1971

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Technical Bulletin 30
March 1971

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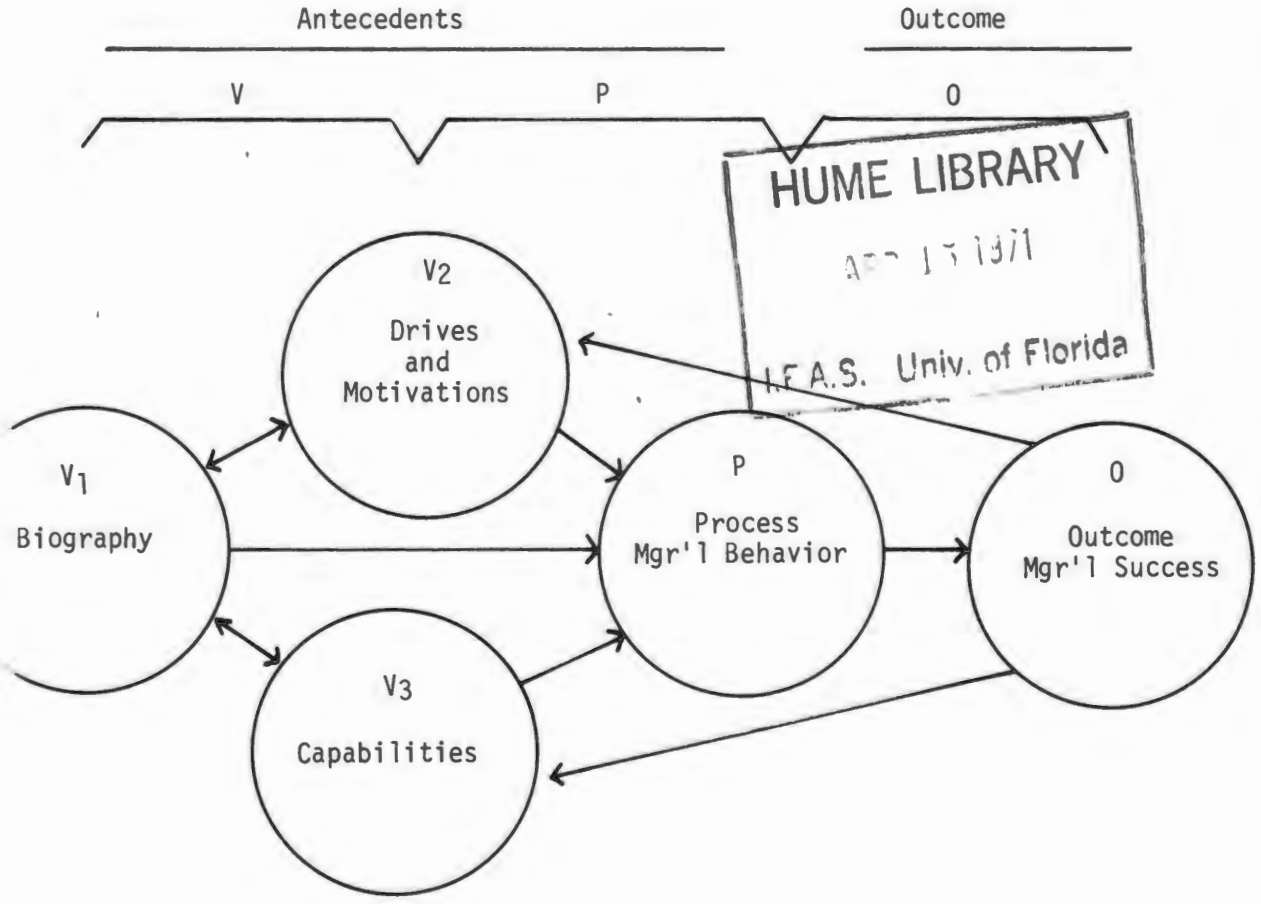

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Perspective

This is a study of the relationship between certain psychological factors and managerial success among several farm couples. An interdisciplinary study in economics and psychology, its motivation in part originated with farm lending agencies in South Dakota. They observe that South Dakota farmers are requiring increasing amounts of credit.

In some cases this credit is needed to expand enterprises with "traditional" technology, in other cases new and sometimes untried technology is the reason for expanded credit requests. Consequently, credit agencies frequently review their lending criteria and consider developing new criteria and methods to appraise the credit worthiness of the farm entrepreneur in terms of his potential.

Since evaluating credit risks is essentially evaluating management, greater understanding of the human element in management is increasingly important. Managerial competence appears to involve personality and behavioral elements. Paul Williams, formerly head of the South Dakota State University Psychology Department, was encouraged to join the study as a project co-leader. His training and experience reflect a clinical as well as an industrial orientation to psychology.

This study is necessarily exploratory, since no theory or theories have evolved that successfully integrate economics, sociology, political science, and psychology in managerial evaluation. Several hypotheses are advanced and tested in the study. Economic variables were considered as dependent variables and psychological variables as independent variables.

Seven major points of significance resulted from the study.

1) Any study of farm management that involves a farm couple must take cognizance of the wife's role in management. This is demonstrated by the fact that predictors were developed that are as statistically relevant for the wife as for the husband; when variables for both husbands and wives were included, a higher level of prediction accuracy was obtained.

2) While other farm managerial evaluation studies, conducted mainly by agricultural economists, have focused largely on selected separate parts of a managerial model known as the Nielson Model, this study included all parts of the model.

3) The total number of independent variables used in this study is greater than any in the literature of research in farm management. Further, these variables added up to a more holistic approach rather than looking at a few isolated variables.

4) The concept of management was more firmly established with an operational definition rather than treating management as a mysterious entity. While it may be convenient to talk about management in an economic model—as though it really exists—we must, if we are to do meaningful research and to understand human behavior, work with it in behavioral terms. The approach taken in this study was that management is one type of human behavior and, like other concepts of "talents" such as musical ability or athletic ability, it can and should be studied in behavioral terms.

5) This study demonstrates the practicality of developing criteria that can be used to counsel and select farm operators. Although such an instrument was not developed due to the self-imposed limits of this study (because of the limited sample size and exploratory nature of this study), nevertheless it is now possible to use the results and techniques of this study to further refine and to build selection instruments.

6) One feature of methodology that appears to be unique and that was used in this study was a combination of "clinical" and objective techniques. While this approach has been used by some researchers in consumer behavior, no specific reference was found to its use in farm management study. Preliminary group interviewing of sub-samples was used here with an analysis of the interview results in order to identify variables that should be measured by objective instruments.

7) The dependent variables used are more explicit and objective than have heretofore been used.

500—3-71—7957

Contents

Acknowledgements

This project necessarily involved several people. Appreciation is expressed to the following South Dakota State University faculty: Dr. Loyd Glover, former Economics Department head, who supported this project through its inception and early phases; Dr. John Thompson, present Economics Department head, who supported the project through its final phases; Dr. W. L. Tucker, Experiment Station Statistician, who assisted with data processing; Dr. Patricia Milic, Mathematics Department, who assisted with specific regression programs; Mr. Herb Bartling, director of testing and measurements, who assisted with the vocational interest portion of the study.

Mr. Joel Reed, Mrs. Beverly Borich, Mr. John Klein, and Mrs. Susan Auwarter assisted with the farmer interviews and with data processing. Mr. Robert McKellips provided major assistance in data processing and coordination during the latter part of the study. Dr. Glover, Dr. Howard Gilbert, Dr. Thompson, and Professor William Kohlmeyer provided useful suggestions in reviewing the manuscript. Mr. Alan DeKock, NASA Fellow, University of South Dakota, assisted with the factor analysis portion of the study.

The following officers in the State Farmers Home Administration office provided helpful suggestions in reviewing the manuscript: Mr. Arlo Swanson, formerly state director; Mr. Robert Caple, chief of real estate loans; Mr. Maurice McLinn, chief of operating loans; and Mr. Robert Swartout, chief of community services and former district supervisor for the FHA which included Brookings County. Mr. Charles Lawrence, manager of the Sioux Falls Production Credit Association, also provided meaningful suggestions in reviewing the manuscript.

Considerable assistance was provided in selecting the sample and in arranging for interviews with farmers by Mr. Roger Jones, formerly Brookings County FHA supervisor, and these personnel of the Sioux Falls PCA: Mr. Charles Lawrence, manager, and Mr. Kenneth Hustrulid and Mr. Richard Sweet, associate managers.

Assistance in defining farm managerial success was received from a panel composed of Professor Hilding Gadda and Dr. Arthur Matson of South Dakota State University and Brookings County Agricultural Agent Alvar Aho, former Associate County Agricultural Agent Merlyn Dahl, and former County Home Economics Agent Margeret Laughrey.

Finally, the generally cheerful approach taken by the 90 farmers and their wives who spent an average of 4½ hours each completing the questionnaires and interviews made the study possible.

Personality Characteristics Related to Managerial Success

By Kenneth R. Krause and Paul L. Williams*

There is an increasing need to find ways to improve the manipulation of technology, innovation, and factors of production to increase man's food supply and living standards. To meet this need an improved ability to understand, to teach, and to apply management effectiveness must be developed, and management effectiveness must be learned by an increasing number of people. These areas are particularly important in the United States with the decreasing emphasis on the manual worker and the increased emphasis on the intellectual input.

During most of the past century, efforts in American agriculture have been directed towards efficient production of increasing quantities of food and fiber. The predominance of research and educational expenditures have been in the physical production sciences with emphasis on the machine rather than man. Only in very recent years has attention been directed toward management. Even so, the assumption has been that if facts and knowledge are made available, the human element will assimilate and digest them and make decisions that will bring forth food and fiber in optimum manner. This approach has neglected the presence and nature of individual differences in managerial ability.

A minor portion of the research resources in agricultural economics has been or is being used for study of management in terms of the human element and how it relates to the available and developing resources. However, economics is basically concerned with the management of resources at all levels of abstraction. Thus it would seem at least as important to be able to evaluate the managerial ability of a farmer as it is to estimate the productivity of a machine or given type of soil.

Management is becoming steadily more important as farm businesses increase in size and complexity, as the level of technology employed on farms advances, and as the economic and social framework in which the farmers operate changes. However, a discussion of management leads to difficulties as soon as the subject turns to what management is and what factors are central in importance.

While there has been more than a 50% decrease in the number of farmers since the second world war and some changes in identity of the seat of decision making in food and fiber production, at least two million more farm decision makers are on the land than may be needed to produce the required food and fiber. (1)

The rate of development of new knowledge and innovation in agriculture is not equal among regions of the country nor among types of agricultural products. Eastern South Dakota agriculture has not benefitted as much from Corn Belt technological developments as some areas of the country. While farm numbers have been decreasing at near the national average, South Dakota could become an area with a disproportionately high percentage of substandard and subsistence farmers. This could happen if 1) technological developments continue to be accepted more slowly in South Dakota than in other competitive regions, 2) if the number of farms does not decrease sufficiently to allow remaining farmers a competitive income, or 3) if nonfarm employment alternatives don't develop which present and prospective South Dakota farmers could take advantage of.

Two developments during the past 2 decades are bringing the management needs of food and fiber production to the forefront, particularly those needs related to farm firm growth and financial management. First, the need for increasing quantities and improved quality of food and fiber to meet expanding domestic and world food needs is central. Secondly, the expanding knowledge brought forth through research and development is basic to optimal utilization of the human element in the firm.

Currently, farmers spend between 70 and 80% of their gross income on purchased inputs as contrasted with less than 50% as recently as 20 years ago. The percentage is projected to increase, and in some types of food and fiber production only a small margin between income and expenses may be possible. When 50% or less of the gross income was spent on purchased inputs, much of the input was composed of labor. It was relatively easy for the farmer or hired labor to switch from caring for chickens to seeding oats with a wagon, team of horses, and end-gate seeder. This type of flexibility and risk-reducing technique is no longer possible and will become less possible as farmers invest more heavily in commercial pesticides and specialized production and harvesting machines. For example, it isn't feasible to use a 150 horsepower tractor to feed chickens or to milk cows. Thus, while the farmer was once the all-pur-

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pose machine on a farm, specialized machines and inputs now are used.

In addition to a change in purchased inputs, a second development has been enlargement of farm businesses and an associated structural change in the factor and product markets. Concurrently, there have been increases in acreage, land values per acre, capital requirements per man, and total capital requirements per farm firm. These changes have been projected to continue in the same direction at an increasing rate along with an increasing demand for food and fiber. In addition, the structure of production and marketing will also change. As a result, farmers and agriculture will rely more heavily on nonowned capital and are moving into a money economy which is more interdependent with other segments of the economy.

Given increasing food and fiber production and yet decreasing labor requirements for "on the farm" food and fiber production, the operating capital going into food and fiber production and marketing at the farm level is projected to double in each 5- to 10-year period over the immediate future decades. While the capacity to predict the exact structure of food and fiber production even 10 years hence has not been developed, it appears that individual farm operators will continue to assume major decision making responsibility. The extent to which the individual farmer can meet this new role will depend upon the training and managerial ability that farmers and prospective farmers possess.

There are many forms of ownership and decision making on farms and ranches. Farms may be controlled by full owners, full tenants, agri-business firms that contract for specific quantities and qualities of a product from privately managed farms, or firms which own their own farm production resources and hire an operating manager. The value of fixed and variable assets under entrepreneurial ownership ranges from less than $50,000 to several million dollars. In addition, the structure of food and fiber production ranges from single product specialized cow-calf ranches to multiple product corn, soybeans, wheat, hogs, and sheep farms. The labor used on farms may involve only the farm family or many hired workers. Formal education of farm entrepreneurs ranges from a portion of elementary school through 4 or more years of university training.

In South Dakota this will mean rethinking of society's obligation to farm entrepreneurs. The philosophy has been that anyone can farm who can become located upon some farm land. Once located though, and especially if management difficulty develops, the individual often contends that society owes him appropriate means to increase his income or increase his farm opportunities. Instead of seeking other employment alternatives where his opportunities and productivity might be superior, he tries to stay on the farm.

Development of the ability to predict relative success of farm operator-managers should be a definite aid in the efficient allocation and use of scarce production resources. The lender's task of appraising borrowers' requests and their ability to successfully use and repay credit has become more complex. Lenders suggest that differences in the human element in management roles appear clearer, which emphasizes the need to clarify the role of the human element. Making capital and credit available to farm operators who have a low probability of success falls short of approaching an optimum allocation of resources. Without improved methods of selecting credit risks, the lender's tasks may become much more difficult in view of the several-fold increase in capital and credit that farmers often need to survive and develop firm growth. Public moneys invested in public credit agencies could be more efficiently used if they were available to farmers who have high probabilities of success.

A Review of Relevant Concepts and Insights

Selection of Farm Operators and Managers

Farmers who recognize alternative employment opportunities appear to be increasingly asking the question of whether they have the ability or can develop the ability to survive in the changing economic and social environment. Some South Dakota farmers have as much as 30 working years left, yet they may not be able to survive as farm entrepreneurs. Given some retraining, most present farmers can develop other employment alternatives.

High school and college students are beginning to question more seriously what is the necessary mix of background, ability, and motivation to become a successful farmer; further, how can one determine if he possesses or can develop any or all of these elements? Even though a student may show superior performance in school, he may perform unsatisfactorily in a farm management capacity.

The awareness of major differences existing in a person's ability and management performance is similar to observed differences in capacities of livestock to show efficient rates of feed conversion, in crop varieties to vary in yields, or in various soils to produce various crops. However, compared to work on livestock and crops, limited attention has been given to who will operate the food and fiber producing and

marketing units in the future or to what is needed in a manager.

Since more employment opportunities are developing in the United States, it seems desirable for individuals to be guided into the occupation for which they are most qualified. To guide individuals to enter, stay in, or leave farming will require understanding of the personality requirements in farming and close reexamination of what to teach and how to teach farm entrepreneurship and to whom.

Conventional economic analysis of farm management performance has focused on production coefficients such as yield per acre, feed per hundred pounds gain, physical size in acres or livestock, returns per ton of fertilizer used, and value of farm production per $1.00 nonfeed cost. Headley, however, found that such measures do not explain management goals and management returns of Illinois farmers. (2) He concluded that a better understanding of farmers' attitudes, skills, objectives and behavior is needed to evaluate performance and to teach farmers and prospective farmers how to achieve a high degree of performance.

Kellogg states that agricultural enterprise managers of the future will be selected largely because of their management capacities and not because of their knowledge or training in agriculture. (3) He further suggests that the unique era is past in which control of farms is obtained by inheritance from farm parents. Brake says that in a few years the farm entrepreneur will spend most of his time in decision making work with emphasis on financial management as opposed to physical labor or operation of machines. (4)

Drucker suggests that management ability or executive talent can be measured and consequently the aggregate output of management improved. (5) Caution is advanced against taking too narrow a view of management performance. Management cannot be easily categorized, packaged and sold by commercial firms like a conventional unit of production input such as a machine or ton of fertilizer. Management effectiveness must be learned by an increasing number of people. He says that management ability seems to have little correlation with intelligence, imagination, or brilliance. He defines effective management as people who get the right things done. What is right varies according to specific circumstances and the type of institution a man is serving and attempting to develop. Effective executives do possess certain habits and practices that can be learned by certain people—those who have the necessary personality traits.

Currently, farm resource owners use intuition to a large degree, along with biographical and personal information when selecting a farm firm operator and manager. Often what an individual has been able to accomplish in the past in a given farm situation (for example, satisfactory handling of an activity) is dominant in consideration or selection for a different form of, or an increased amount of, management responsibility. In many farm firm situations, a son or son-in-law often "takes over the farm" as the parents phase out of the operation. Creditors have tended to "go-along with" a prospective, young farm manager if he comes from a "good family." The current selection system appears to operate with error. It does not give specific consideration to motivations and goals, ability, nor managerial processes.

Limited work is available on using objective loan application and physical production data for predicting success in use of capital and credit in farming operations. A discriminant analysis technique has been tried with farm loan application data for FHA and PCA borrowers. (6) Factors which seemed to be important in distinguishing between successful and unsuccessful users of credit were farm ownership, experience on a particular farm, the relationship between non-real estate debts and total debts, planned debt repayment, attitudes toward insurance and the ability to make annual increases in net worth prior to loan application.

The study was exploratory and the author suggests that farm lending agencies currently do not obtain all data which could be useful in predicting success in the use of credit, especially as related to risk prediction. He suggests that character and management ability are closely related to a farmer's ability to repay a loan and that indicators of good or poor management ability need to be developed so that lenders may be assisted in their credit extending tasks.

Other types of business firms face problems too in the selection of managers and an administrative team. One concern is "what college training enables a man to develop into the best manager?" Often this type of question is answered in a rather noncommittal manner with replies such as the "well rounded specialist." A relationship between performance on the job and performance in college has not been well established. Currently the selection of a supervisor or executive is essentially made from a broad base of personnel. A foreman is selected from a work group, a supervisor from a group of foremen, a junior executive from a group of supervisors, and a senior executive from a group of junior executives. The intuition of the individual making the selection continues to be utilized to a large degree along with biographical and personal information. To date performance, previous outcomes, and biography are perhaps the most objective information components available for the selection of managers in commercial and manfacturing business firms.

An attempt is made to determine that the individual selected has the necessary mental capacity. Improvements in the system, such as more objective selection and development of administrative capabili-

ties, are being sought and studied and are considered by many to be one of the most important current business needs.

Simons, one of the leaders in behavioral science as applied to management, sees a high probability that major advances in understanding the human element in management will be made. (7) He refers to the use of simulation techniques with the advent of computer technology. Farm managerial evaluation research by a North Central States farm managerial research group has indicated the potential for selection and training of people with managerial ability. (8)

However, a well developed theory for identifying managerial potentials has not been developed. Most studies in this area have suggested a need to develop a general theory or theories for managerial evaluation. The evidence points to the need for interdisciplinary work as a point of departure for the study of human activity in management. Knowledge in industrial psychology, industrial sociology, and political science has not been integrated into economic knowledge of firms to any great extent.

The Human Factor in Management

Economics generally has been the science of choice with emphasis on providing knowledge to the decision maker on how to combine factors of production, for instance, to maximize production or profits or minimize costs. A new or modified science, behavoral economics, appears to be developing which will integrate knowledge in economics with existing and developing knowledge in other social science disciplines. The objective of behavioral economics as it is emerging is to find ways to manipulate technology, innovation, and creative ideas as well as factors of production to increase productivity. It focuses on what makes man act alone or in groups to increase creativity and productivity.

Currently management is considered to be the force within the firm that directs resource use and assists in interpreting the wants, needs, and objectives of the owners or controllers of the food and fiber production and marketing resources in relation to external assistance and constraint. After the objectives have been established, it is management's responsibility to achieve both the short- and long-run objectives and adjust short- and long-run objectives as goals of resource owners are modified.

The force is recognized to exist and function at all levels of operation. The firm's goals at each operational level influence, and may dictate to some degree, the use of the available resource inputs. The manager must resolve conflicts between those controlling inputs for production and consumption purposes.

Managerial behavior is the resultant action and reaction to a complex of internal and external conditions. The internal conditions have been identified using such terms as: values, goals, motivation, drive, desire, capabilities, performance, attitudes, and biography. External conditions include the dictates of markets, technological change, relations with other agents, weather, and governmental and other organizations.

A Farm Managerial Model

A model of a farm operator-manager, which from previous studies has come to commonly be referred to as the Nielson model, is used in this part of the literature review. (9) The model describes the manager as possessing a biography of past experiences, drives and motivations, and capabilities (antecedents) which produce managerial behavior (processes); this in turn produces an outcome or result (Figure 1). The model is completed by appropriate "feed-back" from the outcomes to the attributes of the manager, where results can be used to influence future decisions and outcomes.

The model considers management to be somewhat analogous to a catalytic agent—it does not in and of itself become a part of the product. The manager or the managerial complex is a behavioral entity. Feedback resulting from outcome experience is related to the primary antecedents, which in turn develops and influences the manager's capability for subsequent actions. Managerial success or outcome is the end result. Efficiency measures of various types may be utilized to differentiate managerial acumen.

This model of management can be used for an individual as well as for a firm managerial complex. If the manager is viewed as a goal-oriented system seeking to achieve a desirable goal, as has been done in this model, the concept of a behavioral system is introduced.

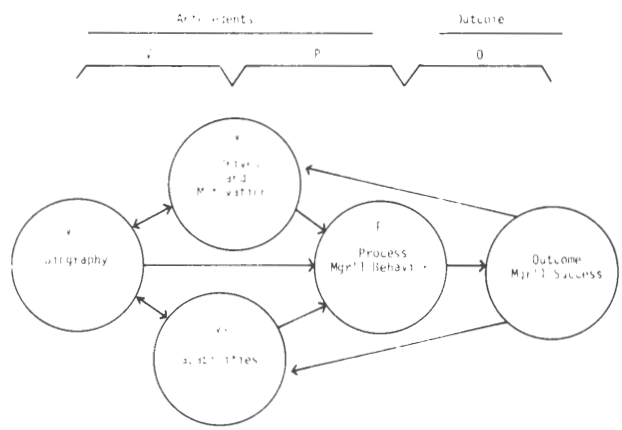

Figure 1. A model of the farm manager.

BIOGRAPHY

An individual's past experience or biography influences what he knows and how he thinks, acts, and reacts to a set or sets of stimuli. As each new experience is added, the compositions of the individual's antecedent are changed to the degree that this experience may modify, in small or large measure, what was previously included. In some cases recent events may tend to be given dominant consideration and the individual may draw heavily on recent experiences when confronted with a similar managerial concern rather than from more distant past experiences. In other cases there is great resistance to even consider new experiences or opportunities for learning. Biographical information and past performance feedback play an important function in the development of the value, motivation, and capability antecedents.

CAPABILITIES

Ability as an antecedent, through processes, determines management outcome. Identity and magnitude of the important elements of ability are variables not easily conceptualized or researched. Unanswered questions include, what is management ability, management potential or management performance? The question of what is managerial ability leads to circularity. It can be identified only by outcome. It is composed of the interaction of several variables.

It is hypothesized that there is a positive relationship between the managerial ability of a farmer and the managerial outcome which he achieves. However, the relationship is tempered by biographic and motivational antecedents in the human complex. Uncontrollable forces such as weather and commodity prices also influence the extent to which ability is turned into performance in the short run. However, the research goal is to measure ability and with this measurement to predict performance that is valid and reliable. Performance and ability variables need to be identified.

DRIVES AND MOTIVATIONS

Goals, values, and attitudes are included as one set of behavioral antecedents in the model through the concepts of motivations and drives. Human behavior is goal oriented. That is, there are some end states of affairs desired by an individual, variable from immediate to long range, that motivate his behavior.

An individual is positively oriented toward attainment of a number of goals which can be arranged into a hierarchy according to how he perceives these as satisfying his various needs. Two or more hierarchies may be integrated into one: the individual's rank-ordering of states of affairs according to his individual preference and the time dimension or level of generality—the need for a sense of security and the need for prestige may become integrated into a resultant need for financial success which provides both the prestige and security sought. The relation between various behavioral antecedents and managerial performance involves a second order level of inference. This is portrayed in the model whereby managerial success is described as a function of managerial behavior and managerial behavior is described as a function of behavioral antecedents and concurrent psychological states of the decision making.

One of the problems in dealing with these variables is the different levels of aspiration an individual may have regarding goal achievement. Most individual goals may be considered as having a quantitative as well as a qualitative dimension; that is, there may be various levels of attainment rather than simply a dichotomy of attainment or unattainment. It may also be that some goals, such as achievement and security, are of a sufficient level of generality and the value placed on the goal is sufficiently great that it serves as a nearly constant source of motivation and may never be attained to the complete satisfaction of the individual.

Values, along with beliefs and attitudes, may be considered as predispositional forces that influence the ordering of desirability of goals of the individual. They are latent variables which underlie behavior and which are manifest in the actions of an individual. Knowledge of these variables should enable improved prediction of human behavior.

A belief is defined as an enduring organization of perceptions and cognitions about some aspect of the individual's world. While it is essential that an individual believes a certain course of action to be possible in order for his behavior to be directed toward its attainment, the belief of the individual provides little or no indication of whether such a course of action actually will provide a positive or negative effect for him.

A distinction between beliefs and values is suggested as follows: a belief is a conviction that something is real whereas a value is a preference. Values relate closely to cognition as do beliefs, but the perception of what is supposed to exist, (belief), is distinct from the subject's bias of favor or disfavor toward this supposed reality. As implied by this distinction, neither beliefs nor values, having their basis in the perceptions and cognitions of the individual, bear any necessary relationship to scientifically validated "facts." Rather, they indicate what the individual believes to be true or what he believes conditions ought to be. The beliefs of the individual, along with his values, form the basis for subjective interpretation of phenomena and functionally may be considered as the underlying assumptions and postulates upon which an individual makes judgment and evaluations. Therefore, in order for an individual to be motivated toward the attainment of some objective, he must be aware of it and believe it is possible to attain as well as place some value on its attainment.

Two individuals who equally value prestige will

not necessarily choose the same combination of means to achieve this general end. Beliefs about means are also an important element in their selection. Consequently, as individual beliefs and knowledge vary, so may the choice of means be expected to vary. Individual choices of goals and means are also influenced by: (1) cultural norms and values, (2) biological capacities of the individual, and (3) accessibility of the goal in the physical and social environment. Equal valuation of prestige, if such a state were possible, would not necessarily be reflected in a parallel choice of means. Thus, a common generalized end may be manifest in a variety of more specific goal choices. Conversely, any goal of an individual is not necessarily related to a single value. One specific goal may reflect several values.

Attitudes have a direct subject-object relationship. This relationship implies that individuals tend to have attitudes toward specific objects which enter their experience, and that attitudes are possessed with motivational, emotional, and effective characteristics. Attitudes incorporate a functional state of readiness or a predisposition to action.

The distinction between attitudes and values is often not precise. They are both categorized as latent variables. Values and attitudes are affectively charged and represent actual or potential emotional mobilization. The terms attitudes and values are sometimes used interchangeably. The concept of value implies judgments of worth, often in terms of normative standards, whereas attitude refers to a specific response pre-disposition.

MANAGERIAL DECISION PROCESSES

Managerial success is a function of managerial behavior, which may be defined as the whole of the complex of activities involved in making and implementing the decisions of the firm. These activities are usually referred to as managerial processes. Managerial behavior may be similarly described as a function of the behavioral antecedents—biography, motivation, and capability. The antecedents, on the surface at least, hold promise as variables which can be used in building devices to predict managerial success or outcomes.

Review of Studies Using the Nielson Model

Farm managerial evaluation work relating to the Nielson model has been overlapping between the various parts of the model. This is in part due to the interrelationship of the various parts. All parts of the model have not been considered in one study with a given sample of farmers. Researchers have worked somewhat independently and their results cannot be generalized across a region, farm type, or managerial attributes.

In past studies, sample sizes have been small and the studies generally lack comparability in terms of management experience, size, type of enterprises, risk exposure, and background of the farm operators. This however was deliberate in a number of studies due to the pilot study nature of the work. Most samples have consisted of farmers who were members of record keeping or management associations and were not representative of all farmers. In addition, there has been little comparability in the method of measurement of dimensions and interrelationships of independent and dependent variables.

Results developed in specific studies are not enumerated in this publication. A publication devoted to a review of relevant studies on farm managerial evaluation research through 1966 can be consulted for a more extensive review. (8)[1]

MANAGEMENT CRITERIA

There appears to be two views with regard to success in farming: 1) success is achieved by being a competent technician and businessman; 2) success is achieved by staying rationally consistent between farm values concerning the family and community actions.

Several measures of success have been used to predict farm management success. These have been either measures of farm financial success, business-technical success, or community success. The methods used to develop success criteria can be summarized as follows: 1) indices of business success derived from management returns, 2) management returns, 3) economic efficiency measures, 4) ratings by other local farmers or farm leaders, 5) measures of ability to implement decisions.

Financial measures of achievement of the farm business have been widely used to measure managerial performance, with the implicit assumption that performance serves as a proxy measurement of ability. To measure ability and predict performance requires a criterion of performance that is both valid (measures what it supports to measure) and reliable (gives the same results with different samples). It is not clear that the financial measures used to date have these qualities.

In a study designed to develop criteria for success based on ratings by experts using rating scales and checklists, Carlson found that there are at least three dimensions to the concept of criteria for success. (10) He titles these "farm success," "community success," and "business-technical success." He concluded that there is a common dimension that relates certain predictors to rating by farm management fieldmen and which can be called "farm-businessman." This construct can be predicted by 1) years of vocational agriculture in high school, 2) years as a farmer, 3) score

[1]Also note individual publications cited therein for more detail and reference to specific studies.

on vocabulary tests, 4) a scaled goal measure, 5) score on numerical reasoning tests, and 6) years on the farm as a youth.

The criterion of success called "farm-businessman" is a predictable function of antecedent variables which include measures of ability. These measures of ability are not inferred, but are direct indications of ability in the absence of any past performance measure. However, measurements involving a behavioral approach to management such as ability and performance are not as accurate as are measurements of corn yields which reflect measurement of fertilizer productivity.

Carlson concluded that prediction of the success of a farmer involves two distinct dimensions. A construct called "farm success" is best determined by measures of economic or quasi-economic performance data, but it is not obvious that "community-family success" can be measured in this manner. A self or peer rating scale is the strongest instrument for measuring "community-family success."

Results of Carlson's study indicate the need for care in criteria selection and the problems of inferring management ability from criteria. Local professional agriculturalists' ranking of farmers on their management ability have been correlated with economic performances. The ratings have explained over half of the variance in various economic performance variables. Carlson concluded that the raters' criterion of performance was basically economic and that, to the raters, good economic performance meant good management ability.

It appears that local ratings are based on *a priori* knowledge, accumulated over varying lengths of time. While economic performance enters into the judgments, the ratings reflect the local concept of success. Community and individual goals, values, and attitudes as well as factors not directly related with economic performance, such as local reputation and nonfarm activities, enter into these ratings.

Criterion rating by an expert appears to be a measure of several variables including business performance, some community performance, and technical performance which is correlated with economic performance measures. Therefore, test scores may predict ratings which predict economic performance and, if the relationships are reliable, ability measures could be used to rank persons as to their probable success as "farmer-businessmen."

It appears that success or performance criteria developed to date are not a unique function of managerial success, but rather they reflect some composite of human and other inputs. However, measures of success or performance used must be considered as a function of the managerial ability of farmers since the human element modifies the effect of all other inputs. They verify the existence of large differences in what is thought to be the managerial ability of farmers.

MANAGEMENT ABILITY AND POTENTIAL

Research in the area often defined as management ability has dealt with ability, performance, and potential. It may be desirable to measure all three in a given study, but for different reasons. For example, one objective of recent management research projects has been to develop techniques which, within a reasonable degree of accuracy, predict future performance of a manager or a prospective manager.

Development of this type of predictive instruments involves several research steps and more than one management concept. The objective is to predict future performance. The prediction instrument variables will be comprised of measures of human attributes, which researchers have found positively or negatively associated with the level of performance of farmers. In the Nielson model, these attributes are either antecedents or processes. One or more of them may be aspects of management ability. These attributes can be identified by the analysis of attributes and performance of farmers. Therefore, in the first step in developing a predictive technique, the emphasis is on identifying and measuring actual managerial performance. In this research process a measure of managerial ability is an independent variable or a complex of independent variables.

Some studies using net income data for a farm business, changes in a net income or net worth, or measures of physical production such as crop yields and milk production per cow, have made inferences about managerial ability. However, performance was actually studied.

It can logically be hypothesized that there is a positive relationship between the ability of a farmer and the performance he obtains. Moreover, forces beyond the control of the individual, such as weather and commodity prices, also influence the extent to which ability is turned into performance.

Several studies have attempted to attribute some of the variation in measures of farm "success" to attributes of farmers and their families that could be called "managerial ability." Studies on farm managerial ability spanning a 30-year period were done in various parts of the country and have dealt with widely different components of the farm population.

An early study of managerial ability in the 1930's included the administration of a 50-item agricultural trade test. The farmer's ambition to succeed, interest in farming as an occupation, possession of technical information about farming, and farm experience and his wife's interest and help in farming were related to the farmer's earnings. (11)

Other knowledge test scores have been found to relate to income. In general, farmers with high knowledge scores possess other traits considered desirable.

(12) Although other factors were found related to performance, the predominant influences are knowledge, education, and experience. Operators with more years of formal schooling had substantially higher incomes, as did farmers receiving high scores on a combined age-health variable. However, this may be due to other factors, i.e., parents who have higher net worths may be able to send their children through more years of schooling and provide them with a larger farm financial position.

In the study it was shown that knowledge of good performance standards is a factor in farmer success. Operators who made the higher scores on an administered knowledge test possessed other desirable traits or characteristics such as being more progressive, having a better idea of what is considered a good rate of milk production, and culling their herds at a higher level. They were also adopting more of the recommended practices than were operators making lower scores.

Another study tested the hypothesis that variation in the ability of tenant farm operators can be explained by variation in the personal attributes of the farmers and their wives and the interaction of the personal attributes of the two. (13) A professional farm management firm rated tenants' performance on the farms which it managed. The relationship between biographical characteristics and the tenants' performance as farm operators was analyzed. Two instruments which have validity in predicting probable level of performance of prospective tenants on selected farms operated under a professional farm management service were developed. The instruments provide estimates of the "chances" of a prospective tenant being an "above average" or "below average" farm operator.

An index of farmer decision-making ability has been constructed from questions developed for a theoretical decision making model. (14) An individual farmer's rating indicated his ability relative to the norm of rational decision-making implied by the model. Information was obtained on goals and how farmers go about comparing alternatives. The questions used emphasized farmers' knowledge of information needed to make decisions, sources of information used, use of records, and knowledge of good performance. The study was limited to farm operational decisions. Results indicate a wide variation in the discriminatory power of individual empirical items.

Investigation of swine producers indicated that operational skills and characteristics were associated with high, average, and low levels of managerial ability. (15) Net income per sow was used as the criterion. The level of technical knowledge and knowledge of the farmer's own farm business was significantly related to managerial performance.

The degree of problem recognition has been used as an indicator of managerial ability. (16) Three subsets of independent variables—values, biography, and managerial techniques—were related to problem recognition. The independent variables were signifily related to problem recognition at a low level.

Measures of ability such as mechanical comprehension and numerical reasoning have not been found valuable in predicting "community-family success." Scores on ability tests for such things as mechanical comprehension, vocabulary, and numerical reasoning may be indirect measures of conceptualizing ability, organization ability, imagination, and other abilities that cannot be tested directly.

Ability has several meanings just as performance has several meanings. Real ability may never be measured. The construct that is used as a proxy for real ability must be defined as clearly as possible. The studies completed to date have not generally validated or developed accepted techniques for measuring real managerial ability. Implicit if not explicit in these studies is the assumption that managerial ability is related, in some way and to some degree, to the criterion by which success is measured.

MOTIVATIONS AND DRIVES

The area of motivations and drives includes several dimensions, including values, goals, and attitudes which in turn include personality characteristics.

Studies of the goals, values, and attitudes of farm operators can be grouped into two types: 1) those that have employed measures of goals and values as independent variables in attempting to predict various performance criteria and 2) those which have been concerned principally with determining the kinds of goals and values which characterize farm operators under various conditions.

In the formulation of predictive studies an initial decision has involved identification of goals, values, and attitudes which are relevant to managerial behavior, since management behavior is more restrictive than total behavior. Little consensus is found regarding the goal and value dimensions hypothesized to be relevant to managerial behavior. At the conceptual level, however, there is a general reference to a model of economic rationality as a basis for the decision regarding goal and value dimensions to be included.[2] Several studies have employed uncertainty models as a frame of reference for identifying goal and value dimensions.

Several predictive studies have involved *a priori* construction of independent variables which were intended to predict different levels of managerial success. These studies have been oriented toward deter-

[2]Implicit in this orientation are the assumptions that one of the principal objectives of the farm operator is to make a profit and that differences in profits can be at least partially explained by differences among farm operators concerning the salience of this objective.

mining the relationship between behavioral antecedents and management success. Standardized psychological tests have been used in some studies and in others the independent measures employed were developed specifically for given studies.

The value measures employed as independent variables included economic motivation, independence or decision-making autonomy, scientific orientation, risk-aversion, and mental activity. (17, 18, 19) In addition, the Allport-Vernon scale of values (which includes measures of political, aesthetic, economic, theoretical, religious, and social values), the Kuder Preference Record, the Minnesota Multiphasic Personality Inventory (20), and the need for change, achievement, order and endurance subtests of the Edwards Personal Preference Test have been used. (21)

As part of the above-described and other studies, measures of predispositional factors were included. Included were measures of motivation in analysis of rating procedures in measuring management ability, and measures of motivation, analytical ability, originality and imagination, and workmanship in study of farmer's efficiency in production.

Studies concerned with measuring a farmer's orientation specifically toward the attainment of economic ends generally reveal low level significant correlations between economic motivation and economic success. Likewise, studies which have sought to measure motivation in a broader context by using a broader range of success goals generally reveal significant relationships at a low level with economic performance. Thus, economic or achievement motivation of the farm operator is a factor which bears some relationship to his economic performance, but the magnitude of the relationship that has been found is small. More accurate prediction of motivations and drives would seem to rest on further refinement of motivational measures and dependent variables which more adequately reflect performances.

As part of the above studies, additional goal and value dimensions have been measured, including independence (the operator's willingness to deviate from neighborhood norms in making decisions), and orientation toward science. These dimensions have been found to significantly relate to economic success. Measures of analytical ability such as numerical ability have also been found to relate to economic success. (22) Taken together, the more economically successful farm operator has been found to be positively oriented toward scientific criteria in decision making and possess mental abilities to effectively exercise such criteria.

Studies on the effects of the family life cycle and individual motivations on the organization and operation of farms showed that efficiency as well as volume of inputs dropped sharply with increasing age. As age increased, changes in goals were noted, which included a preference for increasing leisure, an aversion to hired labor and borrowed capital, a reluctance to expand operations, and a greater tendency to choose enterprises on the basis of noneconomically oriented personal preference. Economic inefficiencies were particularly manifest in early and late stages of the farm family life cycle when family concerns are most competitive with production concerns. (23)

BIOGRAPHY

Though relatively easy access to many biographical items seems evident, limited work has been done on relating biographical and other personal factors to farm managerial performance.

Some success has been achieved utilizing biographical or personal characteristic and performance information of past outcomes in the measurement of managerial differences. The biographical component most consistently employed was a measure of knowledge. Researchers have concluded that it is useful for managerial performance measurement but needs additional refinement.

Biographical factors have differentiated levels of managerial performance. Selected biographical factors were found capable of differentiating farm managerial performance of both tenant and owner-operators. (24) Biographical characteristics have been related to the use and type of expectation models. The type of managerial expectation model used was found to be significantly related to formal education, age, and farming experience. Generally, the more training and experience acquired by the respondent, the greater the degree of sophistication found in the price expectation model used.

Several associations of farmer attributes and recognition of managerial facts and strategies have been tested. Questions were included to ascertain if the farmer respondent recognized the probability distribution of an expected event. The possible knowledge situations included: subjective certainty, risk action, learning, inaction, and forced action. The ability to recognize knowledge situations was found to be related to certain attributes, including biographical-type factors.

Years of formal schooling has been found to be associated with success, and it is also related to the way farm operators make decisions and their ability to make decisions. (25) Farmers with more formal schooling displayed a better understanding of analytical methods and used more definite and precise methods for arriving at price expectations. They also used more direct sources of information.

Problem recognition by farm managers and its relationship to characteristics of farmers has been used as a criterion variable. Biographical factors identified included age, education, farm backgrounds, agricultural training, off-farm income, and number of dependents. The thesis underlying these investigations

is that farm operators must identify a problem they face before it is possible to decide upon or to make any type of adjustment. Failure to recognize a problem was concluded to be an important retardation factor in agricultural adjustment required for improved and efficient management of a farm firm. The ability to recognize problems was considered to be associated with managerial performance. Biographical and other ancillary information was used to differentiate problem recognition abilities. (26)

Orientation, independence, general knowledge, and managerial personality have been shown to influence economic performance. Monetary goals are expectations of performance and are closely related to past performance.

Researchers who have worked with biographical information indicate that it is not sufficient as the only type of independent variable data for the identification of managerial differences. Yet, that biographic information needs to be included as one of the model antecedents is suggested when one realizes that meaningful relationships between biography and performance have been found and that past experience provides a part of the motivation and capability component of a manager. One weakness of previous studies, however, is that they generally have dealt with rather crude biographical facts, such as the number of years lived on a farm, without attempting to break down further the events, experiences, and attitudes the farmer may have toward those experiences.

MANAGEMENT PROCESSES

Recent research conducted by agricultural economists relating to management processes has focused on the decision-making function by the manager or managerial complex. Insights about how a manager operates with respect to the strategies employed, the types, kinds, and sources of information and knowledge situations have been developed. They have not shed much light on why a manager chooses to reason in a particular manner.

The antecedents of biography, motivation, and capability, as used by the manager or managerial complex, influence the management process and comprise knowledge, which is basic to understanding why some stimuli cause a different urgency of response than others. Considerable variation may exist in the impact the antecedent variables may exert on managerial processes. The composition of each category, the interaction among antecedent variates and the influence exerted on the process component of the Nielson model have not been studied.

In the field of psychology, work on decision processes has been done under the title of "problem-solving behavior." A person is said to have a problem if he is attempting to reach a goal. Problem solving is viewed as a complex of activities by which a person seeks to overcome the obstacles to goal attainment.

Efforts directed toward providing an understanding of problem solving are divided into two broad groups. First are those efforts concerned with the product of the problem-solving process (particularly with evaluating the effectiveness of the solution), the solution as a response to various stimuli, and second are those efforts which attempt to study the process itself and describe and generalize the processes. The greastest emphasis has been given to the product of problem solving, but within the past decade several new techniques have stimulated work on characterizing the problem-solving process.

At present, the meaning of decision processes is not clearly defined between disciplines. Defining it as problem solving behavior only appears to be too narrow. If it is defined as stylized behavior patterns such as a job description, then it may be too broad to be analytically useful. In agricultural economics it is often defined as the managerial functions such as observation, analysis, decision, action, and responsibility bearing. In this case it would appear to be the scientific method. This appears to be a normative view of processes and does not necessarily reflect managerial behavior and may not be useful as a predictive device.

In dealing with managerial processes in industries other than farming, three approaches have been used: 1) studies that utilize some type of problem-solvng process, 2) serial analysis of the problem-solving process, and 3) computer simulation of human thinking.

Research with problem solving instruments has worked with three processes: an initial phase, lag phase, and synthesis phase. (27) Significant correlation between certain personality and cognitive factors and the ability to perform well in problem solving tasks has been found.

In addition, work on the relationship on physiological variables such as cardiac arousal and complex mental activity using the three phases showed there was a significant increase in cardiac rate and variability for efficient problem solvers compared with little change for inefficient problem solvers. (28) The use of brain-wave recordings has shown that efficient problem solvers operate with a generally higher level of brain activity and are in a keener state of readiness to process and integrate information than are less efficient problem solvers.

Work under serial analysis has considered two phases, preparation and solution. The time spent in the two phases varies with respect to the complexity of a problem. As problems increase in complexity, an increasing proportion of time is spent in preparation. (29)

At present the potential appears strongest to study the managerial process with the aid of computer simulation techniques. The focus of computer simulation has been to view problem solving in its totality as a

process. The programs that have been developed do not include all aspects of human thought. But rather they have focused upon areas such as proving theorems in geometry, designing generators, and playing chess. (30) Some programs have been written to modify themselves on the basis of experience. Other programs have been developed for partial reinforcement experiments, rote memory experiments, and concept-forming behavior. Simulated programs of the management process to date appear artificial—the risks and gains are still imaginary to the person playing the simulated game.

If the area of process is not studied or included in a management model, it is assumed that managerial outcomes are affected by the interplay between biography, abilities, motivations, and drives. This assumption was made in this study and the biography, ability, and motivation and drives antecedents measured.

Preliminary Problem Formulation

Net Worth Change of Selected Southeastern South Dakota Farm Borrowers

Data presented and analyzed in this section illustrate credit extension problems that farm lending institutions face and problems that prospective and current farmers face in the use of credit.[3, 4]

During the period 1960 through 1964 the number of borrowers increased by approximately 50% in the Sioux Falls PCA and in Brookings, Lake and Moody County FHA offices (Table 1). Number of new operating loans and the 5-year increase in number of borrowers was greatest for the PCA. The increase was expected, given increasing farm credit needs and the sources of money to which the PCA's have access through the Farm Credit Administration. Several hail storm problems in Brooking County in 1963 and 1964 were responsible for an increase in emergency loans over the earlier years.

Farmers who repaid the loans and did not use additional credit from 1960 through 1964 were FHA borrowers for about 5 years and PCA borrowers for about 7 years (Table 2). In Brookings County 41.3% continued to farm and 66.2% of the farmers continued in Lake and Moody Counties after repaying their operating loans. In Brookings County 58.7% of the farmers discontinued farming including 4.2% who died, while in Lake and Moody Counties, 33.8% of the farmers discontinued farming including 9.2% who died.

Only three real estate loans were repaid to the FHA in Brookings County. Two of the farmers were foreclosure cases and one retired (Table 3). Ten real estate loans were repaid in Lake and Moody Counties and the farmers continued to farm.

In cases where a farmer is realistically considered unable to repay a loan, the FHA may cease to lend him more money and transfer his account to a collection or judgment account. In some cases the interest cost on these accounts accumulated to more than the principal in the three counties included. The age at completion of these accounts is relatively high—the late 50's and 60's (Table 4). About one-third of the collection only accounts were cancelled, about one-third compromised, and about one-third transferred to another county FHA office. Less than 5% of these accounts were paid in full. Very few farmers continue to farm after the collection only accounts are completed.

One of the objectives of the FHA operating loan program is to assist farmers to develop their operations so that they will be competent to obtain credit from commercial channels. Evidence in Table 5 shows that 44.4% of the Brookings County and 79% of the Lake and Moody County farmers had no further contact with the FHA offices after repaying their operating loans during the 1960-65 period. The remainder either quit farming, returned to FHA, were liquidated by FHA, or were considered as cases FHA would carry until they can qualify for Social Security benefits and were termed equity depletion cases.

Table 6 shows that 37% of the Brookings and 53.5% of the Lake and Moody County farmers who continued to farm after repaying their operating loans refinanced with a commercial lending agency. The remainder either returned to FHA, were transferred to collection only, transferred to another FHA office, or financed themselves.

Of the 22 Brookings County farmers who continued to farm in the county after repaying their operating loans, 13 or 59.1% were successful in terms of increasing their net worth (Table 7). Of the 47 Lake and Moody County farmers 63.8% were successful in increasing their net worth. The 13 successful Brookings County farmers showed a net worth increase from 1960 through 1964 of $7,300 after influences of inheritance and real estate inflation were removed (Table 8). The nine unsuccessful farmers showed an average decrease of $11. Thus there was a $7,311 difference in the change in net worth between the two groups.

In summary of the repaid operating and real estate loans, in Brookings County 20.3% were successful in terms of financial position increase and 45.4% of the Lake and Moody County farmers were successful (Table 9). The remainder of the farmers,

[3]The data which are analyzed in this section were obtained from the Brookings and Lake-Moody Counties FHA offices and from the Sioux Falls PCA office for the period primarily from 1960 through 1964.

[4]All data presented in this section are not routinely collected and recorded by FHA offices. In some cases it was obtained from unofficial records kept by the Brookings County FHA lending officer or clerk.

Table 1. Summary of Loan Numbers and Types—Brookings, Lake, and Moody Counties FHA, and Sioux Falls PCA 1960-1965

Year	Total Unduplicated Loans	All Loans by Type: Operating	Farm Ownership	Rural Housing	Soil and Water	Emergency	Economic Opportunity	Collection and Judgment Accounts
		Brookings County						
1960	140	73	44	18	1	40	0	40
1961	158	96	47	21	1	24	0	45
1962	155	100	52	29	1	8	0	37
1963	180	112	69	33	1	4	0	34
1964	207	120	83	34	0	67	0	31
1965	241	136	98	53	0	67	0	26
		Lake County						
1961	96	53	44	8	3	0	0	20
1962	112	56	54	12	3	0	0	19
1963	128	57	69	16	3	0	0	6
1964	138	58	69	22	3	0	4	4
1965	143	51	75	27	2	1	8	5
		Moody County						
1961	60	48	14	5	1	0	0	3
1962	71	49	26	6	1	0	0	4
1963	82	50	36	8	1	0	0	2
1964	82	49	38	8	1	0	0	1
1965	97	55	41	9	2	1	5	0
		Lake and Moody Office Totals*						
1961	156	101	58	13	4	0	0	23
1962	183	105	80	18	4	0	0	23
1963	210	107	105	24	4	0	0	8
1964	220	107	107	30	4	0	0	5
1965	240	106	116	36	4	2	13	5
		Sioux Falls PCA†‡						
1961	220							
1962	255							
1963	284							
1964	349							
1965	321							

Year	Total Repaid Loans	Repaid Loans by Type: Operating	Farm Ownership	Rural Housing	Soil and Water	Emergency	Economic Opportunity	Collection and Judgment Accounts
		Brookings County						
1961	35	7	0	0	0	22	0	6
1962	40	10	1	0	0	17	0	12
1963	26	11	0	1	0	4	0	10
1964	32	18	1	2	1	2	0	8
1965	85	15	1	2	0	61	0	6
Total	218	61	3	5	1	106	0	42
		Lake County						
1963	11	9	1	0	0	0	0	1
1964	25	8	1	0	0	0	0	16
1965	18	12	3	0	0	0	0	3
1966	15	13	1	0	1	0	0	0
Total	69	42	6	0	1	0	0	20
		Moody County						
1963	6	5	1	0	0	0	0	0
1964	11	8	0	0	0	0	0	3
1965	12	8	0	3	0	0	0	1
1966	3	2	0	0	0	0	0	1
Total	32	23	1	3	0	0	0	5
		Lake and Moody Office Totals						
1963	17	14	2	0	0	0	0	1
1964	36	16	1	0	0	0	0	19
1965	30	20	3	3	0	0	0	4
1966	18	15	1	0	1	0	0	1
Total	101	65	7	3	1	0	0	25
		Sioux Falls PCA						
1960	20							
1961	21							
1962	30							
1963	23							
1964	29							
1965	28							
Total	151							

*One Farmers Home Administration office in Madison, South Dakota, serves both counties.
†Excludes youth project and Cooperative Oil Company loans.
‡The Sioux Falls PCA extends only short and intermediate term credit.

Year	Total Yearly Change	Yearly Changes in Loans by Type						Collection and Judgment Accounts
		Operating	Farm Ownership	Rural Housing	Soil and Water	Emergency	Economic Opportunity	
	(No. Loans)							
				Brookings County				
1961	18	23	3	3	0	—16	0	5
1962	—3	4	5	8	0	—16	0	—8
1963	25	12	17	4	0	—4	0	—3
1964	27	8	14	1	0	+63	0	—3
1965	34	16	15	19	0	0	0	—5
				Lake County				
1963	16	3	10	4	0	0	0	—1
1964	16	1	15	4	0	0	0	—13
1965	10	1	0	6	0	0	4	—2
1966	5	—7	6	5	—1	1	4	1
Total	47	—2	31	19	—1	1	8	—15
				Moody County				
1963	11	1	12	1	0	0	0	1
1964	11	1	10	2	0	0	0	—2
1965	0	—1	2	0	0	0	0	—1
1966	15	6	3	1	1	1	5	—1
Total	37	7	27	4	1	1	5	—3
				Lake and Moody Office Totals				
1963	27	4	22	5	0	0	0	0
1964	27	2	25	6	0	0	0	—15
1965	10	0	2	6	0	0	4	—3
1966	20	—1	9	6	0	2	9	0
Total	84	5	58	23	0	2	13	—18
				Sioux Falls PCA				
1961	35							
1962	29							
1963	28							
1964	37							
1965	18							
Total	147							

Year	Total New Loans	New Loans by Type						Collection and Judgment Accounts
		Operating	Farm Ownership	Rural Housing	Soil and Water	Emergency	Economic Opportunity	
				Brookings County				
1961	43	30	3	3	0	6	0	1
1962	33	14	6	8	0	1	0	4
1963	52	23	17	5	0	0	0	7
1964	121	26	15	3	1	65	0	11
1965	130	31	16	21	0	61	0	1
Total	379	124	57	40	1	133	0	24
				Lake County				
1963	27	12	11	4	0	0	0	0
1964	32	9	16	4	0	0	0	3
1965	27	13	3	6	0	0	4	1
1966	24	6	7	5	0	1	4	1
Total	110	40	37	19	0	1	8	5
				Moody County				
1963	21	6	13	1	0	0	0	1
1964	22	9	10	2	0	0	0	1
1965	12	7	2	3	0	0	0	0
1966	19	8	3	1	1	1	5	0
Total	74	30	28	7	1	1	5	2
				Lake and Moody Office Totals				
1963	48	18	24	5	0	0	0	1
1964	54	18	26	6	0	0	0	4
1965	39	20	5	9	0	0	4	1
1966	43	14	10	6	1	2	9	1
Total	184	70	65	26	1	2	13	7
				Sioux Falls PCA				
1960	30							
1961	43							
1962	39							
1963	39							
1964	50							
1965	78							
Total	279							

Table 2. Summary of the Repaid Operating Loans—Brookings, Lake, and Moody County FHA and Sioux Falls PCA, 1960-1965*

Year	Number Repaid	Av. Age at Repayment	Av. No. Years FHA or PCA Borrower	% that Continued to Farm	% that Discontinued Farming	% that Died
Brookings County						
1961	7	43.8	7.6	28.5	71.5	14.2
1962	10	39.5	6.6	30.0	70.0	0
1963	11	42.3	2.4	36.4	63.6	0
1964	18	47.5	3.7	56.3	43.7	0
1965	15	44.5	5.5	55.3	44.7	6.6
Total	61					
Average (5 years)	12.2	44.1	5.2	41.3	58.7	4.2
Lake County						
1962	9	41.2	5.4	62.5	37.5	0.0
1963	8	41.3	5.2	75.0	25.0	0.0
1964	12	38.4	4.9	58.3	41.7	16.7
1965	13	39.6	4.1	69.2	30.8	7.7
Average (4 years)	10.5	49.9	4.8	64.3	35.7	7.1
Total	42					
Moody County						
1962	5	36.2	4.1	40.0	60.0	0.0
1963	8	39.1	4.2	62.5	37.5	12.5
1964	8	44.2	4.9	75.0	25.0	25.0
1965	2	40.5	8.9	100.0	0.0	0.0
Total	23					
Average (4 years)	5.7	40.3	4.9	65.3	34.8	13.0
Lake and Moody Office Totals						
1962	14	39.6	5.0	57.1	42.9	0.0
1963	16	40.5	4.6	68.8	31.2	6.2
1964	20	40.1	4.9	65.0	35.0	20.0
1965	15	39.8	4.8	73.3	26.7	6.7
Total	65					
Average (4 years)	16.2	40.1	4.8	66.2	33.8	9.2
Sioux Falls PCA						
1961	21		6.1			
1962	30		6.6			
1963	23		6.7			
1964	29		6.7			
1965	28		7.9			
Total	131					
Average (5 years)	26		6.8			

*FHA borrowers included are only these who did not reapply for an additional FHA operating loan and the case was considered closed by the FHA and farmers who were transferred to a collection only category. Age and farming status data were not available for PCA borrowers.

Table 3. Summary of Repaid Real Estate Loans—Brookings, Lake and Moody Counties Farmers Home Administration, 1960-65*

Year	Number	% Foreclose	% Retired	% Continued to Farm
Brookings County				
1961	0	0	0	0
1962	1	100	0	0
1963	0	0	0	0
1964	1	0	100	0
1965	1	100	0	0
Total	3			
Average (4 years)	1	66.6	33.3	
Moody County				
1962	1	0	0	100
1963	0	0	0	0
1964	3	0	0	100
1965	0	0	0	0
Total	4			
Average (4 years)	1	0	0	100
Lake County				
1962	1	0	0	100
1963	1	0	0	100
1964	3	0	0	100
1965	1	0	0	100
Total	6			
Average (4 years)	1.5	0	0	100
Lake and Moody Office Totals				
1962	2	0	0	100
1963	1	0	0	100
1964	6	0	0	100
1965	1	0	0	100
Total	10			
Average (4 years)	2.5	0	0	100

*Not applicable to PCA operations

Table 4. Summary of Collection Only Loans—Brookings, Lake and Moody County PCA, 1960-1965

Year	No. of Loans	Age at Account Completion	% That Continued to Farm	% That Were Cancelled	% That Were Compromised	% of Loans Cancelled When Borrower Died	% That Transferred to Another FHA Office	% That Paid in Full
				Brookings Office				
1961	6	67.2	0	33.3	50.0	50.0	16.7	0.0
1962	12	66.7	0	41.6	25.1	25.0	33.3	0.0
1963	10	64.4	10	50.0	30.0	10.0	20.0	0.0
1964	8	53.0	0	12.5	62.5	25.0	12.5	12.5
1965	6	59.0	0	16.7	33.3	33.3	50.0	2.4
Av. (5 years)	8.4	62.5	2.4	33.3	38.1	26.2	26.2	2.4
				Lake and Moody Office Totals				
1962	1	58.0	0	0	0	0	100.0	0.0
1963	19	56.3	10.5	42.1	31.6	10.5	26.3	0.0
1964	4	55.0	25.0	25.0	0.0	0.0	50.0	25.0
1965	1	60.0	0.0	0.0	0.0	0.0	100.0	0.0
Av. (4 years)	6.2	56.3	12.0	36.0	24.0	8.0	36.0	4.0

Table 5. Summary of Brookings, Lake, and Moody County FHA Borrowers Who Continued to Farm After Repaying Their Operating Loans by Partial Liquidation by the FHA and Exit from and Return to Farming, 1960-64*

	Brookings No.	Brookings %	Lake and Moody No.	Lake and Moody %
Encouraged or forced to liquidate all or part of their assets by FHA†	5	18.5	2	4.7
Quit farming prior to 1964	4	14.8	4	9.3
Returned to FHA for an operating loan or farm ownership loan	4‡	14.8	3	7.0
Termed FHA equity depletion cases by the county supervisor	2	7.4	0	0.0
No further contact with county FHA office	12	44.4	34	79.1
Total	27	100.0	43	100.0

*Data were not available for PCA borrowers.
†Borrower either reduced size of farming operation or refinanced from other source to continue farming.
‡Two of the four who quit prior to 1964 returned to farming in 1965.

Table 6. Method of Financing Used by the 27 Brookings County and 43 Lake and Moody County FHA Borrowers Who Continued To Farm After Repaying Their FHA Operation Loans, 1960-64*

	Brookings No.	Brookings %	Lake and Moody No.	Lake and Moody %
Continued to farm in the county with FHA farm ownership loan and may have obtained operating funds from another source or self-financed operating needs	7	25.9	9	20.9
Transferred to another county or state and continued with an FHA loan	5	18.5	10	23.3
Transferred to FHA collection only	3	11.1	0	0.0
Refinanced through a relative or friend	2	7.4	0	0.0
Return to some FHA office for a loan	0	0.0	1	2.3
Refinanced with commercial lending agency	10	37.0	23	53.5
Total	27	100.0	43	100.0

*Data were not available for PCA borrowers.

Table 7. Summary of Financial Position Change of Brookings, Lake, and Moody County FHA Borrowers Who Continued to Farm After Repaying FHA Opertaing Loans, 1960-65*

	Brookings No.	Brookings %	Lake and Moody No.	Lake and Moody %
Classified as unsuccessful in terms of financial position change from FHA records and county supervisor's evaluation	9	40.9	17	36.2
Classified as successful in terms of financial position change from FHA records and county supervisor's evaluation	13	59.1	30	63.8
Total	22	100.0	47	100.0

*Records were unavailable for borrowers who transferred to another county or state.

79.7% in Brookings County and 54.6% in Lake and Moody Counties, were either unsuccessful, quit farming, or moved to another county. Thus it may be concluded that between one-third and one-half of the borrowers were successful farmers with the FHA loans in Brookings, Lake and Moody Counties. This does not, however, apply to FHA farmers in the three counties who did not repay their loans during the 1960 through 1964 period. During the same period over 50% of all of the Sioux Falls PCA borrowers were able to show positive financial position change. This proportion was greater than that for the FHA borrowers (Table 10 and 11).

These data seem to indicate a need for a new or improved technique that lending agencies can use in evaluating and counseling farm borrowers. Since major farm operations decisions are increasingly being made between lenders and borrowers, it appears that more knowledge is needed on characteristics of farm borrowers as it relates to farm success.

Group Sessions

To assist in defining the problem in a testable manner, formulating a model and developing relevant variables, five group sessions were developed prior to the actual study. In these sessions particular emphasis was placed upon defining success in farming and identifying the factors that a panel thought were relevant in achieving success in farming. The first was with a "panel of experts" including county Extension officers, officers of farm lending institutions, and college professors knowledgeable in areas related to farming.

Seven successful and seven unsuccessful FHA borrowers and their wives (success being defined in terms of financial position change) were interviewed in separate group session—successful FHA wives, unsuccessful FHA wives, successful FHA men, and unsuccessful FHA men. The psychologist and project leader served as the discussion leader and a tape recording was made of the sessions. These were transcribed and both the recordings and typescripts were used as a guide in formulating questions and procedures for the study.

The farmers and their wives were asked to discuss such things as: 1) what farm, family, and community success is and what characteristics they observed in farmers and their wives whom they considered successful; 2) what risk, independence, and economic motivation means in farming; 3) the style and effects of interaction between the husband and wife in setting family and farm business objectives and goals; 4) the degree of belief in self determination of their destiny and factors relating to whether the farmer and his wife can control the outcome from a farm enterprise.

The separate comments of each husband and wife were compared. One of the significant points that

Table 8. Financial Position Change of Brookings County FHA Farmers Who Continued to Farm in Brookings County After Repaying FHA Operating Loans, 1960-1965

No. Farmers	Average Net Worth Beginning	Average Net Worth Ending	Av. Change in Net Worth Due to Real Estate Value Increase	Av. Change in Net Worth Due to Inheritance	Average Net Change after Adjustment
9*	$11,438	$12,127‡	$200	$500	$—11
13†	12,040	19,440§	100	0	7,300

*Number of farmers classified as unsuccessful in Table 7.
†Number of farmers classified as successful in Table 7.
‡Records were available for an average of 4.1 years during 1960-64.
§Records were available for an average of 2.9 years during 1960-64.

Table 9. Summary of Brookings, Lake, and Moody County FHA Borrowers Who Repaid in Full Their Operating and Real Estate Loans from 1960 through 1964

	Brookings No.	Brookings %	Lake and Moody No.	Lake and Moody %
Successful farmers in terms of financial position increase	13	20.3	34	45.3
Unsuccessful farmers in terms of financial position increase, quit farming or transferred to another county	51*	79.7	41†	54.7
Total	64	100.0	75	100.0

*Five transferred to another county and continued as FHA borrowers.
†Ten transferred to another county and continued as FHA borrowers.

Table 10. Summary of Financial Position Change of Sioux Falls PCA Borrowers, 1960 through 1964

Year	Successful No. Unduplicated Borrowers for Each Year	Successful Av. Net Worth Change	Unsuccessful No. Unduplicaed Borrowers for Each Year	Unsuccessful Av. Net Worth Change
1960-64	90	$7327.05	69	$—5227.94
1961-64	110	6317.38	91	—5957.02
1962-64	134	5750.45	104	—5391.80
1963-64	184	4697.36	101	—3452.87
1964-64	228	3850.67	121	—2555.95
1960-63	11	8033.45	4	—3099.50
1961-63	10	7069.80	9	—3276.66
1962-63	11	4834.18	12	—4071.33
1963-63	15	3314.93	15	—2872.73
1960-62	5	1009.20	8	—3223.25
1961-62	7	7171.00	12	—3321.50
1962-62	12	4263.66	12	—4318.33
1960-61	8	1949.62	4	—2006.50
1961-61	7	2545.71	9	—1374.22
1960-60	3	272.66	4	—1918.75

Table 11. Number and Percent of Successful Sioux Falls PCA Borrowers in Terms of Financial Position Change 1960 Through 1964

Year	Successful No.	Successful %	Unsuccessful No.	Unsuccessful %
1960	126	57.3	94	42.7
1961	134	52.5	121	47.5
1962	156	54.9	128	45.1
1963	199	63.8	113	36.2
1964	228	65.3	121	34.7

evolved from the sessions and was used in developing hypotheses and in selection of psychological variables in the study was the extreme difference in the ability of the successful and unsuccessful FHA couples to discuss and agree upon objectives for the family and farm business. The successful group appeared to be able to define, communicate, and agree upon family and farm business objectives. The successful group felt that they can control their own survival and success in farming. The unsuccessful group saw farming as a "big gamble" and thought that corporations will soon take over farming.

Sample Selection

FHA and PCA Borrowers

In view of an expressed interest for assistance in identifying successful farmers and potentially successful farmers by the FHA and PCA's, clients of the Brookings County FHA office and of the Sioux Falls PCA were selected for this study. The FHA borrowers were all farming in Brookings County and the PCA borrowers were located in six counties surrounding Sioux Falls. They were selected from October through December of 1965.

All 63 of the Brookings County FHA borrowers with operating loans and/or real estate loans from 1960 through 1964 were selected for study. This provided observations and records for study for a 5-year period. Thirty-nine PCA borrowers who had shown an increase in financial position were selected. They were selected from among 54 borrowers, the total number of records available for this time period which had shown an increase in financial position. The 15 borrowers who met the financial position increase criterion but were not selected were not family farmers.[5]

ASSISTANCE FROM LENDING OFFICERS

Selection was made from the senior author's review of all of the loan files for the FHA and PCA offices and evaluation of a borrower's success or lack thereof in terms of financial position change. After the borrowers were initially selected, each case was discussed with the county FHA supervisor and with the PCA manager or associate manager to assure consistency in the financial data as reported in files for each borrower.

The supervisor or manager in each case was personally acquainted with all borrowers and their property during the time period under consideration. Supervisors and managers were asked to value each item of the borrower's property at the current market value in each of the 5 years under consideration.[6] This approach encompasses subjective consideration in the appraisal process since it represents what the lending officer thought the property would sell for if a bona fide sale had been executed.

To establish values on each item on the borrower's balance sheet and to learn characteristics of borrowers and their families under consideration the senior author discussed each selected case with the lending officer an average of 2 hours. Particular emphasis was placed upon determining what the lending officer considered success in farming and success in the use of credit in a farming operation.

Approximately 20% of the successful farmers in terms of financial position increase achieved more than 100% more growth in financial position than their FHA farm financial plan called for. However the lending officer evaluated a borrower as more successful if he performed at the level indicated in his FHA farm plan and if he followed the plan and met credit repayment schedules on time.

NUMBER OF RESPONDENTS

For part of the analysis the FHA borrowers were analyzed in terms of successful, unsuccessful and limited success. The categorizations were made on the basis of financial position change. Successful borrowers had attained an increase in financial position and limited success borrowers had shown essentially no change in financial position in the 5-year period from 1960 through 1964. Twenty-six borrowers were classified as successful and an equal number as unsuccessful. Eleven borrowers were classified as achieving limited success.

For purposes of developing prediction models and comparisons between husbands and wives, the limited success FHA group was placed into either the successful or unsuccessful group, depending upon their change in financial position. There were 32 FHA farmers in the successful group and 31 FHA farmers in the unsuccessful group.

Interview and test questions were administered to all of the selected borrowers who had not moved from their farm before May of 1966. Twenty-one successful FHA farmers and their wives completed all of the interview and test questions and 26 completed part of the material which could be used. In the unsuccessful group, 19 completed all of the interview and test questions and 25 completed part of the material. Thirty-two PCA farmers and their wives completed all of the material and an additional five couples completed part of the material. Responses from each group were used in various parts of the analysis where they were complete enough to justify use.

[5] For instance, two were bachelors, three were in partnerships, and another farmer has a highly specialized operation unlike others in the area.

[6] In some cases the individual borrower completed the required balance sheet and cash flow statement and it was not closely evaluated by the lending officers if the borrower's loan repayments were on schedule. In some cases borrowers were as much as 25% over or under the value of their property as established by the lending officers.

Characteristics of the Selected Sample[7]

BIOGRAPHICAL ITEMS

The selected FHA borrowers on the average started with the FHA in 1956 and 1957 to give them between 8 and 10 years experience with the agency as of the last year that their records were considered for analysis (Table 12). Approximately half of the borrowers started with a farm ownership loan and half started with a farm operating loan. One-half of the successful borrowers were placed under intensive supervision when their loans were granted and one-half were under limited supervision.[8] About 80% of the unsuccessful borrowers were under intensive supervision and two-thirds of the limited success group were under this program.

The mean and median ages of the unsuccessful and limited success group was between 10% and 20% greater than that of the successful group. The mean and median age of the PCA farmers was midway between the successful and unsuccessful FHA farmers. The unsuccessful FHA group had an average of 9% more children and the PCA farmers 20% less children than the successful FHA borrowers. Both the unsuccessful and limited success FHA groups had about 50% more years of farming experience prior to 1960 compared with the successful FHA group. The PCA farmers had about 15% fewer years of farming experience as compared with the successful FHA farmers. Approximately equal numbers of successful and unsuccessful FHA borrowers were in a growth stage of physical farm production. However, there was a greater percent of the PCA farmers in a growth stage as compared with the FHA borrowers.

FINANCIAL POSITION

On the average, the net worth of the unsuccessful FHA borrowers was 75% greater than that of the successful FHA borrowers at the time of the first FHA loan application (Table 13). In 1960 the PCA farmers showed the largest net worth, $21,187, followed with $18,020 by the unsuccessful FHA farmers, $11,547 by the successful FHA farmers, and $11,474 for the limited success group. At the end of 1964 the PCA farmers had increased their net worth by an average of $15,447, the successful FHA borrowers by $8,918, the limited success group by $1,527, and the unsuccessful group had shown an $8,262 decrease in net worth over the 5-year period.

ASSET POSITION

In 1960 the PCA farmers owned assets valued at an average of $33,846, the successful FHA farmers at $25,966, the unsuccessful borrowers at $35,629, and the limited success borrowers at $21,524 (Table 14). At the end of 1964 the PCA and successful FHA borrowers had increased their asset position by 70%, the limited success group 48.6%, as contrased with a decrease of 7% for the unsuccessful group. The average value of total assets owned from 1960 through 1964 was greatest for the PCA farmers followed in order by the unsuccessful, the successful, and limited success groups. The PCA farmers managed the greatest average total value of assets during the period followed in order by the successful FHA, unsuccessful, and limited success groups. The PCA farmers held a higher proportion of their assets in real assets than did most FHA farmers. The unsuccessful FHA farmers had a significantly higher proportion of their assets in real assets compared with the successful and limited success groups.

DEBT POSITION

Chattel debt increased noticeably for the borrowers during the 1960-64 period, by 42% for the PCA borrowers, 87% for the successful, 62% for the unsuccessmul, and 125% for the limited success FHA borrowers (Table 15).

Seventeen of the 26 successful FHA farmers owned farm real estate and 15 of the unsuccessful farmers owned a farm as contrasted with 5 out of 11 for the limited success group and 27 out of 39 PCA borrowers.

Real debt showed a greater percentage increase than chattel debt for the PCA farmers, 72% and 42%, respectively, but was less for each category of FHA borrower. The percentage increase in total debt was highest for the successful FHA farmers (69%) and the lowest for the unsuccessful farmers (49%). The number of recognized creditors was greater for the unsuccessful FHA borrowers (8.3) than the successful FHA borrowers (4.9) and for the PCA farmers (2.69). Reasons given by the FHA lending officer for allowing the debt to increase as rapidly for the unsuccessful borrowers as for the successful borrowers include: lack of control of the unsuccessful borrowers, in terms of following agreed upon plans of action, and lack of willingness of the unsuccessful borrowers to cooperate with the FHA supervisor.

AVERAGE DEBT TO ASSETS

The real debt to real asset ratio of .304 for the successful FHA group was greater than for the other groups (Table 16). The chattel debt to chattel asset ratio of .604 was greater for the unsuccessful FHA farmers than for the other groups. However, in terms of total debt to total assets ratio, the unsuccessful borrower held a less favorable position (.658) than the other groups and the PCA group held a significantly

[7]Statistical tests were not developed on data in this section since the emphasis in this study was on financial position change and human characteristics related to managerial performance. However inspection of the data presented in this section generally indicates lower production efficiency for the unsuccessful borrowers contrasted with the successful borrowers.

[8]The intensive supervision program involves frequent farm visits by an FHA lending officer.

Table 12. Original Credit Application Information of Selected FHA and PCA Borrowers

	Successful*	Unsuccessful†	Limited Success‡	PCA§
Average year started with FHA	1957	1957	1955	
No. farmers by type of first loan with FHA				
Operating	14	12	7	
Ownership	12	13	4	
Rural Housing		1		
Original loan size	$13,755‖	$10,803‖	$10,182‖	
No. farmers by type of FHA Supervision				
Intensive	13	21	9	
Limited	13	5	5	
Average years farming experience by 1960	12.2	19.8	18.1	10.9
No. farmers in each physical production stage				
Stable	4	6	3	8
Regressive	1	1	1	
Growth	21	19	7	31
Median age in 1960	35.0	42.0	42.0	37.0
Mean age in 1960	35.5	40.2	40.7	37.8
Number of children	3.42	3.77	3.44	2.74
Number of boys	1.35	1.88	1.64	1.43
Number of girls	2.08	1.88	1.80	1.31

*Average for 26 farmers who showed a financial position increase 1960 through 1964.
†Average for 26 farmers who showed a financial position decrease 1960 through 1964.
‡Average for 11 farmers who showed no financial position change 1960 through 1964.
§Average for 39 farmers who showed a financial position increase 1960 through 1964.
‖The median was essentially the same as the mean.

Table 13. Financial Position and Financial Change of Selected FHA and PCA Borrowers, 1960 Through 1964

	FHA			PCA
	Successful	Un-successful	Limited Success	
Net worth at the time of loan application	$ 8,923	$15,841	$ 8,546	*
1960 Net Worth	11,547	18,020	11,474	$21,187
1964 Net Worth	20,465	9,758	13,001	36,634
Net Worth change from the time of loan application through 1964	11,542	—6,083	4,455	*
1960 through 1964 Net Worth Change	8,918	—8,262	1,527	15,447

*Data were not available.

Table 14. Level of and Changes in Assets Owned and Managed by Selected FHA and PCA Borrowers, 1960 Through 1964

	FHA			PAC
	Successful	Un-successful	Limited Success	
Total Assets owned (1960)	$25,966	$35,629	$21,524	$33,846
Total Assets owned (1964)	44,187	38,156	31,989	57,594
Percent change in assets owned 1960 through 1964	+70%	+7%	+49%	+70%
1960-1964 Average Owned Chattel Assets	21,457	21,300	18,283	26,400
1960-1964 Average Owned Real Assets	15,012	17,514	9,778	19,325
1960-1964 Average Value of Total Assets Owned	36,469	38,814	28,061	45,725
1960-1964 Average Value of Total Assets Managed	57,394	54,711	49,303	83,198
1960-1964 Ratio of Real Assets/Total Assets Owned	.412	.451	.348	.423
1960-1964 Ratio of Chattel Assets/Total Assets Owned	.588	.549	.652	.577

Table 15. Chattel and Real Esate Debt Position and Number of Creditors of Selected FHA and PCA Borrowers, 1960 and 1964

	Year	FHA No.	Successful	FHA No.	Unsuccessful	FHA No.	Limited Success	PCA No.	
Chattel debt	1960		$ 5,118		$ 8,226		$ 4,775		$ 7,319
	1964		$ 9,553		$13,346		$10,756		$10,380
Real estate debt	1960		$13,216		$15,719		$12,539		$ 5,744
	1964		$21,435		$22,394		$17,242		$ 9,867
Total debt	1960		$18,334		$23,936		$17,315		$13,063
	1964		$30,988		$35,740		$27,998		$20,247
Percent change in chattel debt 1960-1964			87%		62%		125%		42%
Percent change in real estate debt 1960-1964			62%		42%		38%		72%
Percent change in total debt 1960-1964			69%		49%		62%		55%
Average chattel debt 1960-1964			$ 8,733		$12,133		$ 8,896		$ 8,850
Average real debt 1960-1964		26*	$11,096	26*	$11,619	11*	$ 6,727	39*	$ 7,782
		17†	$16,970	15†	$20,122	5†	$14,827	27†	$ 8,452
Average total debt 1960-1964			$19,829		$23,752		$15,623		$16,632
Average real estate debt/ total debt 1960-1964			.560		.489		.431		.468
Average chattel debt/total debt 1960-1964			.440		.511		.569		.532
Average no. of creditors year end 1960-1964			4.9		8.3		6.8		2.69

*Total number of farms in each criterion group.
†Number of farms owners in each criterion group.

more favorable ratio (.369) than any of the FHA groups.

FINANCIAL OPERATING DATA

The unsuccessful FHA borrowers incurred considerably greater cash living expenses, farm operating expenses, and total cash farm expenses than the other two FHA groups (Table 17). Concurrently, the cash farm income and net cash farm income was noticeably greater for this farmer group. The limited success group showed lower expenses than the successful group, but at the same time, the lowest total and net cash farm income of all three groups. Analysis of the data in Table 17 indicate that relatively high expenses are more closely related to lack of success than are low cash farm income or even net cash farm income.

CREDIT REPAYMENT EXPERIENCE

The successful FHA borrowers showed stronger repayment performance than the unsuccessful FHA borrowers from 1960 through 1964 (Table 18). They averaged $759 per payment when they paid ahead of the scheduled date. Early payment averaged 155 months ahead of scheduled repayment time over the 5-year period.

Late repayment of real estate loans by the successful FHA group averaged 115 months as contrasted with 168 months behind for the unsuccessful group.

Table 16. Average Debt to Asset Ratio of Selected FHA and PCA Borrowers, 1960 Through 1965

	FHA Successful	FHA Unsuccessful	FHA Limited Success	PCA
Number of owners	17	15	5	27
Number of tenants	9	11	6	12
Average real debt/real assets tenants and owners	.304	.299	.240	.170
Average real debt/real assets owners only	.735	.572	.676	.394
Average chattel debt/chattel assets	.410	.604	.509	.340
Average total debt/total assets	.521	.658	.590	.369

Table 17. Financial Operating Data, Selected FHA Borrowers, 1960 through 1964

	Successful	Unsuccessful	Limited Success
Average cash living expenses	$ 2,452	$ 2,798	$ 2,386
Average cash farm operating expense	7,020	8,113	5,763
Average total cash farm expense	9,472	10,911	8,149
Average total cash farm income	13,612	15,406	11,139
Average net cash income	4,140	4,495	2,990

The former group averaged $5,933 behind as contrasted with $28,335 for the latter group.

In repaying operating loans, the successful group averaged 321 months behind schedule (when they were behind repayments) as contrasted with 3,176 months for the unsuccessful group over the 5-year period. The former were behind payment an average of 49 times on operating loans as contrasted with 160 times for the latter.

FARM OWNERSHIP

The successful and limited success FHA and PCA borrowers who owned farms purchased them on the average in 1956 and the unsuccessful farmers in 1951 (Table 19). The unsuccessful farmers purchased more acres, but the PCA farmers purchased the most crop acres. The PCA farmers paid the most for their farms per acre ($98.09) and the limited success farmers the least ($79.00 per acre). Given the difference in the land quality and location it is not significant that the PCA farmers paid the most per acre for their farms. However, they spent less for improvements as contrasted with the FHA borrowers and their farms had appreciated the most in value. They showed a $5,988 increase in the value of their farms as contrasted with $238 for the successful FHA farmers, a loss of $1,181 per farm for the unsuccessful FHA, and a loss of $1,000 for the limited success FHA clients.

FARM CROP AND ROW CROP ACRES

The PCA borrowers operated the largest average number of acres, 269, which was greater than the average of the FHA groups (Table 20). The successful FHA borrowers owned and operated more total and crop acres than did the unsuccessful borrowers—351 to 258 acres, respectively—as contrasted with 331 and 248 acres. The unsuccessful FHA group, on the average, operated 17 more row crop acres, 112 acres as contrasted with 95.1 acres for the successful FHA farmers. However, the limited success farmers showed a noticeably greater increase from 1960 to 1964 in number of acres operated, 21.2% as contrasted with 10.7% for the successful FHA, 7.8% for the unsuccessful FHA borrowers, and 9.4% for the PCA farmers.

CROP YIELD

The limited success FHA clients produced the highest corn, oats, and flax yields in 1960, followed by the successful group. A single exception was noted with flax, of which the unsuccessful farmers had higher yields (Table 21). The successful group produced the highest tonnage of alfalfa in 1960. The successful FHA farmers showed greater yield increases than the other two groups from 1960 to 1964 (31).

In 1960 the limited success group obtained 107.6% of the county corn yield and 130.9% of the county flax yield. They were below the county average on oats and alfalfa. The other groups were also below the county average. However, the successful group produced higher yields than did the unsuccessful group.

In 1964 the successful FHA group produced yields above the county average. They were above the other two FHA groups for corn, oats, flax, and alfalfa.

Table 18. Credit Repayment Experience, Selected FHA Borrowers, 1960 Through 1964

	Successful	Unsuccessful	Limited Success
Ahead of scheduled payment date			
Number of months ahead*	155	61	126
Average amount	$ 759	$ 148	$ 5,545
Behind scheduled payment date			
Real Estate			
Av. number of times behind	13	14	1
Number of months behind†	115	168	12
Average amount per month	$ 5,933	$ 28,335	$ 262
Average amount per month per time period	$ 456	$ 2,0249	$ 262
Operating Loans			
Average number times behind	49	160	50
Number of months behind	321	3,176	860
Average amount per month	$40,202	$108,524	$42,057
Average amount per month per time period	$ 820	$ 678	$ 901

*Total number of months ahead of scheduled repayment period 1960 through 1964.
†Total number of months behind of scheduled repayment period 1960 through 1964.

Table 19. Farm Ownership of Selected Farm Owners who Borrowed from FHA and PCA

	FHA			PCA§
	Successful*	Unsuccessful†	Limited Success‡	
Average year purchased farm	1956	1951	1956	1956
Total acres purchased	232	258	224	240
Total crop acres purchased	172	193	150	195
Cost of farm	$21,023	$23,188	$17,650	$25,549
Average cost per acre	$ 86.55	$ 89.78	$ 79.00	$ 98.09
Improvement cost	$ 7,265	$ 8,593	$ 8,750	$ 3,648
Present value of farm	$28,050	$30,600	$25,400	$36,179
Gain in real estate value after improvement cost	$ 238	$–1,181	$–1,000	$ 5,988
Owned real assets, 1960-64 average	$22,959	$30,358	$21,512	$31,595

*17 borrowers.
†15 borrowers.
‡5 borrowers.
§27 borrowers.

LIVESTOCK ASSETS HELD BY LIVESTOCK ENTERPRISES

The successful farmers averaged the greatest percent of livestock assets in dairy cows, 36.7%, followed closely by feeder cattle, 34.3% (Table 22). Sows, feeder pigs, sheep, and beef cows comprised about an equal

Table 20. Average and Percent Change in Crop, Row Crop, and Total Acres Operated and Owned by Selected FHA and PCA Borrowers, 1960 Through 1964

Land Use		FHA Successful	FHA Unsuccessful	FHA Limited Success	PCA
ROW CROP ACRES					
Average row crop acres operated	1960	109.8	105.8	94.4	
	1964	128.9	125.6	141.1	
	1960-1964*	95.1	112	105	
% change,	1960-1964	+17.4%	+18.7%	+49.5%	
CROP ACRES					
Average crop acres operated	1960	262.4	234.8	223.8	263
	1964	301.6	254.8	285.3	275
	1960-1964*	258	248	242	269
% change,	1960-1964	+14.9%	+8.5%	+27.5%	+4.6%
TOTAL ACRES					
Average total acres operated	1960	345.2	312.0	337.1	362
	1964	370.6	336.3	408.5	396
	1960-1964*	351	331	371	379
% change,	1960-1964	+7.4%	+7.8%	+21.2%	+9.4%
Owned,	1960-1964	159	149	102	136

*Average data presented may not be the same as the 1960 and 1964 average since data from each year, 1960 through 1964, were included.

Table 21. Average and Percent Change in Crop Yields and Percent of Brookings County Average Crop Yields for the Major Crops, Selected FHA Borrowers, 1960 Through 1964

Crop		County Av.	Successful Yield	Successful County Av. % of	Unsuccessful Yield	Unsuccessful County Av. % of	Limited Success Yield	Limited Success County Av. % of
CORN								
Average corn yield (bushels)	1960	39.0	36.0	92.3	33.8	86.7	42.0	107.7
	1964	45.0	46.8	104.0	37.8	84.0	37.5	83.3
	1960-1964*		37.71		35.49		37.72	
% change,	1960-1964	+15.4%	+30.0%		+11.2%		—10.7%	
OATS								
Average oats yield (bushels)	1960	49.0	37.7	76.9	35.2	71.8	44.2	90.2
	1964	36.0	47.0	130.5	38.6	107.2	39.1	108.6
	1960-1964*		45.59		37.75		39.75	
% change,	1960-1964*	—26.5%	+24.7%		+9.7%		—11.5%	
FLAX								
Axerage flax yield (bushels)	1960	11.0	9.0	81.8	10.9	99.1	14.4	130.9
	1964	11.5	12.0	104.0	10.4	90.4	10.7	93.0
	1960-1964*		10.44		10.59		12.04	
% change,	1960-1964	+4.5%	+33.3%		—4.8%		—25.7%	
ALFALFA								
Average alfalfa yield (tons)	1960	2.35	1.94	82.6	1.73	73.6	1.84	78.3
	1964	2.20	2.21	100.5	1.80	81.8	1.95	88.6
	1960-1964*		2.19		1.96		2.1	
% change,.	1960-1964	—6.4%	+13.9%		+4.0%		+6.0%	
BARLEY								
Average barley yield (bushels)	1960-1964*		26.1		17.4		22.0	
WHEAT								
Average wheat yield (bushels)	1960-1964*		16.2		15.3		15.0	
SOYBEANS								
Average soybean yield (bushels)	1960-1964*		14.0		14.4		16.3	

*Average data presented may not be the same as the 1960 and 1964 average since data from each year, 1960 through 1964, were included.

investment in the rest of their livestock assets. The unsuccessful farmers invested 50.2% of their livestock assets in dairy cows on the average, 28.7% in feeder cattle, and the remainder was about equally divided betweeen other classes of livestock. The limited success group showed less dominance in one enterprise with 43.1% in dairy, 26.3% in feeder cattle, 16.6% in beef cows, and the rest about equally distributed between sows, feeder pigs, and sheep.

Table 22. Average Percentage of Livestock Assets in Each Enterprise, Selected FHA Borrowers, 1960 Through 1964

Livestock Enterprise	Successful	Unsuccessful	Limited Success
	Percent	Percent	Percent
Dairy	36.7	50.2	43.1
Sows	7.5	5.6	4.2
Feeder pigs	8.9	8.0	5.9
Sheep	4.1	2.2	3.6
Beef cows	8.6	4.7	16.6
Feeder cattle	34.3	28.7	26.3

LIVESTOCK PRODUCTION

The successful FHA clients had the largest number of sows and beef cows in 1960 and 1964 (Table 23). The unsuccessful farmers held the largest number of dairy cows in 1960 and 1964 and the largest number of feeder pigs and feeder cattle in 1960. From 1960 through 1964 the unsuccessful FHA borrowers showed the largest percentage increase in dairy cows, while the successful farmers showed the largest percentage increase in feeder pigs and ewes. The limited success farmers showed the greatest increase in sows, beef cows and feeder cattle.

The successful FHA farmers showed a noticeably greater production output in pounds of butterfat per cow and pigs per litter for the 1960-1964 period (Table 24). The limited success farmers produced a slightly higher percentage calf crop and the unsuccessful farmers a slightly higher percent lamb crop than did the successful farmers. The successful farmers showed the greatest increase in percent calf crop, lamb crop, and pigs per litter with the limited success farmers showing the greatest percent increase in pounds of butterfat per cow.

Table 23. Average and Percentage Change in Number of Livestock by Major Enterprises, Selected FHA Borrowers, 1960 Through 1964

Livestock Enterprise		Successful	Unsuccessful	Limited Success
DAIRY				
Average dairy cows	1960	13.3	14.4	11.8
	1964	20.3	24.7	17.9
	1960-1964*	14.7	22.5	17.6
% change, 1960-1964		+52.6%	+71.5%	+51.7%
HOGS				
Average sows	1960	12.2	10.9	10.1
	1964	13.8	11.7	13.7
	1960-1964*	9.4	10.0	8.9
% change, 1960-1964		+13.1%	+7.3%	+35.6%
Average feeder pigs	1960	41.4	47.1	23.7
	1964	70.9	63.4	38.2
	1960-1964*	35.7	39.8	37.7
% change, 1960-1964		+71.3%	+34.6%	+61.2%
SHEEP				
Average ewes	1960	31.0	25.0	44.3
	1964	53.8	6.0	22.7
	1960-1964*	27.5	23.9	22.7
% change, 1960-1964		+73.5%	—76.0%	—48.8%
BEEF CATTLE				
Average beef cows	1960	9.9	8.0	8.4
	1964	23.0	9.5	25.3
	1960-1964*	9.5	7.0	11.0
% change, 1960-1964		+132.3%	+18.8%	+201.2%
Average feeder cattle	1960	20.4	24.6	16.5
	1964	33.8	32.3	27.5
	1960-1964*	25.1	26.6	27.1
% change, 1960-1964		+65.7%	+31.3%	+66.7%

*Average data presented may not be the same as the 1960 and 1964 average since data from each year, 1960 through 1964 were included.

LENDING OFFICERS' EXPLANATION OF SUCCESS OR LACK OF SUCCESS

The lending officers of the FHA and PCA were asked to give their evaluation of each farmer who was interviewed (Table 25). Given the philosophy of the role of the FHA and of the PCA and the freedom permitted the lending offices to interpret and implement the respective laws and rules under which they operate, the lending officers believed that they can identify reasons for success in farming. Their evaluation of each farmer appeared to be based upon the individual and his situation rather than upon a standard established only by the organization at the national or state level.

Particularly in evidence in their evaluations was consideration of identity and implementation of long-term objectives as established by the lending officer and borrower when the first loan was granted and when major changes from an established plan were undertaken. Each FHA supervisor and the PCA manager and assistant manager was asked to give reasons for each borrower's success or lack of success in terms of financial position change and credit repayment ability (Table 25). The supervisor and manager were given the major category headings and were asked to develop additional categories and to develop their own reasons under the categories as they evaluated the selected borrowers. They did not develop additional categories. The reasons given are stated in the general terms of the farm lending trade in South Dakota and represent the appraisal process of the lending officers in evaluating their borrowers.

Reasons given by the lending officers indicate that a borrower may have been successful with one or two positive characteristics while possessing several undesirable characteristics in the lender's view, such as dishonesty or alcoholism.

Table 24. Average and Percent Change in Output of Livestock Products—Selected FHA Borrowers, 1960 Through 1964

Livestock product		Successful	Unsuccessful	Limited Success
Butterfat				
Av. pounds per cow	1960	275.5	256.9	246.1
	1964	322.1	265.7	288.2
	1960-1964*	306.0	275.7	294.0
	% change 1960-1964	+16.9%	+3.4%	+17.1%
Calf Crop				
Av. % calf crop	1960	92.1%	91.3%	90.0%
	1964	93.8%	92.0%	89.0%
	1960-1964*	90.1%	88.0%	90.8%
	% change, 1960-1964	+1.8%	+0.8%	—1.1%
Lamb Crop				
Average % lamb crop	1960	103.0%	112.5%	95.0%
	1964	119.6%	101.0%	102.5%
	1960-1964*	103.0%	104.0%	98.9%
	% change, 1960-1964	+16.0%	—10.2%	+7.9%
Pigs				
Average pigs per litter	1960	7.0	6.7	7.2
	1964	7.3	6.5	6.8
	% change, 1960-1964	+4.3%	—3.0%	—5.6%

*Average data presented may not be the same as the 1960 and 1964 average since data from each year, 1960 through 1964, were included.

The PCA managers chose to use several categories to explain family characteristics. They placed emphasis on the assistance, both physical and mental, in helping the farmer. The FHA supervisor in addition to mentioning the wives' help also noted the uncooperative wives and children. Only the successful FHA borrowers and the PCA borrowers were suggested to have wives who help with physical farm labor.

Under level of living, the progress of 15% of the successful FHA farmers and 51% of the PCA farmers was mentioned as being due in a large part to conservative level of living and spending in the farm business. A heavy family spending for luxury beyond income means or above average for their income class was mentioned for 27% of the successful FHA borrowers, 23% of the unsuccessful group and 9% of the limited success group.

Under personal attributes of the farmer, a hard physical worker was mentioned for 31% of the PCA farmers and a strong desire to get ahead was mentioned for 15% of the successful FHA borrowers. Emphasizing the administrative side of the business and being an opportunist were each mentioned for 12% of the successful FHA farmers. Low mental ability was mentioned for 35% of the unsuccessful FHA borrowers. Poor physical health and alcoholism were each mentioned for 12% of the successful FHA borrowers.

High level of money management was mentioned for 39% of the PCA borrowers and 35% of the successful FHA borrowers. Paying too much in relation to value of their farm was mentioned for 19% of the unsuccessful FHA borrowers. Self imposed gross income too low for credit and family financial obligations but could borrow more was mentioned for 36% of the limited success and 31% of the unsuccessful FHA borrows. No concept of how to handle money was mentioned for 27% of the limited success and unsuccessful FHA farmers and 4% of the successful farmers. Unable to comprehend production and money management were mentioned for 27% and 23% of the limited success and unsuccessful FHA borrowers respectively. Buildup of debt which has been of no help in either family living, production, or repayment of debt was mentioned for 27% of the limited success and unsuccessful FHA borrowers.
rowers.

In terms of cooperation with the lending agency the supervisor suggested that 18% of the limited success and 8% of the unsuccessful FHA borrowers were willing to follow advice but still didn't get the job done. Twenty-seven percent of the limited success group and 23% of the unsuccessful group were listed as uncooperative in following the lending officers' advice.

Under the tenure on the land category 10% of the PCA borrowers were listed as living on their parents' farm. Twenty-seven percent of the unsuccessful group were listed as changing farms more than once due to unsatisfactory performance as evaluated by the land owners.

Under crop production, above average crop production for the quality of land was mentioned for 58% of the successful FHA borrowers and 12% of the

Table 25. Brookings County FHA Supervisor and Sioux Falls PCA Managers—Reasons and Explanation of Success or Lack of Success Among the Selected Borrowers*

Characteristics	FHA Successful No.	FHA Successful %†	FHA Unsuccessful No.	FHA Unsuccessful %*	FHA Limited Success No.	FHA Limited Success %†	PCA No.	PCA %†
Family								
1. High caliber family in their community							6	15.4
2. Children provide physical farm help							3	7.6
3. Wife teaches school or holds professional employment							5	12.8
4. Wife assists with physical farm labor	8	30.8					13	33.0
5. Wife provides only moral encouragement							4	10.3
6. Wife provides cosiderable management help							16	41.0
7. Wife is a pusher	3	11.5					3	7.6
8. Daughter has been ill							1	2.6
9. Wife has been ill	4	15.4	2	7.7	2	18.2	6	15.4
10. Children uncooperative—both with the family and the farm business	1	3.8	5	19.2	3	27.3		
11. Wife uncooperative—both with the husband's business and the FHA	1	3.8	8	30.8	2	18.2		
Level of Living								
1. Progress due in a large part to conservative level of living and spending in the farm business	4	15.4					20	51.3
2. Heavy family spending for luxury beyond income means or above average for their income class	7	26.9	6	23.1	1	9.1		
3. "Big" family	1	3.8	4	15.4				
Personal Attributes of the Farmer								
1. Hard physical worker is the major factor in success							12	30.8
2. Strong desire to get ahead	4	15.4						
3. Emphasizes the administrative side of the business	3	11.5						
4. Devoted to farming	2	7.7						
5. An opportunist	3	11.5					1	2.6
6. Tries for high volume for prestige reasons			2	7.7	1	9.1		
7. Doesn't work well with neighbors	3	11.5						
8. Works well with neighbors	2	7.7						
9. Divorced or remarried							2	5.1
10. Has feuded with neighboring farmers			1	3.8				
11. Low mental ability	1	3.8	9	34.6	1	9.1		
12. Dishonest	2	7.7						
13. An alcoholic	3	11.5						
14. Poor physical health	3	11.5						
Money Management								
1. Some inheritance help							4	10.3
2. Borrows money from parents with moderate break in repayment schedule							7	17.9
3. Nonfarm job combined with farming has improved money management skills							4	10.3
4. High level money manager	9	34.6					15	38.5
5. Very money conscious	3	11.5						
6. Wise investment in productive assets	2	7.7						
7. Paid too much in relation to value when purchasing their farm	1	3.8	5	19.2	1	9.1		
8. Wise use of credit	5	19.2						
9. Self imposed gross income too low for credit and family financial obligations, could borrow more			8	30.8	4	36.4		
10. Low level money manager							4	10.3
11. No concept of how to handle money	1	3.8	7	26.9	3	27.3		
12. Unable to comprehend production and money management	3	11.5	6	23.1	3	27.3		
13. Over mechanized in relation to available labor			4	15.4				
14. Over mechanized due to Extension Service advice			7	26.9				
15. Build up of debt which has been no help in either family living, production, or repayment of debt	1	3.8	7	26.9	3	27.3		
16. Uses all available FHA loans	2	7.7	2	7.7				
Cooperation with the Lending Agency								
1. Willing to follow advice but still doesn't get the job done			2	7.7	2	18.2		
2. Uncoopertaive in following advice			6	23.1	3	27.3		
Tenure on the Land								
1. Lives on parents' farm							4	10.3
2. Changed farms more than once, due to unsatisfactory performance as evaluated by the land owner	2	7.7	7	26.9				
Crop Production								
1. Above average crop production for the quality of land	15	57.7	3	11.5				
2. Good crop machinery manager	2	7.7						
3. Very soil conservation minded	3	11.5						
4. Improper use of fertilized	1	3.8	4	15.4				
5. Low crop production due to hazards, drought, hail, or frost	1	3.8	4	15.4	2	18.2		
6. Lower than average crop production for the quality of land	1	3.8	11	42.3	4	36.4		
Livestock								
1. Above average or good livestock producer	13	50.0	4	15.4			13	33.0
2. Made change in expanding or changing livestock enterprises at the right time	5	19.2					2	5.1
3. Herdsman type	1	3.8						
4. Improper timing of increase in volume, or change to a new species	2	7.7			4	36.4		
5. Below average producer	4	15.4	9	34.6	3	27.3		

*The supervisor and manager were asked to develop their own reasnos under the headings, family, level of living, personal attributes of the farmer, money management, cooperation with the lending agency, tenure on the land, crop production, and livestock production.

†Percent is based upon the total number of borrowers in each success criterion.

unsuccessful FHA borrowers. Being conservation minded was mentioned for 12% of the successful FHA borrowers. Improper fertilizer use and low crop production due to weather were each mentioned for 16% of the unsuccessful FHA borrowers and the latter was mentioned for 18% of the limited success FHA group. Lower than average crop production for the quality of the land was mentioned for 36% of the limited success group and 42% of the unsuccessful FHA group.

Above average or a good livestock producer was mentioned for 50% of the successful FHA group, 15% of the unsuccessful FHA group, and 33% of the PCA group. Indications that the farmer made changes in expanding or changing livestock enterprises at the right time was mentioned for 19% of the successful FHA group and 5% of the PCA group. Improper timing of an increase in volume or change to a new species was mentioned for 8% of the successful and 36% of the limited success borrowers. A below average producer was mentioned for 15% of the successful, 27% of the limited success, and 35% of unsuccessful FHA borrowers.

SUMMARY OF CHARACTERISTICS OF SELECTED FARMERS

To determine the number of farmers in each success category who were still farming in 1965, when they were selected for study and who still remained as farmers 1½ years later, records of the Brookings County FHA and the Sioux Falls PCA were examined in April of 1967 (Table 26). All of the PCA clients were still in farming, over 90% of the successful FHA farmers, 82% of the limited success, and about 70% of the unsuccessful FHA farmers. None of the FHA farmers who had quit farming were able to retire but had to accept other employment for income purposes.

In a general summary of the PCA and FHA clients, the PCA farmers on the average commonly appeared to possess and develop what are considered the stronger characteristics for success in farming. The characteristics of the successful FHA farmers seem more closely aligned to the conventional wisdom of what makes for success in farming. The characteristics presented are general. They do not say much about the human element itself and what makes it do the things that are associated with success or lack of success and they may not be successful predictors of future success.

Table 26. Number and Percent of Selected Farmers Still Farming in 1967

	FHA			PCA
	Successful	Un-successful	Limited Success	
No. farming and selected in 1965	26	26	11	39
No. farming, April, 1967	24	18	9	39
% remaining on farms 1967	92.3	69.2	82	100

The Managerial Model

The model developed for this study is a variation of the Nielson Model (Figure 2). See Figure 1, page 8, for the Nielson Model. It describes the manager as possessing antecedents of a biography of past experiences, drives and motivations, and capabilities which produce managerial processes and behavior and in turn produce an outcome or result. The antecedents are not mutually exclusive and are interrelated. For certain dimensions of decision making the feedback process is instantaneous, for other dimensions the feed-back may take a period of several months or decision making periods.

A manager at any point in time achieved his present ability, motivations and drives, and managerial processes from the background reflected in his biography. However, it is assumed that the manager does not inherit managerial ability, motivation, and drives as he does hair or eye color. The model assumes that management ability can be discussed as a specific entity. However, it is a holistic behavior since a manager's ability in a managerial situation is composed of all characteristics when used to solve management problems.

All dimensions of human decision making or biographic background are not included as specific variables in this study. For instance, marriage adjustment is an aspect of man's behavior which may influence his managerial outcome though this was not included as such in the study. The numerous roles that man plays may be related to his managerial outcome, but this relationship may be indirect and this variable is not included in this study. For instance, a manager may rate low as a citizen but relatively high in managerial outcome for his firm entrepreneurship. Thus, the citizenship variable would be irrelevant.

The general assumptions made in developing and testing the model are as follows: 1) Management in terms of the human element needs to be better understood. 2) Success in the management of an entrepreneurial firm can be recognized and the important components and outcome quantified. 3) Managerial processes may be of several dimensions.

4) There are separate dimensions to drives and motivations, capability, biography, and managerial processes which are used in decision making and these can be studied.[9] 5) Success in the use of credit, capital items, and money is among the most important economic variables desired in a manager given the contemporary economic environment. 6) Growth in financial position and assets owned and managed are among the most relevant variables for measuring success in the use of capital and credit. 7) The challenge is to isolate the relevant variables in each part of the model and the common variables in two or more parts and to establish a range of weights for each of the variables and parts.[10]

Criterion Selection

One of the major tasks facing managerial evaluation research is selection of the criterion upon which to evaluate a manager. In an applied sense, multiple criteria are currently used. For instance, absentee land owners formulate certain objectives for the use of their land and select and evaluate a tenant operator upon how well he meets the owner's objectives. Owner-operators may be freer to evaluate themselves. Farm lending institutions are perhaps the most universial evaluators of farm operators. Their criterion has been credit repayment capacity, which has in part been directed by the laws under which they operate.

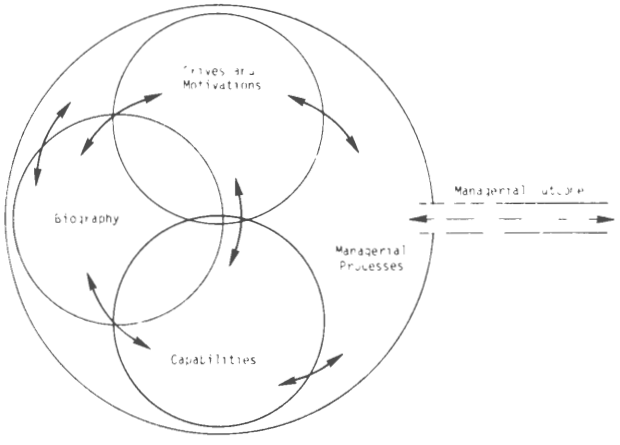

Figure 2. An interactive decision making model of a farm operator entrepreneur.*

*The model contains the same antecedents, managerial processes, and managerial output components as the Nielson Model. However this model assumes that the antecedents interact among each other and with managerial processes. In addition, it assumes that husband and wife are a farm managerial unit.

Although traditional theory of the firm has postulated net revenue or profit maximization as the goal of the firm, firms are observed to pursue goals other than or in addition to profit maximization. The entrepreneurial objectives of an individual firm manager may be diverse and include personal goals such as security and prestige as well as net money income. From a behavioral view, the firm and its entrepreneur may be viewed as an adaptive organism dealing with problems as they arise and not striving to maximize a single objective in the short run.

In an aggregate framework, consumers evaluate the farm entrepreneur through the farm products they purchase and the price they pay for them. Quantitative difficulty is encountered in measuring consumers' and society's changing ends for food and fiber production in relation to evaluating farm entrepreneurs. It appears incorrect to suggest that farm operators alone determine what is to be produced and how and when it will be produced and marketed.

Consumers may possess one set of values and goals for farm operators, while input suppliers and farm product market firms may hold other goals for them, and the farmers themselves may hold still different goals. Thus asking farmers what their goals are and evaluating them on how successfully they achieved their goals appears to lack completeness for purposes of managerial evaluation. This is especially the case on an aggregate basis if the concern is with national objectives for food and fiber production.

To date sufficient knowledge has not been generated to develop a dynamic national or international model which would indicate the most efficient structure of food and fiber production given certain unspecified ends. Thus, it appears premature to specify a given firm managerial complex and measure its management needs.

The most frequently used objective managerial evaluation criterion in recent years has been net returns to management. It has been used with the assumption that performance serves as a measurement of ability. It is an accounting phenomenon in that assumed charges on farm capital investment and family labor are subtracted from net farm income to obtain an estimate of returns to management. These residual

[9]Certain dimensions appear to be the same for more than one antecedent. The separate dimensions include such items as willingness and quality of decision making and what influences a manager's ability to make decisions. This could include desire for risk aversion, recognition of problems, and the execution of solutions once problems have been defined. Past experience may not play an important role in given dimensions of decision making. However, from a theoretical standpoint there may be facets of motivations and drives and ability that have not been isolated and can be measured with biographic information. From an empirical standpoint, biographic information is relatively easily obtained.

[10]For example a low score on the variables composing the ability antecedent may in part be compensated for by a relatively high score on the drives and motivation antecedents.

measurements provide somewhat unreliable estimates since no account is taken of windfall profits and losses which may be involved and the assumed capital and labor charges used in computing the residual returns may have little relationship to the actual earning power of the respective inputs. Furthermore, net management income is an *ex post* and static measure and requires historical experience before prediction can be done.

Management income data generally have not been corrected for exploitation of physical and human resources. A short time period, generally 3 years, has been used so that variation in management income has not been accounted for. Management income along with labor and capital income has been a success variable in many farmer and local community evaluators' eyes. It possesses appeal in that money income can be used to buy conspicuous material which is displayable.

FARM FINANCIAL MANAGEMENT AND FIRM GROWTH

The responsibility for over-all coordination and direction of a business rests with the entrepreneur. Management responsibility of the entrepreneur engaged in food and fiber production whether it be an individual, partnership, or corporation can be subdivided into financial management, physical production, and marketing management. In addition to applied emphasis on physical production and marketing, the dimension of farm financial management is becoming an important management area due to the change in the factor mix. The entrepreneur may assume the operational responsibility for each area himself or he may delegate all or part of it.

The theory of the firm with adaptation provides the basic theory for financial management. In financial management, marginal cost of acquiring money in relation to investment alternatives is used instead of the more commonly used marginal cost of production or increase in total cost. Instead of marginal revenue from sales, marginal return or efficiency of investment is emphasized. Emphasizing the financial aspects of decision making transforms the theory of optimum output of the firm to a theory of optimum investment and should give the same final result—the most profitable resource acquisition and allocation. Growth of the farm firm is in part dependent upon financial management since growth in assets under control is basic to growth by any measures such as increase in physical production, gross sales, aggregate net income, or net worth.

Growth of the farm firm is in part dependent upon financial management since growth in assets under control appears basic to growth by measures such as increase in physical production, gross sales, aggregate net income, or net worth. A basic assumption is that there is a difference in firm managers, their managerial processes, and ability to create various magnitudes of firm growth. A second assumption is that financial management success depends upon personality characteristics of the firm manager.

To transform the theory of the optimum finance of the firm to a growth framework the objective in addition to maximizing returns on investment is to maximize the aggregate value of the firm assets. With these objectives, the firm manager should evaluate each proposal to acquire new assets, each investment project and its method of finance in terms of net effect on growth in financial position. Thus financial management decision making may be regarded as concerned with quantities, timing, and methods of money and capital procured and used for firm survival and growth. In a growth framework, it can be argued that a primary objective of the firm is growth in net worth subject to the constraint of survival or security of a net revenue level or attainment of "satisfactory" profits.

In this framework, one aspect of financial management is how an entrepreneur invests his assets to gain control of additional assets. Several strategies could be used to gain control of additional assets. In each time period the entrepreneur would invest his own assets in a way that would allow him to gain control of an optimum amount of productive assets that would produce the greatest income and capital appreciation commensurate with the risk exposure. In each succeeding period he would invest his net income above principal and interest payments and living costs, plus his own assets and assets that he could rent, lease, or borrow in additional assets that would maximize his net worth. The mix of chattel and real assets and fixed and variable cost assets controlled would be specified by the leverage principle or percent of down payment, interest cost, yearly principal payments along with rental availability, and the net income potential from the mix. Growth would occur in assets under control, gross sales, the value of assets owned, and financial position.

CHANGE IN NET WORTH

Change in financial position is the criterion used in this study. Its strength from a commercial lender's viewpoint is that a primary objective of a lending institution is to extend credit in consideration of repayment capacity and security that the borrower can offer.[11] It also has the advantage of taking account of dynamic aspects of firm growth.

Increasing the absolute dollars of credit to a borrower as his net worth increases should place lending institutions in favorable positions since, if an increase in financial position is stable, security is available to support an outstanding loan. If a cash flow statement

[11]Other firm growth criteria that may be considered include an increase in total value of resources used or an increase in total output. Renborg (32) suggests that we do not yet know which is the superior objective function.

and balance sheet are executed, the lender should receive interest and principal repayment as scheduled if a farmer's net worth increases through net income at a sufficient rate to meet interest and principal repayments. If money is not available to meet interest and principal repayment in given time periods, the lender would have security to cover a default in payment. This is the case if the financial position of the borrower increases at a rate sufficient to meet the payment which could be in error.

In addition, financial position change as a criterion variable as compared with net management income, has the inherent advantage of taking account of "excessive family, non-essential farm business and nonfarm business spending." Given that returns to fixed farm resources have been relatively low and increase in land values relatively favorable in recent years, the change in net worth criterion takes account of these phenomena. This criterion is also supported by the physical production data from the sample. The unsuccessful borrowers showed less favorable output compared with the successful borrowers.

An assumption made in using net worth change as the criterion variable is that the farmers included in this study were able to obtain the credit and productive assets that they wanted to increase their net worth. In addition, it was assumed that there is a difference in firm managers, their managerial processes, and ability to create various magnitudes of firm growth. It was also assumed that financial management success depends upon personality characteristics of firm managers.

Disadvantages of the net worth change criterion should be recognized. Farmers and society possess goals in addition to repaying credit and increasing net worth. However, study of goals is a separate study.

Some of the disadvantages of the selected criterion are: 1) Some farmers who were included in the study who have been unable to show financial position growth, may have produced net incomes greater than needed for "adequate" family living expenses but have been unable or unwilling to add to net worth. Others may have been successful in showing financial position increase up to given levels prior to 1960 but may have been unsuccessful in trying to increase their financial position or asset control growth from 1960 through 1964.

2) From a personal, family and community service view, increasing net worth beyond an unspecified level, may be at the expense of financing children's education or require excessive management time which could be used with the manager's family or in community service.

3) The objective of increasing net worth may not meet national and international food and fiber needs nor foster long-term farm progress or generate structural change in food and fiber production.

4) Social behavior in a given community at a given time or the local or national economic environment may limit the size of a farm business. After the farm business reaches an unspecified size and income level the entrepreneur and his family may desire other ends. However, failure to grow can be attributed to the entrepreneurial resource and the way it adjusts to external forces such as the product and factor markets, uncertainty, and risk.

5) In selecting farmers on the basis of net worth change, consideration was not given to opportunities open to them to select or develop farm buildings and land best suited to their managerial skills during the 5-year period. In addition, attention was not directed to measuring characteristics such as timeliness of completion of the most important jobs. These areas were left unexplored since the focus was on behavioral, personality characteristics associated with financial success.

Development of the Dependent Variable

Variables may be entered into regression equations in several mathematically acceptable forms. Three variations on change in net worth were used. Each form is based on a percentage change in net worth, since percentage change takes into consideration a base—$10,000 or $50,000 in the starting year on which the analysis was based.

The three forms in which the dependent criterion variables were analyzed were as follows:[12]

[12]Additional forms of the dependent variable were developed but were not used in regression equations due to computer limitations. They may be used later. They include: 1 and 2) The change in absolute net worth for criterion variables 1 and 2. 3) An additional variable was developed by subtracting inheritance and inflation from the net worth change. The cost of family illness was added to net worth change. In cases where more than the farmer and his wife and one child were family members during the 1960 through 1964 period, an adjustment of $600 per year per additional child was compounded at 6% per year over the 5-year period. In cases where a son or sons were over 15 years old and worked for the farm business without financial compensation, $1,000 per son per year was subtracted from the net worth change. Absolute and percent change over the 5-year period which were developed using only the inheritance and inflation factor assumes that management has the capacity to adapt to the unforseen events such as illness and large family sizes. Including the additional family expense would give credit for unforeseen events and phenomenon. 4) The 1960 net worth for each subject was compounded annually at a rate of 6% for 5 years. An additional criterion variable was expressed as absolute and percent change in deviations with adjustment for inheritance and inflation from the projected 6% change. This approach compared what a farmer was able to achieve in financial position growth as contrasted with what he could have done if he had invested his net worth at a 6% rate of return and chosen alternative employment. 5 and 6) Two additional dependent variables were developed which reflect growth in farm assets. These are: a percentage change in assets owned from 1960 through 1964 adjusted to reflect current market value of assets and a percentage change in assets managed from 1960 through 1964 adjusted to reflect current market value of assets owned and managed.

Table 27. Years of Farming Experience, 1960 Through 1964, FHA and PCA Respondents

Years Farming Experience	Number of Respondents: Successful FHA	Unsuccessful FHA	PCA	Total
0-5	2		2	4
1-6				0
2-7	1	1	1	3
3-8	3		1	4
4-9	1			1
5-10	1			1
6-11	3		3	6
7-12		2		2
8-13	1		1	2
9-14		1	2	3
10-15	3	2	1	6
11-16	1	1	3	5
12-17		1	1	2
13-18	1	1	1	3
14-19	1		5	6
15-20		2	4	6
16-21			2	2
17-22				0
18-23			1	1
19-24				0
20-25			1	1
21-26	1	1	1	3
22-27	1	3	1	5
23-38		2		2
24-29		1	1	2
25-30	1	1		2

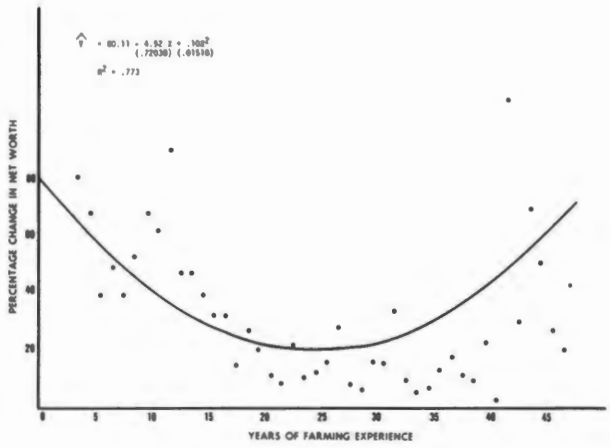

Figure 3. Financial position growth curve, 5-year farming experience periods.

Table 28. Mean and Standard Deviation by 5 Year Periods of Farming Experience in Absolute and Percent Change in Net Worth for 250 PCA Borrowers*

5-Year Period of Farming Experience	No. of Farmers†	Dollar Change in Net Worth: Mean	Dollar Change in Net Worth: Std. Dev.	Percent Change in Net Worth‡: Mean	Percent Change in Net Worth‡: Std. Dev.
0-5	35	$261	$15396	70	130
1-6	37	–463	17606	81	157
2-7	38	2898	8517	69	148
3-8	37	2077	8342	39	88
4-9	38	3089	8170	49	99
5-10	50	2281	5162	39	76
6-11	46	3262	5570	53	93
7-12	48	4262	7697	68	108
8-13	49	4690	8441	62	122
9-14	52	6579	8587	91	159
10-15	59	4323	10802	47	94
11-16	51	4180	11833	47	90
12-17	55	4199	15285	39	100
13-18	60	4168	12921	32	96
14-19	58	3160	7729	32	87
15-20	62	1849	7388	14	58
16-21	60	3137	8012	27	100
17-22	57	2165	6521	20	50
18-23	43	1678	7626	11	43
19-24	50	224	6698	8	45
20-25	46	3388	10647	21	58
21-26	49	1690	7550	10	45
22-27	37	680	6780	12	47
23-28	30	–364	8306	16	50
24-29	32	2115	5541	28	62
25-30	32	–1427	8270	8	41
26-31	33	–1512	7963	6	4
27-32	31	1976	7700	16	47
28-33	27	1892	5230	15	43
29-34	27	2561	6308	34	113
30-35	21	1199	4769	10	37
31-36	20	1185	3780	5	31
32-37	15	494	4644	7	21
33-38	14	270	4795	13	38
34-39	10	3730	7647	18	33
35-40	11	2938	4412	11	17
36-41	9	859	7618	9	40
37-42	10	–754	6611	23	91
38-43	11	–3763	6250	2	62
39-44	8	–942	3387	109	262
40-45	7	1513	4968	30	73
41-46	4	6856	10887	70	116
42-47	3	8377	8270	51	57
43-48	4	5746	10012	27	55
44-49	4	2241	15948	20	80
45-50	2	–4342	1345	–15	6
46-51	2	–3669	2155	–13	8
47-52	1	§	§	§	§
48-53	1	§	§	§	§
49-54	1	§	§	§	§
50-55	1	§	§	§	§
51-56	1	§	§	§	§
52-57	1	§	§	§	§

*Data were obtained from the records of 250 Sioux Falls PCA borrowers.

†The number of farmers is greater than 250 since all farmers with PCA records over 5 years in duration were included in each experience group in which their data were available.

‡A quadratic curve is fitted to the percent change data in Figure 3.

§Insufficient number of observations for realistic values.

1) Data on percentage change in net worth from 1960 through 1964 were adjusted to reflect current market value of assets in 1960 and 1964. The absolute dollars of inheritance and increase in asset values due to inflation above 4% per year on land values were subtracted from the change in net worth. The inflation factor was only considered in three cases where farmers had purchased land with an objective of agricultural use and it was worth more in 1964 for nonfarm uses. The data were used as a percentage change in net worth from 1960 through 1964.

2) Data on net worth change were developed for 250 Sioux Falls PCA borrowers. All borrowers with over 5 years of records were selected.The maximum length of records for any one borrower was 22 years. The data were adjusted to reflect current market value of assets for each borrower. The data were grouped for 5-year periods of farming experience—0 to 5 years of farming experience, 1 to 6 years of farming experience, etc. (Table 27 and 28). The data, when fitted in a regression equation, show a U-shaped curve (Figure 3). The net worth change of the farmers who were interviewed, with adjustment for inheritance and inflation, was compared with the average for their years of farming experience by use of a Z transformation where:

$$Z = \frac{\text{Respondents' \% change in net worth} - \text{Mean \% change in net worth of PCA borrowers for respondents' years of farming experience}}{\text{Standard Deviation}}$$

3) The percentage change in net worth from 1960 through 1964 was adjusted for inheritance and inflation as described in criterion number one. The percentage was multiplied by the farmer's years of farming experience. The resulting data for the respondents were scaled on a continuum from 1 through 9 (Table 29). The rationale on which this dependent variable was developed is that net worth tends to increase at a decreasing rate. It appears that this may be the case in terms of increase in farmers' net worth, since as years of farming experience increase so does the farmer's age and he may have less interest in increasing his net worth at as rapid a rate as in earlier years if his interest turns to other goals. Figure 3 shows that a relatively high percentage increase in net worth is possible in the early years of farming experience when the absolute net worth is small. The curve was developed for a very limited number of farmers with over 25 years of farming experience. It may not be representative of farmers who continue to farm, since farmers with over 25 years of experience may not use credit. Scaling the resulting years of farming experience times the percentage change in net worth tended to take account of the extremes and both the very high positive and very high negative percentage change in net worth by the farmers with a low absolute net worth in 1960.

Table 29. Weighted and Scaled Criterion Variable

No. of Farmers	% Change in Net Worth Weighted by Years Farming Experience*	Scale Value†
5	—1800 to —1400	1
8	—1399 to —500	2
4	—499 to 0	3
17	0 to +499	4
14	+500 to +799	5
6	+800 to +1399	6
6	+1400 to +1999	7
6	+2000 to +2999	8
6	+3000 to +6999	9

*The percentage change in net worth from 1960 through 1964 was weighted by the respondents' years of farming experience.
†Each respondent's dependent variable was entered in the regression equations on the scale value corresponding to his percent change in net worth weighted by his years of farming experience.

Personality Factors

Whenever possible, measures that had been used in other studies and that were generally recognized as valid instruments were used. Many of these instruments cut across both the areas of biography and motivations since one approach to measuring motivation is through self-report inventories and questionnaires. These are often biographical in nature but may have been validated against motivational criteria either empirically or by content validation.[13]

Numerous behavioral variables have been developed and validated with various groups and for various research purposes. However, there is a paucity of behavioral or personality variables specifically developed and validated for farm managerial evaluation.

Consequently three approaches were used in selecting independent variables:

1) Measures of personality variables that had been developed and validated in other managerial evaluation research studies were considered.

2) Measures of motivations, biography, and ability variables that had been developed in studies other than farm managerial evaluation were considered for their application to farm management.

3) Individual questions were formulated and variables were developed within the study itself where adequate instruments were not available from these two sources.

The independent variables were selected in light of the level of difficulty since some of the sample respondents had very limited education, were older, and were not accustomed to answering written questions,

[13] Content validation is a nonstatistical concept that refers to the use of a panel of experts in a particular field to judge how well a test measures what it purports to measure, within their area of competence.

particularly within the time limits required on some of the abilities tests.

Development of Independent Variables[14]

The model that was adopted as the guide for this study suggests that the important components of a firm manager are the experiences reflected in his biography, his motivations and drives, and his capabilities. Within each of these categories there is a multitude of ways in which these might be conceptualized and consequently a variety of scales and measures that might be used in an attempt to represent these concepts.

MOTIVATIONS AND DRIVES

Motivation is a rather general term that is used here to include attitudes, interests, values, needs, and so on; in short, we can think of an entity as being motivational if it serves to organize and/or direct a person's behavior. It should be recognized that a goal may have either a positive or a negative valence—one may be motivated to move toward the goal object such as the cash receipts from the sale of a crop or of livestock or the recognition and words of praise from his banker, his fellow farmers, or other significant person. He may also be motivated to avoid the things that are unpleasant, such as the anxiety that comes from having a debt (at least for some people), or the nagging of a wife, or his own fear of not reaching predetermined personal goals.

Four measures of motivations and drives developed in other managerial evaluation studies included in this study were the Hobbs scales designed to measure attitudes towards risk aversion, economic motivation, scientific orientation in farming, and independence.

Since a great deal of attention is being given to the role of anxiety in decision making strategies and the degree of risk-taking that is involved, this was included as a part of the motivational structure. An adaptation of the Taylor manifest anxiety scale that had been developed for a previous research study was used. (33) This scale developed by Janet Taylor when she was at Iowa State University, was initially used to measure the degree of anxiety that subjects felt in laboratory experiments. It was based on questions taken from the Minnesota Multiphasic Personality Inventory (MMPI), an instrument used widely by clinical psychologists to help in diagnostic classification, plus "buffer" items to partially mark and partially temper the impact of some of the anxiety questions.[15] These buffer items were from the L, F, and K scales of the MMPI that are thought to measure variables related to attitudes toward test taking.[16] The modification used was merely the elimination of some of the buffer items originally included from another source. The scale had previously been used quite successfully by the junior author with a sample of college students.

Another general aspect of personality that has been found to relate to lack of creativity and to influence decision making is similar to the syndrome referred to as authoritarianism.[17] (34) For this reason, the authoritarianism scale was included. (Some of the characteristics of "the authoritarian personality" are lack of flexibility in attitudes, need for structure, and reliance on but at the same time a resentment of authority figures.)

We also hypothesized, based on our experience in talking with farmers in the past, one variable that might be related to success was the degree to which a farmer felt as though he "controlled his own destiny" as contrasted with the degree with which he felt that he was merely "a victim of fate." Impressions gained from our round table discussions with the panel of farmers and their wives confirmed this to a startling degree. In playbacks of the interviews, our impressions were confirmed that to a marked degree this seemed to differentiate the successful farm people from the unsuccessful. The James Internal-External scale, which purports to measure this dimension, was included in our battery.[18] (35)

The Strong Vocational Interest Blank was selected to give a measure of vocational interests that might be related to farming—this instrument is probably the best validated and most thoroughly researched personality measure in existence. (36) A summary of the scales used is given in Table 30.

DEVELOPMENT OF SIGNIFICANT SCALES

Eleven additional variables were developed which are variations of the basic motivation and drives variables selected.

The modified scales were developed by item analysis, comparing the responses given by the three subsamples: unsuccessful FHA borrowers, successful FHA borrowers, and PCA borrowers by using chi-

[14]The individual scales and questions that were used in this study are excluded from this report to preclude their identification by prospective respondents. They are available to research investigators from the authors.

[15]The modified version, constructed by the junior author for previous research was shortened by eliminating one group of buffer items.

[16]These MMPI scales would not normally have been included, but since items constituting these scales were used as "buffer items" in the anxiety scale it was decided to score them, particularly since it was felt they might provide information about the validity of other results.

[17]The behavioral manifestation concept is borrowed from Aderno, et al; this does not mean acceptance of the Freudian theoretical basis on which it was founded.

[18]An unpublished self-report inventory to measure the extent to which people feel their "fate" is determined by "internal" (self) or external influence.

Table 30. Validated Motivation and Drives Scales

Author	Men's Scale	Women's Scale
Hobbs*	Risk Aversion	Risk Aversion
	Economic Motivation	Economic Motivation
	Scientific Orientation	Scientific Orientation
	Independence	Independence
Aderno*†	Authoritarianism	Authoritarianism
Taylor*†	Manifest Anxiety	Manifest Anxiety
	L Validity Scale	L Validity Scale
	F Validity Scale	F Validity Scale
	K Validity Scale	K Validity Scale
James*	External-Internal Orientation	External-Internal Orientation
Strong Vocational Interest	**Group I**	Artist
	Artist	Author
	Psychologist	Librarian
	Architect	English Teacher
	Physician	Social Worker
	Osteopath	Psychologist
	Dentist	Lawyer
	Veterinarian	Social Science Teacher
	Group 2	Y.M.C.A. Secretary
	Mathematician	Life Ins. Salesman
	Physicist	Buyer
	Engineer	Housewife
	Chemist	Elementary Teacher
	Group 3	Officeworker
	Production Manager	Stenographer-Secretary
	Group 4	Business Ed. Teacher
	Farmer	Home Ec Teacher
	Aviator	Dietitian
	Carpenter	Occup. Therapist
	Printer	Nurse
	Math. Phys. Science Teacher	Math-Science Teacher
	Ind. Arts Teacher	Dentist
	Policeman	Laboratory Technician
	Forest Service Man	Musician Performer
		Physical Therapist
		Engineer
		Feminity-Masculinity
	Group 5	
	Y.M.C.A. Phys. Director	
	Personnel Director	
	Public Administrator	
	Y.M.C.A. Secretary	
	Soc. Sci. H.S. Teacher	
	City School Supt.	
	Social Worker	
	Minister	
	Group 6	
	Musician (Performer)	
	Group 7	
	C.P.A.	
	Group 8	
	Senior C.P.A.	
	Office Man	
	Purchasing Agent	
	Banker	
	Mortician	
	Pharmacist	
	Group 9	
	Sales Manager	
	Real Estate Salesman	
	Life Ins. Salesman	
	(Men's Scales, cont.)	
	Group 10	
	Advertising Man	
	Lawyer	
	Group 11	
	President-Mgr. Concern	
	Occupational Level	
	Specialization Level	
	Masculinity-Femininity	
	Interest Maturity	

*The Hobbs scales had not specifically been validated for women but were used in this study. The Aderno, Taylor and James scales had been validated with both sexes together.

†The authoritarian scale is based upon the work of Aderno, the manifest anxiety scale was a slight modification of Taylor's manifest anxiety scale, and the L, F, K validity scales were based on Taylor's work but scored according to an initial MMPI score developed by the junior author.

square tests. The 10% level of significance was used.[19]

Each question having a significant chi-square was scored as a binary variable (+1 or —1) by the observed frequency counts to each individual question. The procedure was to determine the answer or answers given with high frequency by one group and relatively low frequency by the opposite group. If the highly frequent response was by the successful FHA or PCA groups a +1 was used; if it was by the unsuccessful FHA group, a -1 was used. In cases where the comparisons between successful and unsuccessful FHA borrowers and between successful FHA borrowers and PCA borrowers differed, scoring of the questions was resolved by minimizing the number of answers "incorrect" due to a given scoring. Scores for the individual questions within a validated scale were summed to form a new significant scale score (Tables 31 and 32), that is, a score based on only those items actually discriminating the unsuccessful group from one or both of the other groups. The new individual scale scores were summed to form a gross significant motivations and drives score.

GROSS MOTIVATION AND DRIVES SCALE[20]

A gross motivations and drives variable was developed for both men and women by simple summation of scores on each of the validated motivations and drives scales: risk aversion, economic motivation, independence, scientific orientation, external-internal,

[19]The chi-square procedure used in this section on motivations and drive variables and in the following section on biographic individual item between the three groups of men and the three groups of women according to the formula:

$$x^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

where:

O_i = the observed frequency of the ith class

E_i = the expected frequency of the ith class

[20]Considered a gross scale score in later analysis.

Table 31. Significant Questions, Motivations and Drives Scales

Scale, Men and Women
Significant Risk Aversion
Significant Economic Motivation
Significant Scientific Orientation
Significant Independence
Significant Authoritarian
Significant Manifest Anxiety
Significant L Validity Scale
Significant K Validity Scale
Significant F Validity Scale
Significant External-Internal
Significant Strong Items*

*Considered a gross significant score scale in later analysis.

Table 32. Number of Questions in the Validated Motivations and Drives Scales and Number of Questions Per Scale Which Were Significant

Validated Scales	Number of Questions in the Validate Scale	Number of Significant Questions	
		Men	Women
External-Internal	30	0	1
Authoritarian	29	4	6
Independence	19	4	3
Scientific Orientation	20	2	4
Risk Aversion	16	1	3
Economic Motivation	16	4	5
Manifest Anxiety	50	12	13
L Vauidity Scale	15	6	4
K Validity Scale	28	5	8
F Validity Scale	64	11	7
Strong Vocational Interest*	400	85	182

*Considered a gross significant Strong score scale in later analysis.

authoritarian, manifest anxiety, and L, F, and K scales.

GROSS SIGNIFICANT MOTIVATION AND DRIVES SCALE

A gross motivation and drives variable was developed for both men and women by simple summation of equally weighted scores of answers to significant questions on each of the following developed scales: risk aversion, economic motivation, independence, scientific orientation, external-internal, authoritarian, manifest anxiety, and L, F, and K validity scales.

GROSS STRONG SCALE

An additional new Strong Vocational Interest variable was developed for men and for women by simple summation of equally weighted scores of the individual Strong significant scales.

ABILITIES

Less emphasis was given to the abilities component of the model compared to motivations and drives for these reasons: 1) It was felt that ability in the usual sense of factual knowledge or "trade skills" is of secondary importance to "problem solving," since today there are readily available sources of information and skill. 2) The junior author in research in managerial ability with other populations has generally found ability of secondary or even no value in differentiating management success.

It could be argued that one difference may exist that should be considered—farm entrepreneurs are not hired by someone, as are industrial managers. Therefore, they may not be as homogeneous with respect to ability. The authors feel that one reason ability does not account for more variance in industrial managerial success studies is the relatively homogeneous sample resulting from a screening out of low-ability subjects. This screening reflects two things: 1) Ability, as we are using the term, is more easily measured, i.e., validity coefficients of intelligence, aptitude, and achievement tests are generally far higher than those for "nonintellectual" measures. 2) The organizations within which managerial studies are done are typically more "progressive" in their orientation and have probably been more selective in the hiring of managers.

It was felt, however, that these conditions still didn't override the secondary role of "ability" since some farm management decisions often do not require the capacity to deal with high levels of abstraction. Instead, it was felt that the attributes of a good problem solver are his sensitivity in problem recognition, his motivation to seek solutions, his willingness to consider alternatives, the interpersonal relations skills, a readiness to use the help of others, and the willingness to sustain the effort needed to carry out the adopted solution. While it seems logical that a bright, creative person should produce better results than a dull, creative person, research in problem solving or creativity has established that there is a distinct difference between intelligence and creativity. (37)

Three validated measures of ability were used: 1) an adaptability test by Tiffin & Lawshe (38),2) a figures test by Shurrager, Shurrager, and Ross (39), and 3) an abstracting test by Shurrager, Shurrager, and Ross. All of these measures were selected since they had been designed for and validated with groups in jobs with limited educational requirements. In addition, an "animal production knowledge test" was developed by the authors and used. This consisted of eight items calling for factual knowledge about such things as production levels, gestation periods, breeding practices, and feeding rates. Content validation was determined by the judgment of the panel of vocational agriculture experts.

GROSS ABILITY SCALE[21]

A gross ability variable was developed for both men and women by simple summation, equally weighted for the four single ability scores: 1) adaptability, 2) figures, 3) abstracting, and 4) the animal production knowledge test.

[21]Considered a gross ability score in the regression analysis.

BIOGRAPHY

Numerous biographic variables have been used in describing the biographic influences upon and between a manager and his wife. Generally, these have been rather gross variables such as the similarity of socio-economic, educational, or geographic backgrounds. The latest approach, generally referred to as the "bio-data" approach has been to use multiple-choice, highly structured questions dealing with specific experiences or feelings about specific biographic events. In general, this latter approach was adopted for this study. A printed questionnaire of 521 questions was developed. These consisted of items thought to be appropriate for our sample selected from a catalogue of items that had been found to have predictive value in studies with industrial populations.[22] (40)

In addition, several items were selected which may be considered managerial techniques questions. Other items were created by the authors for areas thought to be important but for which no items were available from the other sources. A "gross biographic variable" was developed separately for the men and for the women from the biographic questions using the following procedure:

A chi-square test with a 10% level of significance was employed to determine the questions that showed significant differences between the criterion groups of successful and unsuccessful FHA borrowers and between successful FHA and PCA borrowers. Seventy questions for men and 46 questions for women showed significant differences.[23] A gross biography score for men and for women was developed from these questions by summing the weights for their individual responses.[24]

DEVELOPMENT OF SPECIFIC VARIABLES FROM THE BIOGRAPHIC DATA

Biographic background may take the form of several dimensions. These possible dimensions have not been specifically isolated. In the development of management variables, heuristic arguments based upon intuition and analogy only can be improved upon. Factor analysis can provide an alternative. It can be useful in defining or specifying fundamental variables after some *a priori* hypotheses have been made about what the variables are.[25]

Using factor analysis, 12 variables were developed for men and 10 variables were developed for women that appeared to explain different dimensions of the farmers' and their wives' biographies. The correlation coefficient for the 70 questions for men and 46 questions for women that were significantly different among the successful and unsuccessful FHA borrowers and PCA borrowers were used to develop new variables.

In the case of the men's biographic data variables, 73.8% of the total variance was accounted for by the first 12 factors and 71.4% of the total variance for the women was accounted for by the first 10 factors. (Table 33).

The first six factors for men and the first six factors for women were used in the multiple regression analysis. They were selected on the basis of their factor loadings and the percent of the variability that they accounted for. The titles selected for the factors are shown in Table 34.[26]

Table 33. Factor Analysis Results: Percent of Variability Accounted for by Men's and Women's Factors

Factor	Percent of Variability Each Factor Accounted For	
	Men	Women
1	14.5	13.4
2	8.6	10.2
3	7.5	7.7
4	6.5	7.0
5	5.5	7.0
6	5.3	5.9
7	4.8	5.6
8	4.9	5.0
9	4.2	5.2
10	4.3	4.4
11	3.8	
12	3.9	
Total	73.8	71.4

Table 34. Factor Titles: Men and Women

Factor	Men	Women
1.	Aggressive conservatism	Financial knowledge
2.	External farm and financial help	Life aspirations
3.	Farm operations procedures	Submissiveness
4.	Life expectations	Rebellion toward parental negativeness
5.	Low socioeconomic status	General attitude
6.	Farm independence	Unresolved rebellion

[22]These items had been validated against a variety of criteria including sales performance, peer ratings of scientific creativity, and managerial performance.

[23]The procedure used to develop and score the significant biographic questions was the same as that used to develop and score the significant motivations and drives questions.

[24]The gross biography score for men and for women is considered a gross biographic scale score in later analysis.

[25]See Appendix I for the factor analysis procedure used in developing the specific variables from biographic data.

[26]The naming or titling of factors is at best a highly tenuous art. It is necessary to look at the nature of the items that "load" on each factor and determine what these reflect. Therefore names or titles should not be taken to indicate a final conclusion as the nature of the variables but more of a hypothesis about the nature of the abstractions, otherwise called Factor I, Factor II, etc.

Method of Data Collection

Financial and physical production data were obtained for the selected samples from loan files in the Brookings County FHA office and from the Sioux Falls PCA.

Personality characteristic data were obtained from the selected sample. A bound booklet containing all of the motivations and drives and biographic variables questions was developed. It contained instructions on how to complete the questions. The standard forms of the Strong Vocational Interest test questions and the three timed ability test booklets were used. Personality interview questions, which are considered as part of biographic variables in the analysis, were also prepared.

A woman with a B.S. degree in psychology administered the test questions and interviewed farm wives. A man with a B.S. degree in agricultural economics administered the test questions and interviewed the farmers. Both interviewers were indigenous to the area. Prior to contacting the sample respondents the interviewers assisted in developing the test questions and were trained in interviewing and test question administration by the authors.

The data were obtained from the sample couples from April through September of 1966. The FHA farmers and their wives were invited to attend group sessions in Brookings to complete the questionnaire. They were given three alternative dates and could select their own hours since the material was arranged so that no more than 5 minutes of explanation were required from the test administrator. Three short-timed tests were administered to each individual. A maximum of eight people were present at any one time for the group sessions. The interview schedule was administered in the farm homes of the people who completed the other material in group sessions in Brookings. The interviews in the farm homes permitted the interviewers to observe the respondents' living conditions and could serve as a validation of the questionnaire data. One-half of the FHA sample respondents attended the group session.

The PCA group was invited to an evening dinner in Sioux Falls which was sponsored by the Sioux Falls PCA. Only one-half of the group was able to attend the dinner and questionnaire session due to a late-season ice storm on the selected date. The group that attended was administered the timed tests as a group and completed the questionnaires at their own speed. The individuals who were unable to attend the group session were interviewed in their farm homes.

The remainder of the FHA and PCA groups were administered the questionnaire, test questions, and interview in their farm homes. In some cases it was necessary to leave the questionnaire with the respondents and to call for it later or assist the respondents in completing the material.

On September 1, 1966, the FHA couples were offered $10 per couple if they would complete the material by October 1. (All FHA couples who had completed all of the material previous to September received $10.) Only two couples who had not completed the material did so after the offer of financial compensation. All of the data which was used in the analysis was collected by October 1.

Significant Differences Between Criterion Groups

To determine signifieant differences in the motivations and drives, ability, and biography variables between the criterion groups based upon net worth change. Student t values were calculated.[27]

Since the nature of this study was somewhat exploratory, a 10% level of significance was set as the value for accepting or rejecting observed differences in the mean scores. Accepting at the 10% level was a compromise between the desirability of having significant differences and at the same time not eliminating scales that would discriminate between the criterion groups.

This analysis produced 12 scales where there were significant differences in the means for successful and unsuccessful FHA men (Table 35). In the adaptability tests the number of problems attempted by the successful FHA group was significantly greater than that for the unsuccessful FHA group. The successful FHA group's score on the Strong Vocational Interest Blank indicated interests more like those called masculine in general and specifically less like life insurance salesmen as compared with the unsuccessful FHA men. All of these differences were significant at the 1% level.

Significant, also (at the 5% level) was the indication that the successful group has interests closer to those of chemists and aviators and less like those of bankers and real esate salesmen on the Strong Vocational Interest Blank. Other scores which indicated some significant difference (at the 10% level) were the number attempted on the abstracting test, scores that were less like advertising men and more like Forest Service men. The successful FHA group scored lower on the economic motivation and scientific orientation scales compared with the unsuccessful FHA group. Only one scale, risk aversion, showed significant difference between the PCA group and the unsuccessful FHA group, with the FHA group showing the lower score.

It would appear that the farmer who is too "sociable" in his interests, as indicated by these scores, is less effective than the one who prefers or at least can tolerate the relatively independent and somewhat isolated hours of activity that are necessary in farming. This is consistent with the observations of farmers and farm consultants gained during the interviews. The fact that the successful FHA farmers were able to complete a significantly higher number of abstracting and mental abilities problems probably reflects a faster reading speed. However, they did not benefit from this in their actual scores since items also increase in difficulty as one proceeds through these particular tests.

On significant scales which were developed for men from the validated scales, the successful FHA borrowers, as contrasted with the unsuccessful FHA borrowers, were characterized by significantly higher mean scores on the gross motivations and drives, authoritarian, independence, scientific orientation,

Table 35. Mean Values for Validated Scales Which Showed Significant Differences Between the Criterion Groups for Men*

Validate Scale	Mean Values: Successful FHA	Mean Values: Unsuccessful FHA	Mean Values: PCA	Student t Values
Risk aversion		57.5	62.5	2.34†
Economic motivation	61.5	65.9		1.88‡
Scientific orientation	78.8	83.9		1.58‡
No. attempted, abstracting	19.3	11.4		1.82‡
No. attemped, adaptability	29.2	24.1		2.71†
Strong score for chemist	28.5	20.9		2.47§
Strong score for aviator	43.6	35.7		2.52§
Strong score for Forest Service man	34.7	27.8		1.61‡
Strong score for banker	33.1	38.7		2.12§
Strong score for real estate salesman	34.6	39.9		2.02§
Strong score for life insurance salesman	21.8	29.1		2.84†
Strong score for advertising man	21.5	24.9		1.55‡
Strong score for masculinity-feminity	55.8	49.8		2.61†

*Significant differences were not found on the Independence, External-Internal, Manifest Anxiety, and L, F and K scales, Authoritarian, and 32 out of the 49 Strong Vocational Interest scales.
†=1% level of significance.
‡=10% level of significance.
§=5% level of significance.

[27]The significant difference was calculated with the use of the following formula:

$$t = \frac{\bar{d}}{S_{\bar{d}}}$$

where:

$$S_{\bar{d}} = \frac{S_{\bar{x}_1} + S_{\bar{x}_2}}{n_1 + n_2}$$

$\bar{x}_1$ = the mean of group 1

$\bar{x}_2$ = the mean of group 2

$\bar{d}$ = the difference between the mean of group 1 and group 2

$S_{\bar{x}_1}$ = the standard deviation of $\bar{x}_1$

$S_{\bar{x}_2}$ = the standard deviation of $\bar{x}_2$

$S_{\bar{d}}$ = the standard error of the difference

economic motivation, manifest anxiety, and gross Strong scales (Table 36).

It is probably unwise to attempt too much specific interpretation of the meaning of these differences since they represent scales that are based on only part of the original scale. There is the possibility that these specific items do not represent the same entity that was measured by the complete scale. However, taken as a pattern the various motivations scales suggest that the successful FHA group in our sample had some characteristics in common with the more successful members of the group in which the motivations scales were originally validated.

Some of the other scores that appear for other variables are in the opposite direction from that which had originally been hypothesized. Among these are the authoritarian scale (that typically indicates less flexibility and more dependence on authority figures, at the same time with a certain resentment of them) the L and K scales (which we might generally describe as indicating a desire to present a more positive picture of oneself), and the manifest anxiety scale (which indicates a reporting of more symptoms typically associated with feelings of anxiety).

Based on more subjective impressions gained from the interviews and other contact with the subjects, it is hypothesized now that the unsuccessful group was either less aware of these characteristics at the conscious level, or less willing to report negative characteristics about themselves. It may also reflect, in the case of the manifest anxiety scale, less sophistication about the characteristics described.

There is a strong support for the predictive value of the scales developed from the FHA group. When these same scales were applied to a comparison of the unsuccessful group with the PCA group the results were remarkably similar with respect to the direction of the difference. With the sole exception of the L scale (which was significant only at the 10% level for differentiating the FHA successful and unsuccessful groups), every scale also differentiated PCA from unsuccessful FHA. As would be expected, the magnitude of these differences as indicated by the Student t ratios is not always as great as on the original validating sample. However, this cross-validation can be taken as strong evidence of the predictive value of the scales developed.

Analysis of responses by the women, by criterion group, produced nine scales where there were significant differences between the successful and the unsuccessful FHA groups (Table 37). There were 11 scales on which there were significant differences between the PCA and the unsuccessful FHA group.

Only the external-internal orientation scale was significant at less than the 1% level. This differentiated between the successful and the unsucccessful FHA group. The means on all of the scales for the successful FHA and the PCA groups were higher than for the unsuccessful FHA group.

Table 36. Mean Values for Significant Scales Which Were Developed and Which Showed Significant Differences Between the Three Criterion Groups for Men*

Significant Scales	Mean Values: Successful FHA	Mean Values: Unsuccessful FHA	Mean Values: PCA	Student t Values
Gross Scale Score	97.0	90.3		9.57†
		90.3	95.5	6.58†
Significant Authoritarian	11.7	10.3		2.96†
		10.3	10.6	1.71‡
Significant Independence	11.7	10.9		3.88†
		10.9	11.4	1.77‡
Scientific Orientation	10.5	10.3		1.71‡
		10.3	10.5	1.69‡
Economic Motivation	12.6	11.6		3.88†
		11.6	12.0	1.75‡
L Scale	9.9	9.4		1.77‡
K Scale	9.8	9.0		2.55‡
		9.0	9.8	2.50§
F Scale		9.9	10.8	3.21†
Manifest Anxiety	10.5	8.7		5.32†
		8.7	9.6	2.76†
Gross Strong Scale	40.1	24.2		6.66†
		24.2	35.8	5.80†

*Significant diffeernces were not found on the risk aversion and external-internal scales which were developed.
†=1% level of significance.
‡=10% level of significance.
§=5% level of significance.

Table 37. Mean Values for Significant Scales Which Were Developed and Which Showed Significant Differences Between the Three Criterion Groups for Women

Significant Scales	Mean Values: Successful FHA	Mean Values: Unsuccessful FHA	Mean Values: PCA	Student t Values
Gross Scale Score	111.2	102.1		8.34*
		102.1	112.7	11.40*
External-Internal	10.4	10.2		2.00†
		10.2	10.1	2.67*
Authoritarian	13.4	11.9		4.67*
		11.9	13.2	4.26*
Independence	11.4	10.9		2.84*
		10.9	11.6	3.48*
Scientific Orientation	12.0	10.8		4.92*
		10.8	11.6	4.00*
Economic Motivation		11.1	12.9	7.83*
L Scale	8.9	6.3		4.92*
		6.3	10.1	10.19*
F Scale	11.9	10.5		3.30*
K Scale		10.3	12.2	5.22*
Manifest Anxiety		9.6	8.9	2.08*
Risk Aversion	11.9	10.7		5.40*
		10.7	11.8	3.50*
Gross Strong Score	82.9	74.3		3.51
		74.3	83.2	3.66*

*=1% level of significance.
†=10% level of significance.

There is considerable similarity in the results obtained for the women and those for the men. As with the men, the women in the successful group scored higher on the authoritarianism, independence, and scientific orientation scale. They also scored higher on the L and F scales, the risk aversion, and a summation of the Strong Interest scores. As previously stated, some caution must be used in interpreting the nature of the variables represented by these scores since they are now made up of only those individual items that were found to discriminate. As with the men, there is also strong cross-validating evidence. In every case, the difference that was observed between the successful and the unsuccessful FHA women was observed in comparing the unsuccessful FHA group with the PCA wives.

Regression Analysis

Four models with individual and gross antecedent variables were developed for multiple regression analysis. The individual variables considered were as follows: 1) Model I—men's variables alone, 2) Model II —men's and women's variables scores combined for the same variable, 3) Model III—women's variables alone, 4) Model IV—men's and women's individual variables (Table 38).[28] All independent variables that were developed for each of the antecedents were considered in each model where appropriate.

The gross variables that were considered in each of the four models were as follows: 1) gross bio-data score, 2) gross abilities score, 3) gross validated motivations and drives score, 4) gross significant motivation and drives score, 5) gross significant Strong, and 6) sum of all significant Strong scales scores.

The three criterion variables that were used with each model for the gross and individual variables were: 1) Y_1, percentage change in net worth from 1960 through 1964 adjusted for inheritance and inflation, 2) Y_2, a Z transformation of percentage change in net worth for the years of farming experience of each respondent, and 3) Y_3, the percentage change in net worth from 1960 through 1964 weighted by the years of farming experience and scored from 1 through 9.

Each of the dependent variables was considered in linear form for each model with each criterion variable.[29]

Computer capacity prohibited placing each variable in each equation in linear, log, and reciprocal form at the same time. Hence each equation was developed with one form of each variable at a time. Each variable was considered in the final equation if its F level was significant at the 10% level and was entered in the equation in the form that contributed the most to explaining the coefficient of determination. In each final equation, independent variables are presented if they were significant at the 10% level of significance. An equation was developed for each of the three dependent variables. This was done for the gross scale variables (Table 39) and for the individual scale variables (Table 40). An equation for each model was also developed for the criterion variable, Y_2, for the 32 PCA respondents alone. These equations were developed since the Y_2 experience data were built on PCA borrowers data and should recognize the geographic area and factors such as ethnic backgrounds related to the area. In addition, the net worth position of part of the FHA borrowers declined during the 5-year period considered. It may be hypothesized that they lacked management decision-making freedom and the attempt in this study was to measure characteristics of successful borrowers.

The regression program used selects independent variables in a descending order of explained variance in the dependent variable. In the program the t random variable is equal to $\sqrt{F}$. The actual level of significance associated with a critical value of F or t depends upon the degrees of freedom, which in turn is equal to the number of observations minus the number of parameters estimated including the constant term.

Discussion of Results

The section headed Review of Relevant Concepts and Insights indicated that there are at least two central issues involved in measuring management given the model that was used in this study: selection of a criterion variable and selection of relevant antecedent variables that can be measured.

When the results were combined into gross scores, the results were not as strong as when they were used as individual variables. In comparing results of the gross variable models (Table 39) and the individual variable models (Table 40) with each of the three criterion variables, fewer significant independent variables entered the gross variable equations. The coefficient of determination was from about 40% to 11% lower for the gross variable equations, for each comparable model and criterion variable.

Totaling the scores on the same variables for men and women (Model II) did not develop as strong a coefficient of determination as did the equations with the individual men's or women's variables (Models I

[28] Due to computer capacity limitations, only the variables which were significant in regression models I, II, and III were included in Model IV, and only the Strong Vocational Interest variables that were significantly different among the criterion groups were included in Models I, II, and III.

[29] A stepwise regression routine developed by Boles was used; Boles, James N. *80-Series Multiple Linear Regression System*—available from the IBM 1620 Users' Library, White Plains, New York.
Data for the 72 respondents who completed all of the scales for the independent variables were included in the regression equations.

Variable Description	I* Men's Variables	II* Men's and Women's Variables Totaled	Model III* Women's Variables	IV* Men's Variables	IV* Women's Variables
Gross Risk Aversion Score	X	X	X	X	
Gross Economic Motivation Score	X	X	X		
Gross Scientific Orientation Score	X	X	X	X	X
Gross Independence Score	X	X	X		
Gross Authoritarian Score	X	X	X	X	
Gross External-Internal Score	X	X	X	X	X
Gross Manifest Anxiety Score	X	X	X	X	X
Gross L Scale Score	X	X	X	X	X
Gross F Scale Score	X	X	X	X	
Gross K Scale Score	X	X	X	X	
Number Correct—Abstracting	X	X	X	X	
Number Attemped—Abstracting	X	X			
Number Correct—Adaptability	X	X	X	X	
Number Attempted—Adaptability	X	X			
Number Correct—Figures	X	X	X	X	
Number Attempted—Figures	X	X			
Number Correct—Animal Husb. Test	X	X	X		X
Strong Score—Artist	X	X	X	X	
Strong Score—Physician	X	X	X		
Strong Score—Mathematician	X				
Strong Score—Physicist	X				
Strong Score—Chemist	X				
Strong Score—Aviator	X				
Strong Score—Painter	X				
Strong Score—Industrial Arts Teacher	X				
Strong Score—Voc. Agr. Teacher	X			X	
Strong Score—Forest Service Man	X				
Strong Score—Public Administrator	X				
Strong Score—Musician	X				
Strong Score—Senior CPA	X				
Strong Score—Office Man	X				
Strong Score—Banker	X			X	
Strong Score—Real Estate Salesman	X			X	
Strong Score—Life Insurance Salesman	X	X	X		
Strong Score—Advertising Man	X				
Strong Score—Author-Journalist	X				
Strong Score—Advertising Man	X				
Strong Score—Specialization Level	X				
Strong Score—Occupational Level	X				
Strong Score—Masculinity-Feminity	X		X		X
Strong Score—Author			X		
Strong Score—Librarian			X		
Strong Score—English Teacher			X		X
Strong Score—Social Worker			X		
Strong Score—Psychologist			X		
Strong Score—Lawyer			X		X
Strong Score—Social Science Teacher			X		
Strong Score—YMCA Secretary			X		X
Strong Score—Buyer			X		X
Strong Score—Housewife			X		
Strong Score—Elementary Teacher			X		
Strong Score—Office Worker			X		

Variable Description	I* Men's Variables	II* Men's and Women's Variables Totaled	Model III* Women's Variables	IV* Men's Variables	IV* Women's Variables
Strong Score—Stenographer-Secretary			X		
Strong Score—Business Ed. Teacher			X		
Strong Score—Home Ec. Teacher			X		
Strong Score—Dietitian			X		
Strong Score—Physical Ed. Teacher			X		
Strong Score—Occupational Therapist			X		
Strong Score—Nurse			X		X
Strong Score—Math-Science Teacher			X		
Strong Score—Dentist			X		
Strong Score—Lab Technician			X		
Strong Score—Music Teacher			X		X
Strong Score—Musician		X	X		
Strong Score—Physical Therapist			X		X
Strong Score—Engineer			X		
Gross Significant Strong Scale Score	X	X	X	X	X
Significant Authoritarian Score	X	X	X	X	X
Significant Independence Score	X	X	X		
Significant Scientific Orientation Score	X	X	X	X	X
Significant Risk Aversion Score	X	X	X	X	
Significant Economic Motivation Score	X	X	X		
Significant L Score	X	X	X	X	
Significant K Score	X	X	X	X	X
Significant F Score	X	X	X	X	
Significant Manifest Anxiety	X	X	X	X	
Men's Factor I "Aggressive Conservatism"	X				
Men's Factor II "External Farm and Financial Help"	X			X	
Men's Factor III "Farm Operations Procedures"	X			X	
Men's Factor IV "Life Expectations"	X			X	
Men's Factor V "Low-Socioeconomic Status"	X			X	
Men's Factor VI "Farm Independence"	X			X	
Women's Factor I "Financial Knowledge"			X		X
Women's Factor II "Life Aspirations"			X		X
Women's Factor III "Submissiveness"			X		X
Women's Factor IV "Rebellion Toward Parental Negativeness"			X		X
Women's Factor V "General Attitude"			X		X
Women's Factor VI "Unresolved Rebellion"			X		X
Summation of Men's and Women's Factor I		X			
Summation of Men's and Women's Factor II		X			
Summation of Men's and Women's Factor III		X			
Summation of Men's and Women's Factor IV		X			
Summation of Men's and Women's Factor V		X			
Summation of Men's and Women's Factor VI		X			
Y_1 percentage change in net worth adjusted for inheritance and inflation	X	X	X		X
Y_2 Z transformation of percentage change in net worth	X	X	X		X
Y_3 percentage change in net worth adjusted for inheritance, inflation, and years of farming experience scaled from 1 through 9	X	X	X		X

*An X in the column indicates that the variable was considered in the regression equation for the model.

Table 39. Summary of Gross Variables Entering Estimating Equations Four Models and Three Criterion Variables

Dependent Variable	Independent Variables*	Variable Form				
		Model I (men)	Model II (men and women totaled)	Model III (women)	Model IV (men)	Model IV (women)
Y_1	1. Gross Biographic Score	+§	+†	+§		
	2. Gross Significant Motivations and Drives Score	+§				
	3. Gross Significant Strong Score		—‡	—‡	+§	+†
	4. Gross Abilities Score	+†				
	5. Gross Validated Motivations and Drives Scale Score					
	6. Sum of Strong Scales Score					
		R^2=.238	R^2=.239	R^2=.268	R^2=.322	
Y_2	1. Gross Biographic Score	+§	+†	+§	+§	+§
	2. Gross Significant Motivations and Drives Score					
	3. Gross Significant Strong Score		—‡	—‡	+‡	—‡
	4. Gross Abilities Score	+‡				
	5. Gross Validated Motivations and Drives Scale Score			—‡		+†
	6. Sum of Strong Scales Score					
		R^2=.367	R^2=.388	R^2=.444	R^2=.518	
Y_3	1. Gross Biographic Score	+§	+†	+†	+§	+†
	2. Gross Significant Motivations and Drives Scale Score					
	3. Gross Significant Strong Score		—‡	—‡	—§	—‡
	4. Gross Abilities Score	—§				
	5. Gross Validated Motivations and Drives Scale Score					
	6. Sum of Strong Scales Score					
		R^2=.474	R^2=.438	R^2=.450	R^2=.544	

*The absence of an indicated variable form indicates that the variable did not enter the final equation at a significant level.
†linear
‡reciprocal
§Log*
+=entered the equation with a plus sign
—=entered the equation with a minus sign

Table 40. Summary of Individual Variables Entering Estimating Equations, Four Models and Three Criterion Variables

Independent Variables[1]	Dependent Variables Y_1 I	Y_1 II	Y_1 III	Y_1 IV M[4] W[5]	Y_2 I	Y_2 II	Y_2 III	Y_2 IV M[4] W[5]	Y_3 I	Y_3 II	Y_3 III	Y_3 IV M[4] W[5]	Y_2 PCA Borrowers only I	Y_2 PCA Borrowers only II	Y_2 PCA Borrowers only III
Validated Motivations and Drives															
Risk Aversion	+*[2]	−**[3]		+*						−**					
Economic Motivation															
Scientific Orientation			+*	+*	−*										+***
Independence										−**					
Authoritarian									+*						
External-Internal	−*				−*		+**	+**	−**		+**	+**	−*		+**
Manifest Anxiety	−**		+***							+*	+***	+***			
L Validity						+**	+**	+**	+*		+**	+**			
F Validity						−***			−***						
K Validity									+**						
Vocational Agriculture Teacher[6]					−*				−***				+*		
Banker	+*			+*	+*			+*	+*			+*	+*		
Real Estate Salesman[6]					−***										
Strong Artist		−*							+*						
Strong Life Insurance Salesman						+***				−**					
Strong Physician															
Strong Musician										−***					
Strong Author-Journalist															
Strong Librarian[7]															
Strong English Teacher[7]			−*	−*											
Strong Lawyer[7]											−**				
Strong YMCA Secretary[7]											−*	−*			
Strong Buyer[7]			−***	−***							−*				
Strong Housewife[7]															
Strong Elementary Teacher															
Stenographer-Secretary[7]															
Home Economics Teacher[7]															
Occupational Therapist-Nurse[7]			+*	+*			+*								
Lab Technician[7]															−**
Music Teacher[7]			+***	+***											
Physical Therapist[7]			+***	+***			−*								
Engineer[7]															
Femininity-Masculinity[7]															−*
Abstracting					−**	−*		−**					+**	−*	
Adaptability		+*							+**		+**				
Figures		+*				+*							+**		
Animal Husbandry Test	−*	−*		−*		−*	−***		−***	−*	−*	−*		−*	+**

Significant Motivations and Drives															
Significant Authoritarian							$+^{***}$	$+^{***}$	$+^{*}$	$-^{**}$		$-^{*}$		$+^{*}$	
Significant Independence															
Significant Scientific Orientation			$+^{***}$	$+^{***}$	$-^{*}$		$+^{***}$			$+^{***}$		$+^{***}$	$-^{*}$		
Significant Risk Aversion									$+^{***}$		$+^{***}$		$+^{*}$		
Significant Economic Motivation						$+^{*}$									
Significant L Validity	$-^{***}$				$-^{*}$				$+^{**}$	$+^{*}$			$+^{*}$		
Significant K Validity			$-^{**}$		$-^{*}$									$+^{**}$	
Significant F Validity					$-^{**}$										
Significant Manifest Anxiety															
Significant External-Internal															
Gross Strong Score	$+^{***}$	$+^{*}$	$+^{*}$	$+^{***}$	$+^{*}$	$-^{**}$	$-^{**}$	$+^{*}$	$+^{*}$	$-^{**}$	$-^{**}$	$-^{**}$	$-^{**}$	$-^{**}$	
Biographic													$-^{**}$		
Men's Factor I Aggressive Conservatism	$+^{*}$				$+^{***}$			$+^{***}$	$+^{*}$				$+^{*}$		
Men's Factor II External Form and Financial Help[6]					$-^{*}$				$+^{*}$						
Men's Factor III Farm Operations Procedures[6]															
Men's Factor IV Life Expectations[6]	$-^{***}$			$-^{***}$	$-^{**}$			$-^{**}$					$-^{**}$		
Men's Factor V Low-Socio-economic[6]															
Men's Factor VI Farm Independence[6]						$-^{***}$							$-^{***}$		
Women's Factor I Financial Knowledge[7]			$+^{*}$		$+^{*}$		$+^{*}$	$+^{*}$		$+^{*}$					
Women's Factor II Life Aspirations[7]															
Women's Factor III Submissiveness[7]															
Women's Factor IV Rebellion Toward Parental Negativeness[7]							$+^{***}$								$-^{**}$
Women's Factor V General Attitude[7]			$-^{***}$												$+^{*}$
Women's Factor VI Unresolved Rebellion[7]			$+^{*}$		$+^{*}$		$+^{***}$				$+^{***}$	$+^{***}$			
Men's and Women's Factor I Total[8]		$+^{*}$				$+^{***}$				$+^{***}$					$+^{**}$
Men's and Women's Factor II Total[8]		$+^{*}$													
Men's and Women's Factor III Total[8]															
Men's and Women's Factor IV Total[8]		$+^{*}$				$-^{**}$				$+^{***}$					$-^{**}$
Men's and Women's Factor V Total[8]															
Men's and Women's Factor VI Total[8]		$-^{**}$				$-^{***}$				$+^{**}$					
	$R^2=$ .396	$R^2=$ .448	$R^2=$ .632	$R^2=$ .729	$R^2=$ .599	$R^2=$ .555	$R^2=$ .558	$R^2=$ .667	$R^2=$ .666	$R^2=$ .617	$R^2=$ .713	$R^2=$ .731	$R^2=$ .760	$R^2=$ .440	$R^2=$ .623

[1]Unless otherwise noted all variables were considered in each model.
[2]A + before the variable form indicates that it entered the equation with a positive sign.
[3]A — before the variable form indicates that it entered the equation with a negative sign.
[4]The variable entered the final equation for men.
[5]The variable entered the final equation for women.
[6]Variables considered in only the Men's Model I.
[7]Variables considered in only the Women's Model III.
[8]Variables considered in only the Men's and Women's Model II.
*=Linear
**=Reciprocal
***=Log•

or III). On the basis of the coefficients of determination, the results for the men alone (Model I) and the women alone (Model III) were not as strong as for the men's and women's individual variables combined (Model IV) for either the gross or individual variables.

The results suggest that there are at least several dimensions to each of the antecedents of ability, motivations and drives, and biography. They appeared to be more completely measured with the individual antecedent variables and with men's and women's individual variables each entered into the prediction equation. The results suggest that consideration must be given to both husbands and wives as inputs into the management process.

In fact, the men's individual variables were generally no stronger predictors than were the women's individual variables. With criterion variable Y_1, the coefficient of determination was considerably lower for the men than for the women for both the individual antecedent variables and slightly stronger for the gross variables. With Y_2, the women's equation showed a higher R^2 with the gross variable but only slightly weaker with the individual variables as compared with the men alone. With Y_3 the reverse was the case; the women's individual variables were stronger than the men's and the men's gross variables equation was stronger than the women's.

The coefficient of determination was higher for the PCA borrower only versus all of the 72 respondents for the criterion variable Y_2 for Models I and III and lower for Model II. This was expected since 32 PCA borrowers (who were compared with the larger group of PCA borrowers with this criterion variable) were more like the larger group than were the FHA borrowers.

It was not the intent of this study to select a specific form of the criteria, change in net worth, as superior over other forms. However, the results do tend to favor the Y_3 variable over Y_2, and Y_2 over Y_1. Apparently a comparison with other farmers, in the form of Y_2, is a closer approximation of a farmer's ability to increase his net worth than is the straight percentage change in net worth which is a comparison with himself. Weighting the percentage change in net worth by years of farming experience, Y_3 does include experience influences, and scaling the variable after the weighting appeared to take fuller account of the wide variation in percentage change in net worth that the sample respondents were able to achieve.

With each model and each dependent variable, the independent variables that entered the final equation were regressed on the other two dependent variables, e.g. significant variables in Model I with Y_1 were regressed on Y_2 and Y_3. In four out of six cases where Y_3 was used with the variables that had been significant with Y_1 and Y_2, the coefficient of determination was higher than Y_3. It was lower in Model II with Y_2 and Model III with Y_1 but by less than .065%. When Y_3 was used with each of the first three models and significant variables with it regressed with Y_1 and Y_2, the coefficient of determination was lower with the latter two dependent variables (Appendices II, III, and IV, equations one through nine).

The level of the coefficients of determination developed with the individual variables with any of the four models and especially with the dependent variables Y_2 and Y_3 appears relatively high as compared with previous studies on farm managerial ability. This may in part be due to lack of inclusion of instruments that attempt to measure each of the antecedents of ability, biography, and motivations and drives in any one previous study. In industrial studies where the attempt is to predict success of people in various selling, research, or junior level executive jobs, a coefficient of determination of .5 with up to 15 independent variables in the prediction equation has been considered strong. Compared to a sample of FHA and PCA borrowers, industrial management personnel represent a pre-screened group, and less variance would be expected. For purposes of understanding the human element in operation, management, and entrepreneurial roles in farm firms, research workers may want to develop instruments that will explain the variance in the criteria with an R^2 above .9.

Analysis of Model IV

The variables that entered the final equations at a significant level in each of the models with the criterion variables were not all the same. All independent variables were included in each model in the initial computer runs. In each case one or more variables entered from each of the antecedent areas. However, the independent variables interacted in different ways as expected. All independent variables did not enter each final equation at significant levels.

In Model IV the individual independent variables which were significant in models I (men alone) and III (women alone) were included (Table 41 and equations 1, 2, and 3). The variables that entered each of the final equations at a significant level with each of the three dependent variables entered with the same signs except the Gross Significant Strong Score for men and for women (Table 42).

With Y_1, the following variables entered the final equation: three motivations and drives, and one biography variable for men; and one ability, ten motivations and drives, and two biography variables for women. With Y_2, one ability, one motivations and drives, and two biography variables for men; and one ability, six motivations and drives, and one biography variable for women entered the final equation. With Y_3, one ability, three motivations and drives, and one biography variable for men; and one ability, six moti-

Table 41. Variables Used in Model IV with Y_1, Y_2, and Y_3

Independent Variable	Dependent Variable Y_1	Y_2	Y_3	Description of Men's Variables
X_1		*[1]		Gross Scientific Orientation Score
X_2	*[1]			Gross Risk Aversion Score
X_3			*[1]	Gross Authoritarian
X_4	*	*	*	Gross External-Internal
X_5	*			Gross Manifest Anxiety
X_6			*	Gross L
X_7			*	Gross K
X_8			*	Gross F
X_9		*		No. Correct—Abstracting
X_{10}			*	No. Correct—Adaptability
X_{11}		*		No. Correct—Figures
X_{12}			*	Strong Score—Artist
X_{13}		*		Strong Score—Voc. Agr. Instr.
X_{14}	*	*	*	Strong Score—Banker
X_{15}		*		Strong Score—Real Estate Salesman
X_{16}			*	Significant Risk Aversion
X_{17}		*		Significant Scientic Orientation
X_{18}	*	*	*	Significant L
X_{19}		*		Significant F
X_{20}		*		Significant K
X_{21}	*	*	*	Men's Factor I, Aggressive Conservatism
X_{22}		*	*	Men's Factor II, External Farm and Financial Help
X_{23}	*	*	*	Men's Factor IV, Life Expectations
X_{24}		*		Men's Factor VI, Farm Independence
X_{25}	*	*	*	Gross Significant Strong Score
				Description of Women's Variables
X_{26}	*			Gross Scientific Orientation
X_{27}	*		*	Gross Manifest Anxiety
X_{28}		*	*	Gross L
X_{29}		*	*	Gross External-Internal
X_{30}	*	*	*	Strong Score—Nurse
X_{31}	*	*		Strong Score—Physical Therapist
X_{32}			*	Strong Score—Lawyer
X_{33}			*	Strong Score—YMCA Secretary
X_{34}	*		*	Strong Score—Buyer
X_{35}	*			Strong Score—English Teacher
X_{36}	*			Strong Score—Music Teacher
X_{37}	*		*	Strong Score—Feminity-Masculinity
X_{38}	*	*	*	Significant Scientific Orientation
X_{39}		*	*	Significant Authoritarian
X_{40}	*			Significant K
X_{41}			*	Significant L
X_{42}	*	*	*	Women's Factor I, Financial Knowledge
X_{43}		*		Women's Factor IV, Rebellion Toward Parental Negativeness
X_{44}	*			Women's Factor V, General Attitude
X_{45}	*			Women's Factor VI, Unresolved Rebellion
X_{46}	*	*	*	Gross Significant Strong Score
X_{47}		*	*	No. Correct on the Animal Husbandry Test

[1]*Indicates that the variable was significant with the dependent variable in one or more of models I, II, and III and was included in Model IV.

Table 42. Variables Entering the Final Equations in Model IV, with Y1, Y2 and Y3

Variable Description	Dependent Variable Y_1	Y_2	Y_3
MEN			
Ability			
No. Correct—adaptability			+[1]
No. Correct—abstracting		+	
Motivations and Drives			
Gross Risk Aversion	+		
Strong Score—Banker	+	+	+
Significant Risk Aversion			+
Gross Significant Strong Score	+		—[2]
Biography			
Factor I, Aggressive Conservatism		+	+
Factor IV, Life Expectations	—	—	
WOMEN			
Ability			
No. Correct—Animal Husbandry Test	—	—	—
Motivations and Drives			
Gross Scientific Orientation	+		
Gross Manifest Anxiety	+		+
Gross External-Internal		+	+
Gross L	+	+	+
Strong Score—English Teacher	—		
Strong Score—Buyer	—		—
Strong Score—Nurse	+		
Strong Score—Music Teacher	+		
Strong Score—Physical Therapist	—		
Strong Score—Femininity-Masculinity	+		
Gross Significant Strong Score	+	+	+
Significant Scientific Orientation	+	+	+
Significant Authoritarian		+	
Biography			
Factor I, Financial Knowledge	+	+	
Factor VI, Unresolved Rebellion	+		+
	R^2	R^2	R^2
	=	=	=
	.729	.667	.731

[1]+indicates that the variable entered the final equation with a positive weight.
[2]—indicates that the avariable entered the final equation with a negative weight.

vations and drives, and one biography variable for women entered the final equation.

With Y_1 and Y_2 the negative sign for men on factor IV, life expectations, is as expected—farmers who hold low expectations for life are apparently less successful in achieving increase in their net worth. The negative sign for women on the number correct on the animal husbandry test was not expected. A reason for the negative sign might be that wives of the successful farmers may not be as involved with farm livestock as wives of the unsuccessful farmers. The Strong scores on the women's variables for English teacher, buyer, and physical therapist were expected to show negative signs. Each of these interest variables are activities that would take a woman away from the farm home and business and were expected to show a negative relationship with increasing the net worth of the farm business. The fact that nurse and music teacher showed positive signs may indicate that these are activities that can be accomplished in the farm home. All of the other positive signs on the other variables that entered the equations at a significant level with Y_1 and Y_2 were expected.

All of the positive signs with Y_3 were expected. The negative signs for the number correct on the animal husbandry test for women as found with Y_1 and Y_2 and the Strong score for buyer for women were not expected. Both variables are significant with significant Strong score for both men and women was not expected. Both variables are significant with Y_3 with negative signs. The explanation for the negative sign apparently lies in the interaction of these variables with other motivation variables and with the fact that the variable was developed from selected questions that represent interests that do add to the objective of increasing the net worth of the farm firm.

Implications of Study

Efficiency of resource allocation and utilization is a function of the human element through its managerial behavior system. Management needs are becoming more critical in the survival and growth of the farm firm in view of accelerated technological development and a change in both the agricultural and general economy in the United States. Thus there is a need for greater understanding of the human element in management and entrepreneurial roles in agriculture. It would be useful to develop measures of management ability and potential 1) from the standpoint of providing guidance to present farm managers and entrepreneurs on their likelihood of success under any one of several farm firm ownership and management structures, 2) to strengthen high school and university adult education programs, 3) to provide better guidance to people considering farm operation and entrepreneurship as a career, and 4) to provide a basis for judging the likelihood of success of individuals on credit applications or employment situations.

Most research and analysis in farm management has been on physical and capital relationships. Knowledge in the area of farm firm survival and growth is limited, though it is an emerging area of emphasis. In addition, very limited work has been done on viewing the manager-entrepreneur as a personality or as part of a management behavioral system. However the economic and social strength of agriculture, though changing or losing its identity, will be in part determined by the ability and motivations of the entrepreneur and managers in farm and agri-business firms.

Though this study was exploratory and the sample was purposefully selected and was relatively small, the approach used shows promise as a method for providing guidance to present and prospective South Dakota farm operators. The criterion variable—change in net worth—appears as one of the key variables in analyzing firm growth. The approach in this study emphasized personality characteristics of the human element in the management and operation of the farm firm. The degree of the relationships found between the criterion variable and the personality variables appeared higher than relationships found in other farm managerial evaluation studies using different variables. However additional testing and inclusion of different independent variables may develop stronger relationships than were developed in this study.

With increasing research emphasis being directed to farm firm growth, additional insights on selection of criterion variables may be developed. Developments in simulation techniques appear to hold promise for use in evaluating at least certain personality characteristics in firm management.

Given the increasing use of credit by South Dakota's farmers and agricultural industry, credit institutions are facing new challenges in evaluating the borrower's physical resources and his ability to use credit successfully. Results from this study can provide some guidance to lending officers and to farmers in the evaluation process. Results should be interpreted in light of the sample respondents, FHA borrowers and representative farm size PCA borrowers in eastern South Dakota. Large farmers in terms of net worth, acreage, livestock numbers, and gross sales were not included in the study.

Use of prediction instruments in credit extension would need to be considered as supplemental to eval-

uation of a borrower's technical production and marketing knowledge. In addition, the more traditionally understood loan profitability, credit repayment, cash flow, net worth, and family living expense budgets would continue to need to be included in appraising a borrower. Lenders should be encouraged to seriously increase the rigor of the completeness and analysis of conventional tools at their disposal for appraising loan applications. More evaluation of the farmer's wife and children could be useful, too.

Structure of the farm firm and managerial and entrepreneural roles are continuing to change. Some farm firms may develop a structure where management responsibilities are delegated to several people who may own or be employed by the firm. Selection instruments have largely been developed for such specialized roles in industrial firms and may have application to farm firms that develop similar management structures.

Given the current management structure of farm firms that borrow from the Farmers Home Administration and Production Credit Associations in eastern South Dakota, results from this study indicate that farmers and prospective farmers without the potential both in terms of personality characteristics and physical resources to develop into commercial farmers can be recognized. It appears to be useful to separate the economic or financial problems from the personal problems of borrowers. Either one or both may limit a borrower in achieving financial success.

If personal characteristics are not limiting factors, then credit extension may assist the borrower in achieving success—it is one thing if a farmer needs a loan to increase his output but another if he needs a loan due to inability to manage his resources. If farmers with and without commercial farm potential can be separated, appropriate credit programs could be developed for each. Farmers without the potential to develop into commercial farmers but who desire to farm may need intensive supervision to maintain a survival income level and to meet credit repayment schedules. Goals other than firm growth should be established for such farm families and they should be recognized for achieving goals that may be established for them. Commercial farmers and farmers with commercial farm potential need credit and management assistance programs provided by private farm lending institutions specifically for commercial farmers. Farm lending institutions may want to refer borrowers without commercial farm firm management potential to other agencies and institutions who specialize in assisting people with specific income and personal problems.

Lending officers of present farm credit institutions are not trained specifically in evaluating the human element in management. However, intensive adult education work could assist them in recognizing personality traits and borrowers who need the help of personal counseling. In some cases members of a borrower's family may retard the borrower's management ability and may need counseling. Development of management selection instruments may assist lending officers in appraising the human element. High school and university teachers and counselors could also assist farmers and prospective farmers to a greater extent in appraising their management potential through the use of management selection instruments.

Unless major structural and management changes are anticipated in the farm firms that were included in this study, selection instruments would have the major practical usefulness to credit agencies for: 1) new or unknown borrowers, 2) marginal borrowers who are experiencing credit use difficulty, 3) borrowers who have successfully used credit with given growth strategies but who desire to accelerate their growth rate and at the same time will necessarily increase the risk exposure. Selection instruments could also be useful for farmers and prospective farmers who fit the above mentioned categories.

In the absence of training in recognizing and evaluating personality traits in farmers, the type of lending agencies who cooperated in this study could consider employing screening techniques similar to those used in industrial firms to select personnel. Direct use of an industrial psychologist may or may not be involved. In cases where interpretation of selection tests proves difficult for the lending officer, additional assistance could be obtained by asking a psychologist for his evaluation of a borrower. Present credit agencies would not need the services of a full-time industrial psychologist but could share one with other lending agencies or employ one on a consulting basis. Experimentation would be required on the role of the psychologist beyond assisting in evaluating credit applicants and borrowers who experience difficulty. In most cases one or two periodic consultations may be the extent of the help that would be needed to assist a farm borrower to successfully use farm credit or to transfer to another occupation. Since community mental health centers are developed to handle counseling cases, farm credit agencies would not need to engage in competitive work.

The immediate needs of selecting and appraising credit needs of borrowers are pressing. Additional fundamental research is needed in conceptualizing and developing management and firm growth models, which integrate basic management theories of economics, psychology, sociology and political science. However, major developments in integrating knowledge in these basic disciplines is considered a relatively slow process, and major changes in the production of food and fiber are projected for the next decade.

This study did not focus on changes in the owner-

ship and management structure of farm firms. However, appraisal of the borrowers included in the study suggest that credit agencies and the state may want to carefully consider their role and how economic development could be increased through improving or through changing the management and ownership structure on farms in the eastern part of the state. Given the projected economic environment, perhaps one-half or more of the farmers included in this study lack the ability and motivation to use capital and credit to reorganize their operations to substantially increase efficiency and productivity. If these people remain as operator-entrepreneurs, credit agencies may want to consider alternative methods of providing the major management inputs on these farms.

If the United States society should choose to support programs to keep existing and encourage new people to enter farming with doubtful commercial farm potential, consideration may need to be given to supporting more intensive supervision of such farmers. One supervisor-lending officer may be required for as few as 30 such farmers. If farm lending agencies would choose not to use selection instruments with current borrowers who experience difficulty and with new unknown borrowers, a neutral institution such as land grant universities could develop and administer personality instruments and make the results available to lending institutions. If farm couples with limited management potential could be recognized in this manner, intensive supervision programs could be implemented at the time a loan is granted.

Implications for Future Studies

As with any study there are several questions and ideas that were generated by the experiences of the investigators or that logically follow from the results obtained.

One major contribution that this study makes is the rather conclusive demonstration of the need to look equally at both members of the farm couple in investigations of "farm management" for the type of farms studied. The idea that this must be done came from the junior author's experience in dealing with both individuals and couples from farm backgrounds (among others) in an outpatient mental health center, and confirmed by discussions with the experts and panel discussants. It seems obvious to those working with farm couples that in many cases the strong management talents of a wife often are the only saving factor, compensating for an otherwise ineffective husband.

To a lesser extent, there also is the negative influence on a good husband-manager of the unhappy or disgruntled farm wife or children who may not only demoralize the man with complaints, but in some cases actually try to "sabotage" the farm operation in order to get him to give up farming. This may be done by deliberate (although in some cases unconscious) mismanagement or by overspending in nonfarm accounts in an effort to deliberately (and again sometimes unconsciously) bankrupt the husband. Cases have also been encountered where the reverse is true: that is, the husband may resent staying in farming, but feels this is the only way he can continue to supply the financial demands of his wife.

Certainly the influence of a wife's needs and attitudes on her husband's career is not unique to farming. However, it is more significant in farming than other areas for these reasons: 1) the typical lack of separation of household finances from the farm finances, 2) the wife's direct presence, and often, participation in farm work and decisions, 3) the frequent division of labor of which wives are a part, and sometimes the primary source of management, with the husband being primarily the labor input.

The pattern of characteristics and the manner of interaction should be studied further. Specifically, further work needs to be done on 1) traits important to managerial effectiveness that must be present in the wife, 2) traits that must be present in the husband, 3) traits that must be present in one or the other, 4) traits that must be present in both, and 5) traits that may be undesirable if they are paired with another trait in the spouse.

One other observation can be made concerning our contact with many of the individual cases that we feel should be seriously considered: many of these people are not only inadequate performers or farm managers, they are problem people who in our opinion are not likely to become more effective merely by economic support or "business counseling." Many of these people appear to be similar to those problem families one might find in nonfarm situations.

It seems important to differentiate economic problems from psychological problems and to apply economic or psychological solutions differentially. There is, we feel, a tremendous need to provide an effective program of rehabilitation to deal with this problem. "The dole" did not solve the same kind of problem in an urban setting, and there is no reason to feel it would solve these problems. Instead, financial support should be considered as only one part of the total program needed—a program that must include oppor-

tunities for personal and marriage counseling, career guidance, and even psychotherapy where warranted. It may require retraining for other occupations for which the person is better suited.

The effects of urban poverty are complex and require complex solutions. Many farm people are equally impoverished, at least as culturally deprived, and exist in a situation further complicatd by the fact that any discussion of farming or farmers looses a torrent of emotion. Compare, for example, the attitudes to relocating slumdwellers with that of removing someone from a farm, no matter how run-down the farm.

To summarize, we must 1) admit that some farm couples have problems that are not caused by farm problems, 2) separate farm economic problems from sociological and psychological problems, and 3) apply economic, sociological, psychological, or hybrid solutions differently to meet the needs of rural people.

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Appendix— Borrowers and Their Wives

Appendix I. Factor Analysis Procedure

A factor is defined as an empirical construct or functional unit describing common relationships among variables. Items were grouped into factors to account for the interrelationship between variables. This technique provides a method of identifying and summarizing relationships by combining highly interrelated variables into "clusters," thereby reducing the dimensions of a matrix of correlations between variables. Factors may be considered as dependent variables of a system.

The dimensionality of a matrix of measures of several different variables for many different entities refers to the number of basic variables necessary to account for the observed measures within a specified degree of accuracy. In the factor analysis process a factor loading matrix is developed. The number of factor loading matrixes that are developed from a correlation matrix depends upon the specified percentage of the total variance to be explained.

Since the questions posed were binary, it was necessary to use a phi correlation coefficient to develop a simple correlation matrix:

$$\phi = \frac{P_{ij} - P_i P_j}{\sqrt{P_i Q_i}\sqrt{P_j Q_j}}$$

where: Q_i and Q_j are 1-P_i and 1-P_j respectively and p_{ik} is the proportion answering both items i and j correct and p_i and p_j the proprotion correctly answering i and j, respectively.[1]

Since the calculated phi coefficient was binary and the distribution on which the binary scoring consisted of continuous variables, the phi coefficients were divided by .637 to adjust them to continuous variables.[2] Thus an estimate of the Pearson r correlation coefficient was obtained.

The Thurstone Centroid Method of solution for factor analysis was used. It involved successive extraction of factors first from the original matrix and subsequently from successive residual matrices until residuals are reduced to near zero. On the assumption that residuals will vanish as successive factors are extracted, the correlations of the original matrix may be expressed as:

$$r_{jk} = a_{j_1}a_{k_1} + a_{j_2}a_{k_2} + \cdots + a_{j_m}a_{k_m}$$

where the a's are the factor coefficients and there are m factors.

The procedure consists of computing the first factor coefficients using the following computational formula:

$$a = \frac{\sum_k r_{jk}}{\sqrt{\sum_j \sum_k r_{jk}}}$$

From the first factor loading the first residual matrix is computed:

$$_1r_{jk} = r_{jk} - a_{j1}a_{k2}$$

The method basically involved a continuation of this procedure, computing the second factor loadings from the first residual matrix and a second residual matrix from the first factor loadings until a residual matrix is obtained with values at or near zero.

Since the centroid method does not yield a simple structure solution, it is necessary to rotate the axes to adjust the computed factor loadings. The final factor matrix consists of a coefficient for each variable on each factor in columnar form.

[1] See Paul Horst, *Psychological Measurement and Prediction*, Wadsworth Publishing Company, Inc., Belmont, California, 1966, p. 93.

[2] See J. P. Guilford, *Fundamental Statistics in Psychology and Education*, Holt Reinhart & Co., 1942, p. 247.

Equation 1, Model IV with Y_1 husbands and wives' individual variables, with Y_1 percentage change in net worth adjusted for inflation and inheritance

$$Y_1 = 2265.10590 + 7.00938\,X_2 + 2.64164\,X_{14}$$
$$(1.89403) \quad (1.53454)$$

$$-11.45081\,\text{Log}_e X_{28} + 135.10904\,X_{25} + 3.95310\,X_{26}$$
$$(5.93895) \quad (46.42539) \quad (2.06247)$$

$$+62.03042\,\text{Log}_e X_{27} + 3.25760\,X_{30} - 107.17123\,\text{Log}_e X_{31} - 232.04724\,\text{Log}_e X_{34} - 6.88184\,X_{35}$$
$$(22057) \quad (1.51234) \quad (44.36898) \quad (60.96475) \quad (1.46480)$$

$$+61.69577\,\text{Log}_e X_{36} + 121.9500\,\text{Log}_e X_{37} + 455.80098\,\text{Log}_e X_{38} + 16.73270\,X_{42}$$
$$(27.18410) \quad (89.47208) \quad (162.49336) \quad (6.64426)$$

$$+ 69.41331\,X_{45} + 2.38794\,X_{46} - 11.49477\,X_{47}$$
$$(22.13245) \quad (1.60957) \quad (6.94684)$$

$R^2 = .729$

Standard error of $Y \cdot X = 87.70782$

Simple Correlation Matrix, Model IV, Variables With Y_1

	X_2	X_{14}	X_{23}	X_{25}	X_{26}	X_{27}	X_{30}	X_{31}	X_{34}	X_{35}	X_{36}	X_{37}	X_{38}	X_{42}	X_{45}	X_{46}	X_{47}	Y_1
X_2	1.000	−.046	.446	.176	.197"	−.044	.133	−.016	.001	.101	−.056	.060	−.086	.332*	−.064	−.103	−.056	.350*
X_{14}		1.000	−.185	−.272'	.059	.111	.193	.121	.094	−.132	.081	.014	−.049	−.157	.043	−.233'	.075	.106
X_{23}			1.000	.269'	.126	.008	.067	.051	0.13	.149	.008	.060	.084	.060	−.030	.136	.043	.013
X_{25}				1.000	−.014	−.255'	−.024	.030	.092	−.041	.098	.045	.314	.307*	−.132	.238*	−.031	.353*
X_{26}					1.000	−.134	.249'	.216"	−.271'	.480*	−.383*	.479*	.332*	.297'	−.224"	.232'	.099	.130
X_{27}						1.000	−.001	−.275'	.188	−.148	−.242'	−.162	.212"	−.220"	−.247'	.149	−.058	−.094
X_{30}							1.00	.632*	.187	.245	.278	.500*	.008	.120	−.083	.033	−.107	.284'
X_{31}								1.000	−.232	.143	.473*	.349*	.298	.135	−.049	−.173	−.083	.138
X_{34}									1.000	−.647*	.065	−.189	−.021"	−.098	−.178	−.014	−.054	−.069
X_{35}										1.000	.355*	.494*	.166	.088	.062	−.041	.038	.190
X_{36}											1.000	.650*	−.074	.083	−.021	−.022	−.137	.337*
X_{37}												1.000	−.163	.221"	.085	.187	−.107	.221"
X_{38}													1.000	.121	.094	.110	.044	.428*
X_{42}														1.000	−.231"	.108	.184	.141
X_{45}															1.000	−.082	.192	.237'
X_{46}																1.000	−.078	−.100
X_{47}																	1.000	1.000
Y_1																		1.000

F test
X_2 =13.690*
X_{14}= 2.958*
X_{23}= 3.725*
X_{25}= 8.468*
X_{26}= 3.686*
X_{27}= 3.062*
X_{30}= 4.622*
X_{31}= 5.856*
X_{34}=14.516*
X_{35}=22.090*
X_{36}= 5.153*
X_{37}= 1.850'
X_{38}= 7.896*
X_{42}= 6.350*
X_{45}=10.996*
X_{46}= 2.190'
X_{47}= 2.722*
where:
*=1% level of significance
'=5% level of significance
"=10% level of significance

Equation 2, Model IV, husband's and wives individual variables with Y_2 Z transformation of percentage change in net worth

$$Y_2 = -16.96783 + \underset{(.76840)}{2.81473\ X_{23}^{-1}} + \underset{(.01222)}{.04752\ X_{14}}$$
$$+ \underset{(.10259)}{.28662\ \text{Log}_e X_{21}} - \underset{(.0034)}{.0087 X_{23}^{-1}} + \underset{(.45378)}{1.591132\ X_{28}^{-1}} + \underset{(9.69741)}{16.99826\ X_2^{-1}}$$
$$+ \underset{(1.17700)}{1.96574\ \text{Log}_e X_{38}} + \underset{(1.08338)}{2.16758\ \text{Log}_e X_{39}}$$
$$+ \underset{(.05793)}{.10836\ X_{42}} + \underset{(.01144)}{.054431\ X_{46}} - \underset{(.16072)}{.33640\ \text{Log}_e X_{47}}$$

R^2=.667

Standard error Y · X=.75181

Simple Correlation Matrix, Model IV, Variables with Y_2

	X_9	X_{14}	X_{21}	X_{23}	X_{28}	X_{29}	X_{38}	X_{39}	X_{42}	X_{46}	X_{47}	Y_2
X_9	1.000	−.001	−.128	.111	.042	−.139	−.139	−.166	−.098	.069	−.071	.189
X_{14}		1.000	−.154	.266'	.164	−.051	−.049	−.018	−.157	−.233'	.107	.114
X_{21}			1.000	−.159	−.007	.155	.132	.125	.478*	.261'	−.101	.458*
X_{23}				1.000	.232'	−.134	−.012	−.068	−.112	−.296'	.088	−.254*
Z_{28}					1.000	−.069	−.027	.048	.218"	−.130	.270'	.206"
X_{29}						1.000	−.080	−.129	.426*	−.047	.087	.166
X_{38}							1.000	.432*	.121	.110	.017	.233'
X_{39}								1.000	.146	.123	−.099	.304*
X_{42}									1.000	.108	.192	.424*
X_{46}										1.000	−.101	.440*
X_{47}											1.000	−.133
Y_2												1.000

F test
X_9 =13.396*
X_{14}=15.132*
X_{21}= 7.784*
X_{23}= 6.350*
X_{28}= 8.585*
X_{29}= 3.062'
X_{38}= 2.789*
X_{39}= 4.000*
X_{42}= 3.497*
X_{46}=15.761*
X_{47}= 4,368*
where:
*=1% level of significance
'=5% level of significance
"=10% level of significance

where:
*=1% level of significance
'=5% level of significance
"=10% level of significance

Equation 3, Model IV, Husbands' and Wives' Individual Variables, with Y_3 Percentage Change in Net Worth Adjusted for Inflation, Inheritance, Weighted for Years of Experience, and Scaled.

$$Y_3 = -35.59384 + \underset{(2.29577)}{3.26893}\ X_{10}^{-1} + \underset{(.02270)}{.0728}X_{14}$$
$$+\underset{(3.75716)}{12.34937}\ \text{Log}_e X_{16} + \underset{(.07150)}{.23901}\ X_{21} - \underset{(19.7981)}{72.22000}\ X_{25}^{-1}$$
$$+\underset{(.57628)}{1.27003}\ \text{Log}_e X_{27} + \underset{(.95639)}{2.33445}\ X_{28}^{-1} + \underset{(16.66381)}{34.85878}\ X_{29}^{-1}$$
$$-\underset{(.02076)}{.03487}X_{34} + \underset{(2.02955)}{5.40256}\ \text{Log}_e X_{38} + \underset{(.22808)}{.68578}\ \text{Log}_e X_{45}$$
$$-\underset{(121.47965)}{520.30617}\ X_{46}^{-1} - \underset{(.09863)}{.29500}\ X_{47}$$

$R^2 = .731$

Standard error of Y · X=1.30084

F test

$X_{10} = 2.016'$
$X_{14} = 10.304^*$
$X_{16} = 10.824^*$
$X_{21} = 11.156^*$
$X_{25} = 13.322^*$
$X_{27} = 4.840^*$
$X_{28} = 5.954^*$
$X_{29} = 4.368^*$
$X_{34} = 2.822^*$
$X_{38} = 7.076^*$
$X_{45} = 18.318^*$
$X_{46} = 4.840^*$
$X_{47} = 8.940$

where:
* = 1% level of signficance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model IV, Variables with Y_3

	X_{10}	X_{14}	X_{16}	X_{21}	X_{25}	X_{27}	X_{28}	X_{29}	X_{34}	X_{38}	X_{45}	X_{46}	X_{47}	Y_3
X_{10}	1.000	.181	−.109	−.157	.128	.243'	.258'	−.029	−.167	−.013	.104	.174	.039	.112
X_{14}		1.000	−.082	−.188	.277'	.111	.164	−.051	.101	−.049	.300'	.227"	.075	.125
X_{16}			1.000	−.130	.070	−.246'	.030	.243'	−.069	−.111	−.155	.112	.247'	.016
X_{21}				1.000	−.394*	.049	.014	.181	−.120	.205"	.015	−.244'	−.171	.551*
X_{25}					1.000	.259'	−.056	−.213"	−.082	−.294'	.056	.255	.026	.460*
X_{27}						1.000	−.133	−.069	.178	.212	.188	−.155	−.058	.115
X_{28}							1.000	−.315	−.008	.027	.100	.131	.256'	.177
X_{29}								1.000	−.233	−.080	−.047	.033	.079	.232"
X_{34}									1.000	−.054	−.019	−.006	−.089	.148
X_{38}										1.000	−.060	−.130	.044	.283'
X_{45}											1.000	.198"	−.059	.195"
X_{46}												1.000	.050	.378*
X_{47}													1.000	−.158
Y_3														1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of signifiance

Appendix II. Prediction Equations—Model I with Dependent Variables Y_1, Y_2 and Y_3

A. Individual Variables Included in Model I

Variable	Description
X_1	Gross Risk Aversion
X_2	Gross Economic Motivation Score
X_3	Gross Scientific Orientation Score
X_4	Gross Independence Score
X_5	Gross Authoritarian Score
X_6	Gross External-Internal Score
X_7	Gross Manifest Anxiety Score
X_8	Gross L Score
X_9	Gross F Score
X_{10}	Gross K Score
X_{11}	Number Correct—Abstracting
X_{12}	Number Correct—Adaptability
X_{13}	Number Correct—Figures
X_{14}	Strong Score—Artist
X_{15}	Strong Score—Voc. Agr. Teacher
X_{16}	Strong Score—Banker
X_{17}	Strong Score—Real Estate Salesman
X_{18}	Strong Score—Life Insurance Salesman
X_{19}	Significant Authoritarian Score
X_{20}	Significant Independence Score
X_{21}	Significant Scientific Orientation Score
X_{22}	Significant Risk Aversion Score
X_{23}	Significant Economic Motivation Score
X_{24}	Significant L Score
X_{25}	Significant K Score
X_{26}	Significant F Score
X_{27}	Significant Manifest Anxiety Score
X_{28}	Factor I Aggresive Conservatism
X_{29}	Factor II External Help
X_{30}	Factor III Farm Operations Procedures
X_{31}	Factor IV Life Expectations
X_{32}	Factor V Low Socioeconomic Status
X_{33}	Factor VI Farm Independence
X_{34}	Gross Strong Scores
X_{35}	Number Correct on Animal Husbandry Test
Y_1	Percentage Change in Net Worth Adjusted for Inflation and Inheritance
Y_2	Z of Percentage Change in Net Worth
Y_3	Percentage Change in Net Worth Adjusted for Inflation, Inheritance, Years of Experience, and Scaled to a Nine-Point Scale.

Equation A1, Model I with Y_1

$$Y_1 = -732.74771 + \underset{(2.33037)}{5.97090\ X_1} - \underset{(1.82036)}{3.05195\ X_6}$$
$$+ \underset{(362.74963)}{498.98567 X_7^{-1}} + \underset{(2.134217)}{6.05525 X_{16}} - \underset{(12.22794)}{216.87451\ \mathrm{Log}_e\ X_{24}}$$
$$+ \underset{(5.98660)}{9.04561\ X_{28}} - \underset{(7.49635)}{17.50318\ \mathrm{Log}_e\ X_{31}} + \underset{(60.37054)}{215.56232\ \mathrm{Log}_e\ X_{34}}$$

$R^2 = .396$

Standard error of Y · X = 121.13101

F test:
$X_1 = 6.554^*$
$X_6 = 4.709^*$
$X_7 = 1.904''$
$X_{16} = 8.066^*$
$X_{24} = 2.890^*$
$X_{28} = 2.280'$
$X_{31} = 5.429^*$
$X_{34} = 12.745^*$
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_1

	X_1	X_6	X_7	X_{16}	X_{24}	X_{28}	X_{31}	X_{34}	Y_1
X_1	1.000	−.318*	.034	−.046	.039	.235	.445*	.176	.350*
X_6		1.000	.089	.335*	−.167	−.174	−.282"	−.113	−.193
X_7			1.000	−.244'	−.102	−.020	.004	.058	.094
X_{16}				1.000	.017	−.118	−.185	−.272'	.106
X_{24}					1.000	.090	.025	.270'	−.012
X_{28}						1.000	.177	.358*	.319*
X_{31}							1.000	.269*	.013
X_{34}								1.000	.353*
Y_1									1.000

where:
* = 1% level of signifiance
' = 5% level of signifiance
" = 10% level of significance

Equation A2, Model I with the significant variables with Y_1 regressed with Y_2 as the dependent variable

$$Y_2 = -2.89631 - .03065X_6 + .05163X_{16}$$
$$(.01386) \quad (.01667)$$
$$-1.71058 \text{ Log}_e X_{24} + .13315 X_{28}$$
$$(1.03634) \quad (.04856)$$
$$+ 1.67862 \text{ Log}_e X_{34}$$
$$(.48274)$$

$R^2 = .359$

Standard error of Y . X = .99463

F test:

$X_6 = 4.884^*$
$X_{16} = 9.610^*$
$X_{24} = 2.722'$
$X_{28} = 7.508^*$
$X_{34} = 12.110^*$

* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_6	X_{16}	X_{24}	X_{28}	X_{34}	Y_2
X_6	1.000	.335*	−.167	−.174	−.113	−.191
X_{16}		1.000	.017	−.118	−.272'	.114
X_{24}			1.000	.090	.270'	.006
X_{28}				1.000	.358*	.420*
X_{34}					1.000	.388*
Y_2						1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A3, Model I with the significant variables with Y_1 regressed with Y_3 as the dependent variable

$$Y_3 = -3.19988 - .05275 X_6 + .10047 X_{16}$$
$$(.02381) \quad (.02778)$$
$$-3.59688 \text{ Log}_e X_{24} + .37410 X_{28} - .14479 \text{ Log}_e X_{31}$$
$$(1.73483) \quad (.08101) \quad (.09525)$$
$$+ 3.64022 \text{ Log}_e X_{34}$$
$$(.82452)$$

$R^2 = .510$

Standard error of Y . X = 1.65710

F test

$X_6 = 4.928^*$
$X_{16} = 13.032^*$
$X_{24} = 4.285^*$
$X_{28} = 21.344^*$
$X_{31} = 2.310'$
$X_{34} = 19.448^*$

* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_6	X_{16}	X_{24}	X_{28}	X_{31}	X_{34}	Y_3
X_6	1.000	.355*	−.167	−.174	−.282'	−.113	−.154
X_{16}		1.000	.017	−.118	−.185	−.272'	.125
X_{24}			1.000	.090	.015	.270'	.009
X_{28}				1.000	.177	.358*	.551*
X_{31}					1.000	.269'	.049
X_{34}						1.000	.448*
Y_3							1.000

where:

* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A4, Model I with Y_2

$$Y_2 = 12.13784 - .02638\ X_3 - .04184\ X_6 + 2.55293\ X_{11}^{-1}$$
$$(.01244) \quad (.01387) \quad (.91171)$$
$$+ .89274_{13}^{-1} - .02099 + .07866\ X_{16}$$
$$(.55250) \quad (.01272) \quad (.01970)$$
$$-1.20484\ \text{Log}_e X_{17} - .40770\ X_{21} - .13787\ X_{24}$$
$$(.70450) \quad (.22282) \quad (.10593)$$
$$+ .18458 X_{25} - 17.30255\ X_{26}^{-1} + .38388\ \text{Log}_e X_{28}$$
$$(.09519) \quad (11.38890) \quad (.12710)$$
$$+ .16667\ X_{29} - .0076\ X_{31}^{-1} - .17211\ \text{Log}_e X_{33} - 38.50250\ X_{34}^{-1}$$
$$(.08737) \quad (.00044) \quad (.11617) \quad (16.10743)$$

$R^2 = .59986$

Standard error of Y . X = .86093

F test

$X_3 =$ 4.494*
$X_6 =$ 9.120*
$X_{11} =$ 7.840*
$X_{13} =$ 2.624*
$X_{15} =$ 2.722*
$X_{16} =$ 15.290*
$X_{17} =$ 2.657*
$X_{21} =$ 3.349*
$X_{24} =$ 1.690"
$X_{25} =$ 3.764*
$X_{26} =$ 2.310'
$X_{28} =$ 9.120*
$X_{29} =$ 3.648*
$X_{31} =$ 2.993*
$X_{33} =$ 2.190'
$X_{34} =$ 5.712*

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_2

	X_3	X_6	X_{11}	X_{13}	X_{15}	X_{16}	X_{17}	X_{21}	X_{24}	X_{25}	X_{26}	X_{28}	X_{29}	X_{31}	X_{33}	X_{34}	Y_2
X_3	1.000	−.284'	−.017	.062	−.113	−.028	−.024	−.215"	−.096	.013	−.158	−.038	−.034	−.055	−.213"	.036	.009
X_6		1.000	−.131	.060	.033	.335*	.016	−.093	−.174	.046	.060	−.122	.152	.229"	.084	.117	.008
X_{11}			1.000	.162	−.011	−.001	.041	−.130	−.011	−.121	.093	−.128	−.135	.111	.043	.089	.014
X_{13}				1.000	−.095	.026	−.100	.181	−.088	−.064	.108	−.027	.121	.092	.130	.063	.321
X_{15}					1.000	.049	−.428*	−.204"	.026	.065	.173	.098	.053	.086	.131	−.398*	.205"
X_{16}						1.000	.489*	.100	.119	−.185	−.060	−.154	.010	.266'	−.089	.277'	−.072
X_{17}							1.000	−.020	.118	−.077	−.182	−.147	−.097	−.130	−.248'	.287'	.026
X_{21}								1.000	−.001	.169	.078	.234'	.051	−.023	.048	−.123	.204"
X_{24}									1.000	−.049	.032	.015	−.089	−.051	−.085	−.277'	.042
X_{25}										1.000	.130	.206"	−.185	.048	−.211'	−.141	.015
X_{26}											1.000	.248'	−.031	.086	.032	.164	−.301'
X_{28}												1.000	−.134	−.159	.148	−.497*	.135
X_{29}													1.000	−.109	.053	−.159	.087
X_{31}														1.000	.179	.296'	−.098
X_{33}															1.000	−.122	.051
X_{34}																1.000	−.026
Y_2																	1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A5, Model I with the significant variables with Y_2 regressed with Y_1 as the dependent variable

$$Y_1 = 469.14267 - \underset{(1.76853)}{4.47381}\ X_6 + \underset{(2.17930)}{6.30858}\ X_{16}$$
$$- \underset{(14.32391)}{20.96225}\ X_{24} + \underset{(12.28724)}{19.90277}\ X_{25}$$
$$- \underset{(1496.63240)}{2728.57960}\ X_{26}^{-1} - \underset{(1645.25870)}{5826.88820}\ X_{34}^{-1}$$

$R^2 = .317$

Standard Error of Y . X = 126.85779

F test
X_6 =6.401*
X_{16}=8.352*
X_{24}=2.132"
X_{25}=2.624'
X_{26}=2.528'
X_{34}=1.822"
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of signicance

Simple Correlation Matrix

	X_6	X_{16}	X_{24}	X_{25}	X_{26}	X_{34}	Y_1
X_6	1.000	.335*	-.714	.046	.060	.117	-.193
X_{16}		1.000	.019	-.184	-.060	.277'	.106
X_{24}			1.000	-.049	.032	-.276'	-.008
X_{25}				1.000	.130	-.141	.138
X_{26}					1.000	.162	-.281'
X_{34}						1.000	-.395*
Y_1							1.000'

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A6, Model I with the significant variables with Y_2 regressed with Y_3 as the dependent variable

$$Y_3 = 13.06308 - \underset{(.02122)}{.03255}\ X_3 - \underset{(.02435)}{.05460}\ X_6$$
$$+ \underset{(1.62218)}{4.21362}\ X_{11}^{-1} - \underset{(.01883)}{.04002}\ X_{15} + \underset{(.02812)}{.11765}\ X_{16}$$
$$- \underset{(.19020)}{.37269}\ X_{24} + \underset{(.22009)}{.72099}\ \text{Log}_e - \underset{(26.67545)}{116.60379}\ X_{34}^{-1}$$

$R^2 = .538$

Standard error of Y . X = 1.63498

F test
X_3 = 2.341'
X_6 = 5.018*
X_{11} = 6.760*
X_{15} = 4.494*
X_{16} = 17.472*
X_{24} = 3.842*
X_{28} = 10.758*
X_{34} = 19.097*
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_3	X_6	X_{11}	X_{15}	X_{16}	X_{24}	X_{28}	X_{34}	Y_3
X_3	1.000	-.284'	-.016	-.113	-.028	-.096	-.038	.036	-.083
X_6		1.000	-.131	.033	.335*	-.174	-.122	.117	-.154
X_{11}			1.000	-.011	-.001	-.011	-.128	.089	.174
X_{15}				1.000	0.49	.026	.098	-.398*	.057
X_{16}					1.000	.019	-.154	.277'	.125
X_{24}						1.000	.015	-.276'	.017
X_{28}							1.000	-.497*	.516*
X_{34}								1.000	-.460
Y_3									1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A7, Model I with Y_3

$$Y_3 = 32.00375 + .04985\,X_5 - .07295\,X_6 \quad (.01277) \quad (.02335)$$
$$+ .14913\,X_8 - .52324\,\text{Log}_e X_9 - 17.63928\,X_{10}^{-1} \quad (.09893) \quad (.29093) \quad (6.45533)$$
$$+ 5.17191X^{-1}_{12} + .04031X_{14} + .14095X_{16} - .45562X_{19} \quad (2.47350) \quad (.02109) \quad (.03281) \quad (.27230)$$
$$+ 12.40343\,\text{Log}_e X_{22} + 40.91745\,X_{24}^{-1} + .44506\,X_{28} \quad (4.80487) \quad (15.00946) \quad (.07989)$$
$$+ .24085\,X_{29} - 127.07381\,X_{34}^{-1} \quad (.15432) \quad (25.70341)$$

$R^2 = .666$

Standard of error of $Y \cdot X = 1.461$

F test

$X_5 = 5.244^*$
$X_6 = 9.734^*$
$X_8 = 2.280'$
$X_9 = 3.240^*$
$X_{10} = 7.453^*$
$X_{12} = 4.368^*$
$X_{14} = 3{,}648^*$
$X_{16} = 18.490^*$
$X_{19} = 2.789^*$
$X_{22} = 6.656^*$
$X_{24} = 7.453^*$
$X_{28} = 31.025^*$
$X_{29} = 2.434^*$
$X_{34} = 24.404^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_3

	X_5	X_6	X_8	X_9	X_{10}	X_{12}	X_{14}	X_{16}	X_{19}	X_{22}	X_{24}	X_{28}	X_{29}	X_{34}	Y_3
X_5	1.000	.373*	.008	-.046	.110	.219"	-.005	.103	.265'	.393*	.042	-.017	.083	.089	.060
X_6		1.000	-.022	-.059	.173	.146	-.165	.335*	-.091	.272'	.160	-.174	.152	.117	-.154
X_8			1.000	-.122	-.347*	.059	-.092	-.146	-.076	.226"	.192	-.062	-.022	.130	-.010
X_9				1.000	.403*	.139	.077	.139	.072	.174	-.064	.024	-.188	-.138	.121
X_{10}					1.000	.052	.075	.192	.232'	-.211"	-.016	-.050	-.030	-.037	.141
X_{12}						1.000	.076	.181	-.138	-.109	-.035	-.157	-.037	.128	.112
X_{14}							1.000	-.445*	-.088	.118	-.074	-.097	.015	.188	-.091
X_{16}								1.000	-.030	-.082	-.015	-.118	.010	.277'	.125
X_{19}									1.000	-.075	.091	.179	.122	-.325*	.209'
X_{22}										1.000	-.036	-.130	-.241'	.070	.016
X_{24}											1.000	-.083	.087	.258'	-.001
X_{28}												1.000	-.212'	-.394*	.551*
X_{29}													1.000	-.159	.058
X_{34}														1.000	-.460*
Y_3															1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A8, Model I with the significant variables with Y_3 regressed with Y_1 as the dependent variable

$$Y_1 = -1271.10390 - 2.78331\,X_5 + 10.76895\,X_8 \quad (1.82768) \quad (7.81746)$$
$$-6.18887\,X_{16} + 549.24645\,\text{Log}_e X_{22} \quad * \quad *$$
$$+ 11.68038\,X_{28} - 5416.48790\,X^{-1}_{34} \quad (6.38522) \quad (1675.21610)$$

$R^2 = .314$

Standard error of $Y \cdot X = 127.12904$

*Standard deviations not available.

F test

$X_5 = 2.310'$
$X_8 = 1.904"$
$X_{16} = 3.534^*$
$X_{22} = 2.402"$
$X_{28} = 3.349^*$
$X_{34} = 10.433^*$

* = 1% level of significance
' = 5% level of significnace
" = 10% level of significance

Simple Correlation Matrix

	X_5	X_8	X_{16}	X_{22}	X_{28}	X_{34}	Y_1
X_5	1.000	−.002	.335*	−.272'	−.174	.117	−.193
X_8		1.000	−.146	.226"	−.062	.130	.078
X_{16}			1.000	−.082	−.118	.277'	.106
X_{22}				1.000	−.130	.070	.174
X_{28}					1.000	−.394*	.319*
X_{34}						1.000	−.359*
Y_1							1.000

Where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A9, Model I with the significant variables with Y_3 regressed with Y_2 as the dependent variable

$$Y_2 = -19.46820 + .01782\ X_5 - .03368\ X_6$$
$$(.01255) \qquad (.01411)$$
$$+ 2.72885\ X_{12}^{-1} + .04950\ X_{16} + .683909\ \text{Log}_e\ X_{22}$$
$$(1.50266) \qquad (.01575) \qquad (2.77237)$$
$$15.10358\ X_{24}^{-1} + .17991\ X_{28} + .21327\ X_{29}$$
$$(8.896144) \qquad (.05017) \qquad (.09333)$$
$$-43.12280\ X_{34}^{-1}$$
$$(13.22569)$$

$R^2 = .473$

Standard error of Y . X = .93043

F test

X_5 = 2.016"
X_6 = 5.712*
X_{12}= 3.312*
X_{16}= 9.860*
X_{22}= 6.101*
X_{24}= 2.822*
X_{28}=12.888*
X_{29}= 5.198*
X_{34}=10.628*

Simple Correlation Matrix

	X_5	X_6	X_{12}	X_{16}	X_{22}	X_{24}	X_{28}	X_{29}	X_{34}	Y_2
X_5	1.000	.373*	.219"	.103	−.393*	.042	−.017	.083	.083	.010
X_6		1.000	.059	−.146	.226"	.192	−.062	−.022	−.130	−.034
X_{12}			1.000	.181	−.109	−.035	−.156	−.037	.128	.079
X_{16}				1.000	−.082	−.014	−.118	.010	.277'	.114
X_{22}					1.000	−.036	−.130	−.241'	.070	.089
X_{24}						1.000	−.083	.077	.258'	.000
X_{28}							1.000	−.212"	.394*	.420*
X_{29}								1.000	−.159	.130
X_{34}									1.000	−.406*
Y_2										1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A10, Model I with Y_2^{-1}, PCA Respondents Only

$$Y_2 = 15.01786 - \underset{(1.68019)}{3.19332}\ X_6 + \underset{(3.82291)}{9.94004}\ X_{10}$$
$$+ \underset{(.82088)}{2.06558}\ X_{11}^{-1} + \underset{(.74997)}{.99554}\ X_{13}^{-1} + \underset{(2.01502)}{3.47821}\ X_{16}$$
$$- \underset{(.17959)}{.27965}\ X_{19} - \underset{(.24770)}{.58463}\ X_{21} + \underset{(.27519)}{.76414}\ X_{22}$$
$$+ \underset{(.10384)}{.14816}\ X_{24} - \underset{(6.19177)}{19.16233}\ X_{31}^{-1} - \underset{(.11826)}{.52455}\ \log_e X_{33} + \underset{(31.49299)}{66.00314}\ X_{34}^{-1}$$

$R^2 = .760$

Standard error of X . Y = 60543

F test

$X_6 = 3.422^*$
$X_{10} = 6.760^*$
$X_{11} = 6.350^*$
$X_{13} = 1.769''$
$X_{16} = 2.993^*$
$X_{19} = 2.434'$
$X_{21} = 5.570^*$
$X_{22} = 7.728^*$
$X_{24} = 2.045'$
$X_{31} = 9.548^*$
$X_{33} = 19.714^*$
$X_{34} = 4.410^*$

where
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_2, PCA Respondents Only

	X_6	X_{10}	X_{11}	X_{13}	X_{16}	X_{19}	X_{21}	X_{22}	X_{24}	X_{31}	X_{33}	X_{34}	Y_2
X_6	1.000	−.046	−.364*	.017	.263'	−.107	−.285'	−.197"	−.134	.054	.091	.070	−.100
X_{10}		1.000	−.073	.134	−.283'	−.352*	−.075	.077	−.028	−.019	N.A.	.333*	−.186
X_{11}			1.000	−.054	−.161	−.120	−.191	.212"	.086	.063	N.A.	−.121	.387*
X_{13}				1.000	−.106	−.159	−.157	.206"	−.114	−.012	N.A.	−.164	−.015
X_{16}					1.000	.360*	−.310*	−.114	.068	.164	N.A.	.065	.268'
X_{19}						1.000	−.076	−.183	.201"	.144	N.A.	−.071	−.049
X_{21}							1.000	−.057	−.092	−.184	N.A.	.079	.229"
X_{22}								1.000	.181	.187	N.A.	.017	.008
X_{24}									1.000	.034	N.A.	−.263'	.056
X_{31}										1.000	N.A.	.160	−.319*
X_{33}											1.000	.159	−.469*
X_{34}												1.000	−.119
Y_2													1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix IIB. Gross Variables Included in Model I

Variable	Description
X_1	Gross Bio-Data Score
X_2	Gross Significant Motivation Scale Score
X_3	Gross Significant Strong Score
X_4	Gross Abilities
X_5	Gross Validated Motivation and Drives Scale Score
X_6	Sum of Strong Scales
Y_1	Percentage change in net worth adjusted for inflation and inheritance
Y_2	Z of percentage change in net worth
Y_3	Percentage change in net worth adjusted for inflation, inheritance, weighted by years of experience and scaled.

Equation B1, Model I with Y_1

$$Y_1 = -897.90395 + \underset{(19.84571)}{44.11340}\ \log_e X_1$$
$$+ \underset{(4.64936)}{7.78163}\ X_2 + \underset{(.106127)}{2.01671}\ X_4$$

$R^2 = .238$

Standard error of Y . X = 130.99038

F test

$X_1 = 4.928^*$
$X_2 = 2.789'$
$X_4 = 3.610'$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_1

	X_1	X_2	X_4	Y_1
X_1	1.000	.475*	.210"	.414*
X_2		1.000	0.34	.339*
X_4			1.000	.271'
Y_1				1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation B2, Model I with Y_2

$$Y_2 = -2.00834 + .78488\ \text{Log}_e X_1 + 19.358329\ X_4^{-1}$$
$$\qquad\qquad (.12723) \qquad\qquad (8.20625)$$

$R^2 = .367$

Standard error of Y . X = .96657

F test
$X_1 = 38.069^*$
$X_4 = 5.570^*$
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model I with Y_2

	X_1	X_4	Y_2
X_1	1.000	-.156	.562*
X_4		1.000	.135
Y_2			1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% of significance

Equation B3, Model I with Y_3

$$Y_3 = 5.09531 + 1.74050\ \text{Log}_e X_1 - 1.15887\ \text{Log}_e X_4$$
$$\qquad\qquad (.2215) \qquad\qquad (.52504)$$

$R^2 = .474$

Standard error of Y . X = 1.66726

F test
$X_1 = 61.780^*$
$X_4 = 4.88$"

Simple Correlation Matrix, Model I with Y_3

	X_1	X_4	Y_3
X_1	1.000	.205"	.661*
X_4		1.000	-.053
Y_3			1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix III. Prediction Equations Model II with Dependent Variables Y_1, Y_2, and Y_3

Appendix III. A. Individual Variables Included in Model II

Variable	Description
X_1	Gross Risk Aversion Score
X_2	Gross Economic Motivation Score
X_3	Gross Scientific Orientation Score
X_4	Gross Independence Score
X_5	Gross Authoritarian Score
X_6	Gross External-Internal Score
X_7	Gross Manifest Anxiety Score
X_8	Gross L Score
X_9	Gross F Score
X_{10}	Gross K Score
X_{11}	Number Correct—Abstracting
X_{12}	Number Correct—Adaptability
X_{13}	Number Correct—Figures
X_{14}	Strong Score—Artist
X_{15}	Strong Score—Life Insurance Salesman
X_{16}	Strong Score—Physician
X_{17}	Strong Score—Musician
X_{18}	Strong Score—Author-Journalist
X_{19}	Significant Authoritarian Score
X_{20}	Significant Independence Score
X_{21}	Significant Risk Aversion Score
X_{22}	Significant Scientific Orientation Score
X_{23}	Significant Economic Motivation
X_{24}	Significant L Score
X_{25}	Significant K Score
X_{26}	Significant F Score
X_{27}	Significant Manifest Anxiety Score
X_{28}	Gross Strong Score
X_{29}	Number Correct on Animal Husbandry Test
X_{30}	Factor I: Men and Women
X_{31}	Factor II: Men and Women
X_{32}	Factor III: Men and Women
X_{33}	Factor IV: Men and Women
X_{34}	Factor V: Men and Women
X_{35}	Factor VI: Men and Women
Y_1	Percentage change in net worth adjusted for inflation and inheritance
Y_2	Z of percentage change in net worth
Y_3	Percentage change in net worth adjusted for inflation, inheritance, years of experience, and scaled to a nine-point scale

Equation A1, Model II with Y_1

$$Y_1 = 134.20000 - \underset{(.1584410)}{44627\ X_1^{-1}} - \underset{(2.24769)}{5.30439\ X_{12}} + \underset{(1.60081)}{3.82448\ X_{13}} - \underset{(.80741)}{1.19147\ X_{14}} + \underset{(1.12003)}{2.96906\ X_{28}} - \underset{(6.94488)}{10.85745\ X_{29}} + \underset{(3.85980)}{5.75059\ X_{30}} + \underset{(13.24745)}{17.39313\ X_{33}} + \underset{(2.90573)}{6.60287\ X_{35}^{-1}}$$

$R^2 = .448$

Standard error of Y . X = 116.777

F test

$X_1 = 7.952^*$
$X_{12} = 5.570^*$
$X_{13} = 5.712^*$
$X_{14} = 2.190'$
$X_{28} = 7.022^*$
$X_{29} = 2.434'$
$X_{30} = 2.220'$
$X_{33} = 1.716''$
$X_{35} = 5.153^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of signifiance

Simple Correlation Matrix, Model II with Y_1

	X_1	X_{12}	X_{13}	X_{14}	X_{28}	X_{29}	X_{30}	X_{33}	X_{35}	Y_1
X_1	1.000	-.333*	-.223"	-.008	-.072	-.030	-.329*	-.058	.056	-.328*
X_{12}		1.000	.561*	-.267'	.103	.205"	.214"	.165	.127	.091
X_{13}			1.000	-.254'	.053	.209"	.219"	.006	.154	.279'
X_{14}				1.000	.035	-.005	-.073	-.150	-.198"	-.211"
X_{28}					1.000	-.143	.345*	.193	-.068	.363*
X_{29}						1.000	-.129	-.065	.082	-.198"
X_{30}							1.000	.303*	-.091	.411*
X_{33}								1.000	.210"	-.197"
X_{35}									1.000	.173
Y_1										1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A 2, Model II with the significant variables with Y_1 regressed with Y_2 as the dependent variable

$$Y_2 = -1.96210 - \underset{(122.08668)}{209.56606\ X_1^{-1}} + \underset{(.00899)}{.03481\ X_{28}} - \underset{(.05422)}{.07786\ X_{29}} + \underset{(.02977)}{.07765\ X_{30}} + \underset{(.02227)}{.03594\ X_{35}^{-1}}$$

$R^2 = .418$

Standard error of Y . X = .94789

F test

$X_1 = 2.958'$
$X_{28} = 14.977^*$
$X_{29} = 2.074''$
$X_{30} = 6.812^*$
$X_{35} = 2.132''$

where:
* = 1% level of significance
' = 5% level of signifiance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_{28}	X_{29}	X_{30}	X_{35}	Y_1
X_1	1.000	-.072	-.030	-.329*	.056	-.287'
X_{28}		1.000	-.143	.345*	-.068	.507*
X_{29}			1.000	-.129	+.082	-.211"
X_{30}				1.000	-.091	.472*
X_{35}					1.000	.080
Y_1						1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A3, Model II with the significant variables with Y_1 regressed with Y_3 as the dependent variable

$$Y_3 = -2.29068 + \underset{(.01570)}{.05747\ X_{28}} - \underset{(.09519)}{.19551\ X_{29}} + \underset{(.04907)}{.23982\ X_{30}} + \underset{(.03924)}{.06534\ X_{35}^{-1}}$$

$R^2 = .489$

Standard error of Y . X = 1.66745

F test

$X_{28} = 13.396^*$
$X_{29} = .4202^*$
$X_{30} = 23.912^*$
$X_{35} = 2.756'$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_{28}	X_{29}	X_{30}	X_{35}	Y_3
X_{28}	1.000	-.143	.323*	-.089	.500*
X_{29}		1.000	-.126	.095	-.274'
X_{30}			1.000	-.210"	.211"
X_{35}				1.000	.058
Y_3					1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A4, Model II with Y_2

$$Y_2 = .64839 + \underset{(2.33132)}{3.51057}\ X_8^{-1} - \underset{(.20814)}{.33041}\ \text{Log}_e X_9$$
$$- \underset{(.01781)}{.04113}\ X_{11} + \underset{(.01276)}{.02443}\ X_{13} + \underset{(.39842)}{.98817}\ \text{Log}_e X_{15}$$
$$+ \underset{(.05783)}{.08254}\ X_{23} - \underset{(124.36138)}{288.12173}\ X_{28}^{-1} - \underset{(.05503)}{.15006}\ X_{29}$$
$$+ \underset{(.16628)}{.59525}\ \text{Log}_e X_{30} + \underset{(.06409)}{.18901} X_{31} - \underset{(.01763)}{.02609}\ X_{33}^{-1}$$
$$- \underset{(.12312)}{.28514}\ \text{Log}_e X_{35}$$

$R^2 = .555$

Standard of error of $Y \cdot X = .87693$

F test

$X_8 = 2.820$
$X_9 = 2.528^*$
$X_{11} = 5.336^*$
$X_{13} = 3.648^*$
$X_{15} = 6.150^*$
$X_{23} = 2.016'$
$X_{28} = 5.382^*$
$X_{29} = 7.453^*$
$X_{30} = 12.816^*$
$X_{31} = 8.702^*$
$X_{33} = 2.190'$
$X_{35} = 5.382^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model II with Y_2

	X_8	X_9	X_{11}	X_{13}	X_{15}	X_{23}	X_{28}	X_{29}	X_{30}	X_{31}	X_{33}	X_{35}	Y_2
X_8	1.000	.055	.117	.171	.023	-.019	-.071	.230"	.073	.054	.091	-.122	.164
X_9		1.000	-.160	.036	-.153	-.057	-.164	-.020	.098	.061	-.183	.016	.015
X_{11}			1.000	.574*	.114	.176	-.100	.085	.344*	.194	-.132	-.007	.126
X_{13}				1.000	.238'	.138	-.095	.209"	.164	.051	-.062	.040	.178
X_{15}					1.000	-.075	.349*	.174	-.103	-.297'	.110	.073	.042
X_{23}						1.000	-.272'	-.255'	.474*	-.029	-.110	-.146	.214"
X_{28}							1.000	.161	-.524*	-.275'	.010	.128	-.513
X_{29}								1.000	-.140	.084	.001	.015	-.211"
X_{30}									1.000	-.022	-.234'	-.144	.528*
X_{31}										1.000	.058	.097	.198"
X_{33}											1.000	-.080	-.107
X_{35}												1.000	-.243'
Y_2													1.000

where :
* = 1% level of significance
' — 5% level of significance
" — 10% level of significance

Equation A5, Model II with the significant variables with Y_2 regressed with Y_1 as the dependent variable

$$Y_1 = 114.10161 + \underset{(1.44202)}{3.44165}\ X_{13} - \underset{(15641.0)}{22616.0}\ X_{28}^{-1}$$
$$- \underset{(7.44950)}{12.77061}\ X_{29} + \underset{(19.68121)}{44.79958}\ \text{Log}_e X_{30}$$

$R^2 = .295$

Standard error of $Y \cdot X = 126.90922$

F test

$X_{13} = 5.712^*$
$X_{28} = 2.074"$
$X_{29} = 2.924'$
$X_{30} = 5.198^*$
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_{13}	X_{28}	X_{29}	X_{30}	Y_1
X_{13}	1.000	-.095	.209"	.164	.279'
X_{28}		1.000	.161	-.524*	-.375*
X_{29}			1.000	-.140	-.198"
X_{30}				1.000	.437*
Y_1					1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A6 Model II with the significant variables with Y_2 regressed with Y_3 as the dependent variable

$$Y_3 = 4.27638 = 6.85875\ X_8^{-1} = 1.49281\ \text{Log}_e X_{15}$$
$$(4.31239) \qquad (.69032)$$
$$-662.74437\ X_{28}^{-1} - .25270\ X_{29} = .99890\ \text{Log}_e X_{30}$$
$$(217.54150) \qquad (.09840)$$

$R^2 = .502$

Standard error of Y . X = 1.65881

F test

$X_8 = 2.528'$
$X_{15} = 4.666^*$
$X_{28} = 9.302^*$
$X_{29} = 12.744^*$
$X_{30} = 15.210^*$

* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_8	X_{15}	X_{28}	X_{29}	X_{30}	Y_3
X_8	1.000	.023	-.071	.230"	.073	.147
X_{15}		1.000	.349*	.174	-.103	.008
X_{28}			1.000	.161	-.524*	-.520*
X_{29}				1.000	-.140	-.277'
X_{30}					1.000	.589*
Y_3						1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A7, Model II with Y_3

$$Y_3 = 12.45588 - 333.78095\ X_1^{-1} + 893.94237\ X_4^{-1}$$
$$(202.80544) \qquad (414.37408)$$
$$+ .04941\ X_7 - 45.11812\ X_{15}^{-1} - 1.13957\ \text{Log}_e X_{17}$$
$$(.02040) \qquad (24.10592) \qquad (.72673)$$
$$-722.05664\ X_{28}^{-1} - .18222\ X_{29} + .74128\ \text{Log}_e X_{30}$$
$$(199.62869) \qquad (.09076) \qquad (.25761)$$
$$+ .70205\ \text{Log}_e X_{33} + .07726\ X_{35}^{-1}$$
$$(.23304) \qquad (.03636)$$

$R^2 = .617$

Standard of error of Y . X = 1.51273

F test

$X_1 = 2.722^*$
$X_4 = 4.666^*$
$X_7 = 5.856^*$
$X_{15} = 3.497^*$
$X_{17} = 2.465'$
$X_{28} = 14.977^*$
$X_{29} = 4.004^*$
$X_{30} = 8.294^*$
$X_{33} = 9.060^*$
$X_{35} = 4.494^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model II with Y_3

	X_1	X_4	X_7	X_{15}	X_{17}	X_{28}	X_{29}	X_{30}	X_{33}	X_{35}	Y_3
X_1	1.000	.272'	.008	.140	.136	.084	-.030	-.256'	-.068	.056	-.248'
X_4		1.000	.105	-.111	.082	.170	-.187	-.120	-.221"	-.032	.043
X_7			1.000	-.097	-.161	.048	.012	-.070	-.349*	-.073	.112
X_{15}				1.000	.066	.345*	-.194	.104	.103	-.129	-.031
X_{17}					1.000	-.105	-.107	.028	.170	.022	-.092
X_{28}						1.000	.161	-.524*	-.178	.070	-.520*
X_{29}							1.000	-.140	-.119	.082	-.277'
X_{30}								1.000	-.387*	-.096	.598*
X_{33}									1.000	-.121	.328*
X_{35}										1.000	.058
Y_3											1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A8, Model II with the significant variables with Y_3 regressed with Y_1 as the dependent variable

$$Y_1 = 615.52774 - \underset{(15445.0)}{39108.0\ X_1^{-1}} - \underset{(15139.0)}{26680.0\ X_{28}^{-1}}$$
$$- \underset{(7.02482)}{10.7779\ X_{29}} + \underset{(19.47006)}{42.48782\ \text{Log}_e} + \underset{(2.88429)}{6.93937\ X_{35}^{-1}}$$

$R^2 = .351$

Standard error of Y . X = 122.71595

F test

$X_1 = 6.401^*$
$X_{28} = 3.096'$
$X_{29} = 2.341''$
$X_{30} = 4.752^*$
$X_{35} = 5.760^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_{28}	X_{29}	X_{30}	X_{35}	Y_1
X_1	1.000	.084	−.030	−.256'	−.056	−.328*
X_{28}		1.000	.161	−.524*	.070	−.375*
X_{29}			1.000	−.140	.082	−.198"
X_{30}				1.000	−.096	.437*
X_{35}					1.000	.173
Y_1						1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A9 Model II with the significant variables with Y_3 regressed with Y_2 as the dependent variable

$$Y_2 = 3.43615 - \underset{(123.15561)}{254.23550\ X_1^{-1}} + \underset{(244.01688)}{493.95240\ X_4^{-1}}$$
$$- \underset{(14.39355)}{2094710\ X_{15}^{-1}} - \underset{(121.97392)}{458.04201\ X_{28}^{-1}} + \underset{(.15747)}{.28993\ \text{Log}_e\ X_{30}}$$
$$+ \underset{(.13125)}{.21647\ \text{Log}_e\ X_{33}}$$

$R^2 = .451$

Standard error of Y · X = .92735

F test

$X_1 = 4.244^*$
$X_4 = 4.080^*$
$X_{15} = 2.132''$
$X_{28} = 14.138^*$
$X_{30} = 3.386^*$
$X_{33} = 2.722'$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_4	X_{15}	X_{28}	X_{30}	X_{33}	Y_2
X_1	1.000	.272'	.140	.084	−.256'	−.068	−.278'
X_4		1.000	−.111	.170	−.120	−.221'	.023
X_{15}			1.000	−.345*	.104	.103	−.007
X_{28}				1.000	−.524*	−.178	−.513*
X_{30}					1.000	.387*	.528*
X_{33}						1.000	.286*
Y_2							1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A10, Model II with Y_2, PCA respondents only

$$Y_2 = .90845 - \underset{(.02400)}{.05275\ X_{11}} + \underset{(38.26386)}{64.57601\ X_{25}^{-1}}$$
$$- \underset{(219.14555)}{393.77789\ X_{28}^{-1}} - \underset{(.09056)}{.15043\ X_{29}} + \underset{(.44706)}{1.32763\ \text{Log}_e\ X_{30}}$$
$$- \underset{(.23760)}{.46402\ X_{33}^{-1}}$$

$R^2 = .440$

Standard error of Y · X = .80716

F test

$X_{11} = 4.840^*$
$X_{25} = 2.856'$
$X_{28} = 3.240^*$
$X_{29} = 2.756'$
$X_{30} = 8.821^*$
$X_{33} = 3.802^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_{11}	X_{25}	X_{28}	X_{29}	X_{30}	X_{33}	Y_2
X_{11}	1.000	−.314*	.260'	.096	.600*	−.158	−.202"
X_{25}		1.000	.269'	−.284'	−.367*	.227"	.285'
X_{28}			1.000	.010	.230"	−.079	−.312"
X_{29}				1.000	.381*	−.082	−.146
X_{30}					1.000	−.142	.124
X_{33}						1.000	−.210"
Y_2							1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix IIIB. Gross Variables Included in Model II

X_1	Gross Bio-Data Score
X_2	Gross Significant Motivation Scale Score
X_3	Gross Significant Strong Score
X_4	Gross Abilities
X_5	Gross Scale Score
X_6	Sum of Strong Scores
Y_1	Percentage change in net worth adjusted for inflation and inheritance
Y_2	Z of percentage change in net worth
Y_3	Percentage change in net worth adjusted for inflation inheritance, weighted by years of experience and scaled

Equation B1 Model II with Y_1

$$Y_1 = 172.34453 + 4.08992\ X_1 - 25.129.0\ X_3^{-1}$$
$$(1.36807) \qquad (15.630)$$

$R^2 = .239$

Standard error of Y . X = 129.93002

Simple Correlation Matrix

	X_1	X_3	Y_1
X_1	1.000	-.498*	.459*
X_3		1.000	-.375*
Y_1			1.000

F test

$X_1 = 8.940$*
$X_3 = 2.592$"
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

ıere:
= 1% level of significance
= 5% level of significance
= 10% level of significance

Equation B2 Model II with Y_2

$$Y_2 = 2.28691 + .03755\ X_1 - 327.03263\ X_3^{-1}$$
$$(.01000) \qquad (114.32017)$$

$R^2 = .388$

Standard error of Y . X = .95032

Simple Correlation Matrix

	X_1	X_3	Y_2
X_1	1.000	-.498*	.562*
X_3		1.000	-.513*
Y_2			1.000

F test

$X_1 = 14.062$*
$X_3 = 8.180$*
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation B3, Model II with Y_3

$$Y_3 = 7.03833 + .09249\ X_1 - 510.50748\ X_3^{-1}$$
$$(.01740) \qquad (198.87228)$$

$R^2 = .482$

Standard error of Y . X = 1.65319

Simple Correlation Matrix

	X_1	X_3	Y_3
X_1	1.000	-.498*	.658*
X_3		1.000	-.520*
Y_3			1.000

F test

$X_1 = 28.196$*
$X_3 = 6.605$*
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix IV. Prediction Equations Model III with Dependent Variables Y_1, Y_2 and Y_3

Appendix IV A. Individual Variables included in Model III

Variable	Description
X_1	Gross Economic Motivation Score
X_2	Gross Scientific Orientation Score
X_3	Gross External-Internal Score
X_4	Gross Manifest Anxiety Score
X_5	Gross L Score
X_7	Figures Test
X_8	Strong Score—Librarian
X_9	Strong Score—English teacher
X10	Strong Score—Lawyer
X_{11}	Strong Score—YMCA Secretary
X_{12}	Strong Score—Life Insurance Salesman
X_{13}	Strong Score—Buyer
X_{14}	Strong Score—Housewife
X_{15}	Strong Score—Elementary Teacher
X_{16}	Strong Score—Stenographer-Secretary
X_{17}	Strong Score—Home Economics Teacher
X_{18}	Strong Score—Occupational Therapist
X_{19}	Strong Score—Nurse
X_{20}	Strong Score—Lab Technician
X_{21}	Strong Score—Music Teacher
X_{22}	Strong Score—Physical Therapist
X_{23}	Strong Score—Engineer
X_{24}	Strong Score—Femininity-Masculinity
X_{25}	Significant External-Internal
X_{26}	Significant Authoritarian
X_{27}	Significant Scientific Orientation
X_{28}	Significant Economic Motivation
X_{29}	Significant L
X_{30}	Significant K
X_{31}	Significant F
X_{32}	Factor I Financial Knowledge
X_{33}	Factor III Submissiveness
X_{34}	Factor IV Rebellion Toward Parental Negativeness
X_{35}	Factor V General Attitude
X_{36}	Factor VI Unresolved Rebellion
X_{37}	Gross Strong Scores
X_{38}	Number Correct on Animal Husbandry Test
Y_1	Percentage change in net worth adjusted for inflation and inheritance
Y_2	Z of percentage change in net worth
Y_3	Percentage change in net worth adjusted for inflation, inheritance, years of experience, and scaled to a nine-point scale.

Equation A1, Model III with Y_1

$$Y_1 = -2282.30490 + 5.30027\ X_2 \quad (2.32840)$$
$$+ 69.22954\ \text{Log}_e X_4 - 7.00063\ X_9 - 204.65580\ \text{Log}_e X_{13} \quad (42.20283) \quad (1.58602) \quad (66.11265)$$
$$+ 2.91470\ X_{19} + 57.27920\ \text{Log}_e + 1679.85650\ X_{22}^{-1} \quad (1.43460) \quad (28.12182) \quad (533.19593)$$
$$+ 175.65753\ \text{Log}_e X_{24} + 581.96553\ \text{Log}_e X_{27} \quad (103.91742) \quad (177.62193)$$
$$- 1600.38540\ X_{30}^{-1} + 13.43120\ X_{32} - 45.32643\ \text{Log}_e X_{35} \quad (1267.9000) \quad (8.64564) \quad (17.24195)$$
$$+ 68.50835\ X_{36} + 2.78919\ X_{37} - 17.04385\ X_{38} \quad (25.21770) \quad (1.65096) \quad (7.82431)$$

$R^2 = .632$

Standard error of $Y \cdot X = 100.26542$

F test

$X_2 = 5.198^*$
$X_4 = 2.690^*$
$X_{13} = 9.610^*$
$X_{19} = 4.121^*$
$X_{21} = 4.162^*$
$X_{22} = 9.922^*$
$X_{24} = 2.856^*$
$X_{27} = 10.758^*$
$X_{30} = 1.613''$
$X_{32} = 2.402'$
$X_{35} = 6.917^*$
$X_{36} = 7.398^*$
$X_{37} = 2.856^*$
$X_{38} = 4.752^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model III with Y_1

	X_2	X_4	X_9	X_{13}	X_{19}	X_{21}	X_{22}	X_{24}	X_{27}	X_{30}	X_{32}	X_{35}	X_{36}	X_{37}	X_{38}	Y_1
X_2	1.000	.119	−.363*	.397*	−.036	−.159	.084	−158	.151	−.147	+.093	−.087	−.128	−.114	−.038	.021
X_4		1.000	−.148	.183	−.001	.252"	.180	−.162	−.212"	.289"	−.220"	.042	−.247"	.149	−.058	−.094
X_9			1.000	−.647*	.245	.355*	−.139	.494*	−.166	.050	.088	.023	.062	−.041	.038	−.069
X_{13}				1.000	−.187	−.065	.186	−.189	−.021	.039	−.098	−.036	−.178	.014	−.054	−.136
X_{19}					1.000	.278'	−.530*	.500*	.008	−.226'*	.120	.006	−.083	.033	−.107	.284*
X_{21}						1.000	−.420*	.650*	−.074	−.116	.083	.165	−.021	−.022	−.136	.190
X_{22}							1.000	−.337*	−.294*	.222"	−.046	−.027	.098	.058	.137	−.065
X_{24}								1.000	−.163	−.126	.221"	.177	.085	.182	−.107	.337*
X_{27}									1.000	−.014	.121	−.047	.094	.110	.044	.221"
X_{30}										1.000	−.504*	.039	.233"	−.016	.119	−.290'
X_{32}											1.000	−.344*	−.231"	.108	.184	.428*
X_{35}												1.000	.063	−.104	−.164	−.168
X_{36}													1.000	−.082	.192	.141
X_{37}														1.000	−.078	.237'
X_{38}															1.000	−.100
Y_1																1.000

Where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A2, Model III with the significant variables with Y_1 regressed with Y_2 as the dependent variable

$$Y_2 = 19.90495 + .05010\ X_2 + 5.69600\ X_{22}^{-1} \quad (.01765) \quad (3.74606)$$
$$+ 4.38508\ \text{Log}_e X_{27} + .12719\ X_{32} - .26496\ \text{Log}_e X_{35} \quad (1.52826) \quad (.06256) \quad (.14975)$$
$$+ .62082\ X_{37} - .15546\ X_{38} \quad (.13536) \quad (.15546)$$

$R^2 = .468$

Standard error of $Y \cdot X = .92041$

F test:

$X_2 = 8.066^*$
$X_{22} = 2.310'$
$X_{27} = 8.237^*$
$X_{32} = 4.121^*$
$X_{35} = 3.123''$
$X_{38} = 4.476^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_2	X_{22}	X_{27}	X_{32}	X_{35}	X_{37}	X_{38}	Y_2
X_2	1.000	−.159	−.322*	.296'	.059	−.232'	.098	.130
X_{22}		1.000	−.294"	−.046	−.027	.058	.137	001
X_{27}			1.000	.121	−.047	.110	.004	.223'
X_{32}				1.000	.231"	.108	.184	.424*
X_{35}					1.000	.104	−.64	−.174
X_{37}						1.000	−.078	.440*
X_{38}							1.000	−.120
Y_2								1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A3 Model III with the significant variables with Y_1 regressed with Y_3 dependent variable

$$Y_3 = -35.87763 + .05927\ X_2 + 1.83611\ \text{Log}_e X_4$$
$$(.03392) \qquad (.62507)$$
$$- .03034\ X_9 - 1.82212\ \text{Log}_e X_{13} + .03219\ X_{19}$$
$$(.02361) \qquad (.99936) \qquad (.02092)$$
$$+ .78434\ \text{Log}_e X_{21} + 22.06695\ X_{22}^{-1} + 11.123302\ \text{Log}_e X_{27}$$
$$(.39769) \qquad (8.29643) \qquad (2.75966)$$
$$+ .42788\ X_{32} + .68017\ X_{37} - .30973\ X_{38}$$
$$(.10298) \qquad (.23948) \qquad (.11701)$$

$R^2 = .572$

Standard error of Y · X = 1.61251

F test:

$X_2 = 3.063^*$
$X_4 = 8.644^*$
$X_9 = 1.638''$
$X_{13} = 3.312^*$
$X_{19} = 2.373'$
$X_{21} = 3.881^*$
$X_{22} = 3.076^*$
$X_{27} = 16.241^*$
$X_{32} = 17.306^*$
$X_{37} = 8.066^*$
$X_{38} = 7.022^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_2	X_4	X_9	X_{13}	X_{19}	X_{21}	X_{22}	X_{27}	X_{32}	X_{37}	X_{38}	Y_3
X_2	1.000	−.134	.480*	−.271'	.249'	.384*	−.159	−.322'	.296'	−.232'	.099	.116
X_4		1.000	−.148	.183	−.001	−.252'	.179	−.212"	.220"	.149	−.058	.114
X_9			1.000	−.647*	.245'	.355*	−.139	−.166	.008	−.041	.038	.049
X_{13}				1.000	−.187	−.065	.186	−.021	−.098	.014	−.054	−.130
X_{19}					1.000	.278'	−.530*	.008	.120	.033	−.107	.191
X_{21}						1.000	−.420	−.074	−.083	−.022	−.136	.122
X_{22}							1.000	−.294'	−.046	.058	.137	−.019
X_{27}								1.000	.121	.110	.044	.283'
X_{32}									1.000	.108	.184	.467*
X_{37}										1.000	−.078	.385*
X_{38}											1.000	−.158
Y_3												1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A4, Model III with Y_2

$$Y_2 = -15.71843 + 20.73188\ X_3^{-1} + 2.04879\ X_5^{-1}$$
$$(11.27159) \qquad (0.61930)$$
$$+ 0.03017\ X_{19} - 0.02849\ X_{22} + 1.73644\ \text{Log}_e\ X_{26}$$
$$(0.01454) \qquad (0.01874) \qquad (1.24177)$$
$$+ 2.56404\ \text{Log}_e\ X_{27} + 0.11048\ X_{32} + 0.32558\ \text{Log}_e\ X_{34}$$
$$(1.46140) \qquad (0.06084) \qquad (0.15911)$$
$$+ 0.24949\ \text{Log}_e\ X_{36} + 0.05307\ X_{37} - 0.34968\ \text{Log}_e\ X_{38}$$
$$(0.14819) \qquad (0.10436) \qquad (0.18421)$$

$R^2 = .558$

Standard error of $Y \cdot X = 0.86673$

F test

$X_3 = 3.382^*$
$X_5 = 10.956^*$
$X_{19} = 4.285^*$
$X_{22} = 2.310'$
$X_{26} = 1.960'$
$X_{27} = 3.062^*$
$X_{32} = 3.312^*$
$X_{34} = 4.202^*$
$X_{36} = 2.820^*$
$X_{37} = 13.690^*$
$X_{38} = 3.610^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_3	X_5	X_{19}	X_{22}	X_{26}	X_{27}	X_{32}	X_{34}	X_{36}	X_{37}	X_{38}	Y_2
X_3	1.000	-.069	-.015	.108	-.129	-.080	.426*	.093	-.047	-.047	.087	.166
X_5		1.000	-.057	.039	.048	-.027	.218"	-.018	-.100	-.130	.270'	.206"
X_{19}			1.000	.699*	.057	.008	.120	-.303*	.167	.033	-.091	.149
X_{22}				1.000	.162	.262*	.177	-.132	.052	-.261'	-.035	-.001
X_{26}					1.000	.432*	.146	.046	.071	.123	-.099	.304*
X_{27}						1.000	.121	.079	-.060	.110	.017	.233'
X_{32}							1.000	.128	.051	.108	.192	.424*
X_{34}					....			1.000	.077	-.042	-.102	.207"
X_{36}									1.000	.189	-.047	.112
X_{37}										1.000	-.101	.440*
X_{38}											1.000	-.133
Y_2												1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A5 Model III with the significant variables with Y_2 regressed with Y_1 as the dependent variable

$$Y_1 = -1015.68800 + 123.6410\ X_5^{-1}$$
$$(85.46426)$$
$$+ 2.89903\ X_{19} + 280.76552\ \text{Log}_e\ X_{27}$$
$$(1.31923) \qquad (175.33051)$$
$$+ 25.08692\ X_{32} + 2.94337\ X_{37} - 44.84017\ \text{Log}_e\ X_{38}$$
$$(7.41116) \qquad (1.75238) \qquad (35.79816)$$

$R^2 = .339$

Standard error of $Y \cdot X = 124.71244$

F test

$X_5 = 2.102"$
$X_{19} = 4.840^*$
$X_{27} = 2.560'$
$X_{32} = 11.424^*$
$X_{37} = 2.822'$
$X_{38} = 3.028'$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_5	X_{19}	X_{27}	X_{32}	X_{37}	X_{38}	Y_1
X_5	1.000	-.057	.048	-.627	.218"	-.130	.145
X_{19}		1.000	.057	.008	.120	.033	.284'
X_{27}			1.000	.432*	.146	-.261'	.180
X_{32}				1.000	.121	.110	.221"
X_{37}					1.000	.108	.428*
X_{38}						1.000	.237'
Y_1							1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A6 Model III with the significant variables with Y_2 regressed with Y_3 as the dependent variable

$$Y_3 = -31.07792 + \underset{(19.59069)}{56.17600}\ X_3^{-1} + \underset{(1.07638)}{3.65396}\ X_5^{-1}$$
$$+ \underset{(.02528)}{.06255}\ X_{19} - \underset{(.03266)}{.06194}\ X_{22} + \underset{(2.15827)}{4.61131}\ \text{Log}_e X_{26}$$
$$+ \underset{(2.54001)}{6.29875}\ \text{Log}_e X_{27} + \underset{(.10575)}{.22856}\ X_{32} + \underset{(.27655)}{.43647}\ \text{Log}_e X_{34}$$
$$+ \underset{(.25756)}{.67995}\ \text{Log}_e X_{36} + \underset{(.02496)}{.08201}\ X_{37} - \underset{(.32017)}{.80574}\ \text{Log}_e X_{38}$$

$R = .626$

Standard of error of $Y \cdot X = 1.50643$

F test

$X_3 = 8.237^*$
$X_5 = 11.492^*$
$X_{19} = 6.101^*$
$X_{22} = 3.610^*$
$X_{26} = 4.580^*$
$X_{27} = 6.150^*$
$X_{32} = 4.666^*$
$X_{34} = 2.496'$
$X_{36} = 6.970^*$
$X_{37} = 10.758^*$
$X_{38} = 6.350^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple correlation matrix, significant variables with Y_2 regressed with Y_3 as the dependent variable

	X_3	X_5	X_{19}	X_{22}	X_{26}	X_{27}	X_{32}	X_{34}	X_{36}	X_{37}	X_{38}	Y_3
X_3	1.000	−.069	−.015	.108	−.129	−.080	.426*	.093	−.047	−.047	.082	.232'
X_5		1.000	−.057	.039	.048	−.027	.218"	−.018	−.100	−.130	.270'	.177
X_{19}			1.000	.668*	.057	.008	.120	−.303*	.167	.033	−.091	.191
X_{22}				1.000	.162	.262'	.176	−.132	.052	−.261	−.035	.050
X_{26}					1.000	.432*	.146	.046	.071	.123	−.099	.368*
X_{27}						1.000	.121	.078	−.060	.100	.017	.283'
X_{32}							1.000	.128	.051	.108	.192	.467*
X_{34}								1.000	.077	−.042	−.102	.176
X_{36}									1.000	−.189	−.047	.195"
X_{37}										1.000	−.101	.385*
X_{38}											1.000	−.162
Y_3												1.000

Where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A7 Model III with Y_3

$$Y_3 = -10.56070 + 72.27569\ X_3^{-1} + 2.00954\ \text{Log}_e X_4$$
$$(18.92132) \qquad (.57862)$$
$$+ 1.88638\ X_5^{-1} - 3.04619\ X_{10}^{-1} - .06879\ X_{11}$$
$$(1.01628) \qquad (1.09831) \qquad (.02375)$$
$$- .01380\ X_{13} - 159.00469\ X_{24}^{-1} - 54.81921\ X_{26}^{-1}$$
$$(.02036) \qquad (46.36900) \qquad (24.64940)$$
$$+ 7.08914\ \text{Log}_e X_{27} + .26984\ X_{29} + .19370\ X_{32}$$
$$(2.29678) \qquad (.09618) \qquad (.09877)$$
$$+ .63036\ \text{Log}_e X_{36} - 183.08747\ X_{37}^{-1} - .27084\ X_{38}$$
$$(.23317) \qquad (146.14626) \qquad (.10061)$$

$R^2 = .713$

Standard error of $Y \cdot X = 1.35509$

F test

$X_3 = 14.592^*$
$X_4 = 12.041^*$
$X_5 = 3.460^*$
$X_{10} = 7.673^*$
$X_{11} = 8.410^*$
$X_{13} = 2.434^*$
$X_{24} = 11.765^*$
$X_{26} = 4.928^*$
$X_{27} = 9.548^*$
$X_{29} = 7.896^*$
$X_{32} = 3.842^*$
$X_{36} = 7.290^*$
$X_{37} = 1.588'$
$X_{38} = 7.247^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix, Model III with Y_3 Model III

	X_3	X_4	X_5	X_{10}	X_{11}	X_{13}	X_{24}	X_{26}	X_{27}	X_{29}	X_{32}	X_{36}	X_{37}	X_{38}	Y_3
X_3	1.000	−.315*	−.069	.005	.276'	−.233*	−.054	.122	−.080	.108	.426*	−.047	.032	.079	.232'
X_4		1.000	.133	−.021	−.186	.178	.180	−.024	−.212"	−.174	−.220"	.118	−.155	.058	.115
X_5			1.000	−.174	.038	−.018	−.070	−.050	−.027	−.003	.218"	−.100	.131	.256'	.177
X_{10}				1.000	−.156	.078	−.171	−.060	.026	.179	−.096	−.114	−.121	−.101	−.102
X_{11}					1.000	−.231"	−.487*	−.023	.039	−.045	.232'	.130	.252*	.084	−.009
X_{13}						1.000	.127	−.097	−.054	−.018	−.115	−.019	−.006	−.089	−.148
X_{24}							1.000	−.004	.118	−.083	−.232'	.036	.202	.081	−.227"
X_{26}								1.000	−.441*	.237'	−.149	−.070	.178	.066	−.370*
X_{27}									1.000	.185	.121	−.060	−.130	.044	.283*
X_{29}										1.000	.316*	.039	−.316*	.030	.415*
X_{32}											1.000	.050	−.118	.184	.467*
X_{36}												1.000	.198"	−.059	.195"
X_{37}													1.000	.060	−.378"
X_{38}														1.000	−.158
Y_3															1.000

Where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A8 Model III with the significant variables with Y_3 regressed with Y_1 as the dependent variable

$$Y_1 = -713.06437 - 8270.88920\ X_{24}^{-1}$$
$$(3055.01790)$$
$$+ 373.41221\ \text{Log}_e X_{27} + 25.05395\ X_{32}$$
$$(176.12613) \qquad (7.38440)$$
$$- 13.06957\ X_{38}$$
$$(8.79903)$$

$R^2 = .321$

Standard error of $Y \cdot X = 124.57018$

F test:

$X_{24} = 7.34^*$
$X_{27} = 4.49^*$
$X_{32} = 11.49^*$
$X_{38} = 2.19^*$

* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_{24}	X_{27}	X_{32}	X_{38}	Y_1
X_{24}	1.000	.118	−.232'	.081	−.357*
X_{27}		1.000	.121	.044	.221"
X_{32}			1.000	.184	.428*
X_{38}				1.000	−.100
Y_1					1.000

where;
* = 1% level of significance
' = 5% level of significance
" = 10% leve lof significance

Equation A9 Model III with the significant variables with Y_3 regressed with Y_2 as the dependent variable

$$Y_2 = 1.09307 + \underset{(11.93990)}{23.87173\ X_3} + \underset{(.64805)}{1.64597\ X_5^{-1}}$$
$$- \underset{(.70595)}{1.02109\ X_{10}^{-1}} - \underset{(.01544)}{.02638\ X_{11}} - \underset{(29.17626)}{57.49765\ X_{24}^{-1}}$$
$$+ \underset{(15.94515)}{25.10659\ X_{26}^{-1}} + \underset{(1.42207)}{2.26645\ \text{Log}_e\ X_{27}}$$
$$+ \underset{(.06315)}{.10819\ X_{32}} + \underset{(.14970)}{.34271\ \text{Log}_e} - \underset{(86.24907)}{284.05867\ X_{37}^{-1}}$$
$$- \underset{(.06616)}{.12275\ X_{38}}$$

$R^2 = .52927$

Standard error of $Y \cdot X = .89404$

F test:

$X_3 = 4.000^*$
$X_5 = 6.452^*$
$X_{10} = 2.102'$
$X_{11} = 2.924^*$
$X_{24} = 3.881^*$
$X_{26} = 2.465'$
$X_{27} = 2.496'$
$X_{32} = 2,924^*$
$X_{36} = 5.244^*$
$X_{37} = 10.824^*$
$X_{38} = 3.460^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple correlation matrix, Model III, significant variables with Y_3 regressed with Y_2 as the dependent variable

	X_3	X_5	X_{10}	X_{11}	X_{24}	X_{26}	X_{27}	X_{32}	X_{36}	X_{37}	X_{38}	Y_2
X_3	1.000	−.069	.005	.276'	−.054	.122	−.080	.426*	−.047	.033	.079	.166
X_5		1.000	−.174	.038	−.070	−.050	−.027	.218"	−.100	.131	.256'	.206"
X_{10}			1.000	−.156	−.171	−.060	.026	−.096	−.114	−.121	−.100	−.079
X_{11}				1.000	−.487*	−.023	−.038	.232'	.130	.252'	.084	−.036
X_{24}					1.000	.004	.118	−.149	.036	.202"	.081	−.247'
X_{26}						1.000	−.441*	.121	−.070	.118	.066	−.302*
X_{27}							1.000	1.000	−.060	−.130	.044	.233'
X_{32}								1.000	.051	−.118	.184	.424*
X_{36}									1.000	.198"	−.057	.112
X_{37}										1.000	.060	−.524*
X_{38}											1.000	−.120
Y_2												1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A10, Model III with Y_2 PCA respondents only

$$Y_2 = -14.35944 + \underset{(1.91913)}{2.81861\ \text{Log}_e} + \underset{(12.75221)}{20.79382\ X_3^{-1}}$$
$$- \underset{(11.25267)}{35.37742\ X_{20}^{-1}} - \underset{(.01557)}{.05735\ X_{23}} + \underset{(.15094)}{.30319\ X_{26}}$$
$$- \underset{(.14874)}{.33650\ X_{34}^{-1}} + \underset{(.17411)}{.24474\ X_{35}} + \underset{(.38395)}{.87501\ X_{38}^{-1}}$$

$R^2 = .623$

Standard error of $Y \cdot X = .68985$

F test

$X_2 = 2.161'$
$X_3 = 2.657'$
$X_{20} = 9.860^*$
$X_{23} = 13.542^*$
$X_{26} = 4.040^*$
$X_{34} = 5.108^*$
$X_{35} = 1.960"$
$X_{38} = 5.198^*$

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_2	X_3	X_{20}	X_{23}	X_{26}	X_{34}	X_{35}	X_{38}	Y_2
X_2	1.000	.380*	.608*	–.073	–.255'	–.472*	–.194	–.115	.123
X_3		1.000	.182	.296'	–.206"	–.186	–.050	–.088	.074
X_{20}			1.000	–.140	–.091	–.205"	.066	–.194	–.236'
X_{23}				1.000	.088	–.042	–.266"	.024	–.409*
X_{26}					1.000	.237	.191	–.150	.069
X_{34}						1.000	.097	.233"	–.247'
X_{35}							1.000	–.019	.230"
X_{38}								1.000	.224"
Y_2									1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix IV B. Gross Variables Included in Model III

X_1 = Gross Bio-Data Score
X_2 = Gross Significant Motivation Scale Score
X_3 = Gross Significant Strong Score
X_4 = Gross Abilities
X_5 = Gross Scale Score
X_6 = Sum of Strong Scores
Y_1 = Percentage change in net worth adjusted for inflation and inheritance
Y_2 = Z of percentage change in net worth
Y_3 = Percentage change in net worth adjusted for inflation, inheritance, weighted by years of experience and scaled.

Equation B1, Model III with Y_1

$$Y_1 = 156.17441 + \underset{(20.49408)}{81.36335 \log_e X_1} - \underset{(10.811.0)}{15.392.0 X_3^{-1}} + \underset{(.17468)}{.27650 X_6}$$

$R^2 = .268$
Standard error of Y · X = 128.38023

F test:
$X_1 = 15.761$*
$X_3 = 2.016$"
$X_6 = 2.496$'
where:
* — 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_3	X_6	Y_1
X_1	1.000	.235'	.075	.475"
Y_3		1.000	.144	.230"
X_6			1.000	.177
Y_1				1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation B2, Model III with Y_2

$$Y_2 = 1.42091 + \underset{(.14539)}{.81010 \log_e X_1} - \underset{(76.15558)}{237.67823 X_3^{-1}} + \underset{(3.42394)}{5.389791 X_5^{-1}}$$

$R^2 = .444$
Standard error of Y · X = .91274

F test:
$X_1 = 31.025$*
$X_3 = 9.734$*
$X_5 = 2.465$"
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_3	X_5	Y_2
X_1	1.000	–.235'	–.071	.579*
X_3		1.000	–.077	.425*
X_5			1.000	.129
				1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation B3, Model III with Y_3

$$Y_3 = 5.89307 + \underset{(.27028)}{1.67955 \log_e X_1} - \underset{(141.5615)}{374.77759 X_3^{-1}}$$

$R^2 = .450$
Standard error of Y · X = 1.70478

Simple Correlation Matrix

	X_1	X_3	Y_3
X_1	1.000	–.235'	.628*
X_3		1.000	.378*
Y_3			1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

F test:
$X_1 = 38.564$*
$X_3 = 7.022$*
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Appendix V. Prediction Equations—Model IV with Dependent Variables Y_1, Y_2 and Y_3

Appendix V A. Gross Variable Included in Model IV

X_1 Men's Gross Bio-Data Score
X_2 Men's Gross Significant Motivations Score
X_3 Men's Gross Abilities Score
X_4 Women's Gross Bio-Data Score
X_5 Women's Gross Strong Score
X_6 Women's Gross Scale Score

Equation A1, Model IV with Y_1

$$Y_1 = -506.21197 + \underset{(19.10544)}{86.84663 \text{ Log}_e X_3} + \underset{(.98173)}{2.71587 X_4} + \underset{(.16674)}{.28603 X_6}$$

$R^2 = .322$

Standard error of Y · X = 123.51434

F test:
$X_3 = 7.673^*$
$X_4 = 30.702^*$
$X_6 = 2.958'$
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_3	X_4	X_6	Y_1
X_3	1.000	.026	-.108	.271'
X_4		1.000	.075	.475*
X_6			1.000	177
Y_1				1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A2, Model IV with Y_2

$$Y_2 = .44335 + \underset{(.16025)}{.38933 \text{ Log}_e X_1} + \underset{(7.41461)}{18.50335 X_3^{-1}} + \underset{(.18571)}{.50693 \text{ Log}_e X_4} - \underset{(73.17632)}{217.12715 X_5^{-1}} + \underset{(3.24635)}{5.79534 X_6}$$

$R^2 = .518$

Standard error of Y · X = .86237

F test:
$X_1 = 5.905^*$
$X_3 = 6.250^*$
$X_4 = 7.453^*$
$X_5 = 8.821^*$
$X_6 = 3.204'$
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_3	X_4	X_5	X_6	Y_2
X_1	1.000	.156	.688*	-.291'	-.013	.562*
X_3		1.000	-.012	.074	-.087	.135
X_4			1.000	-.235'	-.071	.579*
X_5				1.000	-.077	-.425*
X_6					1.000	.129
Y_2						1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Equation A3, Model IV with Y_3

$$Y_3 = 9.62696 + \underset{(.28003)}{1.23093 \text{ Log}_e X_1} + \underset{(.49695)}{1.20135 \text{ Log}_e X_3} + \underset{(.04747)}{.09701 X_4} - \underset{(133.07029)}{330.34506 X_5^{-1}}$$

$R^2 = .544$

Standard error of Y · X = 1.57417

F test:
$X_1 = 19.360^*$
$X_3 = 5.856^*$
$X_4 = 4.162^*$
$X_5 = 6.150^*$
where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Simple Correlation Matrix

	X_1	X_3	X_4	X_5	Y_3
X_1	1.000	.205"	.650*	-.291'	.661*
X_3		1.000	.109	-.118	.053
X_4			1.000	-.192	.563*
X_5				1.000	-.378*
Y_3					1.000

where:
* = 1% level of significance
' = 5% level of significance
" = 10% level of significance

Summary

Emphasis in this study is on farm firm growth in terms of financial position change and its relationship to the personality of the firm manager. This study may be viewed from two levels: 1) specification and refinement of a model of a farm operator-entrepreneur and 2) development of farm success prediction instruments. The farm operator-entrepreneur is viewed as an individual possessing abilities, motivation and drives, and a biography which determine managerial processes and produce a managerial outcome. Conceptually, the farm couple is considered as a management entity.

Developing evidence indicates that certain farmers are experiencing new difficulties in using credit for farm firm survival and to create growth and still meet credit repayment schedules. During the 5-year period, 1960 through 1964, less than one-half of a group of Farmers Home Administration (FHA) borrowers and about 60% of a group of Production Credit Association (PCA) borrowers whose records were available for analysis, were able to show an increase in net worth and to successfully meet credit repayment schedules.[1]

Sixty-three Brookings County, South Dakota, FHA borrowers and 39 Sioux Falls, South Dakota, PCA borrowers and their wives were selected for this study. Financial and physical production data for a 5-year period, 1960 through 1964, for these farmers were obtained from the credit agencies' records. Personality characteristics were identified through personal interviews and various psychological measurements.[2]

One-half of the FHA borrowers who were selected for intensive study were successful in experiencing a financial position increase and one-half showed a decrease during the 5-year period considered. All of the PCA borrowers were purposely selected on the basis of the increase in financial position which they showed during the period. For purposes of developing some of the variables used in the regression analysis, the farmers and their wives showing a financial position increase were classified as successful. If their net worth decreased during the period they were considered unsuccessful.

On the average the borrowers included in this study had been with the FHA since 1956. The successful borrowers had 12.2 years of farming experience in 1960, the unsuccessful 19.8, and the PCA borrowers had 10.9 years of farming experience in 1960.

Average ages in 1960 were 35.5 for the successful group, 40.2 for the unsuccessful group, and 37.8 for the PCA group. The age difference in the FHA borrowers may be explained by the observation that farmers who are successful tend to transfer from FHA credit to commercial credit sources. Farmers who continue to farm and experience difficulty tend to continue as FHA borrowers.

The successful borrowers owned an average of $25,966 of assets, the unsuccessful $35,629, and the PCA group $33,846 of assets in 1960. On the average, the successful FHA and the PCA borrowers produced higher crop yields and showed greater efficiency in livestock production than did the unsuccessful borrowers from 1960 through 1964.

Significant differences were found on selected measures of motivations and drives and in the biography of the farmers when the two groups of FHA borrowers were compared and when the unsuccessful FHA borrowers were compared with PCA borrowers. Specifically, significant differences were found for men on 10 out of 12 motivation and drive variables which had been previously validated and on 70 out of over 500 biographic items.

Four multiple regression models that included ability, motivations and drives, and biographic variables were developed and tested for: I) men only, II) women only, III) the total of men's and women's scores on comparable variables, and IV) men's and women's individual variables. Variables were considered as individual and as gross variables. Gross variables were obtained by summing the values for all variables considered in each of the personality characteristic areas—ability, motivations and drives, and biography.

Three mathematically acceptable variations of the dependent variable, change in net worth, were used with each of the models: 1) Y_1—a straight percentage change in net worth from 1960 through 1964, 2) Y_2—a comparison of percentage change in net worth during the period with PCA borrowers with the same number of years farming experience, and 3) Y_3—the 1960 through 1964 percentage change in net worth weighted by the number of years farming

[1]The personality scales which were selected and developed are not reproduced in this publication. Readers who are interested in the questions and the methodology used in developing the personality scales are referred to South Dakota State University Economics Department pamphlet no. 128. "Farm Managerial Characteristics Scales," a supplement to Experiment Station Technical Bulletin 30.

[2]Throughout this publication reference is made to comparisons between Farmers Home Administration and Production Credit Association borrowers. However this study is not concerned with appraising the two farm lending institutions but rather reference is made to successful and unsuccessful FHA and PCA borrowers for purposes of developing personality scales and prediction equations. The PCA's in South Dakota make short and intermediate term farm operating loans, while the FHA makes several types of loans including farm operating, ownership, emergency, soil and water conservation, along with several additional nonfarm loans.

Summary of Estimated Equations, Gross and Individual Variables, Four Management Models and Three Forms of a Criterion Variable

Model	Criterion Variable											
	Y_1 (% Change in Net Worth)				Y_2 (% Transformation Comparison with PCA)				Y_3 (% Change in Net Worth Weighted for Years of Farming Experience)			
	R^2	No. Significant Variables			R^2	No. Significant Variables			R^2	No. Significant Variables		
		Abilities	Motivations and Drives	Biography		Abilities	Motivations and Drives	Biography		Abilities	Motivations and Drives	Biography
						Gross Variables						
I. (men only)	.238	1	1	1	.367	1		1	.474	1		1
II. (men's and women's variable totaled)	.239		1	1	.388		1	1	.482		1	1
III. (women only)	.268		1	1	.444		2	1	.450		1	1
IV. (men's and women's variables)	.322	1	2		.518	1	2	2	.544	1	1	1
						Individual Variables						
I. (men only)	.396		6	2	.599	2	10	4	.666	1	11	2
II. (men's and women's variables totaled)	.448	3	3	3	.555	3	5	2	.617	1	6	1
III. (women only)	.632	1	11	3	.558	1	7	3	.713	1	11	1
IV. (men's and women's variables)	.729	1	13	3	.667	2	6	3	.731	1	10	2

experience and scaled from 1 through 9. An equation was developed for each of the three variables for each of the four models and for the gross independent variables and for the individual independent variables. Results for each model with each form of the dependent variables are summarized in the table.

Model IV, men's and women's variables each considered in the equations, produced the highest coefficient of determination for both the gross variables equation and the individual variables equation with each form of the dependent variable. The coefficient of determination was higher with the individual variables as contrasted with the gross variables.

Y_1 and Y_2 with the gross variables, model III (women only) showed a slightly stronger prediction equation than did either model I or model II. Y_1 and Y_3 with individual variables, model III was stronger than either model I or model II.

From the standpoint of selecting a prediction equation for farm success based upon net worth change of the borrowers analyzed, use of individual antecedent variables under ability and motivations and drives appears desirable. The strongest coefficient of determination was obtained with Y_3, percentage change in net worth weighted by years of farming experience. Thus it would appear desirable to select it as the criterion variable and the husband's and wife's individual variables, model IV, as the independent variables. Thirteen significant variables entered the equation with Y_3, model IV.

Generalization from results of this study should be limited to farmers similar to the ones included in the study. Managers of large farm operations in terms of capital managed, output, and assets were not included. In addition, before the variables that were significant in the regression equations are used by lending agencies or individuals interested in guiding farmers, the selected variables should be validated with an additional and larger group of farmers and then should be used first on a pilot basis and evaluated periodically.[3]

[3]Additional insights on identifying reasons for success in the use of credit and characteristics of successful FHA and PCA borrowers should be forthcoming from a study under way by the Agricultural Finance Branch, FPED, ERS, USDA. Loan file records for approximately 200 farmers from ten FHA and five PCA offices in South Dakota are under analysis.