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DECISIONS REGARDING THE DEGREE OF SPECIALIZATION

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INTRODUCTION

Specialization and exchange are opposite sides of the same coin; without specialization, there could be no exchange, no trade and no production for a market. In other words, specialization operates in a money economy and without it, farmers would have to produce most of the commodities they require on their farms and this would be more than a subsistence economy. Specialization cannotes production efficiency because of devision of labour which allows exploitation of our best abilities to the full; it facilitates automisation and reduces wastage of time and equipment. This afternoon, while discussing the decisions regarding the degree of specialization, I propose that we limit ourselves to specialization by product where a farmer is involved in the production of one or two products from start to finish, because I feel that discusssing specialization by process would be getting too industrialized for farm conditions. In my paper, I have decided to categorise factors which affect the level of specialization into Micro level decisions and Macro level decisions.

MICRO LEVEL DECISIONS

(a) Factors of production

For any farmer to produce at all, he must have the three main factors of production namely land, labour and capital, but

specialised farming demands that, in addition, he should have another factor which economists call managerial skill or entrepreneurship.

The level of specialisation will depend a great deal on the farmer's ability to manage the enterprise. With specialization, you actually put all your eggs in one basket and unless you are sufficiently trained to handle that basket, you will most likely lose all your eggs.

Agricultural technology like any other scientific field is constantly changing so the specialised farmer will have to be willing to learn more through special courses, seminars, workshops, bulletins and not to be content with the original training received.

(b) Environment

The basic process in agriculture is the management of biological growth and it has been established that certain crops do better under certain conditions. The location of a farm can greatly influence the type of enterprise to be developed. A farm on the eastern side of a hill may be more suitable for grapes than another farm on the western side of the same hill. The soils of the farm, the climate of the area and the topography can dictate the type of enterprise to specialise in and a farmer should be able to decide which enterprise will do best, basing on his experience and results of local tests carried out.

(c) The Farmer as a Person

The farmer is a person and has two groups of people that are important to him. He is a member of a family and he is a member

of a local community with traditions. He has obligations to these two groups. If specialization means interfering with some of these obligations, the farmer would rather not specialise although the desire to secure a better level of living for his family is an effective pressure on him in many circumstances to improve the productivity of the farm business. In some parts of Uganda, for example, women cultivate the crops and manage the family's money. They, therefore, have considerable influence on how much is to be spent on such items like fertilizers, insecticides, and implements.

The farmer also has some interests and beliefs which will affect that enterprise to deal in and how, for he should go in that enterprise.

(d) Production Incentives for Farmers

Farming is a business and a farmer would like to make profit from his business, so he goes in for the most profitable enterprises, other things being equal. Profit or net income will depend on the relationship between the cost of inputs and the price of the product. There is increasing evidence that a farmer will seek to increase production per acre of a particular crop, when the price of that crop goes up. The farmer is not only interested in the price but also the dependability of the price. A price which fluctuates violently will tend to discourage farmers from specialising in a particular enterprise.

Prices for supplies and equipment will greatly affect the level of specialization as can be shown from the following table worked out from FAO Production Year-Book of 1963, Volume 17.

QUANTITY OF RICE (IN KGS) NECESSARY TO PURCHASE 1 KG OF FERTILIZER

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| COUNTRY  | SULPHATE OF AMONIA | SINGLE SUPERPHOSPHATE |
|----------|--------------------|-----------------------|
| Pakistan | 0.85               | 0.89                  |
| Japan    | 1.18               | 1.00                  |
| India    | 3.82               | 3.19                  |

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These figures show that whereas it takes only about one kilogramme of rice to buy one kilogramme of fertilizer in Pakistan, in India it requires three to four time as much. Clearly there is more price incentive for a farmer to use fertilizer in rice production in Pakistan or Japan than in India as long as these price relationships hold and as long as the increase in yield due to the fertilizer added is the same in the three countries. The Uganda Government operates a subsidy scheme which allows farmers to buy some of the inputs at a price lower than the commercial price which acts as an incentive for farmers to produce more through adoption of improved methods of production.

It is not enough to make a profit from farming; the farmer has aspirations and he produces for a purpose. He would like to educate his children, build himself a beautiful house, buy a car, a radio, a coloured TV and eat well. If these goods and services are available they provide an additional incentive for farmers to produce for a market. A farmer will therefore specialise in an enterprise that gives the highest net income so that he can afford to buy the goods and services he needs. Making goods and services available to farm families is also a spur to agricultural development generally and it illustrates

the interdependence of agriculture and industry in overall economic development. Special attention should therefore be given to stimulating the production and distribution of attractive consumer goods for farm families.

#### MACRO LEVEL DECISIONS

The farmer conducts his business in a dynamic environment and therefore he should not only know what is going on, on his farm but also the whole economic setup in the community and the country as a whole. He needs information concerning marketing, agricultural technology, local availability of supplies and equipment, production credit, and Government Policy and regulations.

##### (a) Markets for Farm Products

Specialised farming increases the output of farm products. There must be a market for these products and a price for them high enough to repay the farmer for his cash costs and his effort in producing them. It is pointless to specialise in an enterprise such as tomato growing when you have no market for the tomatoes. The farmer therefore needs to know that: -

- (i) Someone, somewhere needs to buy the product; in other words there must be demand for his product.
- (ii) There is an established marketing system through which to sell the product.
- (iii) The marketing system is reliable and really works.

- (iv) The price of the product does not fluctuate greatly as this will affect his level of investment and therefore his specialization.

In Uganda farmers specialise in growing coffee because they are assured of all their coffee being bought through an established Coffee Marketing Board at the prevailing world coffee price, less the expenses of course. Similarly cotton growers sell their cotton through Co-operative Unions to the Lint Marketing Board at a price that has been announced a season in advance and they work out up to what level they can go in for cotton growing.

(b) New Farm Technology

Increased agricultural production comes from new techniques or methods put into practice on the farm. It is simply not possible to get much increase by using the same old plant and animal materials and the same old soil in the same old way. There must be constant investigations into new and better farm implements, more productive strains of plant and animal materials, and agrochemicals that will help increase production. This therefore calls for research in these three areas of agricultural machinery, plant and animal breeding and agrochemicals.

No country has achieved substantial agricultural development without establishing and maintaining efficient government experiment stations for agricultural research. In Uganda there are four Government Research Stations at Entebbe, Kawanda, Namulonge and Serere carrying out research programmes on livestock and crops. Some farmers also experiment with new crops and new cultural practices on their own farms. In some other countries like USA or W. Germany research is frequently carried

on by commercial companies interested in selling Seeds, Fertilizers, implements and other supplies and equipment to farmers. These are helpful but they are not an adequate substitute for Government Agricultural Research.

It is important that the farmer should be sufficiently trained to handle the superior supplies and equipment that have been developed through research. There should be vocational schools where farmers can be taught about the new techniques or methods to be put into practice on farms. Uganda Government has established District Farm Institutes where farmers are brought in for a week or two to learn about a specific subject like Animal Husbandry, Banana growing, Coffee growing or Farm Machinery. This coupled with the Agricultural Extension Service, ensures that the new techniques and methods of production developed through research are effectively passed on to the farmer.

(c) Local Availability of Supplies and Equipment

Most of the modern methods of production require the use by farmers of special supplies and equipment. These include seeds, fertilizers, pesticides, livestock feeds and medicines, and tools or implements. It is necessary that these be available at many, many local points and in sufficient quantities to meet the needs of every farmer who may want to use them.

Most farm supplies and equipment have to be manufactured or imported. In Uganda we have only one factory for manufacturing single super-phosphate fertilizer but the nitrogenous fertilizers have to be imported. Pesticides and livestock medicines are also imported and if a farmer specialises in an enterprise such as Dairy Farming he must be sure that the medicine is im-



ported and is available in his locality otherwise he is taking a big risk.

Once a new variety of a crop has been developed by research there should be enough seeds of it multiplied to meet the demand of farmers who want to purchase it. One way would be to establish seed multiplication farms operated by Government as we have done in Uganda or establish a system of "Certified Growers", a system used in Kenya by the Kenya Seed Company. It is important that the supply of the "certified" or "Improved" seeds should be constant.

It is important that the supplies and equipment which farmers buy and use must be technically effective, of dependable quality and must be reasonably priced otherwise farmers will not use them and this will lower the level of specialization.

(d) Production Credit

The rule is a simple one: to produce more, the farmer must spend more. He must spend on fertilizers, improved seeds, pesticides and farm implements and he must incur the expenditure before the product is sold. Few farmers have enough savings which they can use for production purposes but most farmers do not and have to borrow money for the period between the date when supplies and equipment have to be bought and the time when the harvests can be sold.

It follows therefore that there should be credit facilities which farmers can use to obtain the essential items required to increase production through specialization. In Uganda the type of credit readily available to farmers is the supervised credit which combines production credit with technical help

to the farmer using it. The Uganda Development Bank handles short - term agricultural credit and medium - and long - term credit to the agricultural, industrial, and commercial enterprises while The Co-operative Bank handles short-term production credit for small holders through the co-operative credit scheme supervised through co-operative societies. The Co-operative Credit Scheme loans have been increasing through the years as can be seen below:

| <u>YEAR</u> | <u>AMOUNT OF LOANS (Dollars)</u> |
|-------------|----------------------------------|
| 1968        | 1,365,857                        |
| 1969        | 1,424,910                        |
| 1970        | 1,594,006                        |
| 1971        | 2,811,171                        |
| 1972        | 1,048,780                        |
| 1973        | 926,829                          |
| 1974        | 853,707                          |
| 1975        | 1,073,195                        |

When a farmer decides to borrow for productive purposes he must take into account the following considerations:

- Estimate of the Probable yield. A farmer should make a fair prediction of the yield of the crop or livestock involved, with and without the use of additional inputs credit will allow him to buy, basing it on locally tested results and personal experience.
- Estimate of the market price of his crop at the time of harvest so that he does not overshoot his level of investment.
- The ease with which the farmer gets credit and getting it precisely when he needs it. Sources of production credit

need to be close to farmers, procedures need to be as simple as possible and people who process loan applications need to be helpful and courteous.

(e) Government Policies and Regulations

Government institutes certain rules and regulations which affect agricultural production and which a farmer cannot afford to ignore or overlook. In Uganda for example, except where the climate does not allow, all farmers are expected to grow cotton because it is the main foreign exchange earner. It follows therefore that farmers in areas where cotton can grow should not specialise in producing other crops and leave out cotton.

Government can control production of a particular commodity such as coffee or wheat up to a certain level and farmers are forced to accept compensation for the unutilised resources or they diversify their production. Government can also discourage or regulate private investment which would otherwise make available the necessary requisites for specialization. Government may impose heavy import duties on farm supplies and equipment in order to stimulate domestic manufacture of the same. Such a policy penalises farmers from the beginning and may give rise to domestic industries which will exist as long as there is that protection.

The land tenure system of a country influences the productivity of agriculture through the effective will of the people. Where land belongs to the state, administration of land use is done by detailed administrative rules which may specify the type of farm economy, the size of operating units and even the cropping pattern. This type of administration is

approached in the Socialist - Soviet Countries. At the opposite end of the range are those countries where the public administration of land use is achieved through a system of private property in land. In this case individual specialization is easier as farmers make the final decisions and they are not afraid of making the necessary investment required in specialization.

#### SUMMARY

Farming is a business that is controlled by many factors some of which are beyond the control of the farmer. In this paper I have attempted to categorise these factors into micro level and macro level decisions. It is important that the farmer is aware of these decisions and knows where to get the information required before he makes sound decisions as to what to produce, how to produce it, how much to produce and for whom to produce.

The micro level decisions include the factors of production, the environment, personal interests and production incentives which are basically on the farm and generally within the farmers control. The macro-level decisions include marketing, new farm technology, availability of supplies and equipment, production credit and Government Policies and regulations. These are by and large outside the control of the farmer but he needs information on them so that he is in a position to make a sound decision about the degree of specialization.

It is to be recognised that although the final decision about the level of specialization rests with the farmer, he does not operate in isolation and he needs information regarding the above mentioned factors before he makes his decision.

DECISIONS REGARDING THE DEGREE OF SPECIALIZATION IN A DYNAMIC  
AGRICULTURE WITH SPECIAL REFERENCE TO INDIAN CONDITIONS

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I. INTRODUCTION

The decisions with respect to the degree of specialization and the nature of the product-mix are highly important, both from the point of view of an individual farmer as well as the whole economy. At the micro-level, from the farmer's viewpoint, the problem boils down to deciding upon the "most desirable" (optimal) enterprise combinations of crops and livestock to be raised from the given quantity and quality of land, labour, capital, machinery and management resources. In other words, the decision entails the degree of specialization (or diversification) to be adopted by the farmer. At the macro (regional and national) level, such decisions are concerned with the cropping and livestock patterns to be encouraged through governmental programmes and formulation and execution of suitable national policies to meet the desired ends. With increasing emphasis laid by the developing economies on self-sufficiency in food and all round economic development, these questions have assumed added significance and dimensions.

II. SCOPE OF THIS PAPER:

In this session of the Congress, we are concerned with the farm management decisions regarding the degree of specialization in a dynamic environment. After outlining the last two concepts, we shall deal with the process of farm management decisions with special reference to the degree of specialization with examples from India. Their causes and implications shall be examined both at the micro- and the macro-levels, and will be illustrated with the help of two case studies.

Agriculture in India, as in most developing nations, forms the

backbone of the national economy. It provides livelihood to nearly three-fourths of the population and contributes about one half of the national income. Agriculture not only supplies raw materials for some of the major industries such as cotton, jute, and sugar but also provides a substantial portion of country's exports. Agricultural production and marketing systems are, therefore, deeply integrated in the processes of the country's economy and decisions made in agriculture not only affect the other sectors of the national economy but are also conditioned by them.

As proposed in the preceding paper, we shall leave out the specialization by process because, in the Indian context, this is not typical but mostly confined to plantation crops grown on estate farms.

### III. DYNAMIC ENVIRONMENT

Planning and management of the farming business must take due note of the dynamic environment in which the farmer produces his crops and raises his livestock. This dynamism is caused by changes in one or several of the factors discussed later in V. (C). They include his resource endowment, technology available to him, relative prices of inputs and outputs at which he buys and sells, policies of the state, systems of information and the like. As we shall see, the changes in these may have a profound influence on the farmer's decision with regard to the degree of specialization to be adopted by him.

### IV. DEGREE OF SPECIALIZATION:

The term "specialization" is variously interpreted by different farm management specialists. Most of the definitions as given by western authors are market oriented "which consider specialization as the production of only one commodity for the market so that the farmer depends on a single source of income". For developing economies, where farming is generally carried on a relatively

smaller scale and is subsistence in nature, the degree of specialization in case of arable farms should refer to the area under different crops as a proportion of the total cropped area. An arable farm is completely specialized, the degree of specialization being 1 or 100 %, (i.e. the degree of diversification is zero), if the farmer is growing only one crop on his farm. When the farmer raises both, crops and livestock, this criterion may have to be slightly modified. The farm may first be classified into a "crop farm" or a "livestock farm" depending on which of the two activities is a major source of income in terms of the value of production. If necessary, this can be further extended to the specific degree of specialization or diversification within the crop or the livestock system.

At the macro-level, for the country as a whole, generally there are regions of specialization, where one crop or enterprise dominates all others. Thus one finds cotton belt, the great wheat plains, etc. As already pointed out, we shall examine the decisions of specialization both with respect to the farm as well as the regions under Indian conditions.

#### V. DECISIONS REGARDING THE DEGREE OF SPECIALIZATION

Generally speaking, a decision-making problem includes

- (a) An objective function of the decision maker,
- (b) A set of alternative courses of actions/strategies available to the decision maker,
- (c) Various circumstances or events faced by the decision maker and the likelihood of their occurrence. Some of these are under his full control, others are not,
- (d) Consequences of actions/strategies of the decision maker under different circumstances or events, and
- (e) Choice of actions/strategies which optimize the expected value of the objective function.

As (d) depends on (b) and (c), and (e) is the final outcome of all the other components, we shall explain the concepts in (a), (b) and (c), dealing at the same time with their implications for (d) and (e), with reference to the farm management decisions about the degree of specialization. The ingredients of these components vary widely not only from country to country, but from region to region in a country, from farm to farm in a village and even on the same farm at different points of time.

(A) Objective function (goal) of the farmer

Much of the neoclassical analysis of decision making concerns itself with maximizing returns. Most farms in developed economies, which are highly monetized, do follow this as a major goal. They are relatively larger in size and highly capital intensive. The number of persons employed and supported per acre is extremely low. As against this, in most developing countries, the average farm size is small and the number of family members to be fed per acre from the farm production is relatively large. The farmer's primary goal is to produce crops required to meet the basic necessities of life of the family rather than maximizing cash returns. Other things being the same, the latter grows a wide variety of crops, and also keeps a couple of milch animals in order to feed himself and his family.

The risk-bearing ability and the nature of the farmer (risk-taker or risk-averter) also determine the choice of crops and their combinations. Even in developed countries, a new farmer or an experienced farmer with weak financial position may not like "to put all his eggs in one basket" and hence decide to diversify. Many farmers in India are of a subsistence nature and can not afford their production/incomes to fall below a certain level. Their main objective is, therefore, to reduce the variability in their incomes and production subject to a certain minimum, rather than to shoot for high "uncertain" levels of income. Higher degree of diversification in farming is pursued in order to achieve this objective.



(B) A Set of Alternative Action/Strategies

In farm management, the typical decision making problems are of the nature of

- (i) what to produce?, (ii) how to produce? and, (iii) how much to produce?

In order to answer these questions, one examines the well-known (a) product - product relationships, (b) factor - factor relationships and (c) factor - product relationships. The three are closely inter-related. For example, the answer to the first question i.e. what to produce, i.e. whether only wheat or wheat and barley or, wheat, barley and oats (and in what combination) is one of the degree of specialization. But it is also closely related to the allocation of resources and the technique to be used. Here, various combinations of enterprises feasible on the farm of the decision maker will be the alternative strategies/actions available to him. The other two considerations of factor - factor and factor - product relationships are for the purpose of our discussion here, exogenous variables and themselves depend on several other factors. These other factors are called events, or circumstances and are discussed below. It may be pointed out that, in a dynamic environment, one, some or all of these factors change giving rise to changes in factor - factor and factor - product relationships, and hence affecting the degree of specialization.

(C) Various events/circumstances faced by the decision making farmer

There are several endogenous (on which the farmer has full control) and exogenous (on which he has practically no control) circumstances affecting the degree of specialization. They can be broadly grouped into the following categories, which are not necessarily mutually exclusive:

- (i) ecological factors, (ii) technical relationships,
- (iii) economic factors, (iv) personal, social and institutional factors, (v) policies of the state, and
- (vi) nature of enterprise.

(i) Ecological factors

The important ecological factors influencing the degree of specialization are soil, topography and climate. The decision maker has little control over them. Heavy soils in low-lying areas, where drainage facilities are inadequate, can be suitable for paddy and jute but certainly not for maize. Similarly in hills, the northern slopes are preferred for growing apples. These factors are particularly responsible for a high degree of specialization at a regional level. If one looks at the crop map of India, e.g., he will find that the cotton belt runs through Gujarat, Maharashtra, Madhya Pradesh and Karnataka, where black cotton soils predominate. Paddy is largely cultivated in areas of heavy rainfall i.e. West Bengal, Bihar, Assam, Eastern U.P. and coastal belts of Orissa and Tamil Nadu, sugarcane in the Gangetic Plains of Uttar Pradesh, Bihar, Tamil Nadu, Karnataka, Punjab and Haryana, wheat in Punjab, Haryana, Madhya Pradesh, Uttar Pradesh and Eastern Rajasthan, tea in the hill regions of Assam, West Bengal and the Nilgiris, and jute in the low lying areas of high rainfall covering Assam, West Bengal and parts of Bihar.

Greater the variation in the soil, topography and climate the larger is the degree of diversification on the farm. In the regions of highly fluctuating rainfall, a farmer tries to diversify by combining draught resistant crops with those doing well under adequate water availability conditions. For these reasons, mixtures of wheat and barley and wheat and gram had been quite popular with the farmers in the Gangetic plains of Uttar Pradesh because even during scanty rainfall, when wheat fared poorly, the farmer was assured of some production from barley and gram. Fragmented holdings, having different types of soil suitable for different types of crops, are less conducive to a high degree of

specialization as compared to a compact farm with uniform soil.

Biological factors like existence of crop pests and diseases are also important and generally act against a high degree of specialization.

(ii) Technical relationships

A change in the level of technology available to the farmer influences the degree of specialization on his farm by (a) affecting the nature of the three types of relationships discussed in V. (B), and (b) increasing his control over his ecological environment and the range of ecologically feasible enterprises on his farm.

(a) "Where complementarity or supplementarity among products exists, diversification tends to predominate. In other areas, where most products are competitive and substitute at a changing rate, production is less diversified. If products are competitive and have a constant marginal rate of substitution, specialization is the general rule". (2, P. 125)

(b) The evolution of high yielding, easily manageable amber coloured varieties of wheat prompted many Indian farmers to specialize in the production of his crop on soils which were otherwise used for barley, if irrigation and fertilizer were available. Consequently, the area under wheat in India nearly doubled from 1950-51 to 1972-73 and the proportion of area under wheat to that under total foodgrains went up from about 10 % to 16.32 % during the same period. Similarly, development and availability of specialized machines like cobb-shellors and cotton-pickers, have enabled the farmers to decide in favour of a very high degree of specialization in these crops through saving in time and average costs.

(iii) Economic factors

Within the broad limits set by the ecology and technology, the de-

cision regarding the degree of specialization is taken on the basis of the economic, social, personal and institutional considerations. Unlike ecological factors, these are subject to change from time to time. Also, they could be either a cause or an effect of the degree of specialization. The important economic factors affecting degree of specialization are:

1. resource availability, 2. marketing facilities, and 3. relative profitability of farm enterprises.

#### 1. Resource availability

The physical size of farm plays an important role in deciding about the degree and nature of specialization. A small farmer with little risk-bearing ability will like to produce a diverse variety of farm crops for meeting the consumption and nutritional requirements of the family. According to the All India Report on Agricultural Census (1970-71), the relative importance of food crops (in terms of proportion of the total area) decreased with an increase in the size of the farm as shown in table 1 below:

Table 1

Percentage Distribution of Area under Food and Non-food Crops in Different Size Groups of Holdings  
1970-71

| S.No.      | Size Group             | Gross Cropped Area (million ha.) | Percentage area under |                |
|------------|------------------------|----------------------------------|-----------------------|----------------|
|            |                        |                                  | Food crops            | Non-food crops |
| (1)        | (2)                    | (3)                              | (4)                   | (5)            |
| 1.         | Below 1.0 ha .....     | 16.9                             | 88.9                  | 11.1           |
| 2.         | 1.0-2.0 ha.....        | 20.8                             | 85.9                  | 14.1           |
| 3.         | 2.0-4.0 ha.....        | 31.3                             | 83.5                  | 16.5           |
| 4.         | 4.0-10.0 ha .....      | 46.7                             | 78.8                  | 21.2           |
| 5.         | 10.0 ha. & above ..... | 42.3                             | 74.0                  | 26.0           |
| All Groups |                        | 158.0                            | 80.5                  | 19.5           |

Source: All India Report on Agricultural Census, 1970-71. P. 59.

Farmers with holdings of less than 1.0 hectare devoted 45.3 % of their total area to rice. The figures for size groups 1.00 - 2.00 hectares, 2 - 4.0 hectares, 4 - 10 hectares and 10 hectares and above were 37.1 %, 18.4 % and 9.6 % respectively showing a strong negative correlation between the size of holding and the degree of specialization in paddy. Within food crops, larger farmers had less diversification with 2 % or more of their area under five crops, the number of such crops for small farmers was eight. Similarly, in case of cash crops, large farmers were more specialized, devoting more than 1 % of their total acreage to only two crops viz cotton and groundnut. The small holders had more than 1 % of their total area under each one of the four major crops. Thus both in case of food as well as non-food crops small farmers had decided on a smaller degree of specialization as compared to large farmers.

A greater degree of specialization in crops generally entails a heavy requirement of labour during peak season and little at other times. Livestock farming is an exception where the labour needs are fairly uniform. However, dairy farming generally requires much more investment than arable farms. Specialization is, generally, capital intensive and capital is a limiting factor on most farms in developing countries like India. Hence the production is not so specialized. Another reason for diversification is that, except for dairy, poultry and vegetables, the income flow from most other enterprises is intermittent. A farmer, having small amount of capital to start with, may decide in favour of specializing in crops like vegetables (provided the market exists) which have a rapid turnover.

Higher degree of specialization requires expert management in the special enterprise. This is not only in the area of organizing all the resources but also applying latest suitable (appropriate) technology and making appropriate arrangements for the proper marketing and storage of the produce.

## 2. Marketing facilities

The market mechanism is a device for the transmittal of preferences of the consumers to the producers and affects the degree of specialization. Even small holders in the vicinity of big towns and cities like Delhi and Bombay have highly specialized farms and grow vegetables and maize for cobs or keep some heads of dairy animals and poultry because they find a ready and profitable market for their products.

In several hill areas, the soil and climate are ideal for specializing in temperate fruits. However, lack of suitable market in the neighbourhood and high costs of transportation force the farmers to divert orchard lands to other enterprises. A high degree of specialization in sugarcane is found in the vicinity of sugar factories.

At the macro-level, the establishment of factories and processing facilities may be a consequence of regional specialization in agricultural production (as dictated by physical factors) whereas these in turn open new marketing opportunities to individual farmers who may decide to specialize in the production of that crop. Thus marketing infrastructure may be both, a cause and a consequence of the degree of specialization.

## 3. Relative profitability of farm enterprises

Farmers give due consideration to the relative profit ability of enterprises. For example, in Western Uttar Pradesh, soil and climatic conditions are amenable to the production of both, sugarcane and cotton. However, because of its high income relative to cotton, sugarcane is grown extensively in the region and the acreage under cotton is meagre. In 1970-71, there was a record harvest of 8 million tons of BAJRA (*Pennisetum Sativum*) in India, partly because of good weather and partly because the farmers increased the area under this crop on account of its relatively high profitability in the previous year. This created a glut in the mar-

ket, and the post-harvest price dipped bringing disaster to BAJRA growing farmers. Consequently, the farmers reduced their acreage under this crop from 12913000 hectares in 1970-71 to 11,773000 hectares in 1971-72.

(iv) Human, social and institutional factors

The degree of specialization is dependent on a farmer's skills as a cultivator, manager, seller and buyer, because most farmers in India perform all these functions. The personal likes and dislikes of the farmer and his family may have a strong influence on the cropping pattern. A risk-averse farmer does not want to put all his eggs in one basket. He diversifies.

Religious and social affinities also affect the choice of enterprise and the technique to be used. Hog production is considered to be an enterprise of a very "low" social status and except for HARIJANS, no one else rears pigs in India, unlike western countries where hog farming is a highly specialized enterprise. Similarly, about two decades ago, keeping poultry was not looked very favourably in the Indian society. Now, with a change in social attitudes, specialized poultry farms have sprung up all over, mostly near big cities and towns. In Western U.P., in many villages a particular community specialized in dairy farming. "In Africa, much overstocking of pastures (high degree of livestock) is due to the prestige conferred by ownership of mere number of cattle, and to their use in paying bride-price." (3, P. 85).

Availability of irrigation and credit facilities help in reducing the variability in yields and incomes through the adoption of less-risky and specialized technologies, thereby encouraging the degree of specialization. Though in some cases, climate and other factors permitting, increased availability of these factors is conducive to multiple cropping and hence diversification. Establishment of credit and marketing institutions and facilities of transport and communication also play similar roles for reasons mentioned

earlier. The activity of extension agency influences the degree of specialization on a farmer's holding by informing him about the new enterprises and methods of production, use of different inputs and the sources of their supply, and likely costs and returns. In India, some nationalized banks have "adopted" whole villages for the local supply of credit, necessary inputs and expertise for the adoption of improved varieties of paddy and wheat on a large scale. In some places, they have encouraged fruit growing by setting up processing and marketing facilities. Several agricultural universities and institutes organize farmers' fairs of one or two days during each of the growing seasons. The farmers are informed of the dates through block development officers, radio announcements, advertisements in newspapers and publicity vans. During the fair, a farmer has the opportunity to see the experiment and demonstration plots and get answers to his questions by specialists. He can also give his soil for testing, and get suitable fertilizer recommendations for the next crop. He is also able to buy a limited quantity of seed of the new varieties for the coming season.

#### (v) Policies of the state

State, by its price, credit and institutional policies can influence the pattern of specialization both at the macro and the micro-level. As already pointed out, by making the relative price of sugarcane highly attractive, the state has turned western U.P. into a sugarcane region at the cost of cotton. Putting a ceiling on holdings reduces the number of a larger holding and as we have seen, other things being the same, discourages the degree of specialization.

#### (vi) Nature of enterprise

Some enterprises lend themselves easily to vertical integration and hence a high degree of specialization in their production on the farm. Several sugar factories in India own estate farms growing nothing but sugarcane for them. The same is true for tea. Other plantation crops like coffee, rubber, etc., which require sophisti-



cated and specialized processing, are also found to be cultivated by the farmers at a high degree of specialization.

## VI. TWO EXAMPLES FROM INDIA

In the following sections, we present two case studies. The first explains the regional differences in the specialization of crops within one district of South India. The second deals with changes in the degree of specialization on a typical farm situation in North India under dynamic environment of prices, technology and information. We must hasten to add that these are only illustrative of some factors affecting the degree of specialization and should not be taken to represent all farming conditions in India for obvious reasons. India is a large country having regions of extremely diverse climatic, soil, social and infrastructural conditions. In addition, though the central government has a strong influence on agricultural policies, agriculture is still primarily the responsibility of the state and hence one finds a wide variation in laws regarding ceiling size on holdings, agricultural income tax and revenue structure, etc.

Moreover, because of the zoning policies of the national government with respect to crops like paddy and wheat, the marketing opportunity available to the farmers in different states were different.

### CASE A: Regional Differences in the Specialization of Crops within one District of (South Kanara) India (Source: Agrawal, et.a.)

1. Geographical features: The district has 3 natural divisions

- (a) Western Ghats with dense forests and high rainfall - as represented by Karkal Taluk <sup>+</sup>)
- (b) mainly hill region - as represented by Puttur Taluk
- (c) low land - as represented by Adipi Taluk.

+ ) A TALUK is an administrative sub-division of a district.

2. Climate: (a) tropical monsoon, marked by heavy rainfall, high humidity and oppressive weather in hot season.
- (b) 87 % of annual precipitations of 3930 mm received from south-west monsoon in June-September. The rainfall as well as the number of rainy days increases from the coast towards the Western Ghats.

3. Infrastructure: well developed.

4. Main occupation of population: agriculture.

5. Education: High level of literary in relation to all-India average.

6. Social structure: Wide spectrum of religions.

| 7. <u>Rotations</u> : | 1st season<br>(June/July -<br>Sept/Oct) | 2nd season<br>(Oct/Nov -<br>Jan/Feb) | 3rd season<br>(Jan/Feb -<br>April/May) |
|-----------------------|---|--------------------------------------|--|
| (a) Irrigated         | Paddy                                   | Paddy                                | Paddy                                  |
| (b) Irrigated         | Paddy                                   | Paddy                                | Pulses                                 |
| (c) Unirrigated       | Paddy                                   | Pulses                               | -                                      |
| (d) Unirrigated       | Paddy                                   | Maize                                | -                                      |
| (e) Unirrigated       | Paddy                                   | Ragi                                 | -                                      |

8. Population density, average size of holdings and cropped area under main crops in 3 selected Taluks is given in table 2.

Table 2

Showing Population Density, Average Size of Holdings and Cropping Pattern

|  | NAME OF TALUKS |        |        |
|--|----------------|--------|--------|
|  | UDIPI          | PUTTUR | KARKAL |
| Population density (Number/<br>Sq/Km)  | 415            | 171    | 159    |
| No of farmers in the sample  | 64             | 71     | 65     |
| Average size of land holding of<br>interviewed farmers (acres)                     | 3.5            | 5.9    | 6.7    |
| Area under the following<br>crops as % of the main crops<br>of interviewed farmers |                |        |        |
| (i) Food grains  | 96.2 %         | 57.1 % | 88.5 % |
| (a) Paddy  | 68.5 %         | 54.6 % | 81.7 % |
| (b) Pulses)  | 27.8 %         | 2.5 %  | 6.8 %  |
| (ii) Chillies  | .1 %           | -      | 6.9 %  |
| (iii) Other vegetables   | 2.8 %          | 1.2 %  | 2.9 %  |
| (iv) Area nut  | .8 %           | 41.7 % | 1.7 %  |

9. Analysis of results

- (a) Because of climatic reasons, as seen from rotations given in 7., the region specializes in paddy production.
- (b) There are important regional differences within the district in the degree of specialization with respect to different crops.

- (c) In Udipi, the degree of specialization for food crops is much higher because a high population density and a rather small size of holding make a high percentage of subsistence farming necessary.
- (d) Karkal also has a high percentage of area under food crops despite low population density and a relatively higher average size of holding. This is explained by two facts:
- (i) the region receives a high rainfall and hence is climatically best suited for paddy, and (ii) the farmers of this Taluk have a ready market for paddy in the nearby areas of high population density. All the 65 farmers, interviewed in Karkal, were growing paddy. 37 sold paddy and 31 of these sold more than 10 % of their total produce.
- (e) A lower density of population in relation to the larger size of holding and hilly region permit the Puttur farmers to achieve a high degree of specialization in arecanut and grow them on commercial basis. Of all the farmers growing arecanut in this Taluk, 49 % had between 1001 - 5000 trees and 70 % had more than 500 trees, resulting in considerable incomes to the farmers. Of the 71 interviewed farmers in Puttur, 66 had arecanut trees and 64 of them were selling more than 90 % of their produce. The arecanut farmers sold more than 53 % of their produce through the cooperatives showing that the marketing institutions for this crop are well developed.

CASE B: Changes in Specialization in a Dynamic Environment on a Farm in Northern India. (Source: Singh and Pandey)

Given below is the case of a progressive farmer who approached an Indian agricultural university for help in increasing his farm income through reallocation of his existing resources. Though the data pertain to 1964-65 and 1966-67, the findings are valid for

illustrating the factors responsible for changes in the specialization of farm production.

1. Location: Central Uttar Pradesh, India
2. Area under cultivation: 25 acres (Size of farm is 27 acres of which 2 acres are not available for cultivation)
3. Climate: Sub-tropical. Relatively high humidity throughout the year.
4. Soil: Sandyloam to loam.
5. Management: Good.
6. Human and animal labour: Very adequate.  
availability:
7. Irrigation: Tubewell owned by the farmer.  
Water from government canal also available for irrigation.
8. Milch animals: Two
9. Changes in the degree of specialization are indicated in table 3.

Table 3

Showing Changes in Specialization On an Indian Farm in a Dynamic Environment

| Enterprise +)                   | % of total cropped area in |             | % contribution to total net farm income in |         |
|---------------------------------|----------------------------|-------------|--|---------|
|                                 | 1964-65                    | 1966-67     | 1964-65                                    | 1966-67 |
| 1. Foodgrains of which:         | 51.4                       | 70.5        | 55.23                                      | 85.16   |
| (a) Wheat                       | 28.6                       | 33.7        | 40.66                                      | 56.10   |
| (b) Paddy                       | 11.4                       | 36.8        | 7.57                                       | 29.06   |
| (c) Others (barley and sorghum) | 11.4                       | 0.0         | 8.00                                       | 0.0     |
| 2. Pulses                       | 5.7                        | 4.2         | 3.71                                       | 3.38    |
| 3. Vegetables                   | 5.6                        | 14.8        | 9.08                                       | 11.53   |
| 4. Sugarcane                    | 28.6                       | 7.3         | 30.38                                      | -.12    |
| 5. Fodder                       | 5.8                        | 3.2         | .87  | .21     |
| 6. Cotton                       | 2.9                        | 0.0         | 1.18                                       | 0.0     |
| 7. Milch animals                | 0.0                        | 0.0         | -.45                                       | -.16    |
| Total                           | 100.0                      | 100.0       | 100.00                                     | 100.00  |
| Total cropped area              | 39 acres                   | 47.50 acres |  |         |

10. Analysis of information

(a) In 1964-65

(i) The farmer devoted around half of his total cropped area to foodgrains. (ii) The total number of crops grown on the farm was 11 (classified into 6 broad categories in table 3), with wheat and sugarcane being the two most important crops in terms of area as well as net income.

(iii) All of the fodder and pulses and most of the vegetables were produces for home use. Same was the case with milk.

(b) In 1966-67

(i) The cropping pattern shows a marked shift from sugarcane to a still greater specialization in foodgrains and to some extent in vegetables. (ii) The farmer raises nine crops (classified into 5 broad categories in table 3).

(iii) Amongst foodgrains, the farmer has completely dropped barley and sorghum and moved to a very high degree of specialization in wheat and paddy. (iv) Cotton is also done away with. (v) Sugarcane has been replaced by foodgrains as a major source of income. The farmer also sold some vegetables.

(c) The reasons for the shift are as follows!

(i) In the beginning of 1964-65, cash crops (e.g. Sugarcane) were relatively more profitable than most food crops. At the end of 1965-66, the relative prices of various crops changed in a way that food crops had a greater comparative advantage over cash crops. (ii) This was also the time when farmers adopted technological improvements in paddy and wheat by substituting high-yielding-varieties for local varieties through the farm planning advice of the university staff.

(d) Because of the introduction of high-yielding-varieties in wheat and prevalence of an unusually high level of wheat prices, the contribution of this crop to the net income of the farmer has exceeded 56 %. In fact in terms of remunerativeness, wheat has become a "cash" crop for the farmer resulting in a high degree of specialization.

VII. EPILOGUE

In this paper we have attempted to deal with important variables that influence the degree of specialization in agriculture at the

micro- and macro-levels. Within the limits set by the ecological factors of climate, soil, altitude, natural flora and fauna, etc., the decisions of the farmer, communities or governments with regard to the degree of specialization in agriculture are conditioned by several economic, human, social and political factors such as personal preferences, resource endowments and availability, expected profits, traditions and customs, infrastructure and institutions, level of available technology, and so on. These decisions taken after a good deal of thought and experience can, however, be only as good as the quality and the quantity of information about these factors on which such decisions are based.

As the farmer moves to a higher degree of specialization, he feels the necessity for more specific and detailed information on items such as the techniques of production, availability of inputs prices of factors and products, weather conditions, and the markets. His sources of information tend to be more and more specialized. The advice of the extension worker alone may no longer be adequate and the farmer looks much beyond what a typical extension worker ordinarily has to offer by way of information. He tries to supplement it by information from subject-matter specialists, technical and popular journals and other farmers specializing in these enterprises. The larger the size of the farm, the greater is the proportion of crops/livestock products grown for the market and hence more technical and diverse are the sources of his information. In fact, at a high degree of specialization, the farmer himself becomes a very reliable and significant source of information to other fellow farmers, extension workers and even the subject-matter specialists and research workers.

The information regarding ecological factors comes to an Indian farmer from past experience of his own, relatives or local people. He himself is the source of information on the quality and quantity of land, labour and capital available to him during different times of the year. The information regarding prices, availability



of inputs, demand for output, etc. is obtained from neighbours, extension workers, Government officials, and shop-keepers. He learns about the new crops and techniques from extension workers, university scientists, state departments of agriculture, horticulture and animal husbandry, agricultural officers of the bank, his neighbours, and relatives, etc.

As we have seen, the farmer is quite sensitive to the changes in the exogenous and endogenous factors and adjusts his cropping pattern accordingly. However, the soundness of his decisions with respect to the degree of specialization is, among other things, a function of the transparency and the accuracy of the information used by the farmer for making decisions. The role of the state and the extension agencies in this respects is extremely important in India.

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