RAFELD, Frederick James, 1940-
AN ANALYSIS OF THE INFLUENCE OF PERSONAL ATTITUDES, GOALS, MANAGEMENT ABILITY, AND GROWTH STRATEGIES IN FARM FIRM GROWTH.

The Ohio State University, Ph.D., 1968
Agriculture, general

University Microfilms, Inc., Ann Arbor, Michigan
AN ANALYSIS OF THE INFLUENCE OF PERSONAL ATTITUDES, GOALS, MANAGEMENT ABILITY, AND GROWTH STRATEGIES IN FARM FIRM GROWTH

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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* * * * * *

The Ohio State University
1968

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ACKNOWLEDGMENTS

The author is sincerely appreciative to Dr. Edgar Shaudys, Professor in the Department of Agricultural Economics and Rural Sociology, who served as his adviser.

The author is grateful to Drs. J. Robert Tompkin, Norman Rask, and Howard Phillips for their many helpful suggestions. Special thanks are also given to Dr. Francis Walker for suggestions concerning statistical analysis and Dr. Ronald Krenz and associates of the Economics Research Service, U.S.D.A. for comments and suggestions.

Appreciation is expressed to the farmers who cooperated in the study and to Messrs. Ed Trainor, Jim Hunt, and Larry Traub who assisted in the collection of the data.

Sincere thanks are expressed to Mrs. Elizabeth Howard and associates in the department statistical laboratory and to The Ohio State University Computer Center for computer time.

Acknowledgment is also made to Misses Mary Ellen Harman, Jan Bauer, and Becky Murday for typing the rough draft and to Mrs. Jeanette White who typed the final draft of this dissertation.

Finally, special thanks are expressed to the author's wife, Judy, sons, Mike and Jeff, and parents, Mr. and Mrs. James Rafeld whose encouragement and sacrifice contributed to the accomplishment of this endeavor.
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CHAPTER I

INTRODUCTION

Background

Before 1930 farms in the United States were many, small, diversified and largely self-sufficient. Farming was a "way of life." Labor was an important input and many of the other inputs were produced on the farm. Because farms were small and technological advances were adapted to them, the capital investment in technology per farm was minimal.

In the last thirty years the evolution of farming from a "way of life" to a business endeavor and the application of scientific research results to farming have resulted in many changes. Many factors have contributed to this evolution: (1) the growth of the non-farm economy and the resulting migration of farm labor to urban employment contributed to the increased adoption of high capital investment labor-saving technologies; (2) expansion of farm product markets and demand for higher quality products have also required higher levels of production performance; (3) increased dependence upon the non-farm economy for factor inputs resulted in less flexibility in production decisions because many of these purchased inputs are long-term
investments with cost commitments which must be met annually;\(^1\) and (4) the change in farmers themselves as they became less self-sufficient and more urban-oriented and demanded their "fair share" of our economy's affluence.

The net effect of the changes of the past thirty years is that the structure of the farming industry has changed. There are fewer farms and the remaining farms are larger, more highly capitalized and use more business-orientated management. The magnitude of some of these changes is illustrated in Table 1.

Looking to the future there are reasons to expect that further changes will occur in farming. More machines and other technical changes will continue to become available for adoption as long as the critical factor in technical change—human knowledge based on imagination, research and ingenuity—continues to find developmental opportunities in agriculture. Farm numbers are expected to continue decreasing and the capital needs per farm are expected to continue increasing in the future. A recent study\(^2\) estimates that there will be a 25 per cent decrease in total farm numbers in the Corn Belt between 1964 and 1980. Commercial farm numbers in the region are expected to


### TABLE 1

**NUMBER OF FARMS AND SELECTED MEASURES OF FARM SIZE, OHIO, AND THE UNITED STATES, 1954 and 1964**

<table>
<thead>
<tr>
<th></th>
<th>Ohio</th>
<th>United States</th>
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<tbody>
<tr>
<td><strong>Number of farms</strong></td>
<td>177,074</td>
<td>4,782,416</td>
</tr>
<tr>
<td><strong>Acres per farm</strong></td>
<td>113</td>
<td>242</td>
</tr>
<tr>
<td><strong>Value of land and buildings per farm</strong></td>
<td>22,772</td>
<td>22,083</td>
</tr>
<tr>
<td><strong>Index of value of land and buildings per farm (1954=100)</strong></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Gross sales per farm</strong></td>
<td>5,158</td>
<td>5,577</td>
</tr>
<tr>
<td><strong>Index of gross sales per farm (1954=100)</strong></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of farms greater than 1,000 acres</strong></td>
<td>214</td>
<td>130,481</td>
</tr>
</tbody>
</table>

---

*No adjustment has been made in these data for the change in the census definition of a farm between 1954 and 1964.*

*bIn constant 1964 dollars—deflated by index of wholesale prices.*

decrease 10 per cent in the same time period. Capital needs per farm are anticipated to increase by 82 per cent as the substitution of capital for labor continues.

These future changes in agriculture will not occur without problems. The large projected increase in capital needs per farm suggests that there may be problems in securing the operating and investment capital needed for farming. These problems may result in changes in the methods of resource acquisition and control. Increasing amounts of the production inputs may be purchased. Leasing may become a much more frequent means of resource control.

Because of the size and structure of the farm firm of the future, management will be a much more critical factor in successful farming than it has been in the past. Financial management, purchasing of inputs, inventory control and marketing of products are some of the concerns which the business-minded farm manager of the future must consider.

Purpose of the Present Study

The evolving farm firm structure will experience further dramatic changes. Some firms must expire so that others can grow to an efficient size. But which firms will grow and how will they grow? One method of answering this question is to study the process of growth as observed on existing operating farms. Further, since changes in farm firm size occur as a result of decisions of the manager, an individual possessing certain values, goals, and abilities, it must be recognized that these management characteristics will affect the speed and
direction of the growth process. This study will investigate the process of growth as it is occurring on selected farms in Ohio and evaluate the effect of differing management characteristics on the growth process.

Description of the Present Study

Recognizing the general lack of knowledge about the influence of human factors upon farm firm growth, the Ohio Agricultural Research and Development Center and the Farm Production Economics Division of the Economic Research Service, U.S.D.A., inaugurated a cooperative research project to investigate the effects of goals, attitudes, management ability and growth strategies on farm firm growth.

The research reported herein is a part of this cooperative project. The results are based on data collected by personal interview from sixty-two farm operators located in five southwestern Ohio counties. The respondents were randomly selected from a population of operators that: (1) were between thirty and fifty years of age, (2) had a gross farm income in excess of $10,000 each year during the study period, (3) had less than $4,000 of family income from nonfarm sources in any year, and (4) received greater than 50 per cent of gross farm income from the sale of cash grain and hogs. These sample criteria were used: (1) to reduce the variance of the sample, (2) to minimize the influence of nonfarm generated capital, (3) because non-commercial and small commercial farms are not the most rapidly
expanding ones, and (4) because previous research has indicated that the growth of the farm parallels the age of the farm operator.

Data about the operator's background (age, education, experience), goals, attitudes, and management ability were collected by personal interview in August and September of 1967 by the author and three other graduate students in Agricultural Economics at The Ohio State University. In addition, information necessary to measure the amount of growth occurring during the five year study period, 1962 to 1967, was enumerated. Substantial changes in resource inputs that occurred over the study period were isolated and information on production efficiency, farm income, and related knowledge was also collected.

These data were tabulated and analyzed using least squares multiple regression and group comparison techniques.

Objectives of the Study

Data collection and analysis for this project were conducted with the main objective of learning more about the process of farm firm growth as it occurs in empirical situations. Answers were sought to the following questions: (1) what are the factors, including the human factors, which contribute to growth?, (2) what are the effects of attitudes, goals, strategies and management ability upon growth?, and (3) what are the quantitative relationships of these factors to selected measures of growth?

---

More specifically the objectives of this study are:

1. To measure by two methods the amount of growth occurring on sample farms during the five year study period, 1962 to 1967,
2. To isolate the influence of attitudes, management ability and other personal factors upon growth,
3. To determine the importance of a growth goal,
4. To identify the growth strategies used,
5. To determine the effects of production efficiency, size, operator percentage equity, livestock specialization and other nonpersonal factors upon growth, and
6. To compare and evaluate the two measures of growth in light of the findings regarding the above objectives.

General Procedure

The first step in attacking a research problem is to review the literature to determine how other people have studied the topic. The review of literature for this study is presented in Chapter II.

The next step is to review the relevant theory and develop a research hypothesis. In Chapter III a farm firm growth hypothesis for this study is developed based upon economic theory, managerial theory, sociological and social-psychological theory and firm growth theory.

To test the hypothesis developed in Chapter III data and analytical tools are needed. The sampling procedure, questionnaire design, and analytical methodology are explained in Chapter IV.
Because this study uses psychological scaling, a technique unfamiliar to many agricultural economists, Chapter V presents a fairly detailed discussion of this technique as used in the study. This chapter also discusses the measurement by dummy variables of certain other selected variables used in the study.

Chapter VI is a presentation of the results and conclusions of the data analysis conducted according to the procedures discussed in Chapter IV.

The final chapter, VIII, presents the general conclusions and a brief summary of the entire study.
CHAPTER II

REVIEW OF LITERATURE

Previous Research on Farm Size

Farm management researchers over the past thirty years have studied many aspects of firm behavior. Input factor combinations and the level of output were of major concern. These were normally analyzed with the goal of optimizing economic efficiency in the static situation—the equilibrium position of the firm. However, research by several authors during the 1940's and 1950's (Headington and Falconer,\(^1\) Schoeff and Robertson,\(^2\) Sitterley and Falconer,\(^3\) Pond and Nodland,\(^4\)

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\(^1\) R. C. Headington and J. I. Falconer, Size of Farming Units as Affected by the Farming of Additional Land, Bulletin 637 (Wooster: Ohio Agricultural Experiment Station, 1942).

\(^2\) Robert W. Schoeff and Lynn S. Robertson, Agricultural Changes from 1910 to 1945 in a Central Indiana Township, Bulletin 524 (Lafayette: Purdue University, Agricultural Experiment Station, 1947).

\(^3\) J. H. Sitterley and J. I. Falconer, Change in Size of Farms in Ohio—1900–1940, Bulletin 669 (Wooster: Ohio Agricultural Experiment Station, 1947).

Mosher, and Atkins studied the changes in agriculture, including change in farm size, over various time periods. These studies were mainly concerned with descriptions of changes in the number of units of production factors such as acres of land, number of machines, and number of livestock. Very little, if any, analysis was conducted to determine why or how these changes were made. The numbers of production units are the basic components of the measures of size used in this study.

The North Central Farm Management Research Committee sponsored a conference on "Farm Scale and Resource Productivity" in 1954. Olsen summarized the research on farm size as follows:

Of the studies concerned particularly with farm size, principal objectives have included the following: (1) to explain existing patterns of farm size, (2) to determine historical trends in farm size, (3) to describe differences in farm size among regions and among farms within regions, (4) to determine the size of farm necessary to provide minimum levels of living, (5) to learn the effect of farm size on financial stability, (6) to measure the effect of size on labor productivity, (7) to find the effect of various technological developments on farm size, (8) to describe the characteristics of particular farm size groups, and (9) to determine the optimum size of farm under various conditions.

---


However, none of the objectives listed by Olson concerned themselves with the understanding of the process of change in size over time; they related only to the net advantages of different sizes. Objective (7) is a possible economic reason for change but did not include a study of the effects of technological development over time.

Increased Interest in Farm Firm Growth

With the exception of studies of the type mentioned in the previous section, farm management researchers have neglected, until recently, research on the changes in farm firm size. Bailey proposed several reasons for this. One of these was the fact that farms in the older farming regions (Midwest and South) became established and remained large enough to fully utilize the family's resource inputs with existing technologies until recent years. Any opportunities for firm growth were mainly through increase in livestock feeding that could use idle, winter labor.

A second reason for lack of research on farm firm growth was the preoccupation of researchers and others with the idea that research should deal with "... actions within the power of most operators, hence with solutions having general applicability." Acquisition of

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9 Ibid., p. 36.
additional resources, particularly land, was limited and thus the possibility of growth was largely ignored.

The third reason was that the main farm management research concern was with resource allocation within the existing firm.

The situation described above has changed. Farms are no longer of economical size. Researchers and farm operators recognize that economic progress requires growth. Whether or not a majority of farmers realize that technological change and the development of our economy demand the relative shrinking of agriculture—the expiration of some firms in order that others may expand and survive—they do recognize the problem of the survival of their firm as a business, and are beginning to seek research guidance.

Additionally, the parallel developments of increasing computer capacity and economic theory in the dynamic setting, with the synthesis of the two into mathematical models suitable for computer analysis has been a contributing factor to increased interest in farm firm growth research. Most researchers agree that the dynamic setting is a more realistic situation in which to study resource allocation, production response, firm growth and other management problems. This is now feasible as a result of these developments.

Present Research

Presently, several studies are being conducted or have been recently completed which investigate aspects of farm firm growth.
Martin and Plaxico,^ Johnson,^ Patrick,^ and Heidhues,^ conducted studies in a dynamic setting using empirically based mathematical programming models with the objectives of exploring growth, testing hypotheses about the influence of various economic factors upon growth and drawing conclusions about how farm firms can grow most economically. The solutions to these models indicated the projected farm size at some future date based upon the implicit and explicit assumptions of the models—beginning structure of the firm, operator goals, operator management ability, consumption, reinvestment, interest rates and so forth. Changes in these assumptions were the variables whose influences were investigated.


Martin and Plaxico used a polyperiod linear programming model to study capital accumulation ("growth") over a 30-year period for a representative farm situation in the rolling plains of Oklahoma and Texas. They assumed that the operator had the necessary management ability to operate the expanded firm. Six criterion functions were maximized subject to varying restrictions on borrowing limits, starting firm size, land acquisition methods, and consumption functions. One conclusion was that the structure of the firm as depicted by the restrictions of the programming model was a more important factor affecting capital accumulation than was the criterion function maximized—-with the exception of one function for the last period, all six of the criterion functions gave the same results. Other conclusions were that a conservative borrowing policy (capital rationing) limited growth, farms with small starting sizes exhibited similar growth but on a smaller scale than farms with larger starting size, absence of the alternative of renting land restricted capital accumulation and higher capital withdrawals because of greater consumption restricted the amount of growth.

Johnson also used a polyperiod linear programming model to study growth. But, he modified his model to allow for stochastic crop yield variability. He maximized the constant dollar value of the stocks of physical assets ("growth") over a 15-year period for a typical farm in the southern high plains of Texas subject to varying restrictions of initial size and borrowing limits. Again, the conclusions were that small initial size and conservative borrowing limits restricted growth over the study period.
Patrick used a simulation model which considered family goals, yield and price expectations and varying levels of management ability (as specified by assumed crop yields) interest rates, and loan limits. Each of the various combinations was simulated over a 20-year period. The conclusions were that capital growth was positively related to management ability and the length of the loan limits.

Heidhues used a recursive programming model to study the effects of four European Economic Community price policy alternatives upon different types of viable farms in Northern Germany between 1964-65 and 1969-70. Growth was defined as investment capital accumulated for the purchase of durable assets. Predominately cash crop farms had a higher potential for growth than the farms with a high percentage of forage crops. These latter farms had higher investment requirements which curtailed their growth. In general, however, there was a fairly stable growth pattern within each farm type category under the price levels and price ratios considered.

The above studies all projected some measure of growth into the future based upon the particular assumptions of the model. However, none of them attempted to explain presently occurring changes in farm size. The present study is an exploration of this phenomenon.

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14 These are representative studies and are not intended to be a complete review because their method of analysis was considerably different than the one used in the present study.
Additional Ideas About Farm Firm Growth

Bailey\(^{15}\) has suggested five necessary conditions for farm firm growth. These are: (1) excess managerial ability, (2) profitable business, (3) minimum starting size, (4) some unused resources, and (5) added resources procurable. Numbers (1) and (4) can be the same. In general these conditions seem logical. The review of present research in this chapter indicated that starting size and management abilities affected the growth rate.

Morris\(^{16}\) develops some of the same ideas in a slightly different manner. He argues that the average farm firm should not be expected to grow; it cannot generate the necessary cash flow to invest in order to obtain growth. These operators can only expand to the full use of their fixed resources and cannot purchase more because they cannot pay for the purchased resources with the profit derived from production.

To further expand Morris' idea the conclusions from the research reviewed above indicate that the amount of capital withdrawal for family consumption restricts growth. Family consumption can be subdivided into living expenditures and emergency expenditures because of illness or some other unplanned occurrence.

\(^{15}\) Bailey, op. cit., pp. 38-40.

A second idea proposed by Morris was that the operator's lack of ambition to grow, or of goals to develop a large farm business, limit the growth of the farm business. This lack of a growth ambition would be reflected in the types of decisions made by the operators.

At the 1967 annual meeting of the American Farm Economics Association, a discussion session on farm firm growth research was held. In this session, it was suggested that the degree of specialization of production may be a factor in growth. A crop production specialist may expand at a different rate than a livestock production specialist. The research of Heidhues would support the hypothesis that the particular specialization can affect growth.

Additional characteristics of the farm operators or their operations which may limit the growth of the farm firm were also discussed. These included the lack of a profit maximization motive, unwillingness to assume risk, managerial inadequacies, and inefficiencies in production.

The programming models reviewed above suggest that conservative borrowing limits restrict growth. In an actual firm situation, it would seem logical to assume that the actual amount borrowed, or alternatively the percentage equity maintained, could influence the amount of growth.

Another idea, gleaned from several sources (Bailey, op. cit. for one) is that the type of resource acquisition strategy used may influence the
amount and rate of growth. An operator who leases land may be able to expand his net worth much faster than one who owns all the land he operates. Again the research reviewed in this chapter indicated that the lack of the land rental alternative restricted growth.

Wirth\(^\text{18}\) has written that the family cycle has an effect upon growth. The young operator is concerned with getting started and becoming established. The middle-aged operator is occupied with expansion. The older operator is concerned with consolidating his gains and protecting them. Thus, the middle-aged group of operators would more likely be the "growers." But even within the middle-aged group, the older operators may be starting to slow down and consolidate.

\(^{18}\text{Wirth, op. cit.}\)
CHAPTER III

DEVELOPMENT OF A HYPOTHESIS OF FARM FIRM GROWTH

The purpose of this chapter is to develop a hypothesis of farm firm growth based upon a review of the relevant economic, managerial, social-psychological, and firm growth theories. The discussion is divided into six areas.

First, the definitions of a firm, firm size and firm growth as used in this study are developed.

This is followed by a discussion of the concepts of economies of size, technological economies, and economic dynamics; factors which have special relevance to a discussion of firm growth since growth is a process which occurs over time (through, economic dynamics) and two economic reasons for growth are technological changes and economies of size which may make a larger firm size more profitable.

The third main subpart of this chapter discusses the firm as the manager sees it instead of the cost curve view of the economist which was used in the second subpart. The concept of farm management is discussed. The farm manager is the decision maker in the farm firm; he reacts to the signals he gets from the economic system and makes decisions for his firm within the context of that firm. These decisions may or may not result in growth depending upon the signals he reads and his evaluation of them relative to his situation.
What signals a farm manager reads, how he interprets them and what action he takes are dependent upon his personality—particularly his goals, values and attitudes. These concepts and their underlying sociological and social-psychological theories are discussed in the fourth part of this chapter.

The current writings on firm growth theory are reviewed in the fifth section of the chapter. This theory is based on economic, managerial, and social-psychological theories although this point is not explicitly discussed in the presentation.

Finally, the working hypothesis of farm firm growth is presented at the conclusion of the chapter. It is based upon the theories discussed in the chapter but is more specific and relates major complexes of variables which can be measured, thereby permitting scientific testing and evaluation.

Definitions

There are several definitions of a firm and many possible measures of growth. For purposes of this study a firm is defined as "an administrative unit and a collection of means of production subject to independent planning for the benefit of the unit as a whole." Thus, a farm firm is the farming operation controlled and operated by one

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manager. (Control can be effected by either ownership or leasing.)

Growth is the increase or decrease in the size of the firm. There are many possible measures of farm size: number of acres, number of breeding animals, number of animal units, gross value of production, number of workers, total capital investment, total costs, net returns (however defined), net worth and total value of assets controlled. At this point in the development of the "theory of firm growth" there is no commonly accepted measure of size. Penrose prefers, ideally, the present value of all resources, but realistically accepts the value of fixed assets. Renborg defines size as "some measure of the total sum of all the means of production which the firm commands." These means of production can be measured in technical units: acres of land, man hours of labor, number of animals, dollars of capital invested in machinery and so forth. Changes in size (positive or negative) can be detected as changes in the numbers of these technical units. However, it is not possible to say if a total size increase is taking place, nor to compare the size of one firm with the size of another, unless some basis of evaluation exists. This has to be done by assigning common denominators, such as dollar values, to the technical units.

In this study two measures of size are utilized: constant dollar value of total assets controlled and operated by the firm and constant

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3 Renborg, loc. cit.
dollar value of total assets owned and operated by the firm. These measures do not involve the question of variation in efficiency as do the values of gross production or net income. Total assets controlled is a measure of the total firm resource base. It allows inclusion of unowned assets which are used in production and is thus consistent with the definition of a firm. It implicitly includes the other measures of size such as: acres of land, members of livestock, and man hours of labor.

Total assets owned (net worth) is the second measure of size used in this study. This is a measure of personal financial investment in the farm business. It differs from the above measure since it includes only the owned resources. It is further reduced by the debt owed on these owned resources.

Economic Theory

Static theory

The production firm has traditionally been conceptualized as an "...input-output process whereby certain inputs or factors of production—labor and land services, capital services, raw material, and so on—are transformed into outputs of salable product." This concept permitted the study of adjustments in resource allocation and levels of output with shifts in prices of both factors and products.

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The manager was assumed to be a profit maximizer operating according to the accepted rules of marginal analysis and reacting to changes in market forces as reflected by price shifts. Under traditional theory no attempt was made to understand by what process he made these decisions to adjust.

Several component parts of the above general theory particularly applicable to this study are reviewed below.

Economies of size\(^5\)

Economies of size refer to reductions in the total cost per unit of output resulting from changes in the quantity of resources employed by the firm or in the firm's level of output.

A firm wishing to maximize profits operates at the point where marginal return (MR) equals marginal cost (MC). This point of profit maximization may be different depending upon whether one is considering cost curves of the short run or of a longer period of time. The short run is defined as a time period so short that the firm is unable to vary the quantities of some resources, such as land, buildings and heavy machinery. As the time period under consideration is progressively lengthened, more and more of these "fixed" resources become variable in quantity until the long run is reached and all resources are variable.

In the short run, economies of size result from the fuller utilization of fixed plant size. This position is illustrated graphically in Figure 1, assuming that the firm sells its output in a purely competitive market. The firm in this case operates at output level A, assuming price, which equals marginal revenue, is P. This level of output is produced at an average cost (AC) greater than the price received. If the price increases to $P'$, the economic size changes to level of output B and the firm maximizes profit if it adjusts accordingly.

The short run average cost curve assumes that one or more resources are fixed—available only in specified quantities in the short run. The typical "U" shape of these short run curves occurs because average costs per unit decline with the initial increase in output as fixed costs are distributed over greater units of output; eventually, however, greater and greater amounts of other variable resources must be added to the fixed resource to achieve greater output.

Under circumstances where few resources are fixed (as an entrepreneur considering entry into an industry) or as the time period is extended, many of the resources which are normally fixed in the short run can be varied. This permits the development of a planning curve—a curve drawn tangent to a series of short run curves for each of the possible firm sizes in the short run. A planning curve or envelope curve is shown in Figure 2. The planning curve is also "U" shaped because of diseconomies of size which are usually attributed to the inability of the management of the firm to maintain efficient
Short run cost curves

Optimal output (in appropriate units)

Price or cost in dollars per unit
Fig. 2. Theoretical illustration of short run average cost curves and envelope curve.
productivity of all resources because of the large or small size of the firm. The exact shape of this planning curve depends upon the output being studied. Several empirical studies in agriculture indicate that this curve may be nearly flat or only very slowly rising beyond a certain level of output.6

The concept of economies of size is important in the study of firm growth because it is a major motivating factor. For example, a firm with cost curve SAC2 in Figure 2 would theoretically expand firm size and attempt to achieve curve SAC3. This curve has the lowest average cost of any firm size. Maximum profit is achieved by operating at the output level where MC=MR (point Q).

Technological economies

The above discussion has assumed a constant level of technology. What happens to the cost curves if the level of technology is allowed to change? There are two possible outcomes—technological economies or technological diseconomies. Technological diseconomies will be ignored since, presumably, uneconomic technical changes would not be adopted.

On the topic of technological economies, Penrose says:

Technological economies arise, when, under given conditions, for given products, changes in amounts and kinds of resources used in production permit a larger output to be produced at lower average cost. Thus, technological economies arise when costs can be reduced through an increase in the specialization of labour; the introduction of automatic machinery, assembly-line

6 Madden, op. cit.
techniques, or mechanized internal transport systems; the installation of large units of equipment capable of producing larger quantities at lower unit costs if used to capacity; and other similar technical alterations in the organization of production.

The effect of any of these technological changes on costs depends not only on the physical productivity of the combination of inputs; but also on the prices of the factors of production required. Hence the 'technically optimum' size of plant is as much a function of prices as of technology, and the concept of technological economies of scale can only mean that with given prices of productive resources a larger scale of output permits changes in the productive techniques or resources used which reduce the average cost of output.  

Thus with changes in technology, the minimum point on the envelope curve shifts downward and to the right. The downshift may or may not be very great, and depending upon the cost of the input embodying the new technology, the minimum cost point may be a considerable distance to the right. An illustration is shown in Figure 3. Curve 2 represents a new level of technology. The distance $C_AC_B$ represents the cost reduction, and the distance $AB$ indicates the change in the minimum cost level of output.

Technology is constantly changing in agriculture and the progressive farm operator attempts to adopt the changes which are relevant to his operation. But in so doing, he shifts his cost curves in such a way that frequently a larger firm size is needed to most economically produce his outputs. This change in size is firm growth. Theoretically, technological change is another factor contributing to farm firm growth.

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7 Penrose, op. cit., p. 90.
Fig. 3. Theoretical illustration of a change in the envelope curve.
Dynamic theory

The static theory of the firm is a useful concept for dealing with many micro-economic problems. However, since firm growth is a process of change over time, dynamic theory is a more realistic basis for considering the problem of growth.

Samuelson defines the difference between statics and dynamics in the following manner:

Statics concerns itself with the simultaneous and instantaneous or timeless determination of economic variables by mutually interdependent relations . . . . It is the essence of dynamics that economic variables at different points of time are functionally related; . . . . It is important to note that each such dynamic system generates its own behavior over time, . . . . This feature of self-generating development over time is the crux of every dynamic process.8

Baumol defines economic dynamics as ". . . . the study of economic phenomena in relation to preceding and succeeding event [sic]."9

Thus economic dynamics is the theory of how changes in the levels of various economic variables are related through time.


A conceptual dynamic model

Because firm growth is a process which occurs over time, it is important to understand the concept of economic dynamics and realize that a decision in one time period is based on past decisions and affects the alternatives which can be considered in later time periods. In order to further clarify this idea, a conceptual model developed by Plaxico will be used.

The usual static view of a resource allocation problem is depicted in Figure 4. Line P is an iso-resource curve and I₀ is an indifference curve relating equal amounts of want satisfaction for a series of combinations of present consumption and capital accumulation. Theory suggests that the point of tangency of these two curves specifies the optimum allocation of resources between present consumption and capital accumulation. Optimum allocation in Figure 4 would be allocating OA to present consumption and OB to capital accumulation. This allocation assumes a closed system where borrowing and lending by the individual are not permitted.

In Figure 5, P₁ is an iso-resource curve relating to time t₁ and I₁ is an indifference curve. The point of tangency of I₁ and P₁ specifies the optimum combination of present consumption and capital accumulation in time period t₁.

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Fig. 4. Resource allocation problem in a static framework.
Fig. 5. Resource allocation problem in a dynamic framework.
$P_{t_2}$ is an iso-resource curve representing the possible combinations of production for present consumption and capital accumulation in period $t_2$ if OB production for capital accumulation and OA for present consumption were produced in $t_1$. In like fashion, $I_2$ is an indifference curve expressing an individual's desires with regard to present consumption and production for capital accumulation during time period $t_2$.

With "n" time periods, we would have "n" production possibility curves, one for each time period, and likewise a series of "n" tangencies of production possibility curves and indifference curves. Line G would be the growth path over time, with given technology and appropriate indifference curves.

It should be noted that in a truly dynamic system, a decision made in one time period affects the subsequent time periods. Consequently there is only one optimum growth path available to an individual economic unit. There are, however, an infinitely large number of possible growth paths which fail to meet the conditions for inter-temporal resource efficiency.

If we assume that $I_0$, in Figure 5, is an indifference curve which lies below $I_1$, it is obvious that welfare in $t_1$ would be less if any combination other than that specified in the tangency of $I_1$ and $P_{t1}$ were used. For example OC production for present consumption and OD production for capital accumulation would be an admissible possibility but would result in a lower level of utility or welfare than would OA and OB. Furthermore, the production possibilities for $P_{t2}$ would lie
below that of $P_t^2$. Thus, choice in the first production period would affect alternatives in the second production period and all subsequent periods.

The above discussion assumes perfect knowledge. In the real world these curves would represent the most probable expected outcomes as viewed by the decision maker based upon his expectations and his imperfect knowledge situation. Consequently, future curves could change with the passage of time because of changes in knowledge, changes in personal preference and the deviation of actual outcomes from expected outcomes. Thus, an expansion decision in one time period might be modified in future time periods because of the experience and knowledge acquired with the passage of time.

Managerial Theory

According to traditional economic theory the operation of the market allocates resources. The manager reacts to changes in the market according to the rules of marginal analyses. However, contrary to traditional economic theory, businessmen have attempted to reduce the degree of uncertainty about future changes by gaining control of, or influence upon, the external forces (product markets and factor markets) which cause uncertainty. The devices used for this control include tariffs, patent laws, collusion, mergers and various other

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methods of gaining a monopolistic position. Thus, decisions are being made internally to change the external environment.

A managerial theory of the firm is really a theory of management decision. It is based upon three factors:

First is the external environment (including the product market and the factor market), which provides real limits but which is also subject to countervailing pressures by the firm. Second is the internal organizational structure of the firm, which must be developed in order for the process of decision making under conditions of uncertainty to be effective. Third is the communication system, which transmits information to and through the organization.\textsuperscript{12}

It implicitly makes the following assumptions: (1) the goals and purposes of the firm are assumed to be satisficing or minimizing ones,\textsuperscript{13} (2) the acquisition and dissemination of relevant information to the firm and within the firm must be accomplished, (3) the decision process is determined by the organizational structure which in turn determines the informational system, (4) the wants, resources, state of technology, and body of knowledge are assumed to be changeable and changing, and (5) the wants, resources, state of technology, and body of knowledge are not independent of one another and can be influenced by the actions of the firm.\textsuperscript{14}

\textsuperscript{12}\textit{Ibid.}, p. 208.

\textsuperscript{13}The satisficing firm attempts to achieve satisfactory profits rather than maximum profits. The minimizing firm attempts to minimize losses and maximize gains.

\textsuperscript{14}\textit{Cleland, op. cit.}, p. 209.
Thus, the key element in the managerial theory is that internal decision making has some influence on the external environment. "By organizing the firm and its information system and establishing control techniques which make limited decisions on the basis of this information, the manager-executive has: (1) the time to plan for future growth; (2) the power and insight to attempt to influence his external environment; and (3) the ability to make decisions whose sequential aspects can be carried out by subordinates." 

Farm firm management

Farm firm management is similar in many ways to industrial firm management. The same basic economic theory is applicable. The farm firm has an organizational structure, though very simple. The farm manager tries to influence the external environment, though not with as much success as the industrial manager achieves. And the farm manager makes decisions and changes his goals, resources, knowledge, and state of technology through time. However, there are some differences which make the management of the farm firm somewhat unique.

First, the organizational structure of the farm firm is very simple. There is no hierarchy of laborers, supervisors, coordinators, and entrepreneurs—one man normally serves all four of these functions in varying degrees depending upon his operation and his abilities. Because management is basically composed of one or a very few individuals, it is much more vulnerable to firm-household or

15 Ibid., p. 216.
firm-community conflicts. Rushton and Shaudys\textsuperscript{16} suggest that the farm firm is a subsystem of the farm family. Carlson\textsuperscript{17} found that there are two "schools of thought" concerning the measurement of the success of a farmer: "farm success" as a technician and businessman and "community success" which includes the holding of certain values concerning the family and the community and the practicing of what these values teach. This is not meant to imply that the industrial firm does not face many community and family pressures. It does, but not as intimately nor are these pressures as important relative to other considerations.

Second, the production process and the product market for the farm firm are somewhat unique. The production process is biological and therefore not as subject to control as is auto manufacturing for example. The demand curve faced by the farm firm is in general perfectly elastic and not readily subject to manipulation by the firm through advertising and so forth so that the firm can achieve a monopolistic competition position. Because of the biological nature of the production and the demand curve faced by the farm firm, the risks


and uncertainties are different from those faced by the industrial firm. The farm manager has less control of prices and production. For this reason farm firms are not as highly specialized as are industrial firms.

Third, because the production process is biological, the various stages of production are separated by waiting periods. In industry the product flows from area to area within the factory until it is complete. Timing is very important in the factory but also cannot be neglected on the farm. The timeliness of some production stages in farming are more critical than those of industry. Hot, dry weather during corn tasseling is detrimental to corn yield. Cool weather is timely but not controllable.

Finally, because farm firms are normally owned and managed by the operator, the acquisition of capital for operation and investment depends upon evaluation of the man to a greater degree than in industry. In addition, investments in land, improvements and machinery (normally fixed costs) make up a larger portion of total costs of farm production than is normally true in industry.

The farm firm has not reached the stage where the managerial theory of the firm is a major concern; however, the basic elements of the theory are present. Because of the unique characteristics of the farm firm a separate management concept is normally developed. This is presented below.
A theoretical construct of a farm manager

Farm management has been defined and viewed in many ways. All of the definitions have in common the idea of human involvement. A comprehensive summary of all these various concepts of farm management and the concept that is used in this study is the Nielsen model of a farm manager. This model is shown in Figure 6.

The V set of this model symbolizes the manager as a person with a certain configuration of background experiences, V₁, and presumably a memory of these; as a person who is directed by certain drives and motivations, V₂, which are monitored by a value system; and as one endowed with certain capabilities or talents, V₃, such as intelligence, imagination, skills and so on. The P set signifies the whole complex of activities usually referred to as managerial processes. While it is recognized that much of the actual process of management is internalized in the mind of the manager, attempts (the Interstate Managerial Survey for one) have been made to investigate this process. It is generally recognized as a series of steps including: (1) formulation of goals or objectives of the firm or unit; (2) recognition and


Fig. 6. The Nielson model of a farm manager.
definition of a problem, or recognition of an opportunity; (3) obtaining information—observation of relevant facts; (4) specification and analysis of alternatives; (5) decision making—choosing an alternative, which is the core of the management process; (6) taking action—implementation of the alternative selected (assuming that the decision was to take action); (7) bearing responsibility for the decision or action taken; and (8) evaluating the outcome. Finally, the \( O \) set of the model represents the reason for operating—the outcome.

Considering the whole model, the manager is viewed as a behavioral entity or perhaps better, a goal-orientated system seeking to produce a desirable goal set or outcome. Given certain levels and interactions within the \( V \) set, the manager engages in certain mostly internalized processes, \( P \), which lead him into various activities that produce outcomes, \( O \), of varying degrees of finality.

This view of farm management actually considers management to be somewhat analogous to a catalytic agent, i.e., it does not in and of

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itself became a part of the inputs per se although it does influence or control the use of inputs.\textsuperscript{21,22}

In considering farm management it should be remembered that this process is occurring under conditions of risk and uncertainty which further complicate the problem by bringing to bear such factors as expectations about future events.

Another view of human behavior closely associated with management and including expectations is that of entrepreneurship. McClelland defines the entrepreneurial role as:

\ldots A way of work and life whose excellent performance calls for high level personal need and capacity for (1) risk taking as a function of skill, not pure chance; (2) energetic, innovating activity; (3) individual freedom and responsibility for initiating decisions on what to do; (4) a feedback of concrete knowledge on how well actions are proceeding in line with expected results of initiating decisions; (5) guidance of present decisions and actions by long-range perspective of future possibilities and preference for larger remote rewards to smaller immediate ones; and (6) organizational skills that can gear a multitude of activities into each other so as to achieve desired results with the least amount of effort and friction possible.\textsuperscript{23}


\textsuperscript{22}Glenn L. Johnson, "Methodology for the Managerial Input," Agricultural Policy Institute et al., The Management Input in Agriculture (April, 1963).

It is the opinion of this author that the Nielson model implicitly includes this form of human behavior since it includes motivations ($V_1$) and abilities ($V_3$).

In the above discussion we have not specifically stated the fact that this model could apply to a management complex—a group of individuals contributing to the decision making—as well as to one individual. Or alternatively, if it does apply to one individual, the influence of family, community and other social pressure groups as well as the information obtained from other individuals and groups is implicitly included in the antecedent portion of the model (particularly $V_1$) and the feedback from the outcome ($O$) to the antecedents. In this study management is measured from the response of the farm operators, although it recognized that other individuals may affect the management process. However, their influences are assumed to be reflected in the operator's response.

In summary, managerial theory and more specifically the theoretical construct of a farm manager used in this study, modify the traditional economic theory approach to change in farm size. Even though the optimum firm size may be at a level larger than present size the firm may not expand because, for example, the manager lacks the ability to operate such a firm, or his father had a bad experience on a large farm, or even because he misjudged the situation and made a bad decision of not to expand. These are only a few of the many possible personal reasons why seemingly profitable opportunities are passed up. All of these reasons have a basis in the personality of the manager.
Each manager has his own unique personality which in turn results in unique actions. We turn now to a brief consideration of the basic theory of personality development.

Sociological and Social Psychological Theory

In the previous section, a concept of the farm manager as a "behavioral entity" or a "goal-orientated system" was developed. Goals, attitudes and values (a part of human personality) are important parts of this system. Thus, it is important to understand the theory of human personality before attempting to hypothesize the relationship between the farm manager and farm firm growth.

Before proceeding, certain sociological and psychological terms should be defined.

A **concept** is a semantic symbolization of the relationship which is purported to exist between any two or more given phenomena.

A **belief** is a subjective interpretation of a concept.

A **value** is a subjective interpretation of the relationship which ought to exist between phenomena. Sometimes values are referred to as normative beliefs.

An **attitude** is an individual's tendency to act based upon his beliefs and values.

A **goal** is a future relationship which an individual wishes to establish between himself and certain selected phenomena.

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Means are courses of action which may be taken to achieve goals.

Reality is that part of the relationships which exist between phenomena that are similarly perceived by different individuals in different places and/or at different times. For a given individual, the interpretation of the relationship between phenomena is a composite of reality and beliefs. If a person believes a relationship to exist between phenomena, insofar as his subsequent behavior is concerned, it does exist...25

Because of the truism of this last statement it becomes necessary to understand the process of how man thinks in order to understand the influence of these factors on firm growth.

Man is born with certain biologically determined mental and physical capacities. Through the lifelong process of socialization his personality is developed and he learns how to behave in a human manner. That is, he learns how to use his biological capacities in a socially accepted pattern. The individual personality is a function of his particular subculture and his perception of what is acceptable to it. Man is inclined to organize all the phenomena which he perceives into patterns of cause and effect which to him are rational but, because of selective perception, he does this without taking into consideration all of the data that are known or are possible to know and thus, sometimes assigns spurious relationships to phenomena. But this does not alter to him the rationality of his actions, it simply changes the actual result from his expected result. Management behavior is a part of this total process.

Man can perceive interrelationships because he can deal with abstractions—he can create symbols in his mind which have empirical referents in the universe around him. This frees him from immediate sensory contact with phenomena in order to respond to them.

Whenever a human being is faced with a stimulus or a problem, he responds not to it, but to the interpretation he places upon it. Before he responds to a stimulus, man considers his past experience with similar stimuli, how he responded to these similar stimuli in the past and evaluates whether he was satisfied with the outcome of his actions. He then considers whether similar goals are desired and if not what other goal or goals are important. He projects to the future to evaluate the outcome he prefers relative to the means for attaining this end. Only after consideration of the relevant past experiences and projections of the future does he choose an alternative (end and means) which best suits his values.

The personality of man is molded by the series of events which are a part of his experience world. A repeated stimulus to which the response is the same becomes a "habit." Because he can deal with symbols, he can deal with the accrued experiences of other times and other places as well as those in which he actively participates. Each man builds up his experience world and makes judgments about each of his experiences. The patterning of these judgments forms his value system. This value system provides him with a tendency to act in relation to stimuli which he receives. These tendencies are called attitudes.
Part of a man's value system is a tendency to organize both ends and means into hierarchies on the basis of acceptability to himself as an individual. Thus, he has a series of goals and a series of means of obtaining them at any given time. These hierarchies may vary with the situation. An individual may select an initially less favorable goal because within his value system, the obtaining of a more favorable goal necessitated the expenditure of more means than he is willing to spend to obtain the difference in ends, thus resulting in a reorganization of the hierarchy. With a given goal, man inevitably chooses the means which he considers to be most satisfactory for himself. Of course, the amount of knowledge about the situation, as well as his goals, values and attitudes will determine the alternatives considered in making decisions.

Attitudes flow from the value system which is built up from judgments made about past experiences. After similar experiences with the same concept again and again, the individual comes to expect the same results. He perceives those parts of the present experiences that resemble the past in a process called selective perception. This often leads to canalization in which the range of potential actions that are perceived to be satisfactory becomes more and more narrow. Thus, based upon his value system, man sets up hierarchies of goals and means of obtaining these goals. A given stimulus or problem is evaluated within the present ranking within these hierarchies. However, the individual's attitudes and values tempered with his past experience pattern will determine which goals and means are considered in response to the given stimulus.
When the perceived phenomena do not closely resemble past experiences, an individual must attempt new patterns of behavior. This is the creative aspect of personality and results in changes in the behavior patterns of the individual. These new patterns may be forced upon the individual by the physical, social or economic circumstances—loss of a job, for example—or by the personal choice of the individual—education. However, the basic values, goals and attitudes of the individual change very slowly, even under the above circumstances.

When a farm manager faces a decision he goes through the process described above. When he interprets the situation, he brings to bear his value system and the resultant attitudes and all the past experiences he has had in similar circumstances. The experiences which are known through active personal involvement or by other means may be very limited, but these provide the framework out of which the farm manager projects the alternatives which are considered to be available to him.

**Firm Growth Theory**

Our brief review of relevant theory would be incomplete without some reference to current thinking on the theory of firm growth. These ideas are discussed below.
The Penrose theory of firm growth

Penrose defines the firm as an autonomous administrative unit. This definition is in agreement with the definition used in this study.

The entrepreneur plays a key role in Penrose's theory of firm growth. He furnishes services which are described as:

Those contributions to the operations of a firm which relate to the introduction and acceptance on behalf of the firm of new ideas, particularly with respect to products, location, and significant changes in technology, to the acquisition of new managerial personnel, to fundamental changes in the administrative organization of the firm, to the raising of capital and to the making of plans for expansion, including the choice of method of expansion. Entrepreneurial services are contrasted with managerial services, which relate to the execution of entrepreneurial ideas and proposals and to the supervision of existing operations. The same individuals may, and more often than not probably do, provide both types of services to the firm.27

In addition, entrepreneurs possess imagination and vision, fundraising ingenuity, ambition, and judgment. Entrepreneurs lacking these abilities place a severe limit on the growth possibilities of the firm.

One limit to the growth of the firm in any given time period is the "productive opportunity"—the total of all productive possibilities that the entrepreneurs of the firms see and can take advantage of. This limit is subjective since it consists of what the

26 Penrose, op. cit.

27 Ibid., pp. 31-32.
entrepreneurs think or expect that the firm can accomplish rather than on which the firm could actually accomplish. 28

There are additional limits to growth in a specified time period. External limits on factors and products can be eliminated by assuming additional productive resources can be purchased for a price and that profitable investment opportunities in new products or new areas exist somewhere in the economy at existing prices. These are fairly reasonable assumptions for many firms. The remaining limits are all internal. They are managerial ability and attitudes toward uncertainty and risk. 29

The managerial limit may seem to be a contradiction since the firm could purchase additional management resources according to the assumptions above. A firm will not purchase sufficient management services to take advantage of all opportunities because it takes time to integrate these services into the existing administrative organization in the firm. And to call a group of activities which are not integrated into a given organization an expansion of that organization is a contradiction in terms. An administrative group is more than a collection of individuals; it is a collection of individuals who, because they have had experience in working together, can provide services that are uniquely valuable for the operators of the particular firm with which they are associated and thus, new management cannot have had this experience.

28 Ibid.
29 Ibid., pp. 43-64.
Subjective uncertainty and risk can be effective constraints to growth in certain situations. Subjective uncertainty about the future is based on entrepreneurial "temperament" (whether optimistic or pessimistic, hesitant or self-confident, careless or calculating) and the awareness by the entrepreneur that he possess insufficient information about the factors which might be expected to determine the future course of events. Lack of information can be overcome by the addition of more managers with responsibility to provide needed information, and thus serves as a limit to growth only insofar as the integration of new management serves as a limit. (Before this limit is reached it may become either impossible or too expensive to obtain further information.) However, whether or not it takes large amounts or small amounts of information to instill confidence into decisions about the future, the basic entrepreneurial attitude toward risk taking is unchanged.

The direction of a firm's expansion is dependent upon its external and internal inducements and obstacles to expansion. The external inducements include growing demand, changes in technology which calls for production on a larger scale, and similar conditions. External obstacles include keen competition, high costs of entry into

30"Uncertainty" refers to the entrepreneur's confidence in his estimates or expectations; "risk," on the other hand, refers to the possible outcomes of action (including probabilities) specifically to the loss that might be incurred if a given action is taken, Penrose, op. cit., p. 56.
new areas, and difficulties of obtaining raw materials, labor or specialized technical or managerial skill. Internal obstacles arise when some of the important specialized services needed for expansion are not available—particularly managerial capacity and technical skill. The internal inducements to expand arise largely from the existence of a pool of unused productive services, resources, and special knowledge, all of which will always be found within any firm. This pool will always exist because of: the indivisibility of resources, the fact that the same resources can be used differently in different circumstances—changes in knowledge create new uses—and the ordinary process of operation which creates new productive services (e.g. greater managerial skill). 31

The economies of growth are the internal economies available to an individual firm which make expansion profitable in particular directions. These economies can exist in firms of all sizes and are due to the unique set of productive resources available to it. These economies of growth disappear once the firm has become large if they are not also economies of large-scale production and operation. This does not mean that the firm has no competitive advantages in its new operations, but that these advantages do not rest on the fact that the new activities are part of the activities of a large firm. Thus, a large firm may get larger to take advantage of economies of growth but

31 Ibid., pp. 65-87.
at the larger size it may not be able to produce any more efficiently than a smaller firm.  

A General Farm Firm Growth Hypothesis

Static economic theory tells us that the economics of size and technological economies are reasons for expanding firm size. Dynamic theory tells us that growth over time is a function of the amount of the net income which is not consumed in the present time period but is reinvested in the business. The managerial theory of the firm and the theoretical construct of a farm manager suggest the importance of an understanding of sociological and social psychological theory. These areas of theory tell us that personality factors such as goals and attitudes will indirectly influence farm firm growth. The theory of the growth of the firm suggests that the entrepreneurial characteristics of the manager, his competence as a manager, and his attitude toward risk will influence the growth of the firm.

From the knowledge that farming is changing and will continue to become more business orientated and require further technological innovations, and the recognized fact that the adoption of changes require a considerable capital investment, it is logical to hypothesize that attitudes toward credit use, innovation and the business orientation of the operator will influence farm firm growth. And finally, the review of other research and literature on farm firm growth

\[^{32}\text{Ibid.}, \text{pp. 88-103.}\]
implies that resource acquisition strategies, age, production efficiency, specialization and the availability of additional resources may influence the amount of growth.

The general purpose of this study is to investigate farm firm growth and the effects of the farm operators personal abilities, attitudes, goals and strategies upon growth. The research hypothesis also recognizes that several other factors may affect the realized rates of growth. In summary, the research hypothesis for this study is that farm firm growth (measured as the change in constant dollar value of total assets controlled or as the change in constant dollar value of total assets owned, over the five-year period, 1962 to 1967) is a function of:

1. Operator age and education;
2. Operator attitudes toward credit use, risk acceptance, innovations and business orientation;
3. Operator management ability;
4. The relative importance of a growth goal;
5. Production efficiency: corn yield per acre and pigs per litter;
6. Firm size in 1962: total assets controlled and total assets owned;
7. Availability of additional production resources;
8. Degree of livestock specialization;
9. Capital available for farm operation and reinvestment: this
depends upon farm income, borrowed money, number of children, family
consumption expenditures and emergency expenditures; and

10. Growth strategies used in resource acquisition.

The components of this generalized hypothesis can be classified
into four basic subsections. The first subpart, including the first
four components listed above, are concerned with the personal char­
acteristics of the farm operator. The second subsection, including
the next five components, are concerned with the situational or non­
personal aspects of the firm setting. The third subsection, component
10 above, is the growth strategies used in resource acquisition. The
fourth part consists of the measures of growth. It will be helpful
to the reader to keep these four classifications in mind as he pro­
gresses through the remainder of this dissertation.
CHAPTER IV

EXPERIMENTAL DESIGN AND STATISTICAL METHODOLOGY

In the behavioral sciences the verification of hypotheses normally necessitates the collection of observations. The design of the experiment is essentially the pattern of the observations to be collected. These observations are then subjected to appropriate statistical tests to determine whether the hypotheses can be accepted or rejected based upon the observations. The purpose of this chapter is to discuss the experimental design of this study, including the sampling procedure and the questionnaire used, and the statistical procedures used to test the general hypothesis of farm firm growth developed in Chapter III.

Sampling Procedure

Sample operator criteria

The observations used in testing the growth hypothesis were enumerated from a sample of randomly selected farmers from a population of farm operators with certain specific characteristics. All accepted respondents satisfied the following criteria: (1) the respondent was between 30 and 50 years of age; (2) the respondent had been a commercial farmer with annual gross sales in excess of $10,000 for at least the five years prior to enumeration; (3) at least 50 per cent of
the respondent's gross sales were from the sale of grain and hogs; (4) the respondent, his wife, and his children under 16 earned less than $4,000 in any year from off-farm sources; and (5) the respondent was the manager of the farm firm.

These criteria were developed to reduce sample variance because of the influence of variables not contributing to growth. The age restriction was used because previous research suggested that most farm firm growth occurs during the operator's middle age years. The gross income restriction was made because small farm operators, as a group, do not generate sufficient income to enable them to effect much firm growth. The restriction regarding production enterprises was made to reduce the variance in firm growth because of differences in major enterprises. The restriction on off-farm income was made to eliminate part-time farmers and to reduce variance in growth because of farm investment or farm use of nonfarm generated capital. Because of the inclusion of attitude, goal and management ability in the growth hypothesis and the definition of a firm used in this study the sample was restricted to farm firms with one manager—partnerships and other more complex management organizations were eliminated by this restriction.

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The sample

To reduce sample variance because of differences in soil type, topography, and rainfall, five contiguous counties (Fayette, Pickaway, Clinton, Highland and Greene) in the hog-cash grain production areas of Ohio were selected.

The sample size for each county was determined by multiplying the desired sample size (62) by the relative proportion that the qualifying operators in that county were to the five county total of qualifying operators. The number of qualifying operators was estimated from 1965 Agricultural Census data using the sample operator criteria listed above.

The first stage in the two stage sampling design was a simple random drawing of townships within each county. The number of townships drawn depended upon the sample size needed for the county and the estimated percentage that qualifying operators were to the total number of operators in the county. Two or three townships were drawn in each county.

The second stage was the random ordering of the qualified operators in the selected townships within each county. The qualified operators were determined by asking a panel of agriculturally-orientated people in each county to review the list of the operators in each township and indicate which operators would qualify for the sample according to the sample criteria. This panel included, where available, the county ASCS office manager (and staff), the county extension

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This list was made from Agricultural Conservation and Stabilization Service (ASCS) address plates.
agent, the Farmers Home Administration office manager, the Production Credit Association office manager, the Federal Land Bank agent, local elevator operators, local bankers, and other agriculturally related people. The qualified operators were contacted according to a random order until the sample size needed for the particular county was fulfilled.

Enumeration

Enumeration was conducted in late August and September, 1967 by the author and three other agricultural economics graduate students. Data were collected from 62 farmers. Some of these operators did not give sufficiently complete information so that certain critical values could be determined. Thus, much of this study is based on an analysis of 49 or 44 firms depending upon which particular sub-grouping of the 62 operators is being analyzed. Investigation of the data of the 49 and 44 complete questionnaires revealed that they constituted an adequately sized sample for the actual existing variance.

The Questionnaire

The questionnaire used to collect the data for this study was constructed in four parts: (A) background information and goals, (B) growth of the farm business during the periods 1962 to 1967, (C) questions used in measuring management, and (D) statements used in measuring attitudes. (See questionnaire in Appendix D.)
This particular structure and ordering of parts was used to facilitate the flow of the interview. The background questions were easy to answer and allowed the respondent to "warm up." It was desirable that the goal questions be asked early in the interview to reduce the chance of response bias if the purpose of the study became obvious to the respondent during later questioning. The attitude statements were self-administered by the respondent at the conclusion of the interview and during this period the schedule was checked by the interviewer for completeness.

The structure of the questionnaire related to the subparts of the growth hypothesis in the following manner. Part A consisted of both personal and nonpersonal questions. Part B included measurement of growth or size questions, growth strategy questions, and nonpersonal questions. Parts C and D involved personal questions only.

After the questionnaire was pretested on seven farmers in Madison County in June, 1967, some changes were made in the wording of specific questions and the general organization. The redesigned questionnaire was used in the interviewing of the sample farmers in August and September, 1967.

Part A: Background Information and Goals

The purpose of this part was to obtain background information and a ranking of a growth goal relative to four other goals. The background information included the operator's age; education; years of 4-H; vocational agriculture and young farmer class experience; number,
ages, and sexes of his children; and the year the operator began farming.

A paired comparison forced choice format (each goal paired with every other goal resulting in ten pairs) was used to determine the ranking of the growth goal. The interviewee was asked to respond to each pair of goals by indicating which goal of the pair he tried to achieve most during the five years prior to interviewing. The reader is referred to the following chapter for a detailed discussion of the ranking procedure.

Only five goals were paired and used in the questionnaire in order to reduce the possibility of respondent fatigue and resulting response bias. Even so, some operators experienced difficulty in remembering how they had responded to an earlier pair of goals when they reached pair nine or ten.

Four of the five goals used were composite of several specific goals identified in previous empirical studies. The fifth goal was a statement of a growth objective. The five goal statements were:

1. Enlarge the farming operation by adding more land, more capital, more labor, more livestock, or combinations of them.

2. Increase the production efficiency of present land equipment, livestock, and labor by increasing yields per acre or per animal.

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3. Become or remain active in community activities: church, Farm Bureau, Grange, fair board, school board, and others.

4. Increase the allowance for family consumption to allow for higher levels of family living, i.e. new car, color T.V., washer and dryer, family vacation, college education for the children, etc.

5. Become or maintain your position as a well-known farmer in the community: one who gets his work done early, tries new ideas readily, has high yielding crops or livestock or the newest or biggest machinery.


This section was designed to enumerate the basic data used in measuring the growth occurring during the study period. Information on values of building and machinery investment, acres owned, acres rented, value of labor hired and months of family labor used, value of other assets and other liabilities, number of livestock, and units of grain, hay, and supplies on hand were collected for both 1962 and 1967. All values were as of the January 1 inventory, except labor which was the total available for the year and acres which were those operated during the year.

Additional information on growth included: An investigation of the major expansion decisions of the period—when and why made and how financed to isolate growth strategies, information on problems, limits to growth, availability of additional resources, reasons for expansion, short-run strategies, and future plans.
Part C: Questions Used in Management Measurement

The section on management questions was designed to explore and measure attributes of, or influences on, the operator's management ability. Questions on risk-taking, influence of family and community on decisions, analytical ability, general farm knowledge, decision making, use of farm records, and problem recognition were included.

Part D: Attitude Statements

This section of the questionnaire consisted of forty statements which were designed to measure four attitudes. The statements were presented randomly to reduce response bias. The number of statements in each attitude scale and the attitudes being studied were:

1. Credit use ......................... 4 statements
2. Risk acceptance .................... 7 statements
3. Innovation .............................. 11 statements
4. Business orientation .......... 18 statements

The credit use scale was designed to measure a farm operator's attitude toward the use of credit in his farming operation. The risk acceptance scale measured the operator's feelings toward decision making when the future outcome is not known. The innovation scale was designed to measure a farmer's attitude toward new ideas relating to agricultural production. The business orientation scale was designed to measure the commitment of the farmer to a business approach to farming. This last scale can also be interpreted as a pseudo-management scale if one assumes that the better manager is more business orientated.
The above scales measure attitudes which can help or hinder farm firm growth. In a situation when technological economies indicate expansion is profitable, an operator with a negative attitude toward credit use, risk acceptance, new ideas, or business techniques would not be as likely to cause a firm to grow as one possessing a positive attitude toward these concepts.

**Statistical Procedures**

**Group comparison**

One of the objectives of this study was to isolate factors associated with farm firm growth. One procedure used to accomplish this objective was the identification of variables which had statistically significant differences between the group means when the observations were grouped according to the amount of growth during the study period.

The statistic computed to test for significance of the difference of the means was the following:

\[
t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}
\]

where: \( \bar{X}_1 \) = the mean of a specific variable for group one,

\( \bar{X}_2 \) = the mean of the same variable for group two,

---

Further details on the statistical tests described in this section can be found in all standard statistical textbooks.
\[ S_1^2 = \text{variance of the specific variable for group one,} \]

\[ S_2^2 = \text{variance for the same variable for group two,} \]

and \( N_1 \) and \( N_2 \) = size of group one and group two, respectively.

A two-tailed test was used since it was not known prior to analysis whether a particular variable mean for one group would be greater than or less than the mean of that variable for the other group.

The "t" statistic was computed when comparing the group means for all variables with a normal distribution. However, some of the data consisted of discrete variables, that is, having qualitative rather than quantitative characteristics. For these variables the two groups were compared using the following statistic:

\[
\left(\frac{\Sigma_1 - \left(\frac{\Sigma_1 + \Sigma_2}{N_1 + N_2}\right) N_1}{\frac{\Sigma_1 + \Sigma_2}{N_1 + N_2} N_1}\right)^2 + \left(\frac{\Sigma_2 - \left(\frac{\Sigma_1 + \Sigma_2}{N_1 + N_2}\right) N_2}{\frac{\Sigma_1 + \Sigma_2}{N_1 + N_2} N_2}\right)^2
\]

where: \( \Sigma_1 \) = the number of observations with the characteristic in group one,

\( \Sigma_2 \) = the number of observations with the characteristic in group two,

\( N_1 \) = total number of observations in group one, and

\( N_2 \) = total number of observations in group two.

**Regression analysis**

Another of the objectives of this study was to quantify the relationship between the variables hypothesized to effect growth and the measure of growth itself. The least squares regression technique was used to determine this relationship. In using this procedure one
assumes that the effects of the independent variables upon the dependent variables are additive. The Ohio State University computer regression program, MR-90, was used to compute:

\[
Y = b_0 + b_1 X_1 + \ldots + b_m X_m + d_{1}D_1 + \ldots + d_iD_i + u
\]

where: \( b_0 \) = the Y intercept value,
\( b_i \) = the estimated regression slope for variable \( X_i \),
\( d_i \) = the deviation in \( Y \) because of dummy variable \( D_i \) (see Chapter V for further discussion), and
\( u \) = the error term which is assumed to have a zero mean and constant variance throughout the range of the data.

The \( b \)'s were tested for significance by computing the "t" statistic:

\[
t = \frac{b - \theta}{S_b}
\]

where: \( b \) = the estimate of the regression coefficient, and
\( S_b \) = the estimated standard error of \( b \).

This statistic assumed that the expected value of \( b \) was zero and the test was whether \( b \) was significantly different than zero. Again, a two-tailed "t" test was used.

Coefficients of multiple determination \( R^2 \)'s were computed for the regressions equations. The \( R^2 \)'s were tested for significance by computing:

\[
F = \frac{R^2}{1 - R^2} \times \frac{M - I - 1}{I}
\]
where: \( R^2 \) = the percentage of explained variance of \( Y \)

\[
\frac{\text{Sums of squares of regression}}{\text{Total sums of squares of } Y},
\]

\( 1-R^2 \) = the percentage of unexplained variance of \( Y \),

\( M \) = the total number of observations, and

\( I \) = the number of independent variables.

Several a priori restrictions were specified in the analysis. That is, the coefficients of several of the variables (particularly dummy variables\(^5\)) were restricted to equal zero so that their contribution to total \( R^2 \) could be determined. This contribution was tested for significance by computing:

\[
F = \frac{R_T^2 - R_D^2}{1-R_T^2} \frac{\text{df}_D}{\text{df}_T}
\]

where: \( R_T^2 \) = coefficient of multiple determination of the total model,

\( R_D^2 \) = coefficient of multiple determination of the model with a priori restrictions,

\( \text{df}_D \) = number of coefficients restricted to zero,

\( 1-R_T^2 \) = unexplained variance of the total model, and

\( \text{df}_T \) = degrees of freedom of the total model.

\(^5\) See the section on dummy variables in Chapter V for further explanation.
The significance levels used

The analysis conducted in this study involved areas which had not previously been extensively researched. Therefore, in order to reduce the possibility of eliminating relevant or important variables at this stage of the study of these areas, greater probability levels were used. Most of the null hypotheses were designated "significant" at the .10 level of probability. In the tests of the regression coefficients the .15 level of probability was used as the "significance" level. The probability level of all the significant values are clearly indicated.
The farm firm growth hypothesis developed in Chapter III had four main subparts: personal variables, nonpersonal variables, growth strategy variables and measures of growth. Each of these subparts was expanded by developing questions which would elicit measurable responses. In total these four main subparts were developed into a considerable number of variables.

Some of these variables were measured using methodologies which may be unfamiliar to the reader. The purposes of this chapter are to discuss these methodologies—dummy variables and psychological scaling—and the measurement of specific variables used in this study.

**Dummy Variables**

A "dummy" variable is a method of scaling nominal data (that is, data that can be divided into classes) so that these data can be used in regression analysis. The term "dummy" variable as used in this study refers to zero-one variables. A particular observation is coded "1" for the dummy variable representing the class into which it falls and "0" for dummy variables representing all other classes. Each observation can be coded "1" for only one dummy variable. This could give the following pattern for a four category classification where $D_1$
refers to the dummy variable representing a specific class:

<table>
<thead>
<tr>
<th>Observation number</th>
<th>D_1</th>
<th>D_2</th>
<th>D_3</th>
<th>D_4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

However, the above pattern results in an indeterminate solution because of the perfect intercorrelation between the independent variables. Therefore, one of the dummy variables is eliminated from the regression model to remove this perfect intercorrelation.¹ The b_0 estimated for the resulting equation represents the intercept for the class removed from the regression model. The other b_i's associated with zero-one variables indicate the deviations of the other class intercepts from this base. If there is more than one set of dummy variables included in the regression model, the b_0 then represents the intercept for the classes removed from the model. The remaining b_i's are interpreted as before.

"Dummy" variables can be used in regression analysis when two conditions are met: (1) the original observations can be divided with logic into mutually exclusive classes or groups, and (2) the effects of the class difference is to change the level of the regression equation without changing the slope coefficients.² In the situations


²Ibid., p. 814.
where "dummy" variables are used in this study the observations can be divided into mutually exclusive classes—the operator either did or did not use a specific strategy or combination of strategies or he answered either yes or no to a particular question. Additionally, the assumption of parallel regression equations separated by a value equal to the coefficient of the dummy variable is accepted. This latter statement means that in this study the regression coefficient of a dummy variable can be interpreted as the amount that the regression equation is shifted by the category of response scaled as one.

Using a dummy variable in a regression model which also includes continuous variables is in reality convariance analysis. The regression coefficient of the dummy variable is the difference between the regression slopes at a common value for the continuous variables.

Psychological Scaling

The personal variable subpart of the growth hypothesis developed in Chapter III included the component part "personal attitudes." The methodologies of measuring attitudes have been developed extensively by the social psychologists. This section discusses this methodology and its interpretation.

In its present state of development attitude scaling does not measure attitudes directly but from an individual's response or reaction to a statement involving a value judgement. The underlying assumption is that the direction of the response provides some insight concerning the individual's attitudes in a relative sense. That is to say, one individual's relative ranking can be determined when his
response is compared to the responses made by other individuals to the same statement or statements. Even an individual scoring highest on a particular scale may have values which have a higher ranking in his own preference scale than the value inferred from his responses to the scale item. For this reason the relative value an individual may place on a particular dimension is evaluated primarily in relation to other individuals responding to the same measure and not in relation to other values the individual may hold.³

Methods of scaling

There is a substantial amount of literature available on the methods of attitude measurement. Ferguson⁴ discusses the two basic methods of measurement: (1) Thurstone's method of equal-appearing intervals and its several modifications, and (2) Likert's method of summated ratings. These two methods are opposite approaches to the problem of scaling test items. In Thurstone's method the scaling of the test items takes place prior to the collection of attitude data. While in Likert's method the scaling takes place after the collection of attitude data.


The basic premises of the Thurstone method are that a series of statements can serve as markers in a continuum of the attitude; that each of these statements represent a certain degree of acceptance or rejection of the attitude; and that these specified degrees of acceptance or rejection will be equally spaced throughout the entire range of the attitude continuum. Thus, if a person indicates which statement he accepts and which he rejects, we can locate him on the continuum. The problems are to select an appropriate series of statements and to determine their positions in the attitude continuum. These problems are solved by collecting a list of statements relating to the attitude and having "judges" place these statements in a series of equidistant intervals from complete agreement to complete disagreement. The judges' placings are then evaluated and a mean or median rating for each item determined. Using appropriate techniques the irrelevant and ambiguous statements are eliminated and the final scale is developed.5

As an example of the use of an attitude scale developed by the Thurstone technique consider the following statements and their scale values determined by judges' ratings:

<table>
<thead>
<tr>
<th>Scale Value</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.0</td>
<td>1. I think the church is a parasite on society.</td>
</tr>
<tr>
<td>10.7</td>
<td>2. I think the organized church is an enemy of science and truth.</td>
</tr>
<tr>
<td>10.4</td>
<td>3. The church represents shallowness, hypocrisy, and prejudice.</td>
</tr>
</tbody>
</table>

5Ibid., p. 83.
This is part of a scale to measure personal attitude toward the church.\textsuperscript{6} A person who would agree with statement number 3 but not numbers 2 or 1 would be scored at 10.4 and considered to be less unfavorable toward the church than a person agreeing to all three statements. This latter person would be scored 11.0. In actual use there would be statements to cover the entire range of the scale continuum; the above statements only show one portion of the scale.

The basic assumptions of the Likert method are that each statement in the scale covers the entire attitude continuum; that specific points on this scale can be indicated by alternative responses to each statement; that the points to be represented by the alternative responses can be determined by knowing the percentage of subjects who give each of those responses; and that an individual's attitude can be determined from a summation of his response to all statements in the scale. This final scale score is an average estimate which we get from using a number of different yardsticks (the different statements), each one of which extends the whole length of the attitude continuum.\textsuperscript{7}

The same statements discussed in the example of the Thurstone technique can be used to develop a Likert scale. In the Likert scale these same statements would be presented to the respondent in the following format:

1. I think the church is a parasite society. SA A U D SD
2. I think the organized church is an enemy of science and truth. SA A U D SD

\textsuperscript{6}Ibid., p. 94.
\textsuperscript{7}Ibid., pp. 123-24.
3. The church represents shallowness, hypocrisy and prejudice. SA A U D SD

The SA represents strongly agree and could be scored 5 or 1 depending upon which direction of the attitude was being emphasized. To be consistent with the Thurstone score results, SA would be scored 5. The A represents agree and would be scored 4; the U represents undecided, scored 3; the D represents disagree, scored 2; and SD represents strongly disagree, scored 1. Our hypothetical person scoring 10.4 on the Thurstone scale might respond to the statements in the Likert format as follows: 1-SA, 2-A, 3-D. This would give a total score of 11. The person agreeing to all three statements in the Thurstone format might respond with SA to all three in the Likert format and receive a total score of 15. In the development and use of a Likert scale both positive and negative statements about the attitude are normally used.

In the present study both the Thurstone and Likert techniques were used. The Thurstone technique was used in the preliminary development of the business orientation scale. Final measurement of the four attitudes considered in this study was by the Likert technique.

Scale evaluation

After a researcher has developed a scale he needs some method of determining whether the scale is any good—will it consistently measure the attitude which he was attempting to measure. A scale is considered "good" if it is internally consistent, reliable and valid. Internal consistency is the degree to which items in a scale are interrelated—do they all measure the same thing? A scale is
reliable when it will produce the same results when applied to the same sample at two different times. Validity is the most critical aspect of scale evaluation and probably the most difficult to determine; a scale is said to be valid if it measures what it professes to measure. The purpose of this particular section is to discuss the methods to test the internal consistency, reliability and validity of the scales used in this study.

The Sletto Technique as a test of internal consistency

The first step in using this technique is to obtain the total scale score for each respondent by totaling the scores on each scale statement. Since the Likert scaling method was used in this study the maximum scale score for any individual is five times the number of scale items and the minimum score is equal to the number of items.

The second step is to rank the total scale scores.

The third step is to segregate an equal number of total scores at each extreme of the array developed in step two. The extreme quartiles of the total array were used in this study. Therefore, if there were 32 respondents we are now considering the high scoring eight and the low scoring eight.

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8James Lee Bemiller, "Development of a Scale to Measure the Rationality Element of Farm Management Ability" (unpublished Master's thesis, Department of Agricultural Economics and Rural Sociology, The Ohio State University), pp. 49-56.

9Raymond Franklin Sletto, Construction of Personality Scales by the Criterion of Internal Consistency (Hanover: Sociological Press, 1937).
The fourth step is to calculate the mean score on each item for these two extreme groups (eight in each group in the above example). The difference in these two means is called the "scale value difference" (SVD). For example, if the high scoring eight respondents had a mean score on item A of 4.2 and the low scoring eight respondents had a mean score on item A of 2.0, the SVD would be 2.2. A group comparison "t" test comparing the means of each item for the two extreme groups (4.2 and 2.0 in the above example) is called the "critical ratio."

The fifth step is to compute for each item of the scale a "maximum potential scale value difference" (MPSVD). The MPSVD is computed in the same manner as the SVD except that the extreme groups are segregated from an array based upon the responses to each item. Consider the following hypothetical example of the responses to a statement as an illustration of the calculation of the MPSVD.

<table>
<thead>
<tr>
<th>Response</th>
<th>Weight</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

The eight highest scoring respondents to this statement had a mean score of 4.5 \( \frac{4 \times 5 + 4 \times 4}{8} \). The eight lowest scoring respondents had a mean score of 1.0. Consequently the MPSVD for this statement is 3.5 \( 4.5 - 1.0 \).
The final step is to compute the scale value difference ratio (SVDR) which is the ratio of the SVD (2.2 in the example) to the MPSVD (3.5 in the example). For the example the SVDR is .629.

The values we have just computed require interpretation. The MPSVD informs the investigator how subtle an item is. A low MPSVD indicates a subtle item—an item which will differentiate those individuals which do not hold strong feelings about the attitude under study. A high MPSVD indicates a "broad ax" item. That is, an item which places individuals at one end or the other on the attitude continuum. A scale should include both types of items. The MPSVD is a measure of power. That is, it informs the investigator of the maximum potential each item possesses for discriminating between individuals.\(^1\)

The SVD informs the investigator as to how much the item actually does discriminate. Therefore, when the SVD is divided by the MPSVD the resultant SVDR may be considered as a measure of efficiency. That is to say, the SVDR is an indication of the amount of the MPSVD that the individual item delivers when used in combination with the other scale items. The higher the SVDR, the more efficient the item is. Normally, a scale should include items with a range of SVDR's.\(^1\)

When the investigator has computed these values for each item he is then ready to evaluate his scale for internal consistency. He desires to retain in his scale those items which have a high critical

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\(^{11}\) Ibid.
ratio and a high SVDR. In addition, he desires to include items which have a range of MPSVD's. The items which fail to satisfy these requirements are considered to be internally inconsistent and are removed from the scale.

The split half method as a test of reliability

The ideal method of testing for reliability is to compare the scale scores of the same individuals at two points in time. However, since this is normally impractical to do, the split half test is normally used. This test consists of the correlation of the group of odd-numbered scale items with the group of even-numbered scale items.

Because the scale is divided in half to make the correlation the Spearman-Brown Prophecy Formula is employed to correct the correlation. This corrected coefficient is an estimate of the actual correlation that would have been obtained if the scale had not been reduced by half. As with all correlation coefficients a 1.0 is perfect and the closer the correlation coefficient is to 1.0 the more reliable the scale.

Tests of validity

The most frequent method of establishing validity is to relate the individual scale scores to another set of scale scores for the

same individuals. This second scale should measure the same or nearly
the same dimension. Another method is to compare known criterion
groups as to their score on the variable. For example, a group of
prisoners would be expected to have a less positive attitude toward
laws than a group of lawyers. Confirmation of this expectation as
measured by an attitude scale would constitute a test of validity for
the scale. The method of criterion groups was employed in testing for
validity in this study.

The enumerators were asked to rank the respondents they inter­
viewed on the basis of management ability. Since there were four
enumerators there were four rankings of respondents. The validation
tests were performed on these four rankings.

Only the business orientation attitude scale and the management
scale were tested for validity in this study. The other scales were
validated in the studies in which they were developed. The business
orientation scale can be considered a pseudo-management scale if one
assumes that the business-minded farmer is also a good manager. This
assumption was made. Thus, the enumerator rankings of management
ability can be used to validate the management and business orien­
tation scales. Two test statistics were computed: (1) a group com­
parison "t" and (2) Spearman's coefficient of rank correlation.13

The management scale scores and the business orientation scale scores

13 Robert G. D. Steel and James H. Torrie, Principles and Proce­
of the top half of respondents, as ranked by the enumerators, were compared with the corresponding scores of the bottom half of the respondents to complete the "t's." The Spearman statistic was computed by correlating the respondent rank order as determined by the enumerators with the respondent rank order as determined by the management scores and the business orientation scores.

**Measurement of Specific Variables**

**Measurement of change in size**

(EMR growth)

In Chapter II size was defined as: (1) the sum of the constant dollar value of all the means of production controlled, and (2) the sum of the constant dollar value of all means of production owned (net worth). The means of production included in these summations were land, buildings, machinery and equipment, labor, other assets (basically cash or fairly liquid assets) feed, supplies and livestock. These included owned as well as leased or rented items or owned resources only depending upon which measure of size was being computed. The number of units of these resources were ascertained for January 1, 1962 and January 1, 1967, except for labor which was the annual amount used during 1962 and 1967, and land, which was the acreage operated in these years.

Two methods were used to derive constant dollar values of the various means of production depending upon the measurement unit of the resource. For those factors which could be counted and which use standardized measurement units (grain, hay, land) the number of units
were ascertained from the respondent for both dates and the same value applied to the units controlled at those times. The values used for these items are shown in Table 2. For items such as machinery and equipment, value of other assets, and building investments, the operator was asked to estimate the dollar value on each of the two dates. The 1967 value was then deflated to 1962 dollars by the use of the U. S. Index of Wholesale Prices.

The change in the constant dollar value of resources controlled was determined by subtracting the 1962 sum of all resources controlled (in constant dollars) from the 1967 sum of all resources controlled (in constant dollars).

The change in the constant dollar value of net worth was determined by subtracting the 1962 net worth (in constant dollars) from the 1967 net worth (in constant dollars). Net worth in either year was computed by subtracting operator liabilities (deflated to 1962 dollars) from the sum of owned resources (in 1962 dollars).

**Measurements of attitudes**

Four attitudes were measured by the scales used in this study: (1) credit use, (2) risk acceptance, (3) innovation, and (4) business orientation. These four scales were evaluated for internal consistency and reliability and the business orientation scale was validated. The purpose of this section is to discuss the source of the scales and the results of their evaluation.
TABLE 2
VALUES USED TO CONVERT TECHNICAL UNITS TO DOLLARS,
SAMPLE FARMS, 1962 AND 1967

<table>
<thead>
<tr>
<th>Item</th>
<th>Measurement Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>Bushel</td>
<td>$ .95</td>
</tr>
<tr>
<td>Oats</td>
<td>Bushel</td>
<td>.70</td>
</tr>
<tr>
<td>Soybeans</td>
<td>Bushel</td>
<td>2.32</td>
</tr>
<tr>
<td>Wheat</td>
<td>Bushel</td>
<td>1.88</td>
</tr>
<tr>
<td>Clover seed</td>
<td>Bushel</td>
<td>27.50</td>
</tr>
<tr>
<td>Timothy seed</td>
<td>Bushel</td>
<td>7.50</td>
</tr>
<tr>
<td>Barley</td>
<td>Bushel</td>
<td>.90</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>Ton</td>
<td>24.00</td>
</tr>
<tr>
<td>Clover hay</td>
<td>Ton</td>
<td>22.50</td>
</tr>
<tr>
<td>Mixed hay</td>
<td>Ton</td>
<td>21.00</td>
</tr>
<tr>
<td>Corn silage</td>
<td>Ton</td>
<td>8.00</td>
</tr>
<tr>
<td>Grass silage</td>
<td>Ton</td>
<td>6.00</td>
</tr>
<tr>
<td>Straw</td>
<td>Ton</td>
<td>15.00</td>
</tr>
<tr>
<td>Sow</td>
<td>Head, 400# +</td>
<td>60.00</td>
</tr>
<tr>
<td>Gilt</td>
<td>Head, 250# +</td>
<td>45.00</td>
</tr>
<tr>
<td>Boar</td>
<td>Head</td>
<td>65.00</td>
</tr>
<tr>
<td>Pig</td>
<td>Head, 180# +</td>
<td>35.00</td>
</tr>
<tr>
<td>Pig</td>
<td>Head, 120# - 179#</td>
<td>27.00</td>
</tr>
<tr>
<td>Pig</td>
<td>Head, 80# - 119#</td>
<td>20.00</td>
</tr>
<tr>
<td>Pig</td>
<td>Head, 40# - 79#</td>
<td>12.00</td>
</tr>
<tr>
<td>Beef cow</td>
<td>Head</td>
<td>200.00</td>
</tr>
<tr>
<td>Beef heifer</td>
<td>Head</td>
<td>175.00</td>
</tr>
<tr>
<td>Bull</td>
<td>Head</td>
<td>250.00</td>
</tr>
<tr>
<td>Feeder</td>
<td>Head, 900# +</td>
<td>200.00</td>
</tr>
<tr>
<td>Feeder</td>
<td>Head, 650# - 899#</td>
<td>175.00</td>
</tr>
<tr>
<td>Feeder</td>
<td>Head, 400# - 649#</td>
<td>110.00</td>
</tr>
<tr>
<td>Feeder</td>
<td>Head, under 400#</td>
<td>75.00</td>
</tr>
<tr>
<td>Dairy cow</td>
<td>Head</td>
<td>210.00</td>
</tr>
<tr>
<td>Dairy heifer</td>
<td>Head</td>
<td>150.00</td>
</tr>
<tr>
<td>Dairy calf</td>
<td>Head</td>
<td>50.00</td>
</tr>
<tr>
<td>Item</td>
<td>Measurement</td>
<td>Unit</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>Ewe</td>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>Yearling ewe</td>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>Ram</td>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>Lamb</td>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>Layer</td>
<td>Hen</td>
<td></td>
</tr>
<tr>
<td>Rented land</td>
<td>Acres</td>
<td></td>
</tr>
<tr>
<td>Owned land</td>
<td>Acres</td>
<td></td>
</tr>
<tr>
<td>Unpaid operator labor</td>
<td>Month</td>
<td></td>
</tr>
<tr>
<td>Unpaid family labor</td>
<td>Month</td>
<td></td>
</tr>
<tr>
<td>Hired labor</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Owned buildings</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Leased buildings</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Owned machinery and</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leased machinery and</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other assets</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Debt on land, buildings or machinery and equipment</td>
<td>Dollar</td>
<td>b</td>
</tr>
<tr>
<td>Other liabilities</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Leased livestock</td>
<td>Dollar</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous supplies</td>
<td>Dollar</td>
<td></td>
</tr>
</tbody>
</table>

^aValue for 1962 as supplied by respondent.

^bDeflated to 1962 dollars by the use of the Index of Wholesale Prices.
The credit use scale

The credit use attitude scale was developed in a study by Hessor and Janssen\(^\text{14}\) (see Appendix A). The purpose of this scale was to enable the researcher to obtain a relative value for each farmer concerning their attitude toward the use of credit. Hessor and Janssen subjected their statements to scalogram analysis (another scaling technique used extensively by Guttman) and they were accepted as a valid scale. On the basis of the results of the evaluation of the scale for internal consistency and reliability (results shown in Table 3), the total of each respondent's score on statements 1, 2, and 4 was used as his credit use attitude score. The estimate of scale reliability was \(.628\).

A simple correlation of the credit use scale and the 1967 actual debt was run as a validation test of the credit use scale. The correlation coefficient of \(+.231\) was significant at the \(.11\) level of probability.

The risk acceptance scale

The risk acceptance scale was adapted from a previous study at The Ohio State University\(^\text{15}\) (see Appendix A). The purpose of this scale was to obtain a value which represented a respondent's relative

\(^{14}\) Leon F. Hessor and Melvin R. Janssen, *Capital Rationing Among Farmers*, Agricultural Experiment Station Bulletin 703, Purdue University (Lafayette: Agricultural Experiment Station, 1960).

\(^{15}\) Willard T. Rushton and E. T. Shaudys, "The Goal Orientation of Farm Operators and Its Relationship to Farm Management Analysis" (unpublished manuscript, Department of Agricultural Economics and Rural Sociology, The Ohio State University).
### TABLE 3

**ITEM ANALYSIS DATA DETERMINED BY THE INTERNAL CONSISTENCY METHOD FOR THE CREDIT USE SCALE**

<table>
<thead>
<tr>
<th>Item</th>
<th>SVD</th>
<th>MPSVD</th>
<th>SVDR</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.97</td>
<td>1.23</td>
<td>.789</td>
<td>4.27</td>
</tr>
<tr>
<td>2</td>
<td>1.36</td>
<td>1.57</td>
<td>.866</td>
<td>6.45</td>
</tr>
<tr>
<td>3(^b)</td>
<td>-.06</td>
<td>.53</td>
<td>.113</td>
<td>.36</td>
</tr>
<tr>
<td>4</td>
<td>1.10</td>
<td>1.10</td>
<td>1.000</td>
<td>5.64</td>
</tr>
</tbody>
</table>

\(^a\)The split half correlation of this scale was +.238 which when corrected by the Spearman-Brown prophecy formula gave an estimate of reliability of the scale of +.384.

\(^b\)The removal of this item from the scale changed the split half correlation to +.458 and the Spearman-Brown prophecy estimate of reliability to +.628. The final scale consisted of the remaining three items.
risk acceptance attitude. The evaluation of this scale for internal consistency and reliability (Table 4) resulted in statements 1 through 5 and 7 being used as the risk acceptance attitude score. The estimate of reliability of this scale was .420.

The innovation scale

The innovation scale was developed in the same study as the risk acceptance scale (see scale statements in Appendix A). The purpose of this scale was to measure a farm operator's relative willingness to accept new ideas. This is important if changes are to be made in the farm organization. There is evidence of the scale's validity in the as yet unpublished study from which it was taken. The evaluation of the scale for internal consistency and reliability (Table 5) resulted in eight of the eleven statements being included in the final scale. This scale had a reliability estimate of .782.

The business orientation scale

A review of research uncovered no scale which would measure the attitude of the farmer toward farming as a business. Consequently, the author constructed a scale to measure this attitude. The initial step in the development of the business orientation scale consisted of preparing a relatively large number of statements which might be made either in a positive or negative sense by an individual holding an opinion of farming as a business. These statements could also be

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16 Ibid.
TABLE 4
ITEM ANALYSIS DATA DETERMINED BY THE INTERNAL CONSISTENCY METHOD FOR THE RISK ACCEPTANCE SCALE

<table>
<thead>
<tr>
<th>Item</th>
<th>SVD</th>
<th>MPSVD</th>
<th>SVDR</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td>1.73</td>
<td>.578</td>
<td>3.86</td>
</tr>
<tr>
<td>2</td>
<td>.54</td>
<td>1.40</td>
<td>.386</td>
<td>2.38</td>
</tr>
<tr>
<td>3</td>
<td>.54</td>
<td>1.20</td>
<td>.450</td>
<td>2.20</td>
</tr>
<tr>
<td>4</td>
<td>.57</td>
<td>.77</td>
<td>.740</td>
<td>3.45</td>
</tr>
<tr>
<td>5</td>
<td>.40</td>
<td>.67</td>
<td>.597</td>
<td>2.15</td>
</tr>
<tr>
<td>6b</td>
<td>.26</td>
<td>1.00</td>
<td>.260</td>
<td>1.20</td>
</tr>
<tr>
<td>7</td>
<td>1.10</td>
<td>1.63</td>
<td>.675</td>
<td>5.56</td>
</tr>
</tbody>
</table>

a The split half correlation of this scale was +.259 which when corrected by the Spearman-Brown prophecy formula gave an estimate of reliability of +.411.

b The removal of this item from the scale changed the split half correlation to +.266 and the Spearman-Brown prophecy estimate of reliability to +.420. The final scale consisted of the remaining six items.
TABLE 5

ITEM ANALYSIS DATA DETERMINED BY THE INTERNAL CONSISTENCY METHOD FOR THE INNOVATION SCALE

<table>
<thead>
<tr>
<th>Item</th>
<th>SVD</th>
<th>MPSVD</th>
<th>SVDR</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.30</td>
<td>1.77</td>
<td>.734</td>
<td>6.74</td>
</tr>
<tr>
<td>2</td>
<td>.27</td>
<td>.53</td>
<td>.509</td>
<td>2.43</td>
</tr>
<tr>
<td>3b</td>
<td>.10</td>
<td>.23</td>
<td>.435</td>
<td>1.02</td>
</tr>
<tr>
<td>4</td>
<td>.67</td>
<td>.73</td>
<td>.918</td>
<td>4.09</td>
</tr>
<tr>
<td>5</td>
<td>1.10</td>
<td>1.30</td>
<td>.846</td>
<td>5.37</td>
</tr>
<tr>
<td>6</td>
<td>.50</td>
<td>1.63</td>
<td>.307</td>
<td>2.18</td>
</tr>
<tr>
<td>7b</td>
<td>.26</td>
<td>.60</td>
<td>.433</td>
<td>1.55</td>
</tr>
<tr>
<td>8</td>
<td>.76</td>
<td>.83</td>
<td>.916</td>
<td>4.22</td>
</tr>
<tr>
<td>9b</td>
<td>.23</td>
<td>.63</td>
<td>.365</td>
<td>1.44</td>
</tr>
<tr>
<td>10</td>
<td>.30</td>
<td>.63</td>
<td>.476</td>
<td>1.70</td>
</tr>
<tr>
<td>11</td>
<td>.66</td>
<td>1.07</td>
<td>.617</td>
<td>3.38</td>
</tr>
</tbody>
</table>

a The split-half correlation of this scale was +.640 which when corrected by the Spearman-Brown prophecy formula gave as an estimate of reliability of +.780.

b The removal of these items from the scale changed the split half correlation to +.642 and the Spearman-Brown prophecy estimate of reliability to +.782. The final scale consisted of the remaining eight items.
labeled as attitude statements since they involve specific actions. These eighty-seven statements are listed in Appendix B.

In order to eliminate ambiguous statements and also to determine the position of each item on the psychological continuum, fourteen judges evaluated them according to the basic procedure of Thurstone's equal appearing intervals. These judges were all faculty members or senior graduate students in the Department of Agricultural Economics and Rural Sociology at The Ohio State University. Their instructions were:

The following statements are intended to measure the individual's commitment to the use of business techniques in farming. That is, the individual's commitment to the importance and value of good records, the importance of new ideas and change and the diminished importance of personal and family goals in order to satisfy the goals of the farm as a business entity. The opposite of this is a commitment to farming as a way of life, to the family farm as basic to the American social system and to a way of farming until forced to change.

For each of the following statements indicate where in terms of business orientation the individual who would agree with each of the following statements might be categorized on the continuum below. In each case read over the item, think about the individual that would agree with the statement, and place your interpretation of where on the continuum he would be in the form of a number to the left of the statement. It is important to constantly keep in mind that you are evaluating an individual that would agree with the statement.

Not all of these statements are necessarily "polar" in that they indicate orientation at one end or the other. In fact you may find that most statements fit in the categories between the extremes and the neutral point (6). If you think an item measures about an equal orientation toward both, you would probably place it at the neutral point or at least 5 or 7. Remember you are serving as a judge and not indicating your own values.
The continuum:

<table>
<thead>
<tr>
<th>Extreme orientation toward business in farming</th>
<th>neutral</th>
<th>extreme traditionalist</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Use the following statement as an example:

**Corporation farming will eventually take over in agriculture.**

A person who would agree with this statement might be rated at 10 or 11 on the above scale.

From the judges' evaluations a mean score and standard deviation was computed for each statement. The mean values were used to determine the direction of the statement (positive or negative) on the attitude continuum. A statement with a mean score of greater than six was a positive statement while a statement with a mean score of less than six was a negative statement. The standard deviations were used to delete items characterized by a high degree of dispersion of the judge evaluations. A high degree of dispersion was considered to be a measure of ambiguity or irrelevance.

Thirty-three of the statements were retained for further analysis. These were prepared according to Likert's method of summated ratings. That is, the response to each statement could vary over the five point range of strongly agree, agree, undecided, disagree and strongly disagree. These statements were given to 49 students enrolled in farm management courses at The Ohio State University. The individual responses were scored 1, 2, 3, 4, 5, or 5, 4, 3, 2, 1 depending upon the direction of the statement (negative or positive, respectively). Using the Sletto internal consistency test, 18 items were selected for
inclusion in the scale for empirical data collection. (These items are shown in Appendix A.)

The 18 statements were tested for internal consistency and reliability; the results of these tests are shown in Table 6. The final scale consisted of 11 of the 18 statements used for data collection. The estimate of reliability was .715.

The scale was validated as discussed in the section on "Tests of Validity" in an earlier part of this chapter. To review briefly, each enumerator ranked the operators he contacted in management ability. It was assumed that a good manager would also be more business oriented. Consequently group comparisons were made of the business orientation scale scores of the good managers versus the poor managers as ranked by the enumerators. In addition, Spearman's rank correlation coefficient was computed for the operators as ranked by the enumerators compared with the rankings based upon the business orientation attitude score. Based upon the results of these tests (Table 7) the business orientation scale was accepted as a valid scale.

**Measurement of farm management ability**

Many attempts have been made to relate farm management ability to various measures of success in farming. ¹⁷ Most of these have not been

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¹⁷ A review of these can be found in Donald Claude Huffman, "A Technique for Classifying Farm Managers According to Managerial Ability" (unpublished Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1963) or Verlin Richard Meier, "Goals and Factors Affecting Success of Farm Families" (unpublished Master's thesis, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1961). Huffman's dissertation is also a study of the relationship of management to farming success.
TABLE 6

ITEM ANALYSIS DATA DETERMINED BY THE INTERNAL CONSISTENCY METHOD FOR THE BUSINESS ORIENTATION SCALE

<table>
<thead>
<tr>
<th>Item</th>
<th>SVD</th>
<th>LP SVD</th>
<th>SVDR</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.20</td>
<td>2.40</td>
<td>.500</td>
<td>3.79</td>
</tr>
<tr>
<td>2b</td>
<td>.90</td>
<td>1.70</td>
<td>.529</td>
<td>3.66</td>
</tr>
<tr>
<td>3b</td>
<td>.50</td>
<td>1.43</td>
<td>.350</td>
<td>1.88</td>
</tr>
<tr>
<td>4</td>
<td>.80</td>
<td>1.53</td>
<td>.523</td>
<td>3.40</td>
</tr>
<tr>
<td>5</td>
<td>.67</td>
<td>.87</td>
<td>.770</td>
<td>3.72</td>
</tr>
<tr>
<td>6b</td>
<td>.10</td>
<td>.50</td>
<td>.200</td>
<td>.76</td>
</tr>
<tr>
<td>7b</td>
<td>.84</td>
<td>.97</td>
<td>.866</td>
<td>4.24</td>
</tr>
<tr>
<td>8b</td>
<td>.06</td>
<td>.60</td>
<td>.100</td>
<td>.43</td>
</tr>
<tr>
<td>9</td>
<td>.30</td>
<td>.77</td>
<td>.390</td>
<td>1.53</td>
</tr>
<tr>
<td>10</td>
<td>.26</td>
<td>.60</td>
<td>.433</td>
<td>1.69</td>
</tr>
<tr>
<td>11b</td>
<td>.40</td>
<td>1.27</td>
<td>.315</td>
<td>1.73</td>
</tr>
<tr>
<td>12</td>
<td>.73</td>
<td>1.80</td>
<td>.406</td>
<td>2.67</td>
</tr>
<tr>
<td>13</td>
<td>.60</td>
<td>1.00</td>
<td>.600</td>
<td>2.99</td>
</tr>
<tr>
<td>14</td>
<td>.73</td>
<td>1.40</td>
<td>.521</td>
<td>3.16</td>
</tr>
<tr>
<td>15</td>
<td>.56</td>
<td>1.83</td>
<td>.506</td>
<td>2.28</td>
</tr>
<tr>
<td>16b</td>
<td>.10</td>
<td>1.43</td>
<td>.070</td>
<td>.45</td>
</tr>
<tr>
<td>17</td>
<td>.53</td>
<td>.93</td>
<td>.570</td>
<td>2.56</td>
</tr>
<tr>
<td>18b</td>
<td>.24</td>
<td>1.03</td>
<td>.233</td>
<td>1.22</td>
</tr>
</tbody>
</table>

\( a \) The split half correlation of this scale was +.529 which when corrected by the Spearman-Brown prophecy formula gave an estimate of reliability of the scale of +.692.

\( b \) The removal of these items from the scale changed the split half correlation to +.557 and the Spearman-Brown prophecy estimate of reliability to +.715. The final scale consisted of the remaining eleven items.
**TABLE 7**

VALIDITY TESTS OF THE BUSINESS ORIENTATION SCALE

<table>
<thead>
<tr>
<th>Item</th>
<th>Enumerator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Number enumerated</td>
<td>32</td>
</tr>
<tr>
<td>Mean of top half</td>
<td>38.81</td>
</tr>
<tr>
<td>Mean of bottom half</td>
<td>35.88</td>
</tr>
<tr>
<td>Difference of means</td>
<td>2.93b</td>
</tr>
<tr>
<td>Spearman's rank correlation coefficient</td>
<td>.24b</td>
</tr>
</tbody>
</table>

aThe author was enumerator number 2 and was assumed to have a better grasp of the concepts involved.

bSignificant at the .20 level of probability.

cSignificant at the .10 level of probability.
highly successful. Nielson, a member of the North Central Regional Research Committee studying the Management Resource in Farming (NC-59) developed a theoretical construct of a farm manager. This construct, as discussed in Chapter III, serves as a basis for the measurement of management in this study.

The management questions which were asked are listed in Appendix C along with a discussion of the scoring method used for each question. Questions 14 and 15, 13, 8, and 11 and 12 are intended to measure steps two through five, respectively, of the functions of management. Questions 1, 2, and 3 were included to measure the entrepreneurial and risk-taking ability of the respondent (a part of $V_1$). Questions 4, 5, 6, and 7 relate to the influence of family and community upon the manager ($V_1$). Questions 9 and 10 refer to $V_2$ indirectly since it tests knowledge of farming which is a part of the background of the individual. Question 16 was asked to help score question 1.

After the questions were scored, numbers 4, 6, and 9 were eliminated because of the lack of variance in the responses. The remaining 12 scores were evaluated for internal consistency, reliability and validity. The results of these tests are shown in Tables 8 and 9. The final management scale consisted of seven items and had a reliability estimate of .529.
TABLE 8
ITEM ANALYSIS DATA DETERMINED BY THE INTERNAL CONSISTENCY METHOD FOR THE MANAGEMENT SCALEa

<table>
<thead>
<tr>
<th>Item</th>
<th>SVD</th>
<th>MPSVD</th>
<th>SVIR</th>
<th>Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.93</td>
<td>2.35</td>
<td>.396</td>
<td>2.57</td>
</tr>
<tr>
<td>2b</td>
<td>.78</td>
<td>2.19</td>
<td>.356</td>
<td>2.27</td>
</tr>
<tr>
<td>3</td>
<td>.90</td>
<td>1.16</td>
<td>.776</td>
<td>3.63</td>
</tr>
<tr>
<td>4b</td>
<td>.71</td>
<td>3.94</td>
<td>.180</td>
<td>1.43</td>
</tr>
<tr>
<td>5b</td>
<td>.83</td>
<td>3.29</td>
<td>.252</td>
<td>1.81</td>
</tr>
<tr>
<td>6</td>
<td>1.16</td>
<td>2.45</td>
<td>.473</td>
<td>2.61</td>
</tr>
<tr>
<td>7</td>
<td>1.22</td>
<td>2.52</td>
<td>.484</td>
<td>2.76</td>
</tr>
<tr>
<td>8b</td>
<td>.25</td>
<td>1.87</td>
<td>.134</td>
<td>.78</td>
</tr>
<tr>
<td>9</td>
<td>1.26</td>
<td>3.39</td>
<td>.372</td>
<td>2.86</td>
</tr>
<tr>
<td>10b</td>
<td>.62</td>
<td>1.90</td>
<td>.326</td>
<td>2.12</td>
</tr>
<tr>
<td>11</td>
<td>1.19</td>
<td>2.10</td>
<td>.567</td>
<td>3.98</td>
</tr>
<tr>
<td>12</td>
<td>1.29</td>
<td>2.58</td>
<td>.500</td>
<td>2.88</td>
</tr>
</tbody>
</table>

aThe split half correlation of this scale was +.211 which when corrected by the Spearman-Brown prophecy formula gave an estimate of reliability of +.348.

bThe removal of these items from the scale changed the split half correlation to +.360 and the Spearman-Brown prophecy estimate of reliability to +.529. The final scale consisted of the remaining seven items.
### TABLE 9

**VALIDITY TESTS OF THE MANAGEMENT SCALE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Enumerator 1</th>
<th>Enumerator 2a</th>
<th>Enumerator 3</th>
<th>Enumerator 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number enumerated</td>
<td>32</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Mean of top half</td>
<td>16.81</td>
<td>15.50</td>
<td>17.40</td>
<td>12.25</td>
</tr>
<tr>
<td>Mean of bottom half</td>
<td>13.88</td>
<td>10.33</td>
<td>14.00</td>
<td>12.25</td>
</tr>
<tr>
<td>Difference of means</td>
<td>2.93&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.17&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.40</td>
<td>0.00</td>
</tr>
<tr>
<td>Spearman's rank correlation coefficient</td>
<td>.32&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.48&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.51&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.06</td>
</tr>
</tbody>
</table>

<sup>a</sup>The author was enumerator number 2 and was assumed to have a better grasp of the concepts involved.

<sup>b</sup>Significant at the .20 level of probability or less.

<sup>c</sup>Significant at the .10 level of probability or less.

<sup>d</sup>Significant at the .02 level of probability.
Measurement of goals

Man is a goal-directed organism and thus the amount of farm firm growth will be influenced by the goals that the farm operator is pursuing. The main use of goals in this study was to determine the importance to realized firm growth of emphasis on a growth goal. Some method was needed to determine if the operator had an objective of growth. Asking an open-ended question could result in a biased answer. Additionally, using this method the importance of the growth goal relative to other goals would not be known. Therefore, some more subtle method of finding the individual ranking of growth as a goal was desired.

The method chosen was the ranking procedure of the paired comparison technique. Each of five goals was paired with every other goal (resulting in ten pairs) and the respondent was forced to choose which goal of the pair was more important. In using this procedure you implicitly assume transitivity. That is, if the respondent picks A over B and B over C, he will then pick A over C; unfortunately this does not always happen and tied rankings can occur. The ranking of a particular goal was determined by counting the number of times each

---

goal was chosen over the other goal in the pair, and ranking these totals with the highest total being the first ranked goal. If the operator was consistent, the ranking was explicit; but, if inconsistency occurred, there were tied rankings.

In the group comparison analysis discussed in the following chapter, the groups were compared as to the number of operators in each group who ranked the growth goal first or tied for first. Similar comparisons were made for the other three goals (the two community goals were combined because of the small number of operators ranking either one first).

In the regression analysis discussed in the next chapter, the ranking of the growth goal was measured as the number of times it was chosen over the accompanying goal in the pair. This value was 4 for an individual who ranked growth first, 3 for a second place ranking and so forth. This procedure assumes that the differences between the ordinal rankings of each individual are of equal internal scales. The regression coefficient for the growth goal is interpreted as the effect on growth per rank of the growth goal, with four times the coefficient being the effect of a first place ranking.

Measurement of growth strategies

The growth strategies used by the sample farmers were isolated by asking them what changes they had made in the numbers of the various technical units used in their farming operations. That is, for example, did the operator rent or purchase any additional acreage of land in the five-year study period? Changes of this type were
isolated for land, labor, machinery and equipment, livestock and buildings and improvements for the five-year study period.

These additions were classified in three ways: (1) by acquisition method (rent, purchase or other methods—mainly inheritance and internal expansion) hereafter known as strategy set I; (2) by resource acquired (land, labor, livestock or machinery, equipment, buildings and improvements) hereafter known as strategy set II; and (3) by resource by acquisition method (rent land, purchase land, other land strategies, purchase livestock, other livestock strategies, rent machinery, equipment, buildings and improvements, purchase machinery, equipment, buildings and improvements, and purchase labor[19]) hereafter known as strategy set III.

In the group comparison analysis discussed in the following chapter, the groups were compared as to the number of operators in each group who used each of these categories of growth strategies.

In the regression analysis these classifications were used as sets of dummy variables. However, since operators could and did use more than one strategy within a strategy set, the classification had to be expanded to include combinations of strategies (like rent and purchase both) until each operator could be classified into only one mutually exclusive group. (This requirement is discussed in the "Dummy Variable" section.) This resulted in five dummy variables for

[19] The possible combinations of rent livestock; other strategies for machinery, equipment, buildings and improvements; rent labor and other labor strategies, either were not appropriate or did not occur.
strategy set I, eight for strategy set II, and 24 for strategy set III, which indicated considerable pairing or higher order combinations of strategies.

These expanded strategy sets (with one dummy variable deleted because of singularity) were run with each regression model. These sets duplicate each other and therefore were never run together in the regression analysis.
CHAPTER VI

ANALYSIS AND FINDINGS

The purpose of this chapter is to present and discuss the results of the group comparison and regression analyses used to test the hypothesis developed in Chapter III. The first part of the chapter relates the tested variables to the component parts of the research hypothesis. The second section presents a brief description of the data for the sample farmers indicating the means or sums and ranges of individual variables. The third section presents and discusses the results and conclusions of the group comparison analysis. The final section presents and discusses the results and conclusions of the regression analysis.

The Research Hypothesis and the Measured Variables

This section relates the measured variables, as listed in Tables 10 to 15, to the research hypothesis developed in Chapter III. The hypothesized relation was that farm firm growth was a function of personal variables, nonpersonal variables and growth strategies. The components of these subparts will be discussed, using the same order as in Chapter III, and related to the variables numbers in Tables 10-15.
Personal variables

The personal variables included in the hypothesis and their component variables in Tables 10 to 15 were:

1. operator age and education
   a. age—variable 1 in the tables
   b. education—variable 2 in the tables
2. operator attitudes
   a. credit use—variable 3
   b. risk acceptance—variable 4
   c. innovation—variable 5
   d. business orientation—variable 6
3. management ability—variable 7
4. the relative importance of the growth goal—variable 10

Additional personal factors analyzed included the ranking of other goals (variables 21, 40, and 41), operator health (variable 45) and years of 4-H, vocational agriculture and young farmer training (variables 47 to 49).

Nonpersonal variables

The nonpersonal variables included in the hypothesis and their constituent variables in Tables 10 to 15 were:

1. production efficiency
   a. corn yield per acre—variable 8
   b. pigs per litter—variable 18
2. farm size in 1962
   a. total assets controlled—variable 9
   b. net worth—variable 19
3. availability of additional production resources
   a. additional land—variable 11
   b. additional family labor—variable 23
   c. renting land in 1962—variable 25
4. degree of livestock specialization—variable 20
5. capital available for farm operation and investment
   a. farm income 1962—variable 28
   b. nonfarm capital
      (1) not borrowed (inherited money, gift and so forth)—variable 16
      (2) borrowed, 1962—variable 29
      (3) percentage equity—variable 26
   c. family demands
      (1) number of children at home—variable 17
      (2) total number of children—variable 22
      (3) launching of children into adult life—variable 24
      (4) family consumption—variable 27
      (5) unexpected family problems—variable 15

A few brief comments of explanation are required about some of these nonpersonal variables.

There was no appreciable variance in the response to nonfamily labor and capital availability—only two operators indicated that additional nonfamily labor was available while three operators
indicated that additional capital was not available. Consequently, only a variable on land availability was included in the analysis. Variable 25, renting land in 1962, was also included in the analysis. It was hypothesized that a farmer who was willing to rent in 1962 might be more willing to use renting as an acquisition strategy during the remainder of the study period and thus achieve a larger asset base than the operator not renting land in 1962. Growth might also be greater in terms of change in net worth depending upon the profitability of renting and the allocation of these profits. The availability of additional family labor was analyzed as the number of sons aged nine to 15 in 1962--variable 23.

A farm firm must generate sufficient income to meet family demands as well as monies for investment in additional resources to satisfy an expansion goal. Consequently farm income, additional capital sources and family demands were considered in the analysis. Farm income in 1962 was variable 28. Additional sources of operating and investment capital included nonfarm generated capital and borrowed money (variables 16 and 29). Percentage equity (variable 26) was included as a pseudo-attitude measure of credit use in the analysis. The family demand variables considered were total number of children (variable 22), number of children at home (variable 17), launching of children into adult life (variable 24), family consumption expenditures (variable 27), and unexpected family problems affecting capital use or labor supply (variable 15).
Growth strategies

The growth strategy subpart of the growth hypothesis was developed into several variables according to three classifications of growth strategies:

1. classification by type of acquisition method (set I)
   a. renting—variable 12
   b. purchasing—variable 13
   c. other acquisition strategies (mainly inheritance and internal expansion)—variable 14

2. classification by type of resource acquired (set II)
   a. machinery and buildings—variable 36
   b. full-time hired labor—variable 37
   c. land—variable 38
   d. livestock—variable 39

3. classification by type of resource by acquisition method (set III)
   a. rent land—variable 30
   b. purchase land—variable 31
   c. other land strategies (mainly inheritance)—variable 32
   d. purchase livestock—variable 33
   e. other livestock strategies (mainly raising own)—variable 34
   f. rent machinery and buildings—variable 35
   g. purchase machinery and buildings—variable 36
   h. purchase full-time hired labor—variable 37
Measures of growth and size

The fourth subset of the growth hypothesis referred to growth of the firm:

1. measured as change in the constant dollar value of total assets controlled—variable 42
2. measured as change in constant dollar value of net worth—variable 44
3. the average percentage of the above two measures over the five year study period—variables 43 and 45

The two measures of growth above were the principal growth measures used in the study.

Several measures of farm size are included in Tables 10 to 15. Growth can be determined by subtracting the 1962 value from the corresponding 1967 value. These measures were:

1. corn acreage—variables 50 and 51
2. soybean and wheat acreage—variables 52 and 53
3. number of market hogs sold—variables 54 and 55
4. gross farm receipts—variables 56 and 57
5. farm income—variables 28 and 58

Description of the Sample Data

Characteristics of the sample operators and their farm operations are presented in Tables 10 and 11. It should be noted that these data are for 44 and 49 operators for the net worth and total assets controlled measures of growth respectively.
### TABLE 10

MEANS OR SUBS, MAXIMUM VALUES, AND MINIMUM VALUES FOR SELECTED VARIABLES, FORTY-FOUR SAMPLE FARM OPERATORS, GROWTH MEASURED AS CHANGE IN CONSTANT.

**DOLLAR VALUE OF NET WORTH, 1967**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Mean or Sum</th>
<th>Maximum Value</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>year</td>
<td>40.34</td>
<td>50.</td>
<td>30.</td>
</tr>
<tr>
<td>2. Education</td>
<td>year</td>
<td>11.95</td>
<td>15.</td>
<td>10.</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>9.02</td>
<td>13.</td>
<td>3.</td>
</tr>
<tr>
<td>5. Innovation attitude</td>
<td>scale</td>
<td>29.02</td>
<td>36.</td>
<td>18.</td>
</tr>
<tr>
<td>6. Business orientation attitude</td>
<td>scale</td>
<td>37.20</td>
<td>47.</td>
<td>25.</td>
</tr>
<tr>
<td>7. Management score</td>
<td>scale</td>
<td>14.59</td>
<td>28.</td>
<td>5.</td>
</tr>
<tr>
<td>8. Corn yield</td>
<td>bushel</td>
<td>91.59</td>
<td>125.</td>
<td>40.</td>
</tr>
<tr>
<td>9. Total assets controlled, 1962</td>
<td>dollar</td>
<td>154922.00</td>
<td>457665.</td>
<td>35937.</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>16.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>11. Additional land available</td>
<td>scale</td>
<td>15.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>12. Rent strategy</td>
<td>scale</td>
<td>16.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>13. Purchase strategy</td>
<td>scale</td>
<td>43.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>14. Other strategies</td>
<td>scale</td>
<td>11.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>15. Family problems</td>
<td>scale</td>
<td>14.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>16. Use of nonfarm capital (not borrowed)</td>
<td>scale</td>
<td>10.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>17. Number of children at home</td>
<td>number</td>
<td>2.09</td>
<td>4.</td>
<td>0.</td>
</tr>
<tr>
<td>18. Pigs per litter</td>
<td>pig</td>
<td>7.87</td>
<td>10.</td>
<td>5.</td>
</tr>
<tr>
<td>20. Livestock specialization</td>
<td>dollar</td>
<td>40.56</td>
<td>104.</td>
<td>0.</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>Mean or Sum</td>
<td>Maximum Value</td>
<td>Minimum Value</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>--------</td>
<td>-------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>21. Efficiency goal ranked first or tied</td>
<td>scale</td>
<td>23.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>22. Total number of children</td>
<td>number</td>
<td>2.25</td>
<td>4.0</td>
<td>0.0</td>
</tr>
<tr>
<td>23. Sons, 9 to 15 in 1962</td>
<td>number</td>
<td>3.6</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>3.2</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>25. Renting land, 1962</td>
<td>scale</td>
<td>39.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>26. Percentage equity, 1962</td>
<td>per cent</td>
<td>82.43</td>
<td>100.0</td>
<td>8.0</td>
</tr>
<tr>
<td>27. Family consumption</td>
<td>dollar</td>
<td>253.41</td>
<td>450.0</td>
<td>200.0</td>
</tr>
<tr>
<td>28. Farm income, 1962d</td>
<td>dollar</td>
<td>4876.26</td>
<td>19426.0</td>
<td>- 500.0</td>
</tr>
<tr>
<td>29. Farm debt, 1962</td>
<td>dollar</td>
<td>9531.82</td>
<td>144000.0</td>
<td>0.0</td>
</tr>
<tr>
<td>30. Rent land</td>
<td>scale</td>
<td>16.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>31. Purchase land</td>
<td>scale</td>
<td>19.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>32. Other land strategies</td>
<td>scale</td>
<td>2.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>33. Purchase livestock</td>
<td>scale</td>
<td>6.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>10.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>35. Rent machinery and buildings</td>
<td>scale</td>
<td>7.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>36. Purchase (acquire) machinery and buildings</td>
<td>scale</td>
<td>42.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>37. Purchase (acquire) full-time hired labor</td>
<td>scale</td>
<td>3.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>38. Acquire land</td>
<td>scale</td>
<td>32.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>39. Acquire livestock</td>
<td>scale</td>
<td>13.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>40. Family goal ranked first or tied</td>
<td>scale</td>
<td>10.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>41. Community goal ranked first or tied</td>
<td>scale</td>
<td>10.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>42. Change in total assets, 1962-1967</td>
<td>dollar</td>
<td>41480.35</td>
<td>186268.0</td>
<td>- 30761.0</td>
</tr>
<tr>
<td>43. Percentage change in total assets</td>
<td>per cent</td>
<td>33.53</td>
<td>186.2</td>
<td>- 12.7</td>
</tr>
<tr>
<td>44. Change in net worth, 1962-1967</td>
<td>dollar</td>
<td>20750.36</td>
<td>95124.0</td>
<td>- 6845.0</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>Mean or Sum</td>
<td>Maximum Value</td>
<td>Minimum Value</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>45. Percentage change in net worth</td>
<td>per cent</td>
<td>158.93</td>
<td>2748.3</td>
<td>-25.8</td>
</tr>
<tr>
<td>46. Health rating</td>
<td>scale</td>
<td>3.52</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>47. 4-H</td>
<td>year</td>
<td>2.49</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>48. Vo-Ag</td>
<td>year</td>
<td>2.07</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>49. Young farmer</td>
<td>year</td>
<td>2.95</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>50. Corn acres, 1962</td>
<td>acre</td>
<td>107.91</td>
<td>350</td>
<td>18</td>
</tr>
<tr>
<td>51. Corn acres, 1967</td>
<td>acre</td>
<td>178.68</td>
<td>600</td>
<td>40</td>
</tr>
<tr>
<td>52. Soybeans and wheat acres, 1962</td>
<td>acre</td>
<td>69.25</td>
<td>400</td>
<td>7</td>
</tr>
<tr>
<td>53. Soybeans and wheat acres, 1967</td>
<td>acre</td>
<td>99.73</td>
<td>450</td>
<td>0</td>
</tr>
<tr>
<td>54. Hogs sold, 1962</td>
<td>head</td>
<td>475.74</td>
<td>1000</td>
<td>100</td>
</tr>
<tr>
<td>55. Hogs sold, 1967</td>
<td>head</td>
<td>562.71</td>
<td>2400</td>
<td>30</td>
</tr>
<tr>
<td>56. Gross income, 1962</td>
<td>dollar</td>
<td>22050.87</td>
<td>75000</td>
<td>3900</td>
</tr>
<tr>
<td>57. Estimated gross income, 1967</td>
<td>dollar</td>
<td>31933.61</td>
<td>100000</td>
<td>12500</td>
</tr>
<tr>
<td>58. Farm income, 1966</td>
<td>dollar</td>
<td>8166.87</td>
<td>21203</td>
<td>1800</td>
</tr>
</tbody>
</table>

The values for variables 10-16, 21, 25, and 30-41 are the number of respondents who did as the variables indicate.

$^b$Dollar value of investment in livestock per acre of land operated, 1962.

$^c$Mean of estimated monthly family living expenditures for 1962 and 1967.

$^d$Sum of farm income reported on IRS form 1040F and farm income subject to capital gains on IRS form 1040D.

$^e$As a percentage of the 1962 value.

$^f$Excellent equals 4, good equals 3, fair equals 2, poor equals 1.
TABLE 11
MEAN OR SUMS, MAXIMUM VALUES, AND MINIMUM VALUES FOR SELECTED VARIABLES, FORTY-NINE SAMPLE FARM OPERATORS, GROWTH MEASURED AS CHANGE IN CONSTANT DOLLAR VALUE OF TOTAL ASSETS CONTROLLED, 1967

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Mean or Sum</th>
<th>Maximum Value</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>year</td>
<td>40.35</td>
<td>50.</td>
<td>30.</td>
</tr>
<tr>
<td>2. Education</td>
<td>year</td>
<td>12.02</td>
<td>15.</td>
<td>10.</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>9.02</td>
<td>13.</td>
<td>3.</td>
</tr>
<tr>
<td>5. Innovation attitude</td>
<td>scale</td>
<td>29.29</td>
<td>36.</td>
<td>18.</td>
</tr>
<tr>
<td>6. Business orientation attitude</td>
<td>scale</td>
<td>37.49</td>
<td>47.</td>
<td>25.</td>
</tr>
<tr>
<td>7. Management score</td>
<td>scale</td>
<td>14.69</td>
<td>28.</td>
<td>5.</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>19.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>11. Additional land available</td>
<td>scale</td>
<td>16.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>12. Rent strategy used</td>
<td>scale</td>
<td>19.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>13. Purchase strategy used</td>
<td>scale</td>
<td>47.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>14. Other strategies used</td>
<td>scale</td>
<td>12.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>15. Family problems</td>
<td>scale</td>
<td>14.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>16. Use of nonfarm capital (not borrowed)</td>
<td>scale</td>
<td>12.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>17. Number of children at home</td>
<td>number</td>
<td>2.22</td>
<td>6.</td>
<td>0.</td>
</tr>
<tr>
<td>18. Pigs per litter</td>
<td>pig</td>
<td>7.90</td>
<td>10.</td>
<td>5.</td>
</tr>
<tr>
<td>20. Livestock specialization</td>
<td>dollar</td>
<td>41.10</td>
<td>104.</td>
<td>0.</td>
</tr>
</tbody>
</table>

\textsuperscript{a}MAXIMUM VALUES, AND MINIMUM VALUES FOR SELECTED VARIABLES
<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Mean or Sum</th>
<th>Maximum Value</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. Efficiency goal ranked first or tied</td>
<td>scale</td>
<td>26.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>22. Total number of children, 1967</td>
<td>number</td>
<td>2.41</td>
<td>6.</td>
<td>0.</td>
</tr>
<tr>
<td>23. Sons, 9 to 15 in 1962</td>
<td>number</td>
<td>0.37</td>
<td>2.</td>
<td>0.</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>0.33</td>
<td>2.</td>
<td>0.</td>
</tr>
<tr>
<td>25. Renting land, 1962</td>
<td>scale</td>
<td>44.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>26. Percentage equity, 1962</td>
<td>per cent</td>
<td>82.05</td>
<td>100.</td>
<td>8.</td>
</tr>
<tr>
<td>27. Family consumption&lt;sup&gt;C&lt;/sup&gt;</td>
<td>dollar</td>
<td>255.21</td>
<td>450.</td>
<td>200.</td>
</tr>
<tr>
<td>28. Farm income, 1962&lt;sup&gt;d&lt;/sup&gt;</td>
<td>dollar</td>
<td>4816.53</td>
<td>19426.</td>
<td>- 500.</td>
</tr>
<tr>
<td>29. Farm debt, 1962</td>
<td>dollar</td>
<td>9748.84</td>
<td>144000.</td>
<td>0.</td>
</tr>
<tr>
<td>30. Rent land</td>
<td>scale</td>
<td>19.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>32. Other land strategies</td>
<td>scale</td>
<td>3.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>33. Purchase livestock</td>
<td>scale</td>
<td>7.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>10.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>35. Rent machinery and buildings</td>
<td>scale</td>
<td>9.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>36. Purchase (acquire) machinery and buildings</td>
<td>scale</td>
<td>46.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>37. Purchase (acquire) full-time hired labor</td>
<td>scale</td>
<td>3.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>38. Acquire land</td>
<td>scale</td>
<td>37.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>40. Family goal ranked first or tied</td>
<td>scale</td>
<td>11.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>41. Community goal ranked first or tied</td>
<td>scale</td>
<td>10.</td>
<td>1.</td>
<td>0.</td>
</tr>
<tr>
<td>42. Change in total assets, 1962-1967</td>
<td>dollar</td>
<td>45238.43</td>
<td>215204.</td>
<td>- 30761.</td>
</tr>
<tr>
<td>43. Percentage change in total assets</td>
<td>per cent</td>
<td>36.46</td>
<td>186.2</td>
<td>- 12.7</td>
</tr>
<tr>
<td>45. Percentage change in net worth&lt;sup&gt;e&lt;/sup&gt;</td>
<td>per cent</td>
<td>160.62</td>
<td>2748.3</td>
<td>- 25.8</td>
</tr>
</tbody>
</table>
TABLE 11 (contd.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Mean or Sum&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Value</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>46. Health rating&lt;sup&gt;f&lt;/sup&gt;</td>
<td>scale</td>
<td>3.49</td>
<td>4.</td>
<td>2.</td>
</tr>
<tr>
<td>47. 4-H</td>
<td>year</td>
<td>2.55</td>
<td>11.</td>
<td>0.</td>
</tr>
<tr>
<td>48. Vo-Ag</td>
<td>year</td>
<td>1.94</td>
<td>4.</td>
<td>0.</td>
</tr>
<tr>
<td>49. Young farmer</td>
<td>year</td>
<td>2.86</td>
<td>25.</td>
<td>0.</td>
</tr>
<tr>
<td>52. Soybeans and wheat, 1962</td>
<td>acre</td>
<td>68.88</td>
<td>400.</td>
<td>7.</td>
</tr>
<tr>
<td>53. Soybeans and wheat, 1967</td>
<td>acre</td>
<td>105.45</td>
<td>450.</td>
<td>0.</td>
</tr>
<tr>
<td>57. Estimated gross income, 1967</td>
<td>dollar</td>
<td>33218.78</td>
<td>100000.</td>
<td>12500.</td>
</tr>
<tr>
<td>58. Farm income, 1966&lt;sup&gt;d&lt;/sup&gt;</td>
<td>dollar</td>
<td>85425.0</td>
<td>21203.</td>
<td>1800.</td>
</tr>
</tbody>
</table>

<sup>a</sup>The values for variables 10-16, 21, 25 and 30-41 are the number of respondents who did as the variables indicate.

<sup>b</sup>Dollar value of investment in livestock per acre of land operated, 1962.

<sup>c</sup>Mean of estimated monthly family living expenditures for 1962 and 1967.

<sup>d</sup>Sum of the farm income reported on IRS form 1040F and farm income subject to capital gain on IRS form 1040D.

<sup>e</sup>As a percentage of the 1962 value.

<sup>f</sup>Excellent equals 4, good equals 3, fair equals 2, poor equals 1.
Change in size of the farm firm is reported in these two tables. Change in net worth (variable 44 in Table 10) ranged from $-6845 to $95,124 with a mean of $20,750. Change in total assets controlled (variable 42 in Table 11) ranged from $-30,761 to $215,204 with a mean of $45,238. Variables 45 and 43 are the average percentage change in net worth and total assets controlled from 1962 to 1967. This rate averaged 158.9 per cent and 36.5 per cent for the net worth and total assets controlled measure respectively. The high average per cent change in net worth reflects the large change in net worth relative to a very small base for a few farm operators.

Group Comparisons Analysis

"Fast" versus "slow" grower comparisons

The data for each farm operation was arrayed based on the amount of growth occurring during the study period (1962-1967), as indicated by the two measures of growth, change in net worth and change in total assets controlled. Four groups were created by dividing the two arrays at their median values. The upper portion of each array was identified as "fast growers" and the lower portion as "slow growers." A mean or a sum was computed for each of the variables for the four groups. A "t" statistic was computed by comparing the means of the "fast" and "slow" growers. Since some of the variables were zero-one variables a chi-square was computed for these variables as explained in Chapter IV. The means or sums for each of these variables and the significance level of the "t" or chi-square are shown in Table 12.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non</td>
<td>Fast (25) Mean or Sum</td>
<td>Slow (24) Mean or Sum</td>
</tr>
<tr>
<td>1. Age</td>
<td>year</td>
<td>38.7b</td>
<td>42.1b</td>
</tr>
<tr>
<td>2. Education</td>
<td>year</td>
<td>12.2</td>
<td>11.9</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>9.6b</td>
<td>8.4b</td>
</tr>
<tr>
<td>4. Risk acceptance attitude</td>
<td>scale</td>
<td>19.0</td>
<td>18.3</td>
</tr>
<tr>
<td>5. Innovation attitude</td>
<td>scale</td>
<td>29.9</td>
<td>28.7</td>
</tr>
<tr>
<td>6. Business orientation attitude</td>
<td>scale</td>
<td>37.8</td>
<td>37.2</td>
</tr>
<tr>
<td>7. Management score</td>
<td>scale</td>
<td>15.6</td>
<td>13.7</td>
</tr>
<tr>
<td>8. Corn yield</td>
<td>bushel</td>
<td>93.9</td>
<td>91.0</td>
</tr>
<tr>
<td>9. Total assets controlled, 1962</td>
<td>dollar</td>
<td>151441.0</td>
<td>157252.0</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>15.6</td>
<td>4.6</td>
</tr>
<tr>
<td>11. Additional land available</td>
<td>scale</td>
<td>4.6</td>
<td>12.6</td>
</tr>
<tr>
<td>12. Rent strategy used</td>
<td>scale</td>
<td>13.6</td>
<td>6.6</td>
</tr>
<tr>
<td>13. Purchase strategy used</td>
<td>scale</td>
<td>25.6</td>
<td>22.6</td>
</tr>
<tr>
<td>14. Other strategies used</td>
<td>scale</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>15. Family problems</td>
<td>scale</td>
<td>5.6</td>
<td>9.6</td>
</tr>
<tr>
<td>16. Use of nonfarm capital (not borrowed)</td>
<td>scale</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>17. Number of children at home</td>
<td>number</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>18. Pigs per litter</td>
<td>pig</td>
<td>7.9</td>
<td>7.9</td>
</tr>
<tr>
<td>19. Net worth, 1962</td>
<td>dollar</td>
<td>28404.0</td>
<td>40890.0</td>
</tr>
<tr>
<td>20. Livestock specialization</td>
<td>dollar</td>
<td>39.2</td>
<td>43.1</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>Mean or Sum&lt;sup&gt;a&lt;/sup&gt;</td>
<td>By Change in Total Assets Controlled</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>------------</td>
<td>-------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>22. Total number of children, 1967</td>
<td>number</td>
<td>2.8&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.0</td>
</tr>
<tr>
<td>23. Sons, 9 to 15 in 1962</td>
<td>number</td>
<td>.2</td>
<td>.5</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.5</td>
</tr>
<tr>
<td>26. Percentage equity, 1962</td>
<td>per cent</td>
<td>72.0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>90.7</td>
</tr>
<tr>
<td>27. Family consumption</td>
<td>dollar</td>
<td>264.6</td>
<td>245.8</td>
</tr>
<tr>
<td>28. Farm income, 1962</td>
<td>dollar</td>
<td>4309.4</td>
<td>5383.0</td>
</tr>
<tr>
<td>29. Farm debt, 1962</td>
<td>dollar</td>
<td>15065.0</td>
<td>5126.0</td>
</tr>
<tr>
<td>30. Rent land strategy</td>
<td>scale</td>
<td>13.</td>
<td>6.</td>
</tr>
<tr>
<td>31. Purchase land strategy</td>
<td>scale</td>
<td>12.</td>
<td>9.</td>
</tr>
<tr>
<td>32. Other land strategies used</td>
<td>scale</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>33. Purchase livestock strategy used</td>
<td>scale</td>
<td>4.</td>
<td>3.</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>6.</td>
<td>4.</td>
</tr>
<tr>
<td>35. Rent machinery and buildings</td>
<td>scale</td>
<td>7.</td>
<td>2.</td>
</tr>
<tr>
<td>36. Purchase (acquire) machinery and buildings</td>
<td>scale</td>
<td>25.</td>
<td>21.</td>
</tr>
<tr>
<td>37. Purchase (acquire) full-time hired labor</td>
<td>scale</td>
<td>3.</td>
<td>0.</td>
</tr>
<tr>
<td>39. Acquire livestock</td>
<td>scale</td>
<td>8.</td>
<td>6.</td>
</tr>
<tr>
<td>40. Family goal ranked first or tied</td>
<td>scale</td>
<td>6.</td>
<td>5.</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>By Change in Total Assets Controlled</td>
<td>By Change in Net Worth</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>---------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean or Sum&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Mean or Sum&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast (25)</td>
<td>Slow (24)</td>
</tr>
<tr>
<td>41. Community goal ranked first or tied</td>
<td>scale</td>
<td>4.</td>
<td>6.</td>
</tr>
<tr>
<td>42. Change in total assets, 1962-67</td>
<td>dollar</td>
<td>81946.0&lt;sup&gt;d&lt;/sup&gt;</td>
<td>7001.0&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>43. Percentage change in total assets&lt;sup&gt;h&lt;/sup&gt;</td>
<td>per cent</td>
<td>65.7&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.0&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>44. Change in net worth, 1962-67</td>
<td>dollar</td>
<td>30170.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>11753.0&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>45. Percentage change in net worth&lt;sup&gt;h&lt;/sup&gt;</td>
<td>per cent</td>
<td>286.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>51.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>46. Health rating&lt;sup&gt;l&lt;/sup&gt;</td>
<td>scale</td>
<td>3.6</td>
<td>3.4</td>
</tr>
<tr>
<td>47. 4-H</td>
<td>year</td>
<td>2.2</td>
<td>2.9</td>
</tr>
<tr>
<td>48. Vo-Ag</td>
<td>year</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td>49. Young farmer</td>
<td>year</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>50. Corn acres, 1962</td>
<td>acre</td>
<td>122.6</td>
<td>94.4</td>
</tr>
<tr>
<td>51. Corn acres, 1967</td>
<td>acre</td>
<td>226.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>132.4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>52. Soybeans &amp; wheat acres, 1962</td>
<td>acre</td>
<td>54.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>83.7&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>53. Soybeans &amp; wheat acres, 1967</td>
<td>acre</td>
<td>114.8</td>
<td>95.7</td>
</tr>
<tr>
<td>54. Hogs sold, 1962</td>
<td>head</td>
<td>485.6</td>
<td>481.6</td>
</tr>
<tr>
<td>55. Hogs sold, 1967</td>
<td>head</td>
<td>733.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>471.0&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>56. Gross income, 1962</td>
<td>dollar</td>
<td>22613.0&lt;sup&gt;d&lt;/sup&gt;</td>
<td>23961.0&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>57. Estimated gross income, 1967</td>
<td>dollar</td>
<td>39500.0&lt;sup&gt;d&lt;/sup&gt;</td>
<td>25368.0&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>58. Farm income, 1966&lt;sup&gt;g&lt;/sup&gt;</td>
<td>dollar</td>
<td>9650.0</td>
<td>7435.0</td>
</tr>
</tbody>
</table>
a The values for variables 10 to 16, 21, 25, and 30 to 41 are the number of respondents who did as the variable indicates.

b Difference significant at the .10 level of probability.

c Difference significant at the .05 level of probability.

d Difference significant at the .01 level of probability.

e Dollar value of investment in livestock per acre of land operated, 1962.

f Mean of estimated monthly family living expenditures for 1962 and 1967.

g Sum of farm income reported on IRS form 1040F and farm income subject to capital gains on IRS form 1040D.

h As a percentage of the 1962 value.

i Excellent equals 4, good equals 3, fair equals 2, poor equals 1.
Chi-square and "t" statistics were also computed in comparing the fastest growing ten operators to the slowest growing ten operators for each measure of growth (Table 13). This comparison was made to determine whether the ten operators on each extreme of the two arrays had the same variables with significantly different means or sums as were isolated in the above analysis. In general, the groups were found to be significantly different for the same characteristics. This confirmed the previous findings.

Several pieces of information may be useful to the reader in reviewing the results shown in Table 12.

There was considerable overlap of the "fast" and "slow" grower groups. Twenty of the "fast growers" using the total asset growth measure were also included in the net worth analysis. Fifteen of these 20 were also "fast growers" using the net worth growth measure. Additionally, 17 of the 23 "slow growers" using the total asset growth measure were also classed as "slow growers" using the net worth growth measure.

The $81,946 mean increase in total assets controlled of the "fast growers" was made up of the following components (all in constant dollars):

1. $17,445 increase in owned land and buildings
2. $39,309 increase in rented land and buildings
3. $10,424 increase in owned machinery
4. $761 increase in hired and unpaid labor
TABLE 13
MEANS OR SUMS* OF VARIABLES WHOSE LEVELS WERE SIGNIFICANTLY DIFFERENT BETWEEN THE TEN FASTEST AND THE TEN SLOWEST GROWERS, GROWTH MEASURED AS CHANGE IN TOTAL ASSETS CONTROLLED AND CHANGE IN NET WORTH, SAMPLE FARMS, 1967

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean or Sum Fast (10)</td>
<td>Mean or Sum Slow (10)</td>
</tr>
<tr>
<td>1. Age</td>
<td>year</td>
<td>34.5°</td>
<td>42.5°</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>9.3</td>
<td>7.6</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>9.°</td>
<td>1.°</td>
</tr>
<tr>
<td>17. Children at home</td>
<td>number</td>
<td>3.1°</td>
<td>1.8°</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>0.0°</td>
<td>0.9°</td>
</tr>
<tr>
<td>27. Family consumption</td>
<td>dollar</td>
<td>315.0°</td>
<td>240.0°</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>4.°</td>
<td>0.°</td>
</tr>
<tr>
<td>39. Acquire livestock</td>
<td>scale</td>
<td>6.°</td>
<td>1.°</td>
</tr>
<tr>
<td>42. Change in total assets</td>
<td>dollar</td>
<td>138214.0°</td>
<td>-7011.0°</td>
</tr>
<tr>
<td>43. Percentage change in total assets</td>
<td>per cent</td>
<td>96.°</td>
<td>-4.°</td>
</tr>
<tr>
<td>44. Change in net worth</td>
<td>dollar</td>
<td>32086.0°</td>
<td>8296.0°</td>
</tr>
<tr>
<td>51. Corn acres, 1967</td>
<td>acre</td>
<td>305.0°</td>
<td>107.1°</td>
</tr>
<tr>
<td>53. Soybeans and wheat acres, 1967</td>
<td>acre</td>
<td>170.2°</td>
<td>67.6°</td>
</tr>
<tr>
<td>55. Hogs sold, 1967</td>
<td>head</td>
<td>949.0°</td>
<td>495.0°</td>
</tr>
<tr>
<td>57. Estimated gross receipts, 1967</td>
<td>dollar</td>
<td>41236.0°</td>
<td>24797.0°</td>
</tr>
<tr>
<td>58. Farm income, 1966°</td>
<td>dollar</td>
<td>11922.0°</td>
<td>7190.0°</td>
</tr>
</tbody>
</table>
The values for variables 10, 34 and 39 are the number of respondents who did as the variables indicate.

Differences significant at the .10 level of probability.

Differences significant at the .05 level of probability.

Differences significant at the .01 level of probability.

Mean of estimated monthly family living expenditures for 1962 and 1967.

As a percentage of the 1962 value.

Sum of farm income reported on IRS form 1040F and farm income subject to capital gains on IRS form 1040D.
5. $8,084 increase in grain, hay and livestock
6. $5,923 increase in other assets

Debt for these "fast growers" increased an average of $10,706.

The $7,001 mean increase in total assets controlled of the "slow growers" was the summation of the following (all in constant dollars):

1. $11,568 increase in owned land and buildings
2. $6,536 decrease in rented land and buildings
3. $2,088 increase in owned machinery
4. $451 decrease in paid and unpaid labor
5. $1,809 decrease in grain, hay and livestock
6. $2,141 increase in other assets

Debt for the "slow growers" increase an average of $5,341.

The "fast growers" increased more than the "slow growers" in every category, especially in the rented land and buildings class.

The $35,834 change in net worth of the "fast growers" was composed of the following subparts (all in constant dollars):

1. $20,251 increase in owned land and buildings
2. $9,267 increase in owned machinery
3. $6,842 increase in owned grain, hay and livestock
4. $7615 increase in other assets.
5. $8141 increase in debt.

The value of rented land and buildings operated by the "fast growers" increased an average of $16,377.
The $5,667 increase in net worth of the "slow growers" was made up of the following components (all in constant dollars):

1. $10,056 increase in owned land and buildings
2. $2,749 increase in owned machinery
3. $167 decrease in owned grain, hay and livestock
4. $1,682 increase in other assets
5. $8,653 increase in debt

The value of rented land and buildings operated by the "slow growers" increased an average of $13,610.

The "fast growers" increased more than the "slow growers" in every component of the change in net worth, except for debt. The "slow growers" had a $512 greater debt increase than the "fast growers."

The following example is presented to assist the reader in understanding Tables 12 and 13. The mean age of the 25 fastest growing farm firm operators (total assets measure) was 38.7 years (Table 12). The corresponding mean age for the slow growing firm operators (total assets measure) was 42.1 years. These two means were significantly different at the .10 level of probability.

Several noteworthy differences were found in comparing fast and slow growers. When growth was measured as "Change in the Total Assets Controlled," the following significantly different characteristics were observed; the fast growing operators were: (1) younger, (2) possessed a more positive credit use attitude, (3) tended to rank growth as the most important goal, (4) reported little additional land available for either leasing or purchasing, (5) had larger families
with more children still at home but with fewer children 13 to 18 years old in 1962, (6) had a lower percentage equity in the farm business, (7) had hired more full-time labor, and (8) had expanded their firms. The reader should note that firm expansion was measured in terms of constant dollar value of total assets controlled, constant dollar value of net worth, corn, soybean and wheat acreage, number of hogs marketed, dollar value gross receipts and farm income. (These latter five measures were not tested for significance but were inferred from Table 12.)

These results are self-explanatory with the possible exceptions of characteristics numbered (4) little additional land available, (5) larger family, and (6) lower percentage equity. Little additional land available can be interpreted to mean that those respondents experiencing growth had acquired most of the land that they knew was available for acquisition. Farm operators with children at home desire greater income because of family needs. Difference number (6) was consistent with difference number (1) young operators would not be expected to have as great an equity in the business as older operators.

In addition several other comparisons of characteristics deserve comment. The operators of the fastest growing firms had higher mean scores on all the attitude scales and the management scale, with the latter being the largest relative to the slow grower mean score. Also, these operators were less specialized in livestock, placed less emphasis on efficiency, had more debt and more of them rented land. The firms of the fast and slow growers were the same size in '62 as
measured by total assets controlled, but the fast growers had lower net worths. Finally, although not significantly different, the fast growers had greater average 1966 farm incomes than the slow growers by about $2,200.

Further investigation of income differences revealed that in 1962 the slow growers had greater mean incomes by $1,074. Thus, although both groups increased mean incomes, the fast growers increased incomes by nearly $3,300 more than the slow growers.

The "fast growth" firms, using the "Change in Net Worth" growth measure, had the following significantly different characteristics when compared with the "slow growth" firms: (1) the operators had more positive credit use attitudes, (2) the families were larger with more children still at home but with fewer sons nine to 15 years old in 1962, (3) the operators had greater farm income in 1962, (4) the firms expanded a greater amount in terms of constant dollar value of total assets controlled, constant dollar value of net worth, dollar value of gross receipts and number of hogs marketed. (These latter two measures were not tested for significance but were inferred from Table 12), (5) the operators had attended young farmer meetings for fewer years, and (6) the expanded firm generated greater 1967 estimated gross receipts.

These differences are self-explanatory with the possible exception of items number (2) larger family, (3) greater income in 1962, and (5) attended few meetings. Item number (2) may be a reason for a business expansion. Number (3) can be interpreted to mean that the
greater the income generated the greater the amount of money available for business investment. Investment may increase net worth. Item (5) indicates that the fast growth operators attended young farmer meeting less frequently than slow growth operators.

The firms of the fast growers were larger in 1962 in terms of total assets controlled but the net worths were not greatly different. The fast growers were less specialized in livestock, placed less emphasis on efficiency, had less equity in their business and had more debt. Also, the fast growers had about $2,200 greater average farm income in 1966 than the slow growers.

Further investigation of income differences revealed that in 1962 the fast growers had greater mean incomes by about $2,100. Thus, both fast and slow growers increased mean incomes by a similar amount during the study period.

**Conditioned "fast" versus "slow" grower comparisons**

Often the interrelation of some variables conceal important differences which are not revealed by the above method of analysis. To investigate this possibility the four arrays were further divided into eight arrays at the mean value of "conditioning variables." "Conditioning variables" were selected based on significantly differing variables in the above analysis. The two "conditioning variables" for growth measured as "change in net worth" were the credit use attitude and efficiency goal variables. The two "conditioning variables" for growth measured as "change in total assets controlled" were the growth goal and equity percentage variables.
The means and sums of these sub-arrays were tested for significant differences by comparing the fast and slow growers having similar values for the conditioning variables. The same variables which were significantly different in the less complex comparisons reported above were found to be significantly different in these comparisons. Some additional differences were isolated, but these were inconsistent. For example, the fast growers with credit use attitudes scores greater than the sample mean, had significantly greater net worth in 1962 than the slow growers. However, the fast growers with credit use attitudes scores less than the sample mean had less net worth in 1962 than the slow growers.

Comparisons based upon credit use attitude

A third series of group comparisons were made. All firms in each of the growth groups (44 and 49) were divided into two groups at the mean value of the credit use attitude "conditioning variable." The means and sums of these arrays were tested for significant differences (Table 14).

Interpretation of the values in this table is illustrated with the following example. The mean age of operators with a credit use attitude scale score below the mean 9.02 was 39.9 years with growth measured as change in total assets controlled (Table 14). The mean age of operators whose credit use attitude was greater than 9.02 was 40.7 years with growth measured in the same manner. The remaining values in Table 14 can be interpreted in a similar manner.
**TABLE 14**

MEANS AND SUMS\(^8\) OF SELECTED VARIABLES AS "CONDITIONED" BY THE MEAN CREDIT USE ATTITUDE SCORE, GROWTH MEASURED AS CHANGE IN TOTAL ASSETS CONTROLLED AND CHANGE IN NET WORTH, SAMPLE FARMS, 1967

(Mean for Both Groups Equals 9.02)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than Mean (23)</td>
<td>Greater than Mean (26)</td>
</tr>
<tr>
<td>1. Age</td>
<td>year</td>
<td>39.9(^b)</td>
<td>40.7(^b)</td>
</tr>
<tr>
<td>2. Education</td>
<td>year</td>
<td>12.3(^d)</td>
<td>11.8(^d)</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>7.1</td>
<td>10.7</td>
</tr>
<tr>
<td>4. Risk acceptance attitude</td>
<td>scale</td>
<td>18.7</td>
<td>18.6</td>
</tr>
<tr>
<td>5. Innovation attitude</td>
<td>scale</td>
<td>29.0</td>
<td>29.5</td>
</tr>
<tr>
<td>6. Business orientation attitude</td>
<td>scale</td>
<td>37.0</td>
<td>37.9</td>
</tr>
<tr>
<td>7. Management score</td>
<td>scale</td>
<td>13.4(^b)</td>
<td>15.8(^b)</td>
</tr>
<tr>
<td>8. Corn yield</td>
<td>bushel</td>
<td>86.8(^b)</td>
<td>97.5(^b)</td>
</tr>
<tr>
<td>9. Total assets controlled, 1962</td>
<td>dollar</td>
<td>138684.0</td>
<td>166090.0</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>7.</td>
<td>12.</td>
</tr>
<tr>
<td>11. Additional land available</td>
<td>scale</td>
<td>7.</td>
<td>9.</td>
</tr>
<tr>
<td>12. Rent strategy used</td>
<td>scale</td>
<td>10.</td>
<td>9.</td>
</tr>
<tr>
<td>13. Purchase strategy used</td>
<td>scale</td>
<td>22.</td>
<td>25.</td>
</tr>
<tr>
<td>14. Other strategies used</td>
<td>scale</td>
<td>6.</td>
<td>6.</td>
</tr>
<tr>
<td>15. Family problems</td>
<td>scale</td>
<td>7.</td>
<td>7.</td>
</tr>
<tr>
<td>16. Use of nonfarm capital (not borrowed)</td>
<td>scale</td>
<td>6.</td>
<td>6.</td>
</tr>
<tr>
<td>17. Number of children at home</td>
<td>number</td>
<td>2.1</td>
<td>2.3</td>
</tr>
<tr>
<td>18. Pigs per litter</td>
<td>pig</td>
<td>7.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>By Change in Total Assets Controlled</td>
<td>By Change in Net Worth</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>------</td>
<td>---------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than Mean (23)</td>
<td>Greater than Mean (26)</td>
</tr>
<tr>
<td>19. Net worth, 1962</td>
<td>dollar</td>
<td>33021.0</td>
<td>37053.0</td>
</tr>
<tr>
<td>20. Livestock specialization</td>
<td>dollar</td>
<td>42.6</td>
<td>39.8</td>
</tr>
<tr>
<td>22. Total number of children, 1967</td>
<td>number</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>23. Sons, 9 to 15 in 1962</td>
<td>number</td>
<td>.2</td>
<td>.5</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>.2</td>
<td>.5</td>
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<tr>
<td>26. Percentage equity, 1962</td>
<td>per cent</td>
<td>84.0</td>
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</tr>
<tr>
<td>27. Family consumption</td>
<td>dollar</td>
<td>234.0</td>
<td>273.0</td>
</tr>
<tr>
<td>28. Farm income, 1962</td>
<td>dollar</td>
<td>3475.0</td>
<td>5890.0</td>
</tr>
<tr>
<td>29. Farm debt, 1962</td>
<td>dollar</td>
<td>6281.0</td>
<td>13059.0</td>
</tr>
<tr>
<td>30. Rent land strategy</td>
<td>scale</td>
<td>10.</td>
<td>9.</td>
</tr>
<tr>
<td>32. Other land strategies used</td>
<td>scale</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>33. Purchase livestock strategy used</td>
<td>scale</td>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>6.</td>
<td>4.</td>
</tr>
<tr>
<td>35. Rent machinery and buildings</td>
<td>scale</td>
<td>4.</td>
<td>5.</td>
</tr>
<tr>
<td>37. Purchase (acquire) full-time hired labor</td>
<td>scale</td>
<td>2.</td>
<td>1.</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>By Change in Total Assets Controlled</td>
<td>By Change in Net Worth</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>--------</td>
<td>--------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>Less than Mean (23)</td>
<td>Greater than Mean (26)</td>
<td>Less than Mean (21)</td>
</tr>
<tr>
<td>39. Acquire livestock</td>
<td></td>
<td>7.</td>
<td>7.</td>
</tr>
<tr>
<td>40. Family goal ranked first or tied</td>
<td></td>
<td>4.</td>
<td>7.</td>
</tr>
<tr>
<td>41. Community goal ranked first or tied</td>
<td></td>
<td>5.</td>
<td>5.</td>
</tr>
<tr>
<td>42. Change in total assets, 1962-1967</td>
<td>dollar</td>
<td>40053.0</td>
<td>49826.0</td>
</tr>
<tr>
<td>43. Percentage change in total assets(^h)</td>
<td>per cent</td>
<td>35.5</td>
<td>37.3</td>
</tr>
<tr>
<td>44. Change in net worth, 1962-1967</td>
<td>dollar</td>
<td>13209.0 (^c)</td>
<td>27106.0 (^c)</td>
</tr>
<tr>
<td>45. Percentage change in net worth(^h)</td>
<td>per cent</td>
<td>193.2</td>
<td>129.6</td>
</tr>
<tr>
<td>46. Health rating(^i)</td>
<td>scale</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>47. 4-H</td>
<td>year</td>
<td>2.9</td>
<td>2.2</td>
</tr>
<tr>
<td>48. Vo-Ag</td>
<td>year</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>49. Young farmer</td>
<td>year</td>
<td>3.3</td>
<td>2.4</td>
</tr>
<tr>
<td>50. Corn acres, 1962</td>
<td>acre</td>
<td>97.6</td>
<td>118.7</td>
</tr>
<tr>
<td>51. Corn acres, 1967</td>
<td>acre</td>
<td>143.6 (^b)</td>
<td>212.8 (^b)</td>
</tr>
<tr>
<td>52. Soybeans and wheat acres, 1962</td>
<td>acre</td>
<td>57.1</td>
<td>79.3</td>
</tr>
<tr>
<td>53. Soybeans and wheat acres, 1967</td>
<td>acre</td>
<td>95.1</td>
<td>114.3</td>
</tr>
<tr>
<td>54. Hogs sold, 1962</td>
<td>head</td>
<td>450.3</td>
<td>514.4</td>
</tr>
</tbody>
</table>
TABLE 14 (contd.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than Mean (23)</td>
<td>Greater than Mean (26)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than Mean (21)</td>
<td>Greater than Mean (23)</td>
</tr>
<tr>
<td>55. Hogs sold, 1967</td>
<td>head</td>
<td>457.6^c</td>
<td>757.0^c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>436.9^c</td>
<td>688.5^c</td>
</tr>
<tr>
<td>56. Gross income, 1962</td>
<td>dollar</td>
<td>22351.0</td>
<td>23955.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22390.0</td>
<td>21746.0</td>
</tr>
<tr>
<td>57. Estimated gross income, 1967</td>
<td>dollar</td>
<td>26493.0^c</td>
<td>40250.0^c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25916.0^c</td>
<td>38252.0^c</td>
</tr>
<tr>
<td>58. Farm income, 1966</td>
<td>dollar</td>
<td>7274.0^b</td>
<td>9616.0^b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7192.0</td>
<td>9057.0</td>
</tr>
</tbody>
</table>

^a The values for variables 10 to 16, 21, 25 and 30 to 41 are the number of respondents who did as the variables indicate.

^b Difference significant at the .10 level of probability.

^c Difference significant at the .05 level of probability.

^d Difference significant at the .01 level of probability.

^e Dollar value of investment in livestock per acre of land operated, 1962.

^f Mean of estimated monthly family living expenditures for 1962 and 1967.

^g Sum of farm income reported on IRS form 1040E and farm income subject to capital gains on IRS form 1040 D.

^h As a percentage of the 1962 value.

^i Excellent equals 4, good equals 3, fair equals 2, poor equals 1.
For both measures of growth (Table 14) operators with credit use attitude scores greater than the sample mean had the following significantly different characteristics compared to those with a credit use attitude scale score less than the mean: (1) less education, (2) higher corn yield, (3) more sons aged nine to 15 years old in 1962, (4) more family consumption expenditures, (5) more 1962 and 1966 farm income, and (6) greater change in constant dollar value of net worth, greater dollar value of gross receipts in 1967, greater number of hogs marketed in 1967, and more acres of corn growth in 1967.

These results indicate that the operators who were willing to borrow money achieved larger size, had $2,300 greater 1966 income, spent more money for family consumption and had higher corn yields than operators not as willing to borrow money. These operators had significantly less education and fewer years of 4-H, Vo-Ag and Young Farmer class experience.

Operators with more positive credit use attitudes were better managers, had larger firms in 1962 as measured by total assets controlled or net worth, had a less intensive livestock operation, had greater debt, greater change in total assets controlled, hogs sold, gross receipts and farm income, but had no outstanding differences in the types of strategies used.

Comparisons based upon the growth goal ranking

The final series of comparisons involved testing groups formed using the importance attached to the growth goal as the grouping criterion (Table 15).
TABLE 15
MEANS AND SUMS\textsuperscript{a} OF SELECTED VARIABLES AS "CONDITIONED" BY THE GROWTH GOAL RANKING, GROWTH MEASURED AS CHANGE IN TOTAL ASSETS CONTROLLED AND CHANGE IN NET WORTH, SAMPLE FARMS, 1967

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Not Ranked First (30)</td>
<td>Ranked First (19)</td>
</tr>
<tr>
<td>1. Age</td>
<td>year</td>
<td>42.5\textsuperscript{d}</td>
<td>37.0\textsuperscript{d}</td>
</tr>
<tr>
<td>2. Education</td>
<td>year</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>3. Credit use attitude</td>
<td>scale</td>
<td>8.7</td>
<td>9.6</td>
</tr>
<tr>
<td>4. Risk acceptance attitude</td>
<td>scale</td>
<td>18.6</td>
<td>18.8</td>
</tr>
<tr>
<td>5. Innovation attitude</td>
<td>scale</td>
<td>29.0</td>
<td>29.7</td>
</tr>
<tr>
<td>6. Business orientation attitude</td>
<td>scale</td>
<td>37.3\textsuperscript{b}</td>
<td>37.8 \textsuperscript{b}</td>
</tr>
<tr>
<td>7. Management score</td>
<td>scale</td>
<td>13.5\textsuperscript{b}</td>
<td>16.5 \textsuperscript{b}</td>
</tr>
<tr>
<td>8. Corn yield</td>
<td>bushel</td>
<td>91.2</td>
<td>94.5</td>
</tr>
<tr>
<td>9. Total assets controlled, 1962</td>
<td>dollar</td>
<td>153399.0</td>
<td>155691.0</td>
</tr>
<tr>
<td>10. Growth goal ranked first or tied</td>
<td>scale</td>
<td>0. \textsuperscript{d}</td>
<td>19. \textsuperscript{d}</td>
</tr>
<tr>
<td>11. Additional land available</td>
<td>scale</td>
<td>9.</td>
<td>7.</td>
</tr>
<tr>
<td>12. Rent strategy used</td>
<td>scale</td>
<td>9.</td>
<td>10.</td>
</tr>
<tr>
<td>13. Purchase strategy used</td>
<td>scale</td>
<td>28.</td>
<td>19.</td>
</tr>
<tr>
<td>14. Other strategies used</td>
<td>scale</td>
<td>8.</td>
<td>4.</td>
</tr>
<tr>
<td>15. Family problems</td>
<td>scale</td>
<td>10.</td>
<td>4.</td>
</tr>
<tr>
<td>16. Use of nonfarm capital (not borrowed)</td>
<td>scale</td>
<td>9.</td>
<td>3.</td>
</tr>
<tr>
<td>Variable</td>
<td>Unit</td>
<td>By Change in Total Assets Controlled</td>
<td>By Change in Net Worth</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>---------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Ranked First (30)</td>
<td>Ranked First (19)</td>
</tr>
<tr>
<td>17. Number of children at home</td>
<td>number</td>
<td>1.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.8&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>18. Pigs per litter</td>
<td>pig</td>
<td>8.0</td>
<td>7.7</td>
</tr>
<tr>
<td>19. Net worth, 1962</td>
<td>dollar</td>
<td>40724.0</td>
<td>25566.0</td>
</tr>
<tr>
<td>20. Livestock specialization&lt;sup&gt;e&lt;/sup&gt;</td>
<td>dollar</td>
<td>42.5</td>
<td>38.8</td>
</tr>
<tr>
<td>21. Efficiency goal ranked first or tied</td>
<td>scale</td>
<td>19. b</td>
<td>7. b</td>
</tr>
<tr>
<td>22. Total number of children, 1967</td>
<td>number</td>
<td>2.1</td>
<td>2.8&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>23. Sons, 9 to 15 in 1962</td>
<td>number</td>
<td>0.4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.3</td>
</tr>
<tr>
<td>24. Children, 13 to 18 in 1962</td>
<td>number</td>
<td>0.5&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.1</td>
</tr>
<tr>
<td>26. Percentage equity, 1962</td>
<td>per cent</td>
<td>86.2</td>
<td>75.1</td>
</tr>
<tr>
<td>27. Family consumption&lt;sup&gt;f&lt;/sup&gt;</td>
<td>dollar</td>
<td>258.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>282.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>28. Farm income, 1962&lt;sup&gt;e&lt;/sup&gt;</td>
<td>dollar</td>
<td>5310.0</td>
<td>4126.0</td>
</tr>
<tr>
<td>29. Farm debt, 1962</td>
<td>dollar</td>
<td>10263.0</td>
<td>8881.0</td>
</tr>
<tr>
<td>30. Rent land strategy</td>
<td>scale</td>
<td>9.</td>
<td>10.</td>
</tr>
<tr>
<td>31. Purchase land strategy</td>
<td>scale</td>
<td>12.</td>
<td>9.</td>
</tr>
<tr>
<td>32. Other land strategies used</td>
<td>scale</td>
<td>3.</td>
<td>0.</td>
</tr>
<tr>
<td>33. Purchase livestock strategy used</td>
<td>scale</td>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>34. Other livestock strategies</td>
<td>scale</td>
<td>6.</td>
<td>4.</td>
</tr>
<tr>
<td>35. Rent machinery and buildings</td>
<td>scale</td>
<td>5.</td>
<td>4.</td>
</tr>
</tbody>
</table>
TABLE 15 (contd.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Not Ranked First (30)</th>
<th>Ranked First (19)</th>
<th>Not Ranked First (28)</th>
<th>Ranked First (16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36. Purchase (acquire) machinery and buildings</td>
<td>scale</td>
<td>27.</td>
<td>19.</td>
<td>26.</td>
<td>16.</td>
</tr>
<tr>
<td>37. Purchase (acquire) full-time hired labor</td>
<td>scale</td>
<td>3.</td>
<td>0.</td>
<td>3.</td>
<td>0.</td>
</tr>
<tr>
<td>38. Acquire land</td>
<td>scale</td>
<td>19.</td>
<td>18.</td>
<td>17.</td>
<td>15.</td>
</tr>
<tr>
<td>39. Acquire livestock</td>
<td>scale</td>
<td>7.</td>
<td>7.</td>
<td>7.</td>
<td>6.</td>
</tr>
<tr>
<td>40. Family goal ranked first or tied</td>
<td>scale</td>
<td>6.</td>
<td>5.</td>
<td>6.</td>
<td>4.</td>
</tr>
<tr>
<td>41. Community goal ranked first or tied</td>
<td>scale</td>
<td>8.</td>
<td>2.</td>
<td>8.</td>
<td>2.</td>
</tr>
<tr>
<td>42. Change in total assets, 1962-1967</td>
<td>dollar</td>
<td>23125.0d</td>
<td>80154.0d</td>
<td>22652.0d</td>
<td>73253.0d</td>
</tr>
<tr>
<td>43. Percentage change in total assetsh</td>
<td>per cent</td>
<td>22.9c</td>
<td>57.9c</td>
<td>22.2c</td>
<td>52.7c</td>
</tr>
<tr>
<td>44. Change in net worth, 1962-1967</td>
<td>dollar</td>
<td>18902.0</td>
<td>22712.0</td>
<td>19630.0</td>
<td>22712.0</td>
</tr>
<tr>
<td>45. Percentage change in net worthh</td>
<td>per cent</td>
<td>189.9</td>
<td>111.2</td>
<td>185.2</td>
<td>111.2</td>
</tr>
<tr>
<td>46. Health ratingi</td>
<td>scale</td>
<td>3.4b</td>
<td>3.7b</td>
<td>3.5</td>
<td>3.6</td>
</tr>
<tr>
<td>47. 4-H</td>
<td>year</td>
<td>3.1</td>
<td>1.7</td>
<td>3.0</td>
<td>1.7</td>
</tr>
<tr>
<td>48. Vo-Ag</td>
<td>year</td>
<td>1.9</td>
<td>2.0</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>49. Young farmer</td>
<td>year</td>
<td>3.7b</td>
<td>1.5b</td>
<td>4.0c</td>
<td>1.1c</td>
</tr>
<tr>
<td>50. Corn acres, 1962</td>
<td>acre</td>
<td>102.5</td>
<td>118.6</td>
<td>100.3</td>
<td>121.2</td>
</tr>
</tbody>
</table>
### TABLE 15 (contd.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>By Change in Total Assets Controlled</th>
<th>By Change in Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Not Ranked (First) (30)</td>
<td>Ranked First (19)</td>
</tr>
<tr>
<td>51. Corn acres, 1967</td>
<td>acre</td>
<td>145.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>234.6&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>52. Soybeans and wheat acres, 1962</td>
<td>acre</td>
<td>77.5</td>
<td>55.3</td>
</tr>
<tr>
<td>53. Soybeans and wheat acres, 1967</td>
<td>acre</td>
<td>91.5</td>
<td>127.5</td>
</tr>
<tr>
<td>54. Hogs sold, 1962</td>
<td>head</td>
<td>471.5</td>
<td>502.2</td>
</tr>
<tr>
<td>55. Hogs sold, 1967</td>
<td>head</td>
<td>348.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>733.2&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>56. Gross income, 1962</td>
<td>dollar</td>
<td>25978.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>18973.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>57. Estimated gross income, 1967</td>
<td>dollar</td>
<td>30677.0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>37405.0&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>58. Farm income, 1966&lt;sup&gt;g&lt;/sup&gt;</td>
<td>dollar</td>
<td>-7391.0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>10299.0&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>The values for variables 10 to 16, 21, 25, and 30 to 41 are the number of respondents who did as the variables indicate.

<sup>b</sup>Difference significant at the .10 level of probability.

<sup>c</sup>Difference significant at the .05 level of probability.

<sup>d</sup>Difference significant at the .01 level of probability.

<sup>e</sup>Dollar value of investment in livestock per acre of land operated, 1962.

<sup>f</sup>Mean of estimated monthly family living expenditures for 1962 and 1967.

<sup>g</sup>Sum of farm income reported on IRS form 1040<sup>F</sup> and farm income subject to capital gains on IRS form 1040D.

<sup>h</sup>As a percentage of the 1962 value.

<sup>i</sup>Excellent equals 4, good equals 3, fair equals 2, poor equals 1.
The results indicate that for both measures of growth the operators who ranked growth first had several characteristics in which they were different than the operators who did not rank the growth goal first. The growth orientated operators: (1) were younger, (2) were better managers, (3) had larger families with more children still at home but less children 13 to 18 years old in 1962, (4) had greater family consumption expenditures, (5) had a lower percentage equity in the business, (6) had greater family consumption expenditures, (7) had a greater growth in firm size as measured by total assets controlled, net worth, corn, soybeans and wheat acreage, hogs marketed, gross receipts or farm income. (These latter five measures of size change were inferred from Table 15 and were not tested for significance), (8) had better health and (9) had spent fewer years in young farmer classes.

In addition these growth seeking operators tended to have a higher credit use attitude, lower 1962 net worth, be less specialized in livestock production, placed less emphasis on efficiency, had less 1962 income and less 1962 debt, used the land renting strategy more often (proportionately), and were less concerned about community activities or recognition.

In summary, these results indicate that the young operators with less equity, less debt and larger families were the farmers seeking growth and achieving growth, receiving greater incomes ($2,000 greater in 1966) and spending more for consumption.
Conclusions from the group comparisons

There are several conclusions which can be made from the results of these group comparisons. First, the fast growing firms, with growth measured as the "Change in the Constant Dollar Value of Net Worth," were managed by operators who had a more positive credit use attitude, had more children still at home but fewer sons aged nine to 15 years in 1962, had greater 1962 farm income, and as a result of growth had a greater farm income. However, the income difference between the fast and slow growers was nearly the same in 1962 and 1966.

Second, the fast growing firms, with growth measured as the "Change in the Constant Dollar Value of Total Assets Controlled," were managed by younger operators who had a more positive credit use attitude, were seeking growth rather than efficiency or community recognition, reported little additional land available, had larger families, had lower equity in the business, had hired more full time labor and received a $3300 greater increase in farm income.

Third, operators with the most positive credit use attitude had less education, higher corn yields, more sons nine to 15 years in 1962, spent more for family consumption, had greater 1962 and 1966 farm income and grew more in terms of change in net worth.

The final conclusion is that the operators seeking growth as a goal were younger, were better managers, had larger families, had a lower percentage equity in the business, spent more for family consumption, had greater increase in total assets controlled, had better health and received greater 1966 farm income.
Regression Analysis

The purpose of the regression analysis was to further investigate the importance of personal, nonpersonal and strategy variables in explaining growth and to estimate a linear function which could be used to predict farm firm growth. The two measures of growth were regressed on various sets of independent variables in conducting this analysis. As the analysis progressed, nonsignificant variables were deleted so that the predictive models included a small number of highly predictive variables.

Variables used

Eight personal, nine nonpersonal and from four to 23 growth strategy variables made up the independent variables of the analysis discussed herein. A function could not be estimated using all the independent variables and the 23 strategy variables because of data limitations.

The personal variables (P) included in the present analysis were:

1. Age, measured in years
2. Education, measured in years of formal schooling
3. Credit use attitude scale score
4. Risk acceptance attitude scale score
5. Innovation attitude scale score
6. Business orientation attitude scale score
7. Management ability scale score
8. Growth goal ranking, measured as the number of times the
growth goal was selected in the goal pairings (maximum of
four).

The nonpersonal variables (NP) included the following:
1. Efficiency, measured by bushels of corn harvested per acre
2. Availability of additional land (a dummy variable)
3. Number of children at home during the period
4. Size in 1962, measured by dollars of net worth
5. Livestock specialization, measured as dollars of livestock
   investment per acre operated in 1962
6. Availability of additional family labor, measured as sons
   aged nine to 15 years in 1962
7. Operator equity percentage in 1962
8. Farm income (1040F plus 1040D) in 1962
9. Farm debt in 1962

The growth strategy variables consisted of three sets of dummy
variables. These sets were based upon the classification of growth
strategies by acquisition (set I), by resource acquired (set II) or
by method by resource acquired (set III).

Strategy set I was composed of renting, purchasing, or other ac­
quision strategies in the following combinations:
1. Purchase only
2. Other strategies only (mainly inheritance and internal ex­
pansion)
3. Rent and purchase combination
4. Purchase and other strategies
5. Rent, purchase, and other strategies

The last dummy variable, rent, purchase and other strategies, was deleted in the regression analysis because of regression matrix singularity. Consequently, the regression coefficients of the remaining four were interpreted as deviations from this deleted strategy.

Strategy set II was composed of combinations of strategies to acquire: machinery and building, full-time labor, land, and livestock. The dummy variables of this set were to acquire:

1. Machinery and buildings only
2. Land only
3. Livestock only
4. Machinery-buildings and land
5. Machinery-buildings and livestock
6. Machinery-buildings, labor and land
7. Machinery-buildings, land, and livestock
8. Machinery-buildings, labor, land, and livestock

The last dummy variable was deleted in the regression models.

Strategy set III was composed of dummy variables based upon combinations of renting land, purchasing land, other land acquisition strategies, purchasing livestock, use of other livestock acquisition
methods, renting of machinery and buildings, purchasing of machinery and buildings and purchasing of full-time labor. These combinations were:

1. Purchase land only
2. Other land acquisition methods (mainly inheritance)
3. Other livestock strategies (mainly internal expansion)
4. Purchase machinery-buildings
5. Rent land and purchase machinery-buildings
6. Purchase land and machinery-buildings
7. Other land acquisition and purchase machinery-buildings
8. Purchase livestock and machinery-buildings
9. Other livestock methods and purchase machinery-buildings
10. Rent and purchase machinery-buildings
11. Rent and purchase land, purchase machinery-buildings
12. Rent land, purchase livestock and machinery-buildings
13. Rent land and machinery-buildings and purchase machinery-buildings
14. Rent land, purchase machinery-buildings and labor
15. Purchase land, livestock, and machinery-buildings
16. Purchase land, other livestock strategies and purchase machinery-buildings
17. Purchase land, rent and purchase machinery-buildings

Variables number 2 and 20 were not used in the net worth regression models because no observations occurred in these classes.
18. Purchase and other livestock strategies, purchase machinery-buildings

19. Rent and purchase land, other livestock methods, and purchase machinery-buildings

20. Rent and purchase land, rent and purchase machinery-buildings

21. Rent land, other livestock strategies, and rent and purchase machinery-buildings

22. Purchase land, livestock and machinery-buildings and other livestock strategies

23. Rent and other land strategies, other livestock strategies, purchase machinery-buildings and labor

24. Rent land, purchase and other livestock strategies, rent and purchase machinery-buildings and purchase labor

The last dummy variable (24) was deleted in the regression runs.

Results and conclusions—coefficients of multiple determination

This section presents the coefficients of multiple determination ($R^2$'s) of selected regression models and the effects upon these $R^2$'s of the deletion of selected variables from the models.

The $R^2$'s of selected regression models which were estimated to isolate the effects of the independent factors upon growth are presented in Tables 16 to 19. The $R^2$ for selected models are presented in Table 16. The reductions in $R^2$ effected by the deletion of the eight personal variables from selected beginning models are presented
### TABLE 16

**COEFFICIENTS OF MULTIPLE DETERMINATION \( (R^2) \) FOR SELECTED REGRESSION MODELS, BY DEPENDENT VARIABLE**

<table>
<thead>
<tr>
<th>Model (^a)</th>
<th>Change in Net Worth</th>
<th>Change in Total Assets Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>.177</td>
<td>.488(^d)</td>
</tr>
<tr>
<td>NP</td>
<td>.408(^c)</td>
<td>.336(^c)</td>
</tr>
<tr>
<td>P + NP</td>
<td>.599(^c)</td>
<td>.516(^b)</td>
</tr>
<tr>
<td>P + S(_1)</td>
<td>.256</td>
<td>.607(^d)</td>
</tr>
<tr>
<td>NP + S(_1)</td>
<td>.566(^d)</td>
<td>.506(^d)</td>
</tr>
<tr>
<td>P + NP + S(_1)</td>
<td>.690(^c)</td>
<td>.647(^c)</td>
</tr>
<tr>
<td>P + S(_2)</td>
<td>.307</td>
<td>.611(^d)</td>
</tr>
<tr>
<td>NP + S(_2)</td>
<td>.503</td>
<td>.460(^b)</td>
</tr>
<tr>
<td>P + NP + S(_2)</td>
<td>.686</td>
<td>.640(^b)</td>
</tr>
<tr>
<td>P + S(_3)</td>
<td>.648</td>
<td>.863(^d)</td>
</tr>
<tr>
<td>NP + S(_3)</td>
<td>.934(^d)</td>
<td>.833(^c)</td>
</tr>
<tr>
<td>P + NP \pm S(_3)</td>
<td>.986(^d)</td>
<td>.938(^c)</td>
</tr>
</tbody>
</table>

\(^a\)P stands for the 8 personal variables, NP for the 9 nonpersonal variables, S for strategy set I, S\(_2\) for strategy set II and S\(_3\) for strategy set III.

\(^b\)Significant at the .10 level of probability.

\(^c\)Significant at the .05 level of probability.

\(^d\)Significant at the .01 level of probability.
in Table 17. Similar results for the nine nonpersonal and the strategy variables are presented in Tables 18 and 19, respectively. An $F$ test was made of the hypothesis that the contribution to $R^2$ of the deleted variables was equal to zero. The results of this test are also indicated in Tables 17 to 19.

Several conclusions can be drawn from these results. First, the nonpersonal variables were more satisfactory than the personal variables in predicting change in net worth. This conclusion is based upon a comparison of the effects upon $R^2$ of the personal and nonpersonal variables (Tables 17 and 18). The nonpersonal variables make significant contributions to explaining the variation of change in net worth, the personal do not.

The second conclusion is that the personal variables were as satisfactory or more satisfactory than the nonpersonal in predicting change in total assets controlled. The personal variables had larger effects (several significant) upon the $R^2$'s of selected models than did the nonpersonal variables (Tables 17 and 18).

These first two conclusions appear logical. An operator's attitudes, goals, and abilities would be likely to influence expansion measured in terms of resources controlled; but, the profitability of the farming operation, which is dependent upon efficiency and prices, and the amount of reinvested profit could overshadow these considerations when growth is measured by change in net worth.
**TABLE 17**

REDUCTION IN THE COEFFICIENT OF MULTIPLE DETERMINATION ($R^2$) 
EFFECTED BY THE DELETION OF THE PERSONAL VARIABLES, 
SELECTED MODELS, BY DEPENDENT VARIABLE

<table>
<thead>
<tr>
<th>Basic Model$^a$</th>
<th>Deleted Variables$^a$</th>
<th>Change in Net Worth</th>
<th>Change in Total Assets Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>P + NP</td>
<td>P</td>
<td>.191</td>
<td>.180</td>
</tr>
<tr>
<td>P + NP + S₁</td>
<td>P</td>
<td>.124</td>
<td>.141</td>
</tr>
<tr>
<td>P + NP + S₂</td>
<td>P</td>
<td>.183</td>
<td>.180</td>
</tr>
<tr>
<td>P + NP + S₃</td>
<td>P</td>
<td>.052</td>
<td>.105</td>
</tr>
<tr>
<td>P + S₁</td>
<td>P</td>
<td>.163</td>
<td>.296$^d$</td>
</tr>
<tr>
<td>P + S₂</td>
<td>P</td>
<td>.157</td>
<td>.341$^d$</td>
</tr>
<tr>
<td>P + S₃</td>
<td>P</td>
<td>.084</td>
<td>.173$^c$</td>
</tr>
</tbody>
</table>

$^a$P stands for the 8 personal variables, NP for the 9 nonpersonal variables, $S_1$ for strategy set I, $S_2$ for strategy set II, and $S_3$ for strategy set III.

$^b$Significant at the .10 level of probability.

$^c$Significant at the .05 level of probability.

$^d$Significant at the .01 level of probability.
**TABLE 18**

**REDUCTIONS IN THE COEFFICIENT OF MULTIPLE DETERMINATION \( (r^2) \)**
**EFFECTED BY THE DELETION OF THE NONPERSONAL VARIABLES,**
**SELECTED MODELS, BY DEPENDENT VARIABLE**

<table>
<thead>
<tr>
<th>Basic Model (^a)</th>
<th>Deleted Variables (^a)</th>
<th>Change in Net Worth</th>
<th>Change in Total Assets Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P + NP )</td>
<td>NP</td>
<td>.422(^c)</td>
<td>.028</td>
</tr>
<tr>
<td>( P + NP + S_1 )</td>
<td>NP</td>
<td>.434(^d)</td>
<td>.040</td>
</tr>
<tr>
<td>( P + NP + S_2 )</td>
<td>NP</td>
<td>.379(^c)</td>
<td>.029</td>
</tr>
<tr>
<td>( P + NP + S_3 )</td>
<td>NP</td>
<td>.338</td>
<td>.075</td>
</tr>
<tr>
<td>( NP + S_1 )</td>
<td>NP</td>
<td>.473(^d)</td>
<td>.195</td>
</tr>
<tr>
<td>( NP + S_2 )</td>
<td>NP</td>
<td>.353(^b)</td>
<td>.190</td>
</tr>
<tr>
<td>( NP + S_3 )</td>
<td>NP</td>
<td>.370(^d)</td>
<td>.143</td>
</tr>
</tbody>
</table>

\(^a\)P stands for the 8 personal variables, NP for the 9 nonpersonal variables, \( S_1 \) for strategy set I, \( S_2 \) for strategy set II, and \( S_3 \) for strategy set III.

\(^b\)Significant at the .10 level of probability.

\(^c\)Significant at the .05 level of probability.

\(^d\)Significant at the .01 level of probability.
### TABLE 19
REDUCTIONS IN THE COEFFICIENT OF MULTIPLE DETERMINATION ($R^2$) EFFECTED BY THE DELETION OF THE GROWTH STRATEGY VARIABLES, SELECTED MODELS, BY STRATEGY VARIABLE SET, BY DEPENDENT VARIABLE

<table>
<thead>
<tr>
<th>Basic Model(^a)</th>
<th>Deleted Variables(^a)</th>
<th>Dependent Variable</th>
<th>Change in Net Worth</th>
<th>Change in Total Assets Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P + NP + S_1$</td>
<td>$S_1$</td>
<td></td>
<td>.091</td>
<td>.131(^b)</td>
</tr>
<tr>
<td>$P + NP + S_2$</td>
<td>$S_2$</td>
<td></td>
<td>.087</td>
<td>.124</td>
</tr>
<tr>
<td>$P + NP + S_3$</td>
<td>$S_3$</td>
<td></td>
<td>.387(^c)</td>
<td>.422(^b)</td>
</tr>
<tr>
<td>$P + S_1$</td>
<td>$S_1$</td>
<td></td>
<td>.079</td>
<td>.119(^c)</td>
</tr>
<tr>
<td>$P + S_2$</td>
<td>$S_2$</td>
<td></td>
<td>.130</td>
<td>.123</td>
</tr>
<tr>
<td>$P + S_3$</td>
<td>$S_3$</td>
<td></td>
<td>.471</td>
<td>.375(^b)</td>
</tr>
<tr>
<td>$NP + S_1$</td>
<td>$S_1$</td>
<td></td>
<td>.158(^c)</td>
<td>.170(^c)</td>
</tr>
<tr>
<td>$NP + S_2$</td>
<td>$S_2$</td>
<td></td>
<td>.095</td>
<td>.124</td>
</tr>
<tr>
<td>$NP + S_3$</td>
<td>$S_3$</td>
<td></td>
<td>.526(^d)</td>
<td>.497(^b)</td>
</tr>
</tbody>
</table>

\(^a\)P stands for the 8 personal variables, NP for the 9 nonpersonal variables, $S_1$ for strategy set I, $S_2$ for strategy set II, and $S_3$ for strategy set III.

\(^b\)Significant at the .10 level of probability.

\(^c\)Significant at the .05 level of probability.

\(^d\)Significant at the .01 level of probability.
The third conclusion is that the strategy variables explained more of the variance of the total assets model than for the net worth model. The strategy variables make a greater contribution to the $R^2$ of the total assets model than to the net worth model in all but three of the comparisons which are made in Table 19. This conclusion seems logical. Expansion strategies are more important to increasing assets controlled; consolidation strategies are more important in effecting increase in net worth.

The fourth conclusion is that strategy set III, which consisted of classification by acquisition method by resource acquired, explained more of the variance of the dependent variables than sets I or II for all the models presented in Table 19. However, in the case of the total asset model because set I consisted of only four variables and set III consisted of 23 variables, the additional explained variance per variable was greater for set I. This variance per variable tested significantly different than zero at the same or lower probability levels. Set III tested significant at a lower probability for the net worth models.

The fifth conclusion is a summary of the first four. Namely, the "best" models, the ones with the highest $R^2$'s, were models which included all the variables—personal, nonpersonal and strategy. For change in net worth these models had $R^2$'s of .690, .686 and .986 for strategy sets I, II, and III respectively (Table 16). These $R^2$'s were significant at the .05 level, nonsignificant and significant at the .01 level respectively. Using change in total assets...
controlled as the dependent variable the $R^2$'s were .647, .640, and .938 for strategy sets I, II, and III respectively (Table 16). The $R^2$'s were significant at the .05, .10, and .01 levels, respectively.

Results and conclusions—"best" predictive models

This section presents the "best" predictive models of the farm firm growth isolated in this study. There are six models, one for each strategy set for each of the two measures of growth. These models are "best" as evaluated by the author. The intent was to achieve a relatively high $R^2$ with as few as possible variables.

In interpreting these results the reader should remember that the regression coefficients are the effect upon growth over a five year period per unit of the variable.

Change in net worth as the measure of growth

Strategy set I.—The "best" predictive model using strategy set I was a model of seven variables. It had an $R^2$ of .600 (significant at the .01 level of probability) which indicated that 60 per cent of the variance was explained by these seven variables. This .600 was 87.0 per cent of the $R^2$ of .690 of the 21 variable model. The estimated coefficients (with standard errors in parentheses below the coefficients) were:

- \(-39,800\) as the Y intercept value
- \(+33,477\) per unit of the credit use attitude scale (1,007)
- $10,274 per son aged 9 to 15 years at the beginning of the study period (3,987)
+ $551 per thousand dollars of farm debt at the beginning of the study period (102)
- $2,458 for the dummy variable—purchase only (8,433)
+ $1,092 for the dummy variable—other strategies only (16,973) (mainly inheritance)
- $10,179 for the dummy variable—rent and purchase strategies used (8,595)
+ $11,609 for the dummy variable—purchase and other strategies used (9,722)

The positive influence of the credit use attitude and the positive influence of borrowing money was as expected and is consistent with the idea, espoused by farm management personnel for many years, that you can make money by borrowing money. If this profit is invested in the farm, an increase in net worth results. The negative influence of sons aged nine to 15 years would seem to be a change in the traditional view that a larger family labor force means expansion. All of the coefficients of the above variables were significant at the .05 level.

The coefficients of the dummy variables are interpreted as the deviations of the strategy classes from the deleted class—the use of a combination of renting, purchasing and other strategies. The coefficient effect occurs only if that particular strategy were used. Only one strategy category can be used per operator because the operator has a "one" for only one dummy variable and a "zero" for all others. This interpretation should be remembered in considering these results.
It is possible to rank the growth strategies based upon the size of the regression coefficients. The most positive coefficient is ranked first, the most negative last, the others at an intermediate position, and the deleted class at a position between the positive and negative coefficients. This results in the following ranking of resource acquisition strategies:

1. by a combination of purchasing and other methods
2. by other methods (mainly inheritance and internal expansion)
3. by a combination of renting, purchasing and other strategies
4. by purchase only
5. by renting and purchasing

A ranking of the strategies will be made at the time of the presentation of the regression coefficients of the other "best" models in this chapter.

The ranking of the growth strategies is interpreted as the relative importance of these various strategies in effecting growth. The differences between coefficients is an estimate of differences in the effect of the various strategy classes upon growth. The use of purchasing and other acquisition strategies resulted in greater growth than any other strategy or combination of strategies with change in net worth as the measure of growth. The reader should note the relative importance of purchasing and other methods and the relative unimportance of renting. A comparison will be made of this ranking of strategy set I to the comparable ranking using the total assets growth measure.
Other information can be isolated from this "best" model. If the regression coefficients of the nonstrategy variables are multiplied by their mean values and these products added to the Y intercept value, the resulting sum (which is $b_0 + \sum b_i \bar{x}_i$, where $i$ = only the nonstrategy variables in the "best" model) is an estimate of the change in net worth for an "average operator" using the deleted growth strategy. In the present case this value was $23,115. If the sum of $23,115$ plus the coefficient of a growth strategy is greater than zero, then the strategy resulted in growth for the average operator. If this sum is negative, the strategy resulted in negative growth for the average operator. For this model the lowest ranked strategy, renting and purchasing, had a coefficient of $-10,179$ which when added to $23,115$ gives $12,936. This is positive and consequently all of the strategies in this model resulted in growth for the average operator.

The results of the procedure discussed in the preceding paragraph will be presented for each of the "best" models presented in this chapter.

Strategy set II.—The "best" predictive model using strategy set II was a model of 11 variables. It had an $R^2$ of .592 (significant at

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2An "average operator" would be one possessing the mean value as his observed value for all the nonstrategy variables included in the particular "best" model under consideration.
the .01 level of probability) which was 86.3 per cent of the $R^2$ of .686 of the 24 variable model. The estimated coefficients (and standard errors) were:

- $15,956 as the Y intercept value
+ $ 3,664 per unit of the credit use attitude scale (1,103)
- $ 9,803 per son aged 9 to 15 at the beginning of the study period ($ 4,676)
+ $ 235 per percentage point of equity at the beginning of the study period (134)
+ $ 611 per thousand dollars of debt at the beginning of the period (127)

The model also included strategy set II ranked in the following order:

(deleted) acquisition of machinery and buildings, labor, land and livestock

- $16,956 acquisition of machinery-buildings and land (12,430)
- $17,845 acquisition of livestock only (20,822)
- $17,942 acquisition of machinery-buildings, land and livestock (13,533)
- $22,654 acquisition of land only (20,903)
- $23,137 acquisition of machinery and buildings only (13,957)
- $25,683 acquisition of machinery-buildings and livestock (15,044)
- $43,600 acquisition of machinery-buildings, labor and land (20,472)
All of the nonstrategy variables were significant at the .10 level or less.

The only nonstrategy variable in this model which was not in the model using strategy set I was percentage equity. Since these other nonstrategy variables have the same sign in both models no further comment will be made concerning them. The percentage equity variable had a positive coefficient. This was interpreted to mean that an operator with greater security (higher equity) was able to expand the size of his net worth more rapidly than a less secure operator. Considering the fact that farm debt also had a positive coefficient could mean that the operator with the larger net worth was the expanding firm. (Greater debt and same or increased equity means a larger net worth.)

There was no pattern to the rankings of the growth strategies.

The estimated growth during 1962-1967 for the average operator using this model was $39,658 if he used the deleted strategy—acquisition of machinery and buildings, labor, land and livestock. An evaluation of the coefficients of the strategies revealed that the last strategy (acquisition of machinery-buildings, labor and land) would result in negative growth for the average operator.

Strategy set III.—The "best" predictive model using strategy set III was a model of 25 variables. It had an $R^2$ of .891 (significant at the .01 level) which was 90.4 per cent of the $R^2$ of .986 of the 38
variable model. The estimated coefficients (and standard errors) were:

- $60,930 as the Y intercept
+ $3,388 per unit of the credit use attitude scale (1,055)
- $9,046 per son aged 9 to 15 at the beginning of the study period (3,848)
+ $426 per percentage point of equity at the beginning of the study period (154)
+ $667 per thousand dollars of debt at the beginning of the study period (106)
+ $3,264 per time that the growth goal was chosen in preference to another goal (maximum of four)

It included the variables of strategy set III in the following order:

+ $60,338 rent and other land strategies, other livestock strategies, purchase machinery-buildings and labor (20,404)
+ $51,525 purchase land, other livestock strategies and purchase machinery-buildings (16,167)
+ $30,762 other land acquisition strategies and purchase machinery-buildings (16,347)
+ $10,750 purchase land, rent and purchase machinery-buildings (16,268)
+ $10,500 other livestock strategies (mainly internal expansion) (17,394)
+ $9,061 rent land and purchase machinery-buildings (13,395)
+ $8,220 purchase land and machinery-buildings (12,188)

Only 21 variables were included in strategy set III as used for the net worth regressions because two of the classes had no observations.
$ 5,422 other livestock methods and purchase machinery-buildings
(14,871)

$ 5,306 purchase land only
(17,641)

$ 5,025 purchase land, livestock and machinery-buildings and other livestock strategies
(16,126)

$ 3,738 rent land and machinery-buildings and purchase machinery-buildings
(14,103)

$ 3,547 rent and purchase machinery-buildings
(14,919)

$ 1,757 purchase machinery-buildings
(13,315)

$ 411 rent land, other livestock strategies, and rent and purchase machinery-buildings
(deleted) rent land, purchase and other livestock strategies, rent and purchase machinery-buildings and purchase labor

$ 697 purchase land, livestock and machinery-buildings
(17,217)

$ 1,935 rent and purchase land, purchase machinery-buildings
(13,571)

$ 3,640 purchase and other livestock strategies, purchase machinery-buildings
(16,099)

$ 7,106 purchase livestock and machinery-buildings
(16,859)

$ 9,596 rent and purchase land, other livestock methods, and purchase machinery-buildings
(16,039)

$21,135 rent land, purchase machinery-buildings and labor
(16,178)

$22,190 rent land, purchase livestock and machinery-buildings
(16,608)

All of the coefficients of the nonstrategy variables were significant at the .10 level or less.
The growth goal variable was the variable included in this model which was not in the previous "best" models. (The results for the other nonstrategy variables are interpreted as in the previous models.) The positive coefficient of the growth goal was as expected and indicates that the pursuit of a growth goal had a positive effect upon growth. If the growth goal were ranked first (variable value equal to four) the effect upon growth was $13,056 (4 \times 3,264).

No pattern could be isolated from the growth strategy rankings.

The estimated change in net worth of the average operator using this model was $14,732 if he used the deleted strategy—rent land, purchase and other livestock strategies, rent and purchase machinery-buildings and purchase labor. If this average operator used the last two strategies of the ranking he would have a negative change in his net worth.

Change in total assets controlled as the measure of growth

**Strategy set I.**—The "best" predictive model using strategy set I was a model of nine variables. It had an $R^2$ of .608 (significant at the .01 level of probability), which indicated that nearly 61 per cent of the variance was explained by these nine variables. This .608 was 94.0 per cent of the $R^2$ of .647 of the 21 variable model. The estimated coefficients (and standard errors) were:

- $90,725$ the $Y$ intercept value
- $16,398$ per year of formal education
  
  (7,169)
+ $5,034 per unit of the credit use attitude scale (2,709)

- $3,024 per unit of the innovation attitude scale (1,567)

+ $6,442 per child at home (5,485)

+ $13,674 per time that growth was chosen in preference to another goal (maximum of four) (4,922)

It included strategy set I ranked in the following order:

(deleted) rent, purchase and other strategy combination

- $44,718 for the rent and purchase combination (22,165)

- $58,656 for the purchase and other strategy combination (26,490)

- $82,733 for the purchase only strategy (22,181)

- $102,030 for the other strategies only (mainly inheritance and internal expansion) (36,060)

All of these coefficients, except the children variable, were significant at the .10 level of probability. The positive influences of education, credit use attitude, and the growth goal seem logical. It should be noted that a first place goal ranking (where the goal variable equals four) would have a + $54,696 effect upon growth. The positive influence of children was consistent with the group comparison results. Larger family size could be an incentive to expand. The negative influence of the innovation scale caused some concern. There are two interpretations that can be considered. First, the scale did not measure the innovation attitude. Or second, the innovator takes risks which during this particular period resulted in
decreased growth relative to the operator who is not quite as innovative. The latter interpretation was used.

The ranking of the growth strategies points out the importance of the renting strategy to the change in total assets controlled. The reader will recall that renting was a relatively unimportant strategy for change in the size of the net worth.

The estimated growth of the average operator using this model was $107,323 if he used the deleted strategy. Use of any of the strategies in this model would result in some increase in total assets controlled for the average operator.

Strategy set II.—The "best" predictive model using strategy set II was a model of 11 variables. It had an $R^2$ of .572 (significant at the .01 level) which was 89.4 per cent of the $R^2$ of .640 of the 24 variable model. The estimated coefficients (and standard errors) were:

- $73,734$ as the $Y$ intercept
- $20,207$ per year of formal education
  (8,991)
- $3,849$ per unit of the innovation scale
  (1,735)
- $9,317$ per child at home
  (5,996)
- $16,153$ per time that growth was chosen in preference to another goal (maximum of four)

and the strategy set II variables in the following order:

(deleted) acquisition of machinery-buildings, land, livestock and labor
- $48,831 acquisition of machinery-buildings, land and livestock
  (34,111)
- $54,628 acquisition of machinery-buildings and livestock
  (38,323)
- $56,707 acquisition of land only
  (43,548)
- $64,912 acquisition of machinery-buildings and land
  (31,376)
- $84,865 acquisition of machinery-buildings, labor and land
  (51,902)
- $109,671 acquisition of machinery and buildings only
  (34,930)
- $144,134 acquisition of livestock only
  (60,439)

All of the nonstrategy variables were significant at the .05 level except the children variable which was significant at the .15 level. There were no nonstrategy variables in this model which were not included in the model with strategy set I and since their coefficients have the same signs no further comment is necessary.

No pattern was discernable within the growth strategy rankings.

The estimated change in total assets controlled for the average operator using this model was $112,314, if he used the deleted strategy. He would decrease in size if he used the last ranked strategy.

**Strategy set III.**—The "best" predictive model using strategy set III was a model of 29 variables. It had an $R^2$ of .875 (significant at .01 level) which was 93.3 per cent of the $R^2$ of .938 of the 40
variable model. The estimated coefficients (and standard errors) were:

- $237,934 as the Y intercept
+ $11,113 per year of formal education  
  ( 8,575)
+ $856 per bushel of corn per acre  
  ( 475)
+ $13,972 per child at home  
  ( 7,014)
- $1,136 per dollar of livestock investment per acre operated at the beginning of the study period  
  ( 304)
+ $791 per percentage point of equity  
  ( 334)
+ $12,961 per time the growth goal was chosen in preference to another goal (maximum of four)

It included the variables of strategy set III in the following order:

+ $161,239 rent and other land strategies, other livestock strategies, purchase machinery-buildings and labor  
  ( 60,643)
+ $90,668 rent land, other livestock strategies, and rent and purchase machinery-buildings  
  ( 49,603)
+ $68,026 rent land and machinery-buildings and purchase machinery-buildings  
  ( 39,867)
+ $43,657 other livestock methods and purchase machinery-buildings  
  ( 44,707)
+ $42,396 purchase land, other livestock strategies and purchase machinery-buildings  
  ( 53,186)
+ $34,127 purchase land  
  ( 49,183)
+ $31,444 purchase land, livestock and machinery-buildings  
  ( 46,966)
+ $28,874 rent land and purchase machinery-buildings  
  ( 34,968)
+$25,557 \text{ rent and purchase land, rent and purchase machinery-buildings} \\
(45,220)

+$17,786 \text{ other land acquisition methods (mainly inheritance)} \\
(50,928)

+$5,740 \text{ rent land, purchase machinery-buildings and labor} \\
(47,698)

(deleted) $\text{ rent land, purchase and other livestock strategies, rent and purchase machinery-buildings, and purchase labor}$

$-8,609 \text{ rent and purchase land, other livestock methods, and purchase machinery-buildings} \\
(47,365)$

$-16,409 \text{ purchase land and machinery-buildings} \\
(34,328)$

$-19,200 \text{ purchase livestock and machinery-buildings} \\
(48,731)$

$-30,817 \text{ purchase and other livestock strategies and purchase machinery-buildings} \\
(45,733)$

$-33,627 \text{ rent and purchase land, purchase machinery-buildings} \\
(37,696)$

$-40,316 \text{ purchase land, livestock and machinery-buildings and other livestock strategies} \\
(46,646)$

$-40,562 \text{ purchase machinery-buildings} \\
(35,076)$

$-54,227 \text{ rent land, purchase livestock and machinery-buildings} \\
(41,387)$

$-62,341 \text{ other land strategies and purchase machinery-buildings} \\
(47,768)$

$-67,700 \text{ purchase land, rent and purchase machinery-buildings} \\
(40,561)$

$-87,291 \text{ rent and purchase machinery-buildings} \\
(40,561)$

$-105,852 \text{ other livestock strategies (mainly internal expansion)} \\
(53,153)$
All of the nonstrategy variables were significant at the .10 level or less, except education.

Three variables were included in this model which were not included in the two previous total assets models. The positive effect of corn yield was as expected and means that greater efficiency of the farm operation contributes to growth. The negative effect of specialization in livestock was also as expected. Expansion of the extensive margin results in greater increase in total assets controlled then expansion on the intensive margin. The positive coefficient of equity percentage means that the greater the security (higher equity) of the operator the greater the expansion. Interpreted in this manner, the equity percentage is a pseudo-attitude variable reflecting willingness to take risks with the risk-taker (lower equity) achieving less growth.

The other nonstrategy variables have the same signs as in the previous models and thus no further comment will be made with regard to them.

The growth strategy ranking resulted in no discernable pattern.

The estimated growth for the average operator using this model was $52,275, if he used the deleted strategy. He would increase an even greater amount in size if he used any one of the first 11 strategies of the ranking, but he would have a decrease in total assets controlled if he used any of the last five strategies in the ranking.
Summary comment on the "best" models

If one were required to chose a model to predict farm firm growth over the next five years, for each measure of growth, the models using strategy set III would be chosen. These models explained in excess of 87 per cent of the variance of each of the two measures of growth. However, the models using strategy set I, although they have much lower R²'s, are much less awkward, easier to interpret, and explain more variance per strategy variable than the models using set III. In certain circumstances their use as "best" models can be justified.

Conclusions from the "best" predictive models.

These "best" models further substantiated the group comparison results presented earlier in the chapter for some variables, although some new contributing variables were also isolated. The following conclusions can be drawn about the effects of specific variables upon farm firm growth:

1. The number of years of formal education had a positive influence upon the change in total assets controlled. This influence was not suggested by the group comparison analysis.

2. A positive credit use attitude was a good predictor of change in net worth and in some instances for change in total assets controlled. This conclusion was also indicated by the group comparison analysis.
3. An innovative attitude was not conducive to change in total assets controlled when strategy sets I or II were used. This effect was not suggested by the comparison analysis.

4. The number of children at home had a positive effect on growth in total assets controlled. The comparison analysis had suggested this for both measures of growth; however, this factor was not important in predicting change in net worth.

5. The negative influence on change in net worth of sons aged nine to 15 at the beginning of the study period was isolated in both the regression and comparison analysis.

6. The positive effect of farm debt upon change in net worth was vaguely suggested by the group comparison analysis, but was very important in predicting change in net worth according to the regression analysis.

7. The operator percentage equity was indicative of an increase in size of net worth when strategy set II or III was used or of an increase in total assets controlled if strategy set III were used. An opposite conclusion was reached from the group comparison analysis.

8. The growth goal was an important factor associated with growth as measured by change in total assets controlled. This further substantiates the earlier results.

9. The renting strategy was indicative of growth of total assets controlled while purchasing and other methods resulted in greater growth in net worth. The results are inconclusive concerning the other specific growth strategies. However, the growth strategy variables as sets were helpful in predicting growth, particularly set III.
10. The results are inconclusive concerning the other variables which were important in the "best" models because of their lack of significance in more than one model for the same growth measure.

Another fact that should be pointed out is the general tendency of nonpersonal variables to be the major significant factors in the net worth models with any of the three strategy sets and for personal variables to be the most prevalent significant variables in the total assets models (except for strategy set III). This further substantiates the conclusions drawn from a comparison of the effect upon $R^2$ of the complete sets of personal and nonpersonal variables as presented earlier in this chapter.
CHAPTER VII

GENERAL CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

The purpose of this chapter is to summarize the research presented in this dissertation. The first section relates the specific results to the objectives stated in Chapter I. The second section makes specific recommendations regarding further studies of this type. The final section is a general summary of the research.

General Conclusions

Two methods of analysis were used in conducting this study—group comparison and regression. The group comparison analysis can be considered as a "gross" analysis in the sense that the variables are compared as if their influence were unassociated with any other factors. Regression, on the other hand, is a "partial" analysis since the effect of a variable is the net effect after having been adjusted for the associated effects of other variables. Consequently, a variable which tests significantly different in the group comparison analysis may not necessarily be a significant variable in the partial regression analysis. A variable testing significant in both analyses presents evidence that it is associated with farm firm growth. A variable testing significant by only one method of analysis merits recognition and further investigation. In the following discussion the
significant variables discussed can be grouped into two classes: those testing significant in both analysis and those testing significant in only one analysis.

The objectives and general conclusions of this study follow:

1. To measure by two methods the amount of growth occurring during the five year study period, 1962 to 1967.

The two growth measures used were change in the value of total assets owned (net worth—in constant dollars) and change in the value of total assets controlled (in constant dollars). The analysis of the data indicated that the sample farm firms experienced a mean average increase in net worth of $20,750 and a mean average increase in the value of assets controlled of $45,238 during the study period, 1962 to 1967. Annual farm income increased from $5,810 in 1962 to $9,268 in 1966 for the "fast growth" operators and from $3,693 in 1962 to $7,065 in 1967 for the "slow growth" operators, using the net worth growth measure. The "fast growers," using the total assets controlled growth measure, increased annual farm income from $4,309 in 1962 to $9,650 in 1966 compared with the "slow growers" increase from $5,383 in 1962 to $7,435 in 1966. The "fast growers!! using the total asset measure increased farm income by nearly $3,300 more than the "slow growers." The "fast growers" using the net worth measure increased income by only $86 more than the slow growers.

2. To isolate the influence of attitudes, management ability and other personal factors upon growth.

On the basis of the analysis one can conclude that the credit use attitude of the operator was an important positive influence on farm
firm growth using either measure of growth and either method of analysis. The "fast" and "slow" growers had significantly different mean credit use attitudes and this attitude was a statistically significant explanatory variable in the regression analysis.

The group comparison analysis isolated the fact that the "fast" growers, with growth measured as change in total assets controlled, were significantly younger than the "slow" growers.

The regression analysis isolated a positive effect of education and a negative effect of the innovation attitude upon change in the total assets controlled. The negative effect of the innovation attitude was interpreted to mean that either the scale did not accurately measure the innovation attitude or the innovator took risks which during this particular period resulted in less growth than the less innovative operator achieved.

In addition, the regression analysis revealed that the personal variables were more important in explaining change in total assets controlled than explaining change in net worth. This result supports the discussion above in which more personal variables were isolated which were related to change in total assets controlled than to change in net worth.

This study isolated several specific personal characteristics which were associated with growth. It also revealed that personal factors are important in explaining the growth process. It is the opinion of this author that failure to include personal factors in farm firm growth studies is tantamount to using an incomplete and inaccurate hypothesis of farm firm growth.
3. To determine the importance of a growth goal.

The growth goal variable was isolated as a significant factor contributing to change in total assets controlled. Significantly more of the "fast" growers pursued this goal and it was a highly significantly variable in all the regression models using the total assets controlled measure of growth.

However, when net worth was employed as the growth measure the growth objective was not identified as an important influence. It was a significant factor in only one regression model and did not display a statistically significant difference in the group comparison. However, this is consistent since the net worth measure favors the more conservative, less growth-orientated operator while the total asset measure favors the risk-taker who is trying to expand.

4. To identify the growth strategies used.

The growth strategies used by the farm operators interviewed were classified by acquisition method, by resource acquired and by acquisition method by resource acquired. This latter classification was associated with more of the variance in each measure of growth than the other two classifications. The regression analysis also revealed that change in total assets controlled was closely associated with the use of renting while change in net worth was more likely to be effected by purchasing or other acquisition methods.

The group comparison analysis isolated the significantly greater acquisition of full-time hired labor by the fast growing firms as measured by change in total assets controlled.
5. To determine the effects of production efficiency, size, operator percentage equity, livestock specialization and other nonpersonal factors upon growth.

The number of children at home was isolated as a variable with a significant positive effect on change in total assets controlled using both methods of analysis. But, using the net worth growth measure the number of sons aged nine to 15 years in 1962 had a significant inverse relationship with both regression and comparison analysis. Thus, one can conclude that family size or composition affected these two measures of growth in one direction or the other.

The group comparison analysis also indicated that the mean number of children at home, regardless of sex or age, and the mean farm debt in 1962 were significantly greater for firms whose operators were most rapidly expanding net worth. Additionally this analysis indicated that the "fast" growers in terms of total assets controlled reported significantly less land available for renting or leasing, had fewer children aged 13 to 18 in 1962, and had a lower operator equity percentage.

The regression analysis revealed that percentage equity and farm debt in 1962 had a consistently positive influence on change in net worth. The operator with high equity can borrow money much easier and this money, if properly invested, will increase his net worth. The change in total assets controlled was positively influenced by corn yield and operator equity percentage and negatively affected by the degree of livestock specialization. The negative effect of livestock specialization was expected since the total asset growth measure favors expansion on the extensive margin.
6. To compare and evaluate the two measures of growth in light of the findings regarding the above objectives.

From the analyses the conclusion can be reached that different significant factors were associated with each measure of growth. A positive credit use attitude was consistently associated with changes in both measures of size. But, from an examination of the other factors one must conclude that the factors associated with growth depend upon the measure of growth used. This was not unexpected. However, it points out the fact that researchers could come to different conclusions about the growth process and the conditions necessary for growth if they use different measures of growth. This result does not agree with the conclusion reached by Martin in the research reported in Chapter II. He found no difference in the amount of growth using six different measures over a projected 30 year period.

In the opinion of the author, the total assets controlled growth measure more adequately measured the growth occurring over the five year study period. The "fast growers," using this measure, had a considerable increase in size and a substantial increase in farm income. This was consistent with what actually occurred in farming. Also, the personal characteristics of the operators of the growing firms were consistent with reality.

The net worth growth measure did not isolate similar results and thus was adjudged to be a less desirable growth measure for the period studied.
Recent literature in farm firm growth has presented discussions of two types—one based on research results using the model building approach and the other a discussion of theory. This study was an empirical investigation to learn more about the phenomenon of farm firm growth, particularly the influence of the personal characteristics of the manager upon growth. The personal factors were found to be important contributing factors. Also, many of the ideas presented in the theoretical discussions were confirmed.

Different factors were associated with each of the two growth measures used. This suggests that before meaningful research on this topic can be conducted "farm firm growth" must be defined more precisely.

More specifically, the results of this study indicate that a farm operator with an economic base who is willing to use credit and take risks, who is a good manager and has growth as an objective will be successful in achieving growth. As a result of growth he will receive greater farm income. Growth will be achieved through the use of minimum equity means of resource control.

It should be noted, however, that growth also requires opportunities for growth. Given two operators with equal abilities, attitudes and other important characteristics, the operator who expands his firm the most during a given time period will be the one whose farm is located in a community where growth opportunities occur. These opportunities may or may not have a random pattern unless the operator can influence their occurrence.
The findings of this study will be useful to several groups. Other researchers will find results which support and results which conflict with their ideas. This information will be of value to vocational counselors in their guidance work. Bankers will find the results useful in deciding on farm loan applications. Professional farm managers and land owners will be helped in tenant selection by a review of the results of this study. And sales representatives of agribusiness firms are advised to plan their sales campaigns to contact the "fast growers" as identified by this study.

Recommendations

This study was designed to isolate and ascertain the influence of identifiable factors related to farm firm growth, thus the recommendations which follow are methodological suggestions for the researcher interested in further investigation.

Farm firm growth is a timely research topic. However, approaching the problem by studying the personal factors contributing to growth in empirical situations is difficult and may be a fruitless assignment. Personal factors may not enable an investigator to achieve useful results unless other dimension measurements are included.

Second, the importance of good data cannot be overstated, particularly for the attitude and management scales. In this study some of these attitudinal factors had little or no influence upon growth. There exists the possibility that the scales to measure these factors did not gauge what they were assumed to measure. Consequently, if
the psychological scaling approach is used to isolate measures of operator personal characteristics extreme care should be used in obtaining accurate data for developing these types of scales.

Third, as has been repeatedly stated, the measure of growth affects the results. In this study the total assets controlled growth measure favored expansion on the extensive margin. In periods of inflation as occurred during the study period, or from 1945 to 1950, this measure gives meaningful results. But, during a deflationary period, as during the 1930's, another measure, net worth for example, may give more meaningful results.

Fourth, another study of this type would be better if the sample were larger in size and more representative of all farmers. With this type of sample it might be that personal factors would have even greater significance because of the greater difference between firms and operators. Additionally, policy implications could be ascertained since the sample would be representative of all farmers.

A final recommendation would be that a simple growth strategy classification be used. Also, further thought should be given to the isolation of other personal and nonpersonal factors which could influence growth.

Summary

Farming is changing in the United States. It is more business orientated, with more complex management, higher capitalization, and greater dependence upon purchased inputs. These changes are expected
to continue into the future with the result that some firms will grow at the expense of other farms which must expire. Which of the existing firms will grow and how important are the personal characteristics of the operator to firm growth? This is an important question which was considered in this investigation.

A research hypothesis was developed based upon a review of current farm firm growth research, economic theory, managerial theory, sociological and social psychological theory and general firm growth theory. The hypothesis postulated that growth was a function of three main complexes of variables—personal, nonpersonal and strategy variables. The personal variables included age, education, attitudes toward credit use, risk acceptance, innovation, and business orientation; management ability and the importance of a growth objective. The nonpersonal variables included production efficiency, firm size, availability of additional production resources, degree of livestock specialization, and capital available for farm operation and investment. The strategy variables were the methods used by the operator to achieve firm growth. These were classified in three ways:

1. by method of acquisition (set I)
2. by resource acquired (set II)
3. by acquisition method by resource required (set III).

A random sample of 62 southwestern Ohio cash grain-hog farm operators were interviewed. The sample farmers were randomly selected from the population of farmers in the five sample counties who were: (1) between 30 and 50 years of age, (2) had a gross farm income in
excess of $10,000 each year during the study period, 1962-1967, (3) had less than $4,000 of family income from nonfarm sources in any year, and (4) received greater than 50 per cent of his gross farm income from the sale of cash grain and hogs.

The data were analyzed using group comparison and regression procedures.

The management scale and the attitude scales were developed and evaluated using psychological scaling techniques. The growth strategies were evaluated in the regression analysis using zero-one dummy variables.

Farm firm growth was measured in two ways—the change in the constant dollar value of net worth over the five year study period, 1962 to 1967, and the change in the constant dollar value of total assets controlled during the five years. Only 44 and 49 respondents gave complete information for the net worth and total asset measures, respectively. The mean growth was $20,750 for the net worth measure and $45,238 for the total asset controlled measure.

Several variables had significantly different means when the fast and slow growers were compared. The fast growing firms, with growth measured as change in net worth, were managed by operators who possessed a more positive credit use attitude, had larger families but fewer sons aged nine to 15 years in 1962, greater 1962 income and as a result of growth had greater 1966 farm income.

The fast growing firms, with growth measured as change in total assets controlled, were managed by operators who were younger, had a
more positive credit use attitude, reported less land available for renting or purchasing, were seeking growth rather than efficiency or community recognition, had larger families but fewer children aged 13 to 18 years in 1962, had lower equity in the business, and as a result of growth received greater 1966 farm income.

The regression analysis revealed that the nonpersonal variables explained more of the change in net worth while the personal variables and growth strategies were more important in explaining change in total assets controlled. The regression models which resulted in the highest $R^2$ for both measures were those including all variables—personal, nonpersonal and strategy variables. The classification of the growth strategies by resource acquired by acquisition method was selected as the "best" classification because of its statistical significance and contribution to $R^2$. However, the classification by acquisition method may be preferable in certain circumstances because of its ease of construction and evaluation.

The "best" predictive models for change in net worth (one for each set of growth strategy variables) all included the credit use attitude, sons aged nine to 15 years in 1962 and farm debt variables. Additionally in two of the models the percentage equity of the operator was an additional significant variable. In the model using strategy set III the growth goal variable was also included. All of these variables had a positive influence, except the "sons" variable, which had a negative effect.
The "best" predictive models for change in total assets controlled (one for each set of strategy variables), were more heterogeneous in terms of significant variables than was true in the "best" net worth models. The model using strategy set I included the education, credit use attitude, innovation attitude, number of children at home and growth goal variables. The model using strategy set II was identical except for the deletion of the credit use attitude variable. The model using strategy set III consisted of the education, corn yield, number of children at home, livestock specialization, operator percentage equity, and growth goal variables. Nearly all of the above mentioned variables had a positive effect upon growth. The exceptions were innovation attitude and livestock specialization variables, which had negative effects.

The "best" models of the regression analysis isolated only one fact regarding growth strategies. This fact was that the renting strategy was more important to change in total assets controlled while purchasing and other acquisition strategies were more predictive of change in net worth.

The results of this study indicate that personal factors are important in farm firm growth. The operators who will survive in agriculture must strive to expand their firm size. They must take risks, use credit and be a good manager. They must be willing to use minimum equity means of resource control. Greater farm incomes await the operators who are successful in achieving this growth objective.
APPENDIXES
Appendix A

Scale Statements Used in Data Collection

Credit Use Attitude Scale

1. A farmer should borrow enough money to have as much equipment and livestock as he needs, regardless of how much he is in debt.

2. Most farmers who enlarge their operations by borrowing, make more profit than farmers who have small operations free of debt.

3. Farmers should wait until they can accumulate their own capital rather than to borrow for farm production purposes.

4. A farmer should strive to increase the size of his business, rather than to get out of debt on a small unit.

Risk Acceptance Attitude Scale

1. I sometimes plant my crops before I am sure the weather will be right.

2. People who take risks usually are further ahead than those who don't.

3. I hesitate quite a while before I make a decision.

4. People who invest money in the stock market are foolish.

5. I believe in the philosophy, "Nothing ventured, nothing gained."

6. I would rather be safe than sorry.

7. "He who hesitates is lost."
Innovation Attitude Scale

1. I am one of the first in my community to try something new.

2. I am usually looking for some new and better method of farming.

3. Usually I am willing to accept new ideas and use new farming methods.

4. New farm practices are too complicated for me.

5. It is too risky to be the first person in the community to try something new.

6. I believe people should stick to tested, proven methods.

7. I would rather do things like my father did them.

8. I am usually slow to accept new ideas.

9. I usually am about the last person in my community to use a new farm practice.

10. I enjoy trying new things.

11. I am convinced that the use of new farm practices is the main thing that has helped me to stay in farming.

Business Orientation Attitude Scale

1. Those farmers who cannot earn a satisfactory income from farming under present conditions should plan to leave farming.

2. There are some things about farming where signs of the moon are important.

3. It is dishonest to purchase production items, such as fertilizer, sometimes in December and sometimes in January to reduce income taxes.
4. The best thing about farming is that you are your own boss.

5. A farmer can make a good return per hour for the time he spends studying the income tax manual.

6. Keeping records gives you a lot of material you can refer to in case of major decisions.

7. The main principal in running a farm is to remain free of debt.

8. Planning beyond one year is a necessity in today's economic situation.

9. Most of the articles in farm magazines are impractical and of no use to the farmer.

10. Year-end inventory determination takes more time than it is worth.

11. It doesn't matter whether you own the farm or not as long as you can make a good living.

12. Hard work still counts for more in a successful farm operation than all the new ideas you read about.

13. I wouldn't farm if I had to supervise hired help.

14. The goal of a responsible farmer should be to own his farm by the time he is a certain age.

15. You seldom miss the right decision if you sleep on it overnight, then reconsider, sleep again, and take your time.

16. Leasing of machinery, equipment or buildings is acceptable to me as a means of gaining resource control.
17. I do not like to seek advice from outside sources such as dealers, neighbors, finance agents on farm business matters.

18. A skill in buying of inputs or selling of products is not important to success in farming.
Appendix B

Statements Used in the Construction of the Business Orientation Attitude Scale

1. Renting of land is acceptable to me as a method of gaining resource control.

2. I do not like to seek advice from outside sources such as dealers, neighbors, finance agents or county agents on farm business matters.

3. Planning beyond one year is a necessity in today’s economic situation.

4. Preventative maintenance (replacing worn machine parts before a breakdown occurs) is not worth the time and effort required.

5. Business letter writing is handy to know but not a necessity for today’s farmer.

6. A good farmer would not consider investing his money in a nonfarm business.

7. Government price and supply control should be eliminated from agriculture.

8. I get enjoyment out of keeping farm records.

9. A farmer should figure costs and returns from his compliance with government programs whether he eventually participates or not.

10. Don’t borrow for machinery unless you can get the money from PCA.

11. It is dishonest to purchase production items, such as fertilizer, sometimes in December and sometimes in January to reduce income taxes.
12. It is a poor business practice to pay bills before they are due.

13. Farm records are of little help in decision making.

14. I often discuss farm plans with my wife.

15. I pay my bills on a systemic basis, i.e., like the oldest first.

16. A farmer should follow his county agents recommendations in most cases.

17. The best thing about farming is that you are your own boss.

18. It is not necessary to have to have a desk or separate area designated as a farm business center.

19. Borrowing to the limit of one's credit is dangerous.

20. It is getting harder to make a living in farming; I'd get out if I could.

21. Most farmers who enlarge their operations by borrowing make more profit than farmers who have small operations free of debt.

22. Farmers should wait until they can accumulate their own capital rather than to borrow for farm production purposes.

23. A farmer should strive to increase the size of his business, rather than to get out of debt on a small unit.

24. A farmer should borrow enough money to have as much equipment and livestock as he needs regardless of how much he is in debt.

25. When making decisions I work under a great deal of tension.

26. Many successful farmers have gotten good ideas from extension meetings.
27. Many successful farmers have gotten their ideas from farm magazines.

28. The goal of a responsible farmer should be to own his farm by the time he is a certain age.

29. Usually, I try to pick the highest profit enterprises.

30. Hard work still counts for more in a successful farm operation than all the new ideas you read about.

31. All a farmer wants from his farm is a reasonable living.

32. In farming, there comes a time when it is better to stop trying to keep up and just plug away with what one knows.

33. The main principle in running a farm is to remain free of debt.

34. High school is enough education for a farmer.

35. It is better for an important decision to seek help outside the family, e.g. the county agent or a farm management service. They can better judge your situation.

36. You can get more out of good books and pamphlets on farm business than you can get from anybody else.

37. It is better to own a smaller farm than rent a bigger one if you are short of capital.

38. Most of the articles in farm magazines are impractical and of no use to the farmer.

39. New ideas are good ideas.

40. Knowing all of the new technologies in fertilizer application, plant and livestock disease, etc., is the only way to survive in the farm business.
41. Year-end inventory determination takes more time than it is worth.

42. Borrowing is risky but should be considered as long as it is profitable.

43. I would exhaust all other methods of financing, before I would borrow money.

44. In this day and age if a farmer tries to use all the different kinds of information and keep up with the newest results he won't have time to get any work done.

45. Major farm decisions, such as buying a new machine or increasing the number of animals should be made only by the farmer himself because no one else can know better than he what is best in his case.

46. Nobody can help you in uncertain situations you have to make up your mind by yourself.

47. Let the wife do all the decision making about farming--women have a certain sense which will never let them fail.

48. You seldom miss the right decision if you sleep on it overnight, then reconsider, sleep again, and take your time.

49. In business dealings when more than $100 are involved there should be a written contract.

50. There are some things about farming where signs of the moon are important.

51. A periodic soil test on each field in your farm is costly and unnecessary.

52. It is a good idea to farm like one's neighbors.
53. If one feels he is right he should stand by his convictions, no matter what his family or community thinks.

54. A family vacation every year or two is desirable.

55. A man can be happy in any job if he sets his mind to it.

56. Good children are a bigger asset than high farm income.

57. A man needs to have a good time once in a while and not work all the time.

58. It doesn't matter whether you own the farm or not as long as you can make a good living.

59. The interesting thing about farming is you always have to learn new ways of doing things.

60. Children nowadays should go beyond high school level regardless of what they want to strive for in life.

61. Keeping records gives you a lot of material you can refer to in case of major decisions.

62. Living in a city would give more opportunity for new and interesting experiences.

63. In agriculture nowadays one can be content to keep up with the average farmer.

64. To strive for maximum profit is more important than to strive for a stable income at a lower level.

65. There is little value for a boy who wants to farm to attend an agricultural college.

66. It is not necessary that farming give you the highest income you ever could make.
67. A skill in buying of inputs or selling of products is not important to success in farming.

68. I feel that getting a discount on an input such as fertilizer may make me as much profit as actual production.

69. A farmer should follow the market for a product carefully in order to get the best price for his product.

70. A farmer "gets skinned" when he sells his products no matter where he sells them.

71. Farm organizations are of little benefit to farmers.

72. Farm organizations are mainly for social rather than business purposes.

73. Organized farmers can bargain for higher product prices or discounts on inputs.

74. To be recognized as a community leader is worth the time and effort involved.

75. Farmers can usually purchase most of the required production items and services within their community.

76. I don't like to trade work because the other farmers don't do things the way I want them done.

77. On a farm you should have the help from your wife and children; otherwise you cannot accomplish what you want without hired labor.

78. I prefer to own equipment rather than custom hire.

79. The farmer who gets jobs done first will always be considered a good farmer around here.
80. A farmer can make a good return per hour for his time spent in studying the income tax manual.

81. My philosophy on income tax is to pay no more than I legally have to.

82. I wouldn't farm if I had to supervise hired help.

83. Leasing of machinery, equipment or buildings is acceptable to me as a means of gaining resource control.

84. It is more important that farm people earn satisfactory incomes than it is to maintain the family farm system.

85. Those farmers who cannot earn a satisfactory income from farming under present conditions should plan to leave farming.

86. The replacement of family farms by large-scale farms using hired labor would have undesirable economic and social consequences for the nation.

87. Farmers should be primarily concerned with producing farm products and let someone else worry about the marketing problems.
Appendix C

Scoring of Management Question Responses

The purpose of this appendix is to explain the scoring method used to quantify the responses to the management questions. Since these scores were combined to form a management scale and this scale was evaluated according to the item analysis technique, the requirement that all responses have an equal range of scores had to be satisfied. Thus, the possible score for each question ranged from 0 to 4. Nonresponse was scored as 2. The questions with the asterick (*) before their number were included in the final management scale.

*1. Bill Jones is a 35 year old farmer. He owns 80 acres and rents 160 acres of 120 bushel per acre corn land in southwestern Ohio. He normally raises 150 acres of corn and feeds out the pigs from his 50 head sow herd. He has $10,000 in long term debt and a net worth of $40,000. His gross cash income last year was $40,000 which resulted in a net cash income of $10,000. He is married and has two children.

Mr. Jones has to make a decision about next year's farming operation. He has three alternatives:

(A) Another farmer has offered to sell him 120 acres of land comparable to his own @ $700 per acre; but Mr. Jones would need to borrow $15,000 for down payment and refinance his present mortgage.

(B) Another landlord has offered to lease him 320 acres for three years @ $35 per acre annual cash rent; but this would require an operating loan of $20,000 and $20,000 for additional machinery.

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1 The idea for this scoring procedure came from James Lee Bewiller, "Development of a Scale to Measure the Rationality Element of Farm Management Ability" (unpublished Master's thesis, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1960).
(c) Maintain his operation as it was in the past year.

What would you do if you were Mr. Jones?

16. What is the largest dollar amount you have ever been in debt?

________________________. When was that? _________________________

Questions 1 and 16 were scored together, but were asked separately so that the connection would not be obvious. The purpose of these two questions was to probe the respondents reaction to uncertainty. Farmers make decisions in an uncertain environment, but some are more daring than others in the decisions they make in these circumstances. The "gamblers" strive to maximize gains while the "conservatives" strive to minimize losses. Varying reactions form a continuum from the gamblers at one end to the conservatives at the other. An objective method to determine a respondents position on this continuum was needed. Question 1 was developed for this purpose. It was hypothesized that a farmers response to question 1 was a reflection of his reaction to uncertainty. A farmer answering with response (A) or (B) was classed as a gambler. A farmer answering with (C) was classed as a conservative. However, it was recognized that a respondent might recommend the borrowing of money (A or B) for someone else but not for himself. A four-step adjustment procedure was devised. (1) In question 16 the respondent was asked to relate the

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These two questions were developed from two similar questions reported in a study by Hesser and Janssen. Leonard F. Hesser and Melvin R. Janssen, Capital Rationing Among Farmers, Research Bulletin 703 (Lafayette: Purdue University Agricultural Experiment Station in cooperation with the Farm Economics Research Division, Agricultural Research Service, U.S.D.A., 1960), pp. 11-12.
maximum amount he had ever been in debt and the year this occurred.

(2) This debt was deflated to 1962 dollars by using the U. S. Index of Wholesale Prices. (3) This deflated maximum debt was divided by the operator's net worth for the year in which the maximum debt occurred (also computed in 1962 dollars) or 1962 if the year occurred before 1962 (no data were collected to compute net worth prior to 1962). This adjustment gave a figure representing each respondent's maximum debt relative to his net worth at the time of maximum debt.

(4) These values were then arrayed and the median value determined.

The responses were then scored as follows:

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<tr>
<th>Response</th>
<th>Maximum debt/net worth ratio position</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A or B</td>
<td>above median</td>
<td>4</td>
</tr>
<tr>
<td>A or B</td>
<td>below median</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>above median</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>below median</td>
<td>0</td>
</tr>
</tbody>
</table>

This scoring system gave recognition to the manager who recommends debt for someone else and also had had a relatively high debt to net worth ratio himself. He was considered to be a better manager.

The median value of the ratio was .45 with a range from .023 to 2.99.

2. What minimum checking account balance do you try to maintain?

Question 2 was another question on uncertainty. It was scored as follows:

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<th>Score</th>
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<tr>
<td>$501 - 1000</td>
<td>3</td>
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<tr>
<td>2001 +</td>
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</tbody>
</table>
This question continued the idea about reaction to uncertainty developed in question 1. The better manager was assumed to be the one who operated with the smaller cash balance.

*3. How long into the current production year do you maintain a corn inventory in excess of feed needs until harvest and why?

Again this question probed the same area as the first two. It was scored as follows:

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before April 30</td>
<td>4</td>
</tr>
<tr>
<td>May 1 to August 30</td>
<td>2</td>
</tr>
<tr>
<td>After August 30</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Is leasing or renting of land a common practice in your community?

5. Do your wife and family encourage you to try new farm practices?

6. Do your wife and family demand household items (like an electric dishwasher, etc.) before farm items?

7. Is there anything about your farm or your farming operation that sets you apart from your neighbors? If yes, what?

These four questions probed the area of family and community pressures. Management decisions are not made in a vacuum, but are influenced by the ideas and wishes of people associating with the decision maker. However, a good manager makes decisions which are sometimes at odds with community or family feelings.

The responses to all four questions were either "yes" or "no" with elaboration in some cases. The scoring was as follows:

<table>
<thead>
<tr>
<th>Question 4</th>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes and he does not</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Yes and he does</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No and he does not</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No and he does</td>
<td>4</td>
</tr>
</tbody>
</table>
Question 5  
Response  
Yes 4  
No 0  

Question 6  
Response  
Yes 0  
No 4  

Question 7  
Response  
No 0  
Yes 2  
Yes with good example 4  

*8. If the price of nitrogen fertilizer is $5.00 per 50 pounds, of N and corn is worth $1.00 per bushel, how much N would you apply when:  

<table>
<thead>
<tr>
<th>Pounds Applied</th>
<th>Additional Cost of Fertilizer</th>
<th>Bushels</th>
<th>Increased Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>85</td>
<td>15</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>96</td>
<td>11</td>
</tr>
<tr>
<td>150</td>
<td>5</td>
<td>104</td>
<td>8</td>
</tr>
<tr>
<td>200</td>
<td>5</td>
<td>107</td>
<td>3</td>
</tr>
<tr>
<td>250</td>
<td>5</td>
<td>109</td>
<td>2</td>
</tr>
</tbody>
</table>

The purpose of question 8 was to test the respondent's analytic ability—the ability to consider between alternatives and analyze the outcomes. The correct response—150 pounds—was scored as four; the remaining responses received a zero score.

9. Does leaf analysis eliminate the need to soil test?  

(1) Yes  
(2) No  
(3) I don't know  
(4) Not related to soil test
10. The protein percentage recommended by the OSU Extension Service for feeding pigs weighing between 40 and 100 pounds is:

--- (1) Don't know
--- (2) 12 per cent
--- (3) 15 per cent
--- (4) 9 per cent

Technical knowledge is as important in farming as it is in any business. All of these operators were cash grain hog farmers and thus the two questions were considered reasonable tests of the operator's knowledge on technical material. Question 9 was scored four for response 2, zero for all others. Question 10 was scored zero for all responses but 3, which was scored as four.

11. How did you decide how many sows to breed for this fall?

--- (1) Based decision on expected corn production and expected feed needs per sow and litter.
--- (2) Breed approximately same number each fall.
--- (3) Just decided - didn't use any economic outlook information.
--- (4) Considered prospective prices and numbers of livestock.
--- (5) Asked advice of others.
--- (6) Labor available.

12. When you purchased commercial fertilizer this year, how did you decide where to buy it?

--- (1) Checked prices several places and picked best price or equally good price plus fringe benefits.
--- (2) Always buy at the same place.
--- (3) Neighbors or others advised to buy it there.
--- (4) Purchased brand name from the closest dealer of that brand.
--- (5) Other (How?) ________________________________
Questions 11 and 12 were asked to get an idea of the operator's decision making ability—the main function of a manager. The scoring on question 11 was:

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

The scoring on question 12 was:

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Varied depending upon response.</td>
</tr>
</tbody>
</table>

13. How do you use farm financial records?

- Income taxes
- Net worth statement
- Securing credit
- Cash flow analysis, i.e., determining periods when surplus cash exists or when short term loans are needed
- Partial budgets, i.e., making decisions on increasing or decreasing enterprise size
- Planning
- Other ______________________
- What? ______________________

Information is very important to sound management. However, many farmers have a source of information readily accessible but they do not use it. This source is their farm financial records. A good manager makes use of these records. Question 13 was asked to determine how much each respondent used his farm financial records. Each use which the operator made of his records was scored as one, except that
the responses of "net worth statement" and/or "securing credit" was scored one for either or both of the responses. The response "income taxes" was scored zero. The maximum score was four.

*14. Mr. Smith owns and operates a 100 acre corn-hog farm—gets yields of 110 bushel corn—farrows 12 sows twice a year, markets an average of 8.5 hogs in 5 months per litter. His income has been decreasing—last year his gross income was $11,000 and his net farm income (return for his investment, labor and management) was $3,800. What is (are) his problem(s)?

*15. Mr. Jacobs farms 160 acres of cash crops with the help of a son in high school. For tractor power he has one late model three plow tractor in good condition and four older tractors of various sizes and conditions. He says, "Why not—they are handy, only cost $300 or $400 each and don't cost anything to have on the farm." Do you agree?

The ability to recognize problems is a valuable attribute for a manager. These two questions present hypothetical problem situations and the respondent was asked what the problems were or if there was a problem. Question 14 was scored from zero to four depending upon the type and number of problems the operator recognized. A representative listing and their scores are shown below:

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not big enough, rent additional acres and haul feed home, increase hogs</td>
<td>4</td>
</tr>
<tr>
<td>Not enough corn and hogs</td>
<td>4</td>
</tr>
<tr>
<td>Too small, inefficient</td>
<td>3</td>
</tr>
<tr>
<td>Price of hogs, not enough sows</td>
<td>3</td>
</tr>
<tr>
<td>Volumn</td>
<td>2</td>
</tr>
<tr>
<td>Not enough hogs</td>
<td>2</td>
</tr>
<tr>
<td>Management and prices</td>
<td>2</td>
</tr>
<tr>
<td>Price of hogs</td>
<td>1</td>
</tr>
<tr>
<td>Cost-price squeeze</td>
<td>1</td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Orville Freeman</td>
<td>0</td>
</tr>
<tr>
<td>Too much expense</td>
<td>0</td>
</tr>
</tbody>
</table>
Question 15 was scored as four if the respondent answered "no" and zero if he answered "yes."
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Section A. Background Information

1. What is your age?

2. What are the ages and sexes of your children? (Indicate whether they live at home if there is any doubt.)

   (9-10) (15-17) (21-23) (27-29) ______ ______ ______ ______

   (12-14) (18-20) (24-26) ______ ______ ______ ______

3. How is your health?

   (30) Excellent Good Fair Poor

4. How many years of education have you had?

   (31,32)

5. How many years did you:
   belong to 4-H?

   (33,34)

   study Vo Ag in high school?

   (35)

   attend young farmer classes?

   (36,37) yes

6. Are you an active participant in the county extension program?

   (38) no

   (38) yes

7. Did you grow up on a farm?

   (39) no

   (39) yes

8. When did you start farming as a partner or on your own (i.e. actually helped to make management decisions and were not just a hired laborer)?
All of us have basic values by which we organize our lives. Based on these values we choose among alternative methods of reaching our goals in life. I will now give you 10 pairs of methods of goal achievement. For each pair indicate which you tried to achieve most in the past five years.

9. (1) a. **Enlarge the farming operation** by adding more land, more capital, more labor, more livestock, or combinations of them.
   (2) b. **Increase the production efficiency** of present land, equipment, livestock, and labor by increasing yields per acre or per animal.

10. (4) a. **Increase the allowance for family consumption** to allow for higher levels of family living, i.e. new car, color T.V., washer and dryer, family vacation, college education for children, and etc.
    (1) b. **Enlarge the farming operation** by adding more land, more capital, more labor, more livestock, or combinations of them.

11. (3) a. **Become or remain active in community activities**: church, Farm Bureau, Grange, fair board, school board, and etc.
   (1) b. **Enlarge the farming operation** by adding more land, more capital, more labor, more livestock, or combinations of them.

12. (3) a. **Become or remain active in community activities**: church, Farm Bureau, Grange, fair board, school board, and etc.
   (2) b. **Increase the production efficiency** of present land, equipment, livestock, and labor by increasing yields per acre or per animal.

13. (4) a. **Increase the allowance for family consumption** to allow for higher levels of family living, i.e. new car, color T.V., washer and dryer, family vacation, college education for children, and etc.
   (2) b. **Increase the production efficiency** of present land, equipment, livestock, and labor by increasing yields per acre or per animal.

14. (3) a. **Become or remain active in community activities**: church, Farm Bureau, Grange, fair board, school board, and etc.
   (5) b. **Become or maintain your position as a well-known farmer in the community**: one who gets his work done early, tries new ideas readily, has high yielding crops or livestock or the newest or biggest machinery.
15. (2) a. Increase the production efficiency of present land, equipment, livestock, and labor by increasing yields per acre or per animal.
   (5) b. Become or maintain your position as a well-known farmer in the community: one who gets his work done early, tries new ideas readily, has high yielding crops or livestock or the newest or biggest machinery.

16. (1) a. Enlarge the farming operation by adding more land, more capital, more labor, more livestock, or combinations of them.
   (5) b. Become or maintain your position as a well-known farmer in the community: one who gets his work done early, tries new ideas readily, has high yielding crops or livestock, or the newest or biggest machinery.

17. (3) a. Become or remain active in community activities: church, Farm Bureau, Grange, fair board, school board, and etc.
   (4) b. Increase the allowance for family consumption to allow for higher levels of family living, i.e. new car, color T.V., washer and dryer, family vacation, college education for children, and etc.

18. (4) a. Increase the allowance for family consumption to allow for higher levels of family living, i.e. new car, color T.V., washer and dryer, family vacation, college education for children, and etc.
   (5) b. Become or maintain your position as a well-known farmer in the community: one who gets his work done early, tries new ideas readily, has high yielding crops or livestock, or the newest or biggest machinery.

19. Yes
   Has the expansion of the farm business (i.e. adding more land, more capital, more livestock, more labor, or combinations of these) been an important personal and/or family goal during the past 5 years? (If the answer to No. 1 is yes, ask No. 2; otherwise skip to No. 3).

20. No
   Have there been other personal and/or family goals that were more important than expansion during the past 5 years?

21. Yes
   Has the expansion of the farm business been an important business goal during the past 5 years? (If the answer to No. 3 is yes, ask No. 4; otherwise skip to No. 5).

22. No
   Have there been other business goals that were more important than expansion during the past 5 years?

END OF CARD 1
Section B. Growth of the Farm Business in the past five years.

Begin Card No. 2


<table>
<thead>
<tr>
<th>1962</th>
<th>1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>(7-10)</td>
<td>(10-14)</td>
</tr>
<tr>
<td>(15-17)</td>
<td>(18-20)</td>
</tr>
<tr>
<td>(21-24)</td>
<td>(25-28)</td>
</tr>
<tr>
<td>(29-34)</td>
<td>(35-40)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item Description</th>
<th>1962</th>
<th>1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn Acres raised</td>
<td>(7-10)</td>
<td>(10-14)</td>
</tr>
<tr>
<td>Soybeans and Wheat Acres raised</td>
<td>(15-17)</td>
<td>(18-20)</td>
</tr>
<tr>
<td>Fat Hogs, number Marketed</td>
<td>(21-24)</td>
<td>(25-28)</td>
</tr>
<tr>
<td>Gross Cash Receipts</td>
<td>(29-34)</td>
<td>(35-40)</td>
</tr>
<tr>
<td>Corn Yield, 1966</td>
<td>(41-43)</td>
<td></td>
</tr>
<tr>
<td>Pigs/litter, 1967</td>
<td>(44-46)</td>
<td></td>
</tr>
</tbody>
</table>

2. Inventory of Resources Controlled, 1962 and 1967

Land, Buildings, Machinery and Equipment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned buildings</td>
<td>(47-52)</td>
<td>(53-58)</td>
<td>(59-64)</td>
<td>(65-70)</td>
</tr>
<tr>
<td>Leased buildings</td>
<td>(71-75)</td>
<td>XX</td>
<td>(7-12)</td>
<td>XX</td>
</tr>
<tr>
<td>Owned machinery and equipment</td>
<td>(13-17)</td>
<td>(18-22)</td>
<td>(23-27)</td>
<td>(28-32)</td>
</tr>
<tr>
<td>Leased machinery and equipment</td>
<td>(33-37)</td>
<td>XX</td>
<td>(38-42)</td>
<td>XX</td>
</tr>
<tr>
<td>Owned land</td>
<td>A. @ $ /A.</td>
<td>(49-54)</td>
<td>A. @ $ /A.</td>
<td>(61-65)</td>
</tr>
<tr>
<td>Rented land (by Lease and farm)</td>
<td>A. @ $ /A.</td>
<td>lease terms</td>
<td>A. @ $ /A.</td>
<td>lease terms</td>
</tr>
<tr>
<td>A. @ $ /A.</td>
<td>A. @ $ /A.</td>
<td>A. @ $ /A.</td>
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<td>A. @ $ /A.</td>
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<td>A. @ $ /A.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A. @ $ /A.</td>
<td>A. @ $ /A.</td>
<td>A. @ $ /A.</td>
<td></td>
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</tr>
<tr>
<td>Owned land</td>
<td>(43-48)</td>
<td></td>
<td>(55-60)</td>
<td></td>
</tr>
<tr>
<td>Rented land</td>
<td>(67-72)</td>
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<td>(73-78)</td>
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</table>

END OF CARDS 2 AND 3
### Labor Used

<table>
<thead>
<tr>
<th>Item and Unit</th>
<th>Amount 1962</th>
<th>Amount 1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired labor, dollars</td>
<td>(7-11)</td>
<td>(12-16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpaid labor and management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>operator, months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wife, months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>family, months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other, months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Value, unpaid labor</td>
<td>(17-21)</td>
<td>(22-26)</td>
</tr>
</tbody>
</table>

### Other Assets and Liabilities (As of January 1, 1962, and January 1, 1967)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td></td>
<td></td>
<td>Short term notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stocks</td>
<td></td>
<td></td>
<td>Other notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonds</td>
<td></td>
<td></td>
<td>Bills, Merchant Credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money owed you</td>
<td></td>
<td></td>
<td>Household Installment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td></td>
<td></td>
<td>Other Installment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Assets</td>
<td></td>
<td></td>
<td>Other Debts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Other Assets</td>
<td>(27-32)</td>
<td>(33-38)</td>
<td>Total Other Liabilities</td>
<td>(39-44)</td>
<td>(45-50)</td>
</tr>
</tbody>
</table>
## Inventory of Feed, Supplies and Livestock

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ON HAND 1-1-62</th>
<th>ON HAND 1-1-67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Oats</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Soybeans</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Wheat</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Clover seed</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Timothy seed</td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Clover hay</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Mixed hay</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Corn Silage</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Grass Silage</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Straw</td>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>Sows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GILTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoats and Pigs 150#+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120# - 179#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80# - 119#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40# - 79#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef Cows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef Heifers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calves 900#+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>650# - 899#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400# - 649#</td>
<td></td>
<td></td>
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<tr>
<td>Under 400#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy Cows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy Heifers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy Calves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearling ewes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lambs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leased Livestock</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplies:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Value, Grain and Hay</td>
<td>(51-56)</td>
<td>(57-62)</td>
</tr>
<tr>
<td>Total Value, Livestock</td>
<td>(63-68)</td>
<td>(69-74)</td>
</tr>
</tbody>
</table>

END OF CARD 4
3. Income

Begin Card 5

\[ (6) \]

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1040F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1040D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total farm</td>
<td>(7-11)</td>
<td>(12-16)</td>
<td>(17-21)</td>
<td>(22-26)</td>
<td>(27-31)</td>
</tr>
<tr>
<td>Non-farm</td>
<td>(32-36)</td>
<td>(37-41)</td>
<td>(42-46)</td>
<td>(47-51)</td>
<td>(52-56)</td>
</tr>
</tbody>
</table>

4. What was your normal monthly expense for family living and household purposes in 1962 and 1967?

\[ (57-59) \]

\[ (60-62) \]

<table>
<thead>
<tr>
<th></th>
<th>1962?</th>
<th>1967?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$250 to $349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$350 to $449</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$450 to $549</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than $550</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF CARD 5

Card No. 6

\[ (6) \]

5. What major expansion decisions were made in your farm business from January 1962 until the present? When and why were they made and how was each expansion financed? (Enumerator checklist: land, labor, machinery and equipment, livestock, buildings and improvements and landlord buildings and improvements - Use code card to code the growth strategy used for each expansion).

\[ a) \]

\[ (7-16) \]
6. What were your problems in this period with regard to expansion? (Enumerator - Be sure that problems related to the following are discussed: land, labor, machinery and equipment, buildings and improvements, livestock and landlord.)

7. What kept you from growing more or at a faster rate during this period? What is it that limits your growth?

8. In the past five years, was:
   ___ yes  a) additional land available (for rent or sale) without aggressive search?
       no
   ___ yes  at competitive cost or rent?
       no
   ___ yes  b) additional labor available for hire?
       no
   ___ yes  c) additional capital available at market rates?
       no
9. Which of the following were reasons for the expansion decisions you made in the past five years?

(1) profitable
(2) no choice
(3) to stay competitive
(4) excess management ability
(5) unused capital or labor
(6) additional resources readily available
(7) prestige of being the operator of a large farm
(8) challenge - to see if you could do it.
(9) other, (specify) __________________________________

10. Did you use any money that did not come out of your farming operation for operating capital or investment in the farm during the past five years, i.e. inheritance, off-farm income, etc.? How much and when?

11. What unusual personal and/or family problems have affected your capital and labor use since January 1962?

12. Have you used any of the following strategies in the past five years? (Check the strategies used)

   (32) income tax management (i.e. different depreciation schedules, capital gains in place of regular income, used investment credit, year-end inventory management and income-expense adjustments.
   (33) minimum level of family consumption expense in order to invest in the farm business
   (34) switch to more intensive use of quick cash return enterprises, like corn, in place of livestock feeding
   (35) shop for the lowest interest rate on loans
   (36) custom work as an extra source of income
   (37) other, what? ______________________________

13. What plans do you have for future expansion of your farm business?
C. Management Questions

1. Bill Jones is a 35 year old farmer. He owns 80 acres and rents 160 acres of 120 bushel per acre corn land in southwestern Ohio. He normally raises 150 acres of corn and feed outs the pigs from his 50 head sow herd. He has $10,000 in long term debt and a net worth of $40,000. His gross cash income last year was $40,000 which resulted in a net cash income of $10,000. He is married and has two children.

Mr. Jones has to make a decision about next year's farming operation. He has three alternatives:

a) Another farmer has offered to sell him 120 acres of land comparable to his own @ $700 per acre but Mr. Jones would need to borrow $15,000 for down payment and refinance his present mortgage.

b) Another landlord has offered to lease him 320 acres for three years @ $35 per acre annual cash rent; but this would require an operating loan of $20,000 and $20,000 for additional machinery.

c) Maintain his operation as it was in the past year.

What would you do if you were Mr. Jones?

2. What minimum checking account balance do you try to maintain?

3. How long into the current production year do you maintain a corn inventory in excess of feed needs until harvest and why?

4. Is leasing or renting of land a common practice in your community?

5. Do your wife and family encourage you to try new farm practices?

6. Do your wife and family demand household item (like an electric dishwasher, etc.) before farm items?
7. Is there anything about your farm or your farming operation that sets you apart from your neighbors? If yes, what?

8. If the price of nitrogen fertilizer is five dollars per 50 lbs. of N and corn is worth one dollar per bushel, how much N would you apply when:

<table>
<thead>
<tr>
<th>Pounds Applied</th>
<th>Additional Cost of Fertilizer</th>
<th>Bushels Yield</th>
<th>Increased Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>85</td>
<td>15</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>96</td>
<td>11</td>
</tr>
<tr>
<td>150</td>
<td>5</td>
<td>104</td>
<td>8</td>
</tr>
<tr>
<td>200</td>
<td>5</td>
<td>107</td>
<td>3</td>
</tr>
<tr>
<td>250</td>
<td>5</td>
<td>109</td>
<td>2</td>
</tr>
</tbody>
</table>

9. Does leaf analysis eliminate the need to soil test?
   (1) yes
   (2) no
   (3) I don't know
   (4) Not related to soil test

10. The protein percentage recommended by the OSU Extension Service for feeding pigs weighing between 40 and 100 pounds is:
    (1) Don't know
    (2) 12%
    (3) 15%
    (4) 9%

11. How did you decide how many sows to breed for this fall?
    (1) Based decision on expected corn production and expected feed needs per sow and litter.
    (2) Breed approximately same number each fall.
    (3) Just decided - didn't use any economic outlook information.
    (4) Considered prospective prices and numbers of livestock.
    (5) Asked advice of others.

12. When you purchased commercial fertilizer this year, how did you decide where to buy it?
    (1) checked prices several places and picked best price or equally good price plus fringe benefits
    (2) always buy at the same place
    (3) neighbors or others advised to buy it there
    (4) purchased brand name from the closest dealer of that brand
    (5) other (how?)
13. How do you use farm financial records?

   (64) Income taxes
   ___ net worth statement
   ___ securing credit
   ___ cash flow analysis, i.e., determining periods when surplus cash exists or when short term loans are needed
   ___ partial budgets, i.e., making decisions on increasing or decreasing enterprise size
   ___ planning
   ___ other What? _______________________________________

14. Mr. Smith owns and operates a 100 acre corn-hog farm—gets yields of 110 bushel corn—farrow 12 sows twice a year, markets an average of 8.5 hogs in 5½ months per litter. His income has been decreasing—last year his gross income was $11,000 and his net farm income (return for his investment, labor and management) was $3,800. What is (are) his problem(s)?

15. Mr. Jacobs farms 160 acres of cash crops with the help of a son in high school. For tractor power he has one late model 3 plow tractor in good condition and 4 older tractors of various sizes and conditions. He says, "Why not—they are handy, only cost $300 or $400 each and don't cost anything to have on the farm". Do you agree?

16. What is the largest dollar amount you have ever been in debt? ______. When was that? ___________________________

   (67-72)   (73,74)  

TOTAL MANAGEMENT SCORE

(75,76)

END OF CARD 7
Below are several statements about farmers and farming. Please read each statement and circle the response which best indicates how you feel about the statement. There are no right or wrong answers. Please work rapidly and record your first impressions.

<table>
<thead>
<tr>
<th>Card</th>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>I am one of the first in my community to try something new.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>I sometimes plant my crops before I am sure the weather will be right.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Those farmers who cannot earn a satisfactory income from farming under present conditions should plan to leave farming.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>10</td>
<td>There are some things about farming where signs of the moon are important.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>11</td>
<td>It is dishonest to purchase production items, such as fertilizer, sometimes in December and sometimes in January to reduce income taxes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I am usually looking for some new and better method of farming.</td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>People who take risks usually are further ahead than those who don't.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I hesitate quite a while before I make a decision.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>The best thing about farming is that you are your own boss.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>16</td>
<td>Usually I am willing to accept new ideas and use new farming methods.</td>
<td></td>
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</tr>
<tr>
<td>17</td>
<td>A farmer can make a good return per hour for the time he spends studying the income tax manual.</td>
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</tr>
<tr>
<td>18</td>
<td>New farm practices are too complicated for me.</td>
<td></td>
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</tr>
</tbody>
</table>
13. Keeping records gives you a lot of material you can refer to in case of major decisions.

14. It is too risky to be the first person in the community to try something new.

15. A farmer should borrow enough money to have as much equipment and livestock as he needs, regardless of how much he is in debt.

16. The main principal in running a farm is to remain free of debt.

17. Planning beyond one year is a necessity in today's economic situation.

18. I believe people should stick to tested, proven methods.

19. Most of the articles in farm magazines are impractical and of no use to the farmer.

20. I would rather do things like my father did them.

21. People who invest money in the stock market are foolish.

22. Year-end inventory determination takes more time than it is worth.

23. I am usually slow to accept new ideas.

24. I usually am about the last person in my community to use a new farm practice.

25. Most farmers who enlarge their operations by borrowing, make more profit than farmers who have small operations free of debt.

26. Farmers should wait until they can accumulate their own capital rather than to borrow for farm production purposes.

27. A farmer should strive to increase the size of his business, rather than to get out of debt on a small unit.

28. It doesn't matter whether you own the farm or not as long as you can make a good living.

29. I believe in the philosophy, "Nothing ventured, nothing gained."
30. Hard work still counts for more in a successful farm operation than all the new ideas you read about.

31. I enjoy trying new things.

32. I wouldn't farm if I had to supervise hired help.

33. I would rather be safe than sorry.

34. The goal of a responsible farmer should be to own his farm by the time he is a certain age.

35. You seldom miss the right decision if you sleep on it overnight, then reconsider, sleep again, and take your time.

36. Leasing of machinery, equipment or buildings is acceptable to me as a means of gaining resource control.

37. "He who hesitates is lost".

38. I do not like to seek advice from outside sources such as dealers, neighbors, finance agents on farm business matters.

39. I am convinced that the use of new farm practices is the main thing that has helped me to stay in farming.

40. A skill in buying of inputs or selling of products is not important to success in farming.