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# THE INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

SPECIAL NUMBER

IN HONOUR OF

## SHRI MANILAL B. NANAVATI

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Shri Manilal B. Nanavati

# FARM MANAGEMENT RESEARCH NEEDS IN AMERICAN AGRICULTURE

H. L. Stewart

Opportunities for effective farm management research are influenced greatly by the status of both the social and the natural sciences, by the characteristics and structure of agriculture, and by the economic conditions of the times. Because of this, and because farm management research in the United States has been a dynamic, evolving field of study that has been modified constantly to meet contemporary needs, it seems appropriate to lay the groundwork for a discussion of current farm management research needs by considering briefly both the historical modifications made to meet changing conditions and some of the important characteristics of contemporary agriculture that affect research needs.

## Evolution of Farm Management Research[1]

Farm management research in the United States had its inception in the 1890's. At that time, cost studies were begun by agriculturalists who had little formal economic training but who were interested in depicting farmers' financial distress. Production costs were developed for comparison with farm prices in an effort to reflect the adverse income position of farmers.

From this early beginning, farm management research has evolved through many stages. Many men and many institutions have contributed to the continuous process of change, both in concepts and in techniques. The detailed cost route studies, the origin of which is usually associated with Minnesota, the survey and comparative analysis methods developed at Cornell, and the model farm approach stressed originally by the old Office of Farm Management in the United States Department of Agriculture, have been cited as outstanding early contributions to our applied science.[2]

The concept of farm management research as a means of achieving efficiency in farming and of analysing the whole farm as an operating unit, also evolved early in the 20th century. The survey method soon displaced the model farm approach, while the need for data by the Federal Extension Service, established in 1914, gave impetus to the development and wide use of the farm account book. Later, under the influence of agricultural economists with more formal training in economics, the concept of farm management was extended beyond the farm

1. Much of this section was adapted from other sources, including especially H. C. M. Case and D. B. Williams: *Fifty Years of Farm Management*, University of Illinois Free Press, 1957. Their contributions are gratefully acknowledged but the author assumes responsibility for the conclusions and views expressed.

2. *Ibid.*

gate. Marketing and price studies and the agricultural outlook programme evolved. A related development in the 1920's was the increasing recognition of the need for better tools in guiding the reorganisation of farm operating units. From this developed the farm budgeting and linear programming techniques as we know them today.

During the 1930's the concept of farm management was again expanded with the times. Surpluses, protracted drought, and the great depression gave rise to the agricultural part of the New Deal. Along with it came a recognition by farm management researchers of the need for guides for national planning, farming adjustments, and farm programmes to relieve farmers' distress. Concern with inter-relationships between the farm and its environment, and with inter-regional competition, also began to evolve during this period. But as surpluses, drought, and depression in general were considered to be temporary phenomena, changes in farm management research were oriented primarily to appraisals of the effects on the firm of specific programmes and of methods most helpful to the firm in weathering the storm. A nationwide adjustment study made in 1936 to appraise the effects of a conservation programme in different production situations and in the aggregate was the forerunner of a whole series of comprehensive adjustment studies to be made co-operatively by the United States Department of Agriculture and the State agricultural experiment stations.

With the advent of World War II, farm management research was turned to the planning of production goals, the allocation of scarce factors of production, appraisals of opportunities to expand production through use of improved practices rather than scarce production factors, and the recruitment of farm labour for essential military and industrial uses in a way that would minimize impacts on farm production.

Other areas of inquiry receiving increased or initial emphasis during this period included analyses of labour efficiency, which included studies of time and motion and of labour savings through reorganizing farm plans, economics of soil conservation, risk and uncertainty, and the management factor. Also of importance to us as we evaluate research needs more than a decade later are the efforts in the war and postwar periods to improve both our theoretical framework and our research tools. Sampling procedures were improved, as was our classification of farms. The importance of recognizing differences between production situations in analysing adjustment opportunities was more fully recognized and the budgeting and partial budgeting of adjustments to maximize profits in different production situations was accelerated. Production functions were developed, and the econometric models were adapted to farm management research.

In recent years, the existence of excess production resources in American agriculture has been recognized. A propensity of United States agriculture, through technology, to increase output more rapidly than demand has brought increased efforts to provide economic guides for programmes to encourage a reallocation of resources both within agriculture and between agriculture and other sectors of the economy. A concurrent persistence of a large number of farmers to remain in a low-income position has accelerated efforts to delineate

and attack the income problems of subsistence and part-time farmers in contrast to the problems of the larger commercial farmers, and to appraise the pertinent obstacles to resource transfers.

Many fashionable but fruitless paths have been followed in the continuing effort to improve farm management research. The futility of some of these efforts has been learned, but the evolution of farm management research goes on. The constant and dramatic changes in the character of our agriculture and of its position in our economy present farm management researchers with an urgent and continuing challenge to adapt our research to contemporary needs.

## Changing Status of American Agriculture

Much of the phenomenal change that has been occurring in American agriculture can be attributed either directly or indirectly to technological developments. A trend toward specialized, high-investment farming is underway with increasingly efficient production and a persistent tendency for production to outrun demand, despite substantial reductions in numbers of farms and farmworkers (Table I). During the last two decades an unprecedented increase has occurred in the size of farms and in the capital investments required in farming. Technical competence in farming has increased greatly also.

Accompanying these technological developments has been a tendency for agriculture to become increasingly dependent on non-farm sectors of the economy. Farming is rapidly becoming a non-farm input industry. One-half of all inputs used in agriculture now come from non-farm sources, the proportion derived from such sources having increased from less than a third in 1940. More and more of the capital required in farming is coming from off the farm. Tostlebe estimates that 90 per cent of the new capital required in farming in the 1940's came from farmers' savings,[3] whereas Garlock estimates that a third of farmers'

TABLE I

CHANGES IN AGRICULTURAL RESOURCE USE, OUTPUT, PRICES, COSTS, AND FARM INCOMES, UNITED STATES

| Item | Unit | 1940 | 1951 | 1957 | Percentage change 1951 to 1957 |
|---|---|---|---|---|---|
| Farm population .. .. .. | Thousand | 30,547 | 24,160 | 20,396 | —16 |
| Man-hours of farm labour .. | Mil. hrs. | 20,445 | 15,632 | 13,553 | —13 |
| Total assets used in farm production (current dollars) .. .. | Bil. dols. | 38.7 | 113.1 | 132.1 | +17 |
| (1947-49 dollars) .. .. | ,, | 83.3 | 98.2 | 104.4 | + 6 |
| Total farm output (1947—49=100) | Index | 83 | 103 | 113 | +10 |
| Acreage cropland (1947—49=100) | ,, | 97 | 101 | 95 | — 6 |
| Production per acre (1947—49=100) | ,, | 88 | 98 | 112 | +14 |
| Gross livestock production (1947—49=100) .. .. .. | ,, | 87 | 112 | 121 | + 8 |
| Farm production expenses .. | Mil. dols. | 6,749 | 22,165 | 23,490 | + 6 |
| Net Income per farm .. .. | Dollars | 720 | 2,951 | 2,388 | —19 |

3. Alvin S. Tostlebe: *Capital in Agriculture*, National Bureau of Economic Research, Princeton University Press, Princeton, New Jersey, U.S.A., 1957.

total expenditures from 1946 to 1955 came from borrowings.[4] Farmers also are becoming increasingly dependent on non-farm sources for income. More than one half (54 per cent) of the net income of farm families in 1957 was from non-farm sources. And more than a third of the farm operators work off their farms 100 days or more.[5]

Accompanying the increases in technology and in investments has been an increasing tendency for agriculture to become less responsive to unfavourable price-cost relationships (Table II). Despite the price-cost squeeze which farmers

TABLE II

CHANGES IN PRICE RELATIONSHIPS AND IN FARM PRODUCTION, UNITED STATES, SELECTED PERIODS FROM 1930 TO 1957

| Item | 1930-32 to 1938-40 | 1938-40 to 1945-47 | 1945-47 to 1955-57 |
|---|---|---|---|
| | Per cent | Per cent | Per cent |
| Total farm output .. .. .. .. | 7 | 19 | 18 |
| Ratio of prices received to prices paid .. | 14 | 42 | —26 |
| Total crop production .. .. .. | 4 | 14 | 12 |
| Ratio of prices received for crops to fertilizer price .. .. .. .. .. | 15 | 120 | —15 |

have encountered as a result of increasing production and the almost inelastic aggregate demand for their products farm output has trended persistently upward. Surpluses have increased while farm prices and farm earnings have declined. Farmers, especially the larger commercial farmers, have shared in an increasing level of living but they have not shared equitably with other sectors of the economy. In 1951, average hourly earnings in agriculture were about half those of workers in industry, and the discrepancy continued to increase through 1957. The index of "real income" per farm worker, in terms of 1947-49 dollars, declined from around 100 in 1950-51 to 91 in 1957, while that of industrial workers increased from 110 to 130.

## Farm Management Research Needs

The foregoing factors, technology, the increasing inter-dependence of farm and non-farm sectors of the economy, the persistence of excess production factors to remain in agriculture, and the increasing tendency for farm production to become less responsive to unfavourable price-cost relationships, affect greatly the areas of farm management research needing increased emphasis in America. Priorities established recently by the Economics Research Advisory Committee of the United States Department of Agriculture reflect this.[6] That Committee

4. F. L. Garlock, "Financing Farm Adjustments," *Journal of Farm Economics*, Vol. 38, No. 5, December, 1956.

5. K. L. Bachman: *Prospective Changes in the Structure of Farming*, United States Department of Agriculture, November, 1958.

6. Economics Research Advisory Committee, *Report and Recommendations, Sixth Meeting*, February 24-26, 1959, Washington, D. C.

recommended an expansion in research in a number of areas of particular interest to farm management researchers. Among others, they assigned a high priority to expanded research in the following areas: (i) Economics of New Technology, (ii) Analyses of Production Response, (iii) Farm Programme Appraisals, (iv) Profitable Adjustments in Farming, and (v) Vertical Integration.

Both the opportunities and the risks which are inherent for the farmer or cultivator in increasing technology enhance the need for *expanded analyses of current and prospective rates of adoption of technological developments by farmers, and their effects on output, income, and efficiency.* The need of individual farmers for guidance in adopting new techniques and new enterprises, and in achieving efficiency in the organization and operation of their farms is even greater than it was in the early days of farm management. Analyses of the impacts of technology and of various adjustments which it will pay farmers to make are equally essential in the development of farm programmes. The Economics Research Advisory Committee explained this need as follows:

> *Economics of New Technology:* New developments in livestock production such as feed additives, pelleted feeds and urea; and new crop production practices such as high analysis fertilizers and plant-growth regulators affect farm costs, output, and income and must be taken into account in farm adjustment programmes. Research should be expanded to measure and evaluate the effects of specific technological changes on growth of farm output, use of resource inputs, resource efficiency, and income.
>
> These studies should explore the factors that influence rate of adoption of new technology, and the effects of technological change on resource requirements and farming efficiency. The risks and uncertainties associated with adoption of new technology should also be studied. It is not enough to analyze experimental observations as such. The decision-making process requires consideration of probabilities and risks in the adoption of new technologies on a farm-enterprise scale.[7]

*Production Response Studies* are needed which go beyond the "normative response," or what it will pay farmers to do, to the "predictive response" or what farmers *will* do, given certain price-cost relationships and other restrictions. In appraising the probable market and other impacts of adjustments by others, individual producers need to know what others will do as well as what it will pay them to do. Similarly, in their efforts to develop programme provisions for achieving desirable adjustments, legislators and administrators are concerned with the adjustments that farmers will make in response to alternative stimuli.

Research needed in bridging the gap between farmers' "normative" and "predictive" response includes the development of better techniques for appraising farmers' expectations and their attitudes. Increasing emphasis is being given to value judgments and to the importance of compatible economic and ethical motivations. Analyses of the various restrictions and obstacles to economic adjustments, and the role of capital rationing and of risk and uncertainty, are

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7. *Ibid.*

required. The need for greater emphasis in this area of research was expressed as:

> *Analyses of Production Response:* The continuing strong tendency for farm production to exceed market outlets results in a persistent demand for modification of production control and price-support programmes. Research in production response at the farm, regional, and national levels should be expanded so that more comprehensive information can be made available on the effects of changes in prices received, costs, technology, and other factors on production of major commodities and on total farm output. Additional analyses of how farmers adjust production to changing economic and other conditions could provide guides for more effective farm programmes.[8]

A related area of research that needs to be more strongly emphasised is that required to appraise both the short-term and the longer term *effects of current and alternative types of farm programmes* on the achievement of a better balance between production and demand and on the income of farm owners and operators, farms of various types and sizes, and farms in different areas and different production situations. The need for this area of research was expressed as:

> *Farm Programme Analyses:* Research to determine the economic effects of alternative courses of action designed to bring agricultural production in a more desirable balance with consumption should be expanded. As long as production continues to outrun demand, public programmes to alleviate the imbalance will be proposed. Analyses of probable effects of measures that are either strongly advocated or appear promising might help avoid the more ineffective ones.[9]

The price-cost squeeze on American farmers and the mounting surpluses of agricultural commodities stress the need for economic studies to reveal the nature of the *adjustments required in resource use on individual farms and by areas and regions* to improve incomes and achieve other goals of farm people, and to provide the data and interpretations needed as a basis for better decision-making by farm people and those responsible for their programmes. Such analyses are needed for each significantly different production situation. The aggregative effects of the actions of individual firms must be considered also. Most producers in the United States are motivated, at least partly, to maximize profits. Adjustments that maximize profits for the firm usually increase output. The result is a tendency to increase output at a faster rate than demand, and the aggregative effects of the firms' adjustments tend to affect both the product and the factor markets. Analyses of the economies of scale and of inter-regional competition should be included in these studies. The Economics Research Advisory Committee expressed the need for this area of work as follows:

> *Profitable Adjustments in Farming:* Continuing surplus production of major farm commodities emphasizes the need for adjustments in farm organisation and output and in the allocation of resources used in farming. Eco-

8. *Ibid.*
9. *Ibid.*

nomic research should be expanded to analyse: (1) Possible adjustments in production which would be profitable for representative farming situations in major types of farming areas; (2) the aggregate impacts of such adjustments within the respective agricultural regions and for the nation as a whole.

Both the surplus problem and the apparent conflicts between desirable adjustments for the individual farmer and desirable adjustments for the industry, require continuing analyses of profitable adjustments and the most economic use of farm resources.[10]

Expanded research also is needed to appraise the nature and extent of the developing tendency to integrate within one management firm the production, processing, and marketing of agricultural products. Analysis is needed of the reasons for "vertical integration," as it is frequently called, its probable economic consequences, and alternatives that might be more advantageous. The need for greater emphasis on this type of research has been described as:

*Vertical Integration:* The growing complexity of farm technology and the development of mass retailing through chain stores and supermarkets have increased the specification buying of farm products and production under contract or other forms of vertical integration. The increasing integration of farm and business firms and the accompanying changes in the organization and scale of farming are subjects of widespread public concern because of their implications on production, efficiency, incomes, financing, risk, the structure and tenure of family farms, product quality, marketing, organization and costs, and pricing practices.[11]

Some may maintain that these and related areas of research are not limited to the field of farm management. This is true. But it is true also that farm management has a major part in each, that they have not received the emphasis needed largely because of lack of leadership in bringing into focus the various disciplines concerned, and that no other group is so strategically located or so well qualified for the task as are farm management researchers. In the past, farm management research has been modified repeatedly to meet the need of the times. And no greater challenge has ever confronted farm management research than the current challenge to provide an adequate economic research basis for wise management and policy decisions. This is equally true in India and in America. But in each country, we can be successful in meeting the challenge only as we adapt our farm management research to the unique conditions of our country and our time.

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10. *Ibid.*
11. *Ibid.*