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MULTIPLE GOALS AND ATTITUDES OF FARM
DECISION MAKERS -- AN EXECUTIVE SUMMARY

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Multiple Goals and Attitudes of Farm Decision Makers

-- An Executive Summary*

One objective of economists is to be able to understand and then to predict a phenomenon. To be able to predict accurately, one must first understand the forces which interact in forming the phenomenon which is being predicted. Within the economics literature, both positive and normative research on decision making has been reported. The major thrust has been on the normative approach or in prescribing what ought to be. In contrast, psychologists and sociologists have tended to describe what is - the positive approach. This positive approach seeks to understand how or why individuals make certain decisions. Goals and attitudes of farmers, and how they relate to decision making is central to both the positive and normative approaches.

Decision Making and Goal Setting

The decision making process is typically thought of as a group of managerial functions which occur when decisions are made. One of the initial functions in this process is that of goal formulation. It is in this function that specific (unique) behavioral characteristics of the decision maker is formulated and recognized.

For many farm families, these goals may not be defined precisely but more as a target that the farm family is shooting for. Studies by Liebenstein (1976), Cyert and March (1963), and Cyert and DeGroot (1974) have shown that business firms' objectives tend to be of this nature. These studies point out that in the short run, firms tend to have target goals that can depart from maximizing profit. These target goals tend to be satisficing theories.

* This is an executive summary of a source document "Multiple Goals in Farm Decision Making: A Social Science Perspective" which was prepared by the authors.

Profit maximization may be a proper and a primary goal but other factors within the target goal prevents the firm from using the profit maximizing resource combination.

Within the economic framework decisions are thought of as being optimal. They maximize or minimize some measure or standard. Economic decisions are reached by: (1) estimating the probable effects on the ends of each alternative, (2) estimating the degree of probability of each effect, (3) estimating and comparing the value of each effect on a single scale, either money, or utility, or preference indifference, and (4) choosing the alternative which when considering its probability produces the greatest value.

Sociologic decisions attempt to impact on the social environment and personalities of the individual (Deising 1958). As outlined by Deising, social decisions tend to progress through the following steps:

- (1) defining the relatively independent problematic situation and uncovering the conflicts that exist in it as well as the factors maintaining them,
- (2) estimating the changes that are possible for each problematic factor, together with the degree of strain the change would bring,
- (3) discovering what strain reducing support is available for each change,
- (4) predicting future conflicts, strains, and stresses likely to accompany each direction of change, or likely to occur in any case, and
- (5) looking for a change at a measurable level of strain that will reduce conflict, or increase flexibility, or prepare for future stresses.

Psychology is a discipline which is founded on the conviction that it is possible to establish scientific principles of human behavior. The only means of determining whether a statement (or theory) is correct is by means of empirical evidence (Katona 1953). In the area of human decision making research, psychologists have directed much effort at testing the subjectively expected utility (SEU) model. The SEU model is an area of interface between economics and psychology, but the approaches have been somewhat different. Economists have tended to view decision making from a normative viewpoint while psychologists have tended to have a largely positive or descriptive view.

A concept quite important to understanding why selected decisions were made is that of rationality. Rationality has received much attention in behavioral modelling (Simon 1955, Simon 1979, March and Simon 1958, Katona 1953, Gore and Dyson 1964). Rationality in human behavior is a typical assumption of theories from the fields of economic, sociology, psychology and anthropology. Simon (1979) suggests that the economists view and definition of rationality tends to be quite different and more restrictive than that for the other disciplines. As a theory rationality has been proposed to better represent actual decision modelling behavior than what economic theory does. A basic argument of rational behavior theory is that rational behavior is deciphering what is in reality a complex situation into a more simplified problem solving framework.

Economists, in general, have been concerned largely with the choice made rather than the process of choice itself (Simon 1978). However, some agricultural economists and management scientists, as well as other social scientists, have been concerned with the process of decision making and how decisions are reached. The satisficing decision making approach offers rich possibilities of analysis of information gathering and the dynamics of rationality. With the satisficing approach, there is greater emphasis on the process or path by which one adjusts than on the final equilibrium position which receives the focus in the maximizing approach. "In human decision making there is no separation of means and ends or alternatives and objectives . . . analysis of what is available and what is desirable, are closely interdependent and interactive" (Zelany, p. 147).

For many problems or decisions, optimization requires modelling techniques substantially more complicated than what satisficing requires. Optimization requires more preciseness--a preciseness that may go beyond the ability of the technique used. In reality, costs involved in refining the

modelling process to obtain optimum solutions may be greater than its benefits over a satisficing solution. This is especially true when the factors being modeled are dynamic and ever changing. These changes can be both absolute and relative and may alter the optimum solution. In practice, optimization may be sacrificed for a quicker, broader, and more readily available satisficing approach.

Measuring Multiple Goals

A number of techniques have been or could be used for the empirical measurement of farmers' goals. These techniques differ in a number of important ways. First, the knowledge or calculating ability required of the farmer differs among methods. Second, the statistical assumptions underlying the analyses differ. Third, some methods produce results for the group as a whole, while other methods provide information on subgroups or individuals. Fourth, the metric properties of scales produced by these techniques differ and this can effect the use and types of analyses which can be made with them (Coombs 1964). Finally, the measurement techniques differ in degree to which they permit testing of the assumed relationships among the goals and implications in the decision making process.

Potential multiple goal measurement techniques include the following:

- 1) numerical rating scales;
- 2) paired comparison - Thurstone scaling;
- 3) magnitude estimation; including constant sum;
- 4) multidimensional scaling;
- 5) conjoint analysis; and
- 6) multiattribute utility measurement.

It is not the intent of this executive summary to elaborate on these techniques. The expanded version of this paper will devote more attention to these techniques. Patrick and Blake (1980) also discuss some goal measurement and

modelling techniques in an upcoming article.

Review of Empirical Results

Much research has been conducted on farmers' goals. However, many studies have been general in nature and were conducted prior to 1965. In their 1968 review of studies on farmers' goals and objectives, Hobbs and Warrack (1968) made a distinction between descriptive and predictive studies. The descriptive studies have been concerned primarily with determining the goals and values of farmers under various conditions. In contrast, predictive studies have employed measures of goals as independent variables in attempts to predict various performance criteria. A third type of study has attempted to measure multiple goals in ways which can be incorporated more formally into economic analysis and models. These studies have commonly attempted to explain differences in goals among farmers in terms of various socio-economic characteristics of the farmer and farm operation.

In general, the descriptive studies have asked farmers open-ended questions about the goals they have. In the predictive studies, those which use measures of goals as independent variables to attempt to predict various performance criteria, goals which are relevant must be determined. The goals which are relevant are likely to vary with the performance criterion considered.

Recent studies by Kliebenstein et. al., (1979, 1980), analyzed farmers perceptions of benefits they received from farming. These studies focused on developing measures of farmers perceptions of benefits they receive from farming and then testing if perception values could be used to classify farmers. Perceived benefit values were obtained from 29 cash grain farmers. They used a magnitude estimator technique to elicit the benefit values for a preselected list of multiple benefits. To develop the benefit values, respondents were asked to assign a value to each of ten items reflecting how

each compared in importance to the base item "provides opportunity to be my own boss". The base item was assigned 100 points. Table 1 lists the items and their mean assigned values.

Discriminant analysis was then used to see if the perceived values could be used to classify farmers. These results are shown in Table 2. If it can be concluded that perceived values are significantly different between groups of farmers, decision making models should be structured to account for those differences. In the event that perceived values are similar between farmer groups then one modelling approach would be sufficient for all groups.

The perceived values reported in Table 1 show that the independence and feeling of accomplishment was quite important. Independence or opportunity to make decisions is shown in items "be own boss", "selling through free market", and "doing something worthwhile". Income and security items received about equal weight and were perceived to be about twice as important as social and recognition items.

Two variables "can express myself" (X_6) and "sense of security" (X_4) were important discriminating variables. Grain farmers have similar values for three benefits; "being their own boss", "increasing security", and "developing friendships". Threshold security levels appeared to vary among farmers, but farmers placed similar values on increasing security above these levels. Decision making models appear to need threshold security levels built into them.

The Kliebenstein, et. al., (1979, 1980) study pointed out that farmers receive multiple benefits from farming. To be effective in a dynamic setting decision models (aids) should account for them. Some benefits were economic while others were not. Benefits can also have conflicting ends where increasing one benefit may reduce another.

TABLE 2: DISCRIMINANT ANALYSIS FOR TEN FACTOR BENEFITS RECEIVED FROM FARMING

Factors	Discriminant Variables	Number of Farmers in Group			Percent of of Group Correctly Specified			
		C ₁	C ₂	C ₃	C ₁	C ₂	C ₃	Total
Age	X ₃ ,X ₉ ,X ₅ ,X ₆	7 ^a	12	10	57.1	75.0	80.0	65.5
Average Acres Cropland	No discriminating Variables	9	10	10	0	0	0	0
% Growth in Total Assets	X ₁ ,X ₄ ,X ₂ ,X ₆ ,X ₇ ,X ₁₀ ,X ₅	9	10	10	88.9	81.8	77.8	82.8
Mean % Return to Capital and Management	X ₂ ,X ₆ ,X ₄	10	11	8	50.0	72.7	75.0	65.5
% Fixed Assets to Total Assets 1977	X ₇ ,X ₄ ,X ₁₀ ,X ₃ ,X ₉ ,X ₆	9	12	8	88.9	75.0	50.0	72.4
Total Acres Owned	X ₇ ,X ₁₀ ,X ₄ ,X ₉ ,X ₃ ,X ₂ ,X ₆ ,X ₈	9	10	10	66.7	90.0	60.0	72.4
% Total Acres Rented	X ₁₀ ,X ₄ ,X ₁ ,X ₆ ,X ₂	9	12	8	66.7	58.3	75.0	65.5
Total Acres in Operation	X ₆ ,X ₄ ,X ₉ ,X ₁	9	12	8	44.4	80.0	70.0	65.5
Crop Technology	X ₁₀ ,X ₈	19 ^b	10	--	80.0	100.0	--	86.6
Why Changed Technology	X ₃ ,X ₄	10 ^c	9	--	60.0	81.8	--	71.4

^aCategory C₁ represents those less than 40 years old; C₂ those from 40-50 years old; and C₃ those over 50 years old.

^bCategory C₁ represents those that changed technology and C₂ those that didn't change.

^cCategory C₁ represents those that changed to reduce risk and C₂ those that did so to increase income.

TABLE 2: DISCRIMINANT ANALYSIS FOR TEN FACTOR BENEFITS RECEIVED FROM FARMING

	Discriminant Variables	Number of Farmers in Group			Percent of of Group Correctly Specified			
		C ₁	C ₂	C ₃	C ₁	C ₂	C ₃	Total
	X ₃ , X ₉ , X ₅ , X ₆	7 ^a	12	10	57.1	75.0	80.0	65.5
Acres Cropland	No discriminating Variables	9	10	10	0	0	0	0
Change in Total Assets	X ₁ , X ₄ , X ₂ , X ₆ , X ₇ , X ₁₀ , X ₅	9	10	10	88.9	81.8	77.8	82.8
Return to Capital Investment	X ₂ , X ₆ , X ₄	10	11	8	50.0	72.7	75.0	65.5
Assets to Total 1977	X ₇ , X ₄ , X ₁₀ , X ₃ , X ₉ , X ₆	9	12	8	88.9	75.0	50.0	72.4
Acres Owned	X ₇ , X ₁₀ , X ₄ , X ₉ , X ₃ , X ₂ , X ₆ , X ₈	9	10	10	66.7	90.0	60.0	72.4
Acres Rented	X ₁₀ , X ₄ , X ₁ , X ₆ , X ₂	9	12	8	66.7	58.3	75.0	65.5
Acres in Operation	X ₆ , X ₄ , X ₉ , X ₁	9	12	8	44.4	80.0	70.0	65.5
Technology	X ₁₀ , X ₈	19 ^b	10	--	80.0	100.0	--	86.6
Adopted Technology	X ₃ , X ₄	10 ^c	9	--	60.0	81.8	--	71.4

Group C₁ represents those less than 40 years old; C₂ those from 40-50 years old; and C₃ those over 50 years old.

Group C₁ represents those that changed technology and C₂ those that didn't change.

Group C₁ represents those that changed to reduce risk and C₂ those that did so to increase income.

Smith and Capstick (1976) evaluated the ranking of farm management goals by age of farm operator. For data acquisition they surveyed farmers with a schedule comprised of 55 paired statements. Respondents were asked to rank goal preferences.

The ten goals in order of preference by the total sample were as follows:
(Smith and Capsticks p. 8)

<u>Goal</u>	<u>Percent of Sample preferring it</u>
Stay in business	14.4
Stabilize income	13.2
Increase efficiency & production	11.8
Provide a college education	11.3
Standard of living	9.4
Reduce borrowing	8.9
Highest profit	8.7
Increase time off	8.0
Increase net worth	7.2
Increase farm size	7.1

Smith and Capstick (1976) concluded that the assumptions of "economic man" or "profit maximization" are not valid. They suggest that farmers "tend to be risk averters rather than risk lovers". Farmers prefer certainty over uncertainty. Also, farmer decisions are based on multiple goals which are both economic and non-economic.

Whitaker (1980) collected information on the goals of a sample of 91 Central Indiana farmers using rating scales, paired comparison, magnitude estimation and conjoint measurement procedures. These were analyzed using factor analysis, Thurston Case V and Case III, multidimensional scaling and regression analysis.^{*/} Based on previous research, eight goals which were

^{*/} Although data were collected using conjoint measurement procedures, these data were not analyzed in Whitaker's thesis.

assumed to have an impact on intermediate run, investment type decisions were selected. These goals, in order of importance as derived from the Thurstone Case V procedures, were:

- 1) avoid being unable to make loan payments and/or foreclosure;
- 2) attain a desirable level of family living;
- 3) have net worth increase steadily
- 4) select investments with the highest rate of return;
- 5) have a farm business which produces a stable income;
- 6) reduce physical effort and strain in farming;
- 7) have time away from immediate responsibilities for leisure or other activities; and
- 8) recognized as a top farmer.

Although the rating scale statements did not include all of the eight goals, an ordinal ranking of mean rating value was similar to the ranking derived from paired comparisons. A major difference was that a "stable income" was ranked in second place on the rating scale as compared with fifth in paired comparison. The family living standard goals were ranked low with the rating scale, but a desirable level of family living was ranked second with the Thurstone procedures. Factor analyses was performed on the rating scale questions, but the results were not satisfactory. Ideally the scales analyzed should be rephasings of a basic idea to determine measurement validity. However, in this study, the rating scales were not paraphrasings and easily identifiable loading were not obtained.

It was found that the farmers interviewed committed a very limited number of inconsistencies (triads) in the paired comparisons, but the scale values developed with the Thurstone Case V procedures were unstable. Smith and Capstick (1976) has similar difficulties. The lack of fit can be caused by non-normal distributions, dependence among goals or a lack of unidimension-

ality. The assumption of equal variances of the goals was relaxed and the Thurstone Case III procedures were used. Again, the group solution obtained was significantly different from the observed matrix. The Bradley-Terry-Luce procedure was used to transform the data, but there was no concordance between original and reproduced matrices. This suggests that subgroup differences or multidimensionality of goals may exist.

Multidimensional scaling on subgroups were performed. The sample was divided into approximately equal sized subgroups on the basis of average gross income and plans to buy land. The results indicated that the goal rankings did differ statistically among the subgroups. Furthermore, the results suggest that three dimensions exist which were interpreted as risk-growth, monetary-nonmonetary and a degree of feasibility dimensions. These results suggest that a single dimensional approach to analyzing decision making may be incorrect.

The magnitude estimateion results were used for an analysis of factors influencing the weights given specific goals by individual farmers. Age of the operator was significant in 3 of the 7 equations and larger than its standard error in two others. Percent of land owned was significant in 6 of the 7 equations and the debt-asset ratio was significant in four. Overall, 2 of the 7 equations had F values which were not significantly different from zero, the R^2 s on the other equations ranged from .259 to .393. Analysis was also performed on the factors influencing the stable income/desirable income, foreclosure/desirable income, net worth/desirable income, leisure/desirable income, net worth/leisure and foreclosure/leisure trade-offs. Age, debt-asset ratio and goal target levels had influences on these trade-offs. Somewhat surprisingly, measures of wealth, income, and education had little or no influence on weights given different goals.

Most empirical studies have utilized various measurement procedures.

Clearly farmers do consider multiple goals in decision making. The goals considered appear to differ with type of decision considered. Purely economic factors weigh more heavily in short run decisions. It is hypothesized that this is due to the limited effect that short run decisions may have on long run objectives. For example, a decision on how much corn or soybeans to grow one year may have little effect on a long run objective of being your own boss. A second factor is that some long run goals may depend on short and intermediate term economic success. For example, a higher income and reinvestment in the farm business can facilitate providing for children's education in the future. However, as intermediate and long run decisions are made, the non-economic factors or those less related to profit maximization, become more important.

Problem and Future Research

For many decisions a combination of economic, sociologic, and psychologic considerations are needed in the decision framework. A crucial decision may be in determining whether the primary objective should be economic, sociological, or psychological in nature. Few studies have attempted to bridge the gap between the three social sciences of sociology, psychology, and economics--even fewer have been successful.

One method of handling these in a decision framework is to formulate the primary objective function around one of the three areas with subobjective functions formulated for the other areas. The subobjectives serve to boarder or bound the primary objective function. For example, the primary framework may be economic with margins for economic inefficiency being allowed. These inefficiencies can allow for higher level of social and psychological satisfaction.

Another approach of handling the three areas within a modelling framework is sensitivity analysis. This approach has been used by a number of economists along with the typical economic framework of maximization and

minimization. Within the sensitivity analysis framework minor changes in optimum results (maximum or minimum) are evaluated with respect to their effects on the objective function and social and psychological concerns. Each plan that is evaluated under this type of analysis would be looked at both with respect to its impact upon the original objective function which is primarily economic in nature and its impact on some social and/or psychological measure. There may be changes that have very limited effect on the overall economic objective while simultaneously have substantial positive effects on the social and psychological areas.

Factors influencing the weight given to the various goals tends to be highly individualized. In multiple goal research it is difficult to obtain consistent decision information that explains variation in goals. In all of the studies reviewed, a considerable amount of the variation in the goals cannot be explained by the independent variables considered. This may be partially due to errors in measurement. Farmers' ratings do appear sensitive to how the goal statements are worded (Whitaker 1980). Additional research is necessary to determine what factors influence the goal weights. Individual farmers may have different basic goal structures. Structure differences may be related to underlying value orientations. If the basic value orientation of a farmer is identified then perhaps a considerably greater proportion of the overall goal variability can be explained. Future studies need items that are independent and relevant that focus on these value orientations.

Items that are independent will lessen measurement problems. It is important to realize that these problems will not only be reduced and not eliminated. To keep inconsistencies in responses to a minimum, short, clear statements should be used. Also, similarity of respondent choices should be kept to a minimum.

The potential of the measurement techniques and level of the solution varies. Some techniques produce a group solution while others involve the

subgroup or individual level. The metric properties of the measurement techniques also differ. Research on farmers' goals must consider:

- 1) the type of decision being considered;
- 2) how the decision will be modeled - how do the goals enter as criteria;
- 3) what metric properties and level of aggregation are required;
- 4) what measurement techniques will provide the information in the form needed; and
- 5) will the potential benefits outweigh the added costs of analysis.

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