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THE MANAGEMENT INPUT IN FARMING*

Jai Krishna and S. B. L. Gupta

IMPORTANCE OF MANAGEMENT INPUT

Of late considerable attention has been given to the management input in farming in U.S.A. and in other progressive countries. Stressing the importance of the human factor in farming, Westermarck in a recent article in this Journal says: "Economic progress and profitableness of course depend on many things, as for example the climate, the quality of the soil, the price level, etc. However important the collaboration between the natural and economic resources of agriculture is to successful activity, they only constitute the instrument of production. It is the personal contribution of the farmer-entrepreneur which is eventually decisive. How often has it not been seen that where one entrepreneur stumped by his task, another has come off with flying colours."[1] Important though the management input is, the attempts of agricultural economists to develop suitable measures to quantitatively measure the management input and to evaluate its (management's) contribution in returns in farming have so far not been very successful. Research efforts to identify the factors associated with differences in the management skills of the farmers have also met with only partial success. However, the profession can ill-afford to neglect the management input. The consequences of omitting this input in production function studies have been pointed out by Griliches.[2]

The study of the factors affecting the managerial ability of the farmer and its contribution in farm output need hardly be emphasized in Indian agriculture. Our aim is to achieve maximum production with limited agricultural resources. The government, for its part, is primarily engaged in providing technical know-how to the farmers, through extension agencies, which too cannot reach all the farmers. If we can devise some criteria to isolate the good managers and concentrate the educational efforts on farmers with superior management skills, the returns from each rupee spent by the government on extension work can be maximized. This could be done either by measuring the management potential of a farmer or by studying the end result of this management potential, as reflected in farm returns, or by devising an index of some kind based on social and personal characteristics of the farmer. It is argued by many that management is not important on small farms, as is the case in under-developed countries. However, stressing the importance of management on small farms Pasto states: "It hardly seems necessary to point out, however, that to achieve optimum allocation of resources, management decisions on small farms are just as significant as on large farms. The major difference is that decisions on small farms do not involve such large 'chunk's of resources as on the large ones."[3]

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* This is a joint paper irrespective of the order of the names of the authors.

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1. N. Westermarck, "The Human Factor and Economic Progress," *The Indian Journal of Agricultural Economics*, Vol. XVI, No. 2, April-June, 1961, p. 13.
2. Zvi Griliches, "Specification Bias in Estimates of Production Functions," *Journal of Farm Economics*, Vol. XXXIX, No. 1, February, 1957, pp. 8-20.
3. Jerome K. Pasto, "The Role of Farm Management in Underdeveloped Countries," *Journal of Farm Economics*, Vol. XLIII, No. 3, August, 1961, pp. 608-609.

The purpose of this paper is to review some past researches relating to the management factor in farming, primarily in the U.S.A., so as to provide some guidance for research workers in India.

Researches relating to the management factor can broadly be classified into three categories : (1) Attempts to measure differences in the quality of management among different farmers and the factors associated with these differences ; (2) Attempts to quantitatively measure the management input or the contribution of the management in farm output ; (3) Studies pertaining to the decision making processes of farm managers.

FACTORS AFFECTING THE QUALITY OF MANAGEMENT

The role of the human factor or the quality of management in farming has been recognized over centuries. However, attempts to empirically study this aspect of farming were unknown until the 1930's, when Wilcox and his associates conducted pioneering studies in this field. Wilcox, Boss and Pond[4] used a variety of methods including a self-ranking on a given list of factors and personal interviews, conventional ratings and trade test to study the relation of management, as reflected by various environmental and personal factors, to farm earnings. The data for the study were furnished by 72 farmers, who were co-operators in a farm management service project of the University of Minnesota. The main results of the study are given in three parts. The first part lists the family and environmental influences that do not seem to affect farm earnings. These include number of farm workers, previous occupational experience, nationality influences, community affiliations, variations in school training, children's help, grown up sons at home and farming the same farm which was farmed by farmer's father. The second part of the study describes the family and environmental influences that seem to affect farm earnings. Wife's co-operation, inheritance of property (negative correlation) and non-economic preferences in size of farm and grade of land are among the factors described in this section. The authors then discuss the personal factors that seem to affect farm earnings, including operator's age (the highest income was obtained by farmers between 35 and 39 years of age), inherent differences (as measured by children's progress through school),[5] agricultural knowledge (as revealed by trade test), mental alertness (rated by fieldman),[6] ambition (rated by fieldman) and interest (like or dislike for a particular enterprise).

The same year (1932) Wilcox and Lloyd[7] conducted a similar study in Indiana. The authors arrived at more or less the same conclusion. The following factors

4. W. W. Wilcox, Andrew Boss and G. A. Pond: Relation of Variations in the Human Factors to Financial Returns in Farming, Agricultural Experiment Station Bulletin No. 288, University of Minnesota St. Paul, U.S.A., June, 1932.

5. To analyse the inherited variation in capacity psychological investigations were conducted with students. Index of the rate of children's progress through school was considered as a suitable measure for the purpose.

6. A fieldman is an agricultural graduate employed by the local farmer's farm management association on the recommendation of the Department of Agricultural Economics. He helps the farmers in the proper maintenance of farm records.

7. W. W. Wilcox and O. G. Lloyd: The Human Factor in the Management of Indiana Farms, Purdue University, Agricultural Experiment Station Bulletin No. 369, Lafayette, Indiana, U.S.A., August, 1932.

were found most closely related to variations in labour income : (*a*) wife's co-operation ; (*b*) ambition ; (*c*) interest ; and (*d*) agricultural knowledge.

The literature does not reveal any study on management (human factor) from 1932 until Reiss[8] obtained written essay descriptions of "good" and "poor" farmers from 723 neighbouring farmers, farm advisers, soil conservationists, farm managers and others. Two hundred and fifty-seven descriptive words, phrases or statements were listed as being characteristic of "good" or poor farmers. Out of 184 farmers thus rated on each of 257 observable items, 70 were considered better than average, 61 average and 53 below average in managements. The results of this subjective study indicate that larger farms, more livestock, greater progress in acquiring ownership of land and cultivating better land were associated with better farm operators. The age of the subjects and the years they spent in school were not significantly related to the rank of the operator. The better farmers were also described as those taking pride in achievement, following successful farm practices, having ambition to succeed, planning the farm work and completing the necessary tasks on time. These men had developed business ability and exercised sound judgment.

In the next section of this study the author describes the results obtained with the use of objective criteria. Two hundred and thirty-six account keeping farmers[9] from 14 western Illinois counties were the subject of this study. Ratings were secured from neighbouring farmers. The averages of returns to capital and management ; operator's labour and management earnings ; and net management returns, were used to evaluate neighbour's rating for each farmer. The results indicate that strong motivation toward economic goals, good training and experience and an adequate fund of knowledge expressed in appropriate practices are definitely associated with a high degree of financial success.[10]

Westermarck[11] carried out an investigation similar to the study by Wilcox and others, reported earlier, of 410 Swedish farm operators who kept continuous farm records for five years. The farmers who had taken part in the continuous bookkeeping activity of the Board of Agriculture in Sweden were selected for study and were classified into three groups on the basis of theoretical professional education. Farmers with elementary school education were included in group I, those having some form of further professional education, *i.e.*, at least rural secondary education were classified in group III, while group II composed of those farmers whose education stood in between I and III. They were further classified on the basis of practical experience. An attempt was made to find out the influence of the theoretical professional education on farmer's view of the relationship between certain personal factors and economic results. Summarizing the results

8. Franklin J. Reiss : Individual Differences in Entrepreneurial and Managerial Ability Among Illinois Farm Operators, unpublished Ph. D. Thesis, 1952, University of Illinois, Urbana, Illinois. Also see F. J. Reiss, "Measuring the Management Factor," *Journal of Farm Economics*, Vol. XXXVI, No. 4, Part 2, November, 1949, pp. 1065-72.

9. The farmers were members of the Farm Bureau Farm Management Service in Illinois during the period of study. The organization of the service can be summarized as having ten local farm management associations and one unofficial state organization known as "The Illinois Farm Bureau Farm Management Service" working in close co-operation with the Department of Agricultural Economics, University of Illinois.

10. F. J. Reiss, *Op. cit.*, p. 210.

11. N. Westermarck, "The Human Factor and Success in Farming," *Acta Agriculturae Scandinavica*, Vol. I, 1951, pp. 123-152.

of the first part of his study the author states: "As a comprehensive conclusion drawn ..... , it should be possible to say that a rationalistic way of thinking is more observed among persons with theoretical education, while emotionally coloured factors take a relatively more significant place in persons with only elementary school education. This is the case in all size categories."[12] The results of the second part of the study indicate that the earnings of farmers having more theoretical professional education were greater than those of other groups. Similarly the agricultural earnings of farmers, who practised outside (non-farm jobs), were greater than those of the farmers in the sample.

Several rural sociologists[13] have studied the personal and social characteristics of adopter's and non-adopter's agricultural practices. Assuming that adopters are generally good farm operators, the results of these studies can be used to draw inferences about the relationship of personal and social characteristics of farmer to his managerial ability.

QUANTITATIVE MEASURE OF MANAGEMENT

There have been very few investigations to quantitatively measure the management input or the contribution of the management input to output. Peterson and Swanson[14] compared the highest return farming systems on 240-acre and 480-acre farms under varying levels of livestock management. It was assumed that the effect of the quality of management on returns can be studied through the effect of the variations in the feed to grain ratio (input-output coefficients) on returns. The differences in returns due to differences in the quality of management ranged as high as $8,461 on 240-acre farms. However, such differences had practically no effect on returns on 480-acre farms.

Westermarck[15] attempted to devise a procedure to measure input as a cost item. The results of the study were reported in two parts. The first part was devoted to study of the time spent per day by 15 farmers on managerial operations. Such items as deliberations, vocational training, planning, budgeting, accounting, organization and supervision of resources, business activity and representations on farms were classified as managerial functions. The author investigated the relationship (correlation) of the cost of management input with various other inputs and output, in the second part of the study. The cost of the management input was calculated by multiplying the hours of operator's time spent on managerial functions (established in part I) by the prevailing hourly wages for hired manual labour. The correlation coefficients between management cost and gross returns, total costs (except management and interest), cost of manual labour, were significant at 1 per cent, 1 per cent and 5 per cent significance levels, respectively.

12. Westermarck, *Ibid*, p. 139.

13. See Bibliography of Research on Social Factors in the Adoption of Farm Practices, North-Central Rural Sociology Committee, Second Edition, Iowa State College, Ames, Iowa, March, 1959.

14. G. A. Peterson and E. R. Swanson : Highest Return Farming Systems for Tama and Muscatine Soils, University of Illinois, Agricultural Experiment Station Bulletin No. 602, Urbana, U.S.A., October, 1956.

15. N. Westermarck, "Management and Success in Farming : Part I—Managerial Operations on Family Farms," *Acta Agriculturae Scandinavica*, Vol. VIII, No. 4, 1958, pp. 375-403. "Part II— Management Inputs as a Cost Item," *Acta Agriculturae Scandinavica*, Vol. IX, No. 2, 1959, pp. 30-46.

On the basis of the data from some Finnish and Danish farms, the author concludes: " . . . . . it appears to be possible to determine management as a cost item by making a percentile addition to total costs (less management and interest)."[16]

Another approach suggested to measure the management factor relates to the calculation of the residuals between production levels estimated from the fitted function and the actually observed production levels. These residuals are then used as the basis for a management rating.[17]

Martin[18] and his co-workers tested the hypotheses relating to changes in income resulting from changes in the levels of management. Farm management ability was considered to consist largely of four factors : (1) Ability to achieve favourable input-output results efficiently in particular farm enterprises. (2) Ability to choose the optimum combination (including magnitudes) of farm enterprises. (3) Ability to determine and obtain control, at lowest cost over the resources that best complement his own abilities and to dispose profitably of owned but uncomplementary resources—resource acquisition and disposal. (4) Ability to market the output profitably.

The data for the study were collected from four part-time and seven commercial farmers. Emphasis was laid primarily on the first factor, *i.e.*, favourable input-output relations as a quantitative measure of management skill of the farmer. Linear programming was used to test the stated hypotheses. The results indicate that a great deal of variation in optimal farm income is explained by the changes in the levels of management, as described by various levels of input-output coefficients.

Mundlack[19] suggests a procedure to quantitatively calculate the management input. Analysis of covariance framework was used, the sum of squares to be minimized with respect to the various parameters is given below :

$$S = \sum_{it} \left(Y_{it} - Bo - B_1 X_{lit} \ldots \ldots \ldots B_k X_{kit} - A_i\right)^2$$

where $A_i = CM_i$, M_i being the measure of the management variable,

$$i = 1, \ldots \ldots \ldots, I \qquad t = 1, \ldots \ldots \ldots, T$$

By setting $\sum_i A_i = 0$, the author obtains the estimates of each parameter. The author further assumes that the production function is complete and the factors are divisible and, hence, the condition of constant returns can be imposed. Thus,

$$C = 1 - \sum_{j}^{k} B_j$$

16. Westermarck, *Ibid*, p. 45.

17. E. O. Heady, "Production Functions from a Random Sample of Farms," *Journal of Farm Economics*, Vol. XXVIII, No. 4, November, 1946, pp. 989-1004 ; and E. R. Swanson, "A Measure of Economic Success in Farming," *Acta Agriculturae Scandinavica*, Vol. IX, No. 4, 1959, pp. 485-96.

18. Lee R. Martin, Arthur J. Coutu and H. S. Singh, "The Effects of Different Levels of Management and Capital on the Incomes of Small Farmers in the South," *Journal of Farm Economics*, Vol. XLII, No. 1, February, 1960, pp. 90-102.

19. Yair Mundlack, "Empirical Production Function Free of Management Bias," *Journal of Farm Economics*, Vol. XLIII, No. 1, February, 1961.

and the unbiased estimate of C is

$$c = 1 - \sum_{j}^{k} b_j \text{ . Therefore,}$$

$$m_i = \frac{a_i}{c}$$

The author, however, points out the dangers of using the above estimate as a measure of management input. He states: "In applying this analysis to agriculture, there is a danger that in what we refer to as management, we also include a farm effect—that is, the effect of factor which do not depend on the management but rather on the particular environmental conditions of the farm, such as climate, type of soil, topography, etc. This would not affect the estimates b_j or their properties, but it will change the meaning of a_i. It will now be an estimate of the management and farm effect combined."[20]

DECISION MAKING PROCESSES

The study of "Decision Making Processes of Farm Managers" was little known till 1950's, when Johnson and Haver[21] in 1953 made an attempt to develop certain decision making principles in farm management. The authors, after emphasizing the importance of decision making function in farm organization, have divided the problems of management under five heads : (1) prices ; (2) production methods and responses ; (3) inventions ; (4) human behaviour; and (5) economic, political and social institutions. They point out that a farm manager is found in one of the following five situations : (1) the inactive situation ; (2) the learning situation ; (3) the forced action situation ; (4) the subjective risk situation ; and (5) the subjective certainty situation. Based on these situations the authors have formulated several principles which would serve as a guide for farm managers in decision making. They also list several principles pertaining to strategies and risk situations. Thomas made an attempt to examine the sociological implications of decision making. He points out that "Scarce resources available to decision making units are allocated and utilized in line with a set of goals and objectives that are in part socially determined."[22]

The idea of an empirical study on decision making processes originated with the Risk And Uncertainty Subcommittee of the North-Central Farm Management Research Committee in the United States. Accordingly, an Interstate Managerial Survey covering 1,075 farmers located in eight strata of seven mid-western states—namely, Michigan, Indiana, Ohio, Kentucky, Kansas, Iowa and North Dakota, was conducted in 1954-55. Non-urban commercial farms with a gross income of $2,500 or more, having a single household managerial unit were selected for study with the help of 1950 census of agriculture and the 1947 Revised Master Sample Materials. A questionnaire with 66 questions pertaining to (1) information ; (2) analysis as a function of management ; (3) expectation models ; (4)

20. Mundlack, *Op. cit.*, p. 48.

21. G. L. Johnson and C. B. Haver : Decision Making Principles in Farm Management, Kentucky Agricultural Experiment Station Bulletin No. 593, Lexington, U.S.A., January, 1953.

22. D. Woods Thomas, "Sociological Aspects of Decision Making Processes," *Journal of Farm Economics*, Vol. XXXVII, No. 5, December, 1955, p. 1118.

strategies and insurance ; (5) knowledge situations ; (6) willingness to insure against losses and take chances for gains ; and (7) characteristics of farmers interviewed, was framed. Thus, an attempt was made in the study to find out how farmers decide upon the organization of their businesses for a given year. In order to know whether the respondents understood the question regarding the inductive and deductive methods of arriving at conclusion or not, they were asked to give examples of the two methods. An evaluation of the replies received from 532 respondents revealed that 2.44 per cent of the farmers definitely understood both methods, 18.05 per cent definitely understood induction, 3.57 per cent definitely understood deduction and the understanding of 75.94 per cent could not be verified.

The Interstate Managerial Survey has produced a substantial amount of empirical data in many aspects of decision processes. It provides considerable information on sources used by farmers in securing different types of information. The sources of information in the study have been broadly classified into two groups : (1) Non-Communicative Sources, and (2) Communicative Sources. The former refers to those sources which can be used without contacting another person verbally or in writing. These include types of information on price, production method, new production technology, human (regarding farmer or self, environment of farm, neighbours and community populace), institutions, and home technology. The second group refers to those requiring the use of written or spoken word ; namely, prices of things sold—past prices and price trends, current prices and changes in prices, price outlook ; prices of things bought—past prices and their trends, current prices and changes in costs, price outlook ; production factors—existing varieties of crops and livestock, existing methods of producing crops and livestock, climate, soil and disease conditions ; new developments—new inventions, discoveries and developments; human factors—people with whom a farm manager has to deal with in running his farm, people whose reactions may be important in running the farm ; political, social and religious factors—changes for depression or prosperity, actions and attitudes of local informal groups that may affect the farm, actions of non-government groups affecting farming, federal, state and local government's actions affecting farming. The results of the survey reveal that on an average the six non-communicative sources of information are used more frequently than the sixteen communicative type.

The experience of the survey in the words of Johnson suggests strongly that "non-communicative sources of information are highly important and that research designs and methodologies should be adapted to study how to improve the use made of these sources."[23]

Conclusion

The role of the human factor, as reflected by the managerial ability of the farmer in successful farming is being recognized in U.S.A. and other advanced countries. In India, with our limited agricultural extension resources, it is necessary that extension efforts be concentrated on good managers so as to maximize the returns for each rupee spent. Westermarck emphasizes the importance of

23. G. L. Johnson, "Methodology for Studying Decision Making," *Journal of Farm Economics*, Vol. XXXIX, No. 4, December, 1957, p. 1217.

extension efforts, directed to individual farms in Finland in the following words. "It is apparent that as long as advisory activity is not directed to individual farms with individual planning from case to case, a whole lot of measures will remain untaken. It is to be noted that the farms were quite common smaller ones and by no means model farms, but where the farmer has really felt interest towards promoting its economy. The inference would thus be that greater stress should be laid on individual advisory activity."[24]

24. N. Westermarck, *Op. cit.*, p. 17.