consists of observing movement of firms between specific categories over specific time periods. This information is used to generate an equilibrium distribution of firms which would be expected to result if the type of activity initially observed continued indefinitely.

As an example, the first attributes analyzed in this study (size and percentage of total sales which were grain sales) will be examined in further detail. This study used a base period of 1958 through 1962. It was first determined how many of the 90 sample firms fell in each of the nine categories in 1958. Then it was determined to which categories the firms moved by 1960 (Table 1).

Table 1 shows that in 1958 there were 18 firms in category 1 (firms with less than \$525,000 total sales annually of which 0 to 59 percent was composed of grain sales). By 1960, however, only 11 firms remained in category 1. Three firms moved to category 2 (firms with \$525,000 to \$1,049,999 total sales annually of which 0 to 59 percent was composed of grain sales). Another three firms moved to category 4 (less than \$525,000 total sales annually of which 60 to 79 percent was composed of grain sales). One firm moved to category 5 (total annual sales between \$525,000 and \$1,049,999 of which 60 to 79 percent was derived from grain sales). The column totals show the number of firms in each category in 1960.

Changes occurring among the categories between 1960 and 1962 were determined by the same process. Changes occurring between 1958

TABLE 1.—Firm Transitions among Categories between 1958 and 1960.

No. of Elevators in Each Category in 1958	Category	Categories to which Firms Moved by 1960								
		1	2	3	4	5	6	7	8	9
18	1	11	3	0	3	1	0	0	0	0
14	2	3	5	2	0	4	0	0	0	0
6	3	0	1	5	0	0	0	0	0	0
12	4	1	0	0	6	3	0	2	0	0
21	5	0	0	0	1	12	6	0	0	2
4	6	0	0	0	0	0	3	0	0	1
2	7	0	0	0	0	0	0	2	0	0
7	8	0	0	0	0	0	0	0	6	1
6	9	0	0	0	0	0	1	0	0	5
No. of Firms in Each Category in 1960		15	9	7	10	20	10	4	6	9

and 1960 and 1960 and 1962 were then aggregated and probabilities of firm movement among the categories computed. The Markov process was then applied to these probabilities to obtain a final equilibrium distribution.