**M.A. (ECONOMICS) PART-I** **PAPER V (OPTION-I)**

**SEMESTER-I**

**ECONOMICS OF AGRICULTURE**

**SECTION-A**

Department of Distance Education
Punjabi University, Patiala



**LESSON NO :**

**M.A. (ECONOMICS) SEMESTER I** **PAPER V (OPTION I)**
**(ECONOMICS OF AGRICULTURE)**

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**LESSON NO. 1.1** **AUTHOR : DR. VIPLA CHOPRA**

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# NATURE AND SCOPE OF AGRICULTURAL ECONOMICS

The words agricultural economics are made of two words, viz. agriculture and economics. Before we define agricultural economics as a whole, it would be appropriate to define agriculture and economics separately. The word 'Agriculture' has no rigid definition. It has been explained by many people very comprehensively. Agriculture has been defined as the science and art of cultivating the soil and this definition emphasizes the primary nature of plant production in agriculture. Moreover, it is so frequent that the same person performs both primary functions of growing plants and the secondary one of feeding the plant to livestock that these industries are grouped together as agriculture. Therefore, it may be said that agriculture includes not only the production of crops by the cultivation of the soil, but also the rearing of livestock, milk, meat and wool are as much agricultural products as are wheat, rice and cotton. In the words of George O' Brien, the word agriculture includes "every industry which aims at producing vegetables or animals by the cultivation of the soil." So agriculture is the business of raising products form the land, the products raised may either be plants and their products or animals and their products. The former are the direct products of the land. Agricultural products are complex and diverse in nature, and as such agriculture may be regarded as a complex industry. According to John W. Goodwin, "Agriculture may be defined as the production, processing, marketing and distribution, of crops and livestock. These four activities were all farm centred at one time. However, improvement in technology, division and specialization of labour have moved some of these activities away from the farm into certain strategic central points. We can define agriculture economics as the social science concerned with the allocation of scarce resources among those uses associated with producing processing and consuming the products of farms and ranches.

Modern agriculture is much broader in scope than merely the art and science of cultivating the land. It is the whole business of supplying food and fibre for a growing population at home and abroad.

Again, in agriculture, we include all forms of soil production, from forestry to

glass house culture, from fishery to artificial insemination, and from breeding to horticulture.

Economics, on the other hand, is the science of analysis of the use of limited resources to achieve desired ends. It is a social science which studies how man satisfies wants through the allocation of scare resources. Prof. Robbins has defined economics as "the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses." The gap between what people wish to have and what they actually can afford to have is of central concern in economics. In real life situations, the gap does exist and it has been the main preoccupation of economists to evolve ways and means of reducing this gap.

After having discussed the definitions of agriculture and economics separately, we are now in a position to define agricultural economics. Agricultural economics as a separate branch of economics is a recent addition to economic literature. Various books on agriculture have been written in the past, but well thought out effort on agricultural economics as a separate discipline started only in the beginning of 20th century when interest in economic issues related to agriculture erupted in several educational centres. It was only after the depression of 1890's which seriously affected farm activities that organised farm groups and developed interest in farm management problems. This new field of agricultural interest was later designated as agricultural economics. The emergence of industrial revolution stimulated the growth of agriculture and faciliated understaning of its importance. This stimulation and understanding of the growth of agriculture gradually resulted in the evolution of agricultural economics may be defined as an applied phase of economics in which attention is given to all aspects of problem related to agriculture. It helps the farmer in deciding about what kind of food should be produced, which crop should be raised to maximize his profits and at what level he should price his products. Jouzier was one of the earliest economists to define "Agricultural Economics." According to him, "Agricultural Economics is that branch of agricultural science which treats of the manner of regulating the relations of the different elements comprising the resources farmer whether it be the relations to each other or with other human beings in order to secure the greatest degree of prosperity to the enterprise."

Prof. Goodwin defines Agricultural Economics as "a social science that is connected with human behaviour during the process of producing, processing, distributing and consuming the products on farms and ranches."

Prof. Gray defines agricultural economics, "as the science in which the

principles and methods of economics are applied to the special conditions of agricultural industry." Thus Prof.. Gray treats agricultural economics as a branch of general subject of economics. It is only one of the many branches of applied economics, such as industrial Economics, labour Economics, Monetary Economics, Transport Economics, International Economics, etc. Thus, according to Prof. Gray, agricultural economics is only a phase of an immense field called economics in which primary attention is paid to the analysis of the economic problems associated with the agriculture.

According to Snodgrass and Wallace, "Agricultural economics is an applied phase of the social science of economics in which attention is given to all aspects of problems related to agriculture."

Prof. Hubbard has defined agricultural economics as, "the study of relationship, arising from the wealth-getting and wealth-using activity of man in agriculture."

According to Dr. Taylor, "Agricultural Economics deals with the principles which underline the farmer's problems of what to produce, how to produce it, what to sell and how to sell it, in order to secure for himself the largest net profit consistent with the best interest of the society as a whole. More specifically," Agricultural Economics teats of the selection of land, labour and equipment for a farm, the choice of the crops to be grown, the selection of livestock enterprises to be carried on, and the whole question of the proportions in which all these agencies should be combined. These questions are treated primarily form the viewpoint of costs and prices. "Taylor's definition appears to be a pretty careful definition of farming from the point of view of farm management and therefore, is narrow and limited in scope."

According to Prof. Heady, "Agricultural Economics is an applied field of science wherein the principles of choice are applied to the use of capital, labour, land and management of resources in the farming industry. As a study of using resources efficiently, it is concerned with defining the conditions under which the ends or objectives of farm managers, farm families and the nation's consumers can be obtained to a greater degree."

According to Prof. Edgar Thomas, "Agricultural Economics is concerned with farming as a business and with agriculture as an industry. In the more restricted sphere of farm management, the student of agricultural economics is concerned with the business problems of the farm as the producing unit of the industry. In the wider sphere of social economics, he is concerned with the general economic pattern of the agricultural industry as a whole and with the forces responsible for the moulding of that pattern, he is also concerned with the relation of the agricultural industry to other industries within the

national economy as well as with its place in world economy".

According to Prof.. Holcrow, " Agricultural Economics is concerned with the allocation of resources in the agricultural industry, with the alternatives in production, marketing or public policy. Agricultural economists are concerned with the study of efficiency in farm production, with the returns that will result from employing various quantities and combination of inputs in farming and with determining the best farm production alternatives under given physical and economic conditions. They are concerned with the economics of agricultural markets, with the cost of marketing various farm products, and with the alternative steps or changes that may be made in the marketing structure to serve the objectives of society more efficiency. They are interested in analysis of the alternatives in public policy and the economic effects of carrying out a particular programme, such as price support law or a soil conservation programme. Agricultural economists make use of the tools of economic analysis in studying the operation of the individual firm in agriculture, in analysis agricultural markets and marketing structure and in evaluating the impact of various policies related to agriculture".

In the conclusion of all these, we may define agricultural economics as that branch of general economics in which principles of economics are applied to solve agricultural problem to maximize agricultural production.

**Scope of Agricultural Economics**

The foregoing definitions indicate the scope of agricultural economics. The scope of agricultural economics is very wide. A number of forces are actively involved in agricultural activities whether it is production, processing, marketing or consumption. Some of them are physical and are taken care of by soil scientists, geologists, soil chemists and physicians and some other forces are biological which are studied by animal and plant physiologists, geneticists, entomologists, bacteriologists and pathologists. Agriculture is also governed by some economic and sociological forces. Agriculture is a vocation as well as a way of life. This unique characteristic refers to a relationship between economics and sociology. And it is with this relationship, that agricultural economists deal. There are some relationships which are of purely economics nature. Input - output relationship, cost and revenue relationship, production decisions, price decisions, maximization of output/profit or least-cost combination of inputs, income-distribution and trade are some aspects to which economics pay attention. Demographic structure, working condition, customs, traditions and rituals of rural population and their impact on the thinking of rural masses and on their way of living are some sociological

aspects where sociologists show their keen interest.

Thus, the scope of agricultural economics, as Taylor pointed out, "deals with the principles which underlie the farmer's problems of what to produce, how to produce it, what to sell and how to sell it, in order to secure for himself the largest net profit consistent with the best interest of the 'society as a whole.. More specifically. "Agricultural Economics treats of the selection of land, labour and equipment for a farm, the choice of the crops to be grown, the selection of livestock enterprises to be carried on, and the whole question of the proportions in which all these agencies should be combined. These questions are treated primarily from the viewpoint of costs and prices."

Although Taylor deals with the subject in broader prospective, yet the whole treatment rests only on the problem of production. And as such as impression emerges that agricultural economics has nothing to do with the problem of consumption and distribution of farm productions. But this is not true. Consumption, processing and distribution economics is as important for farm people as it is for them to understand the economics of their farm production. They are, therefore, part of the economics of agriculture.

To be specific, the scope of agricultural economics includes the production, distribution, consumption and government activities in relation to agriculture and farm enterprises. The main problem is of choosing the most profitable activity. The task of agricultural economists is to point out what is best to do in the economic interest of rural community under the given conditions. The scope is very vast which includes every phase of national activities that effect farmers in their efforts to make a happy and prosperous living.

In agricultural economics, we study farm products, livestock and livestock products, horticulture, sericulture, fisheries etc. Agricultural economics makes use of tools of economic analysis in studying the operation of the individual firm in agriculture, in analysing agricultural markets and marketing structure and in evaluating the impact of various policies, regarding agriculture. Further, the study of agricultural economics does not end in attaining the monetary return or maximum individual satisfaction of the farmer, but ultimate objective is to secure in maximum social welfare.

Agricultural Economics does not study only the behaviour of a farmers at the farm level, the micro analysis agricultural problems have a macro aspect as well. Instability of agriculture and agricultural unemployment are the problem which have to be dealt with, mainly at the macro level. And then, there are the general problems of agricultural growth and the problems like those concerning tenurial systems and tenurial character. Such problems, their

origin, their impact and their solutions are all the subject matter of agricultural economics. The scope of agricultural economics is larger than mere economising of resources.' Agriculture is, as we know, an important sector of the overall economy. The mutual dependence of the various sectors of the economy on each other is well established. Growth of one sector is necessary for the growth of the other sector. As such in agricultural economics, we also, study how the development of agriculture helps the development of the other sectors of the economy; how can labour and capital flow into the non-agricultural sectors; how agricultural development initiates and sustains the development of other sectors of the economy; What this implies is that agricultural economics not only develops principles concerning the use of scarce resources in agriculture properly but also examines the principles (a) regarding the out flow of scarce resources to other sectors of the economy and (b) about the flow of these scarce resources from other sectors to the agricultural sector itself.

In fact, the whole subject of Agricultural Economics is not covered within the purview of the following departments: (i) economics of production; (ii) economics of distribution; (iii) economics of consumption (iv) economics of marketing; and (v) economics of planning and policy-making. So vast is the canvas of Agricultural Economics that it cannot be encompassed within the narrow range of these departments.

Thus, the subject-matter of Agricultural Economics makes clear how wide is its coverage, from an application of economic principles to farm organization and management on the individual farm as the primary unit of production, i.e. at the micro level and then at the national and international levels, to the formulation of agricultural policies and enlightenment on relations between farmers and the community, the States and the individuals and the institutions which deals with the farmers in supplying farm requisites, sale and processing of farm products, credit etc. It is enlightenment which leads to a better understanding and co-operation between the farmers, the State and various institutions which provide economic service to the farmers.

**Nature of Agricultural Economics**

Agricultural economics is both a social science as well as a natural science. As a social-science, we study farm activities, decisions and functioning which are greatly influenced by society. The society, in turn, is also affected by the farmer's decisions. Since farmers' decisions are to some extent affected by his own psychology, social institutions and other religious taboos, their activities cannot be measured in such a precise manner as are possible in laboratory

experiments. In this respect, agricultural economics is subject to all such influences which exist within the domain of social-sciences.

As a natural science agricultural economics deals with thorough examination and evaluation of scientific innovations in relation to agricultural activities. Since agricultural economics is an applied science, the practical wisdom of an agricultural economist seems to be more useful than the volume or his theoretical knowledge. The nature of agricultural economics is unique as all the practical aspects of agriculture are controlled and governed by nature. In no other economic' phenomenon as in agriculture is the nature so strongly directly and closely involved. The problem of maximization of output, therefore, more complex in agriculture in comparison to other sectors. Obviously, the solution is also more uncertain. Varying agro climatic conditions, soil-fertility lead to inter-regional and intra-regional heterogeneity in the production conditions. This creates the problems of differential achievements under varied geo-economic conditions.' The problem of agricultural production is, therefore, complex and multi-dimensional.

The nature of agricultural economics is unique because of the important role that nature plays in its working. In no other economic phenomenon as in agriculture is nature so directly and strongly involved. The problem of maximization of returns is, therefore, more complex and the solution to the problem more uncertain as varying agro-climatic conditions, economic systems, soil fertility and soil capacities lead to inter-regional and intra-regional heterogeneity in the agricultural production conditions. This creates the problem of differential achievements under different geo-economic conditions. The problems of agricultural production are, therefore, multidimensional and the subject of agricultural economics has to develop in the light of these problems that it seeks to investigate and work with.

Seasonality is another unique factor that distinguishes agricultural production activities from other non-agricultural production activities. Naturally, market fluctuations are more sharp and frequent in agriculture sector in comparison to non-agricultural sectors. The nature of agricultural activities is such that it involves the whole family in pursuit of livelihood; it becomes a way of life, a culture besides, of course, a means of livelihood. The very word "agriculture" reflects that is more a culture, a way of living than a profession and a business enterprise.

**Conclusion :** Agricultural economics is an applied field of economics which analyses the principles of choice applied to the use of scarce resources such as land, labour, capital and management in the farming and allied agricultural activities. It decides what should be produced, which crops should be raised

to maximise profit and what should be the price of the product. As a social science, agricultural economics is concerned with the allocation of scarce resources among the uses' associated with producing, processing and consuming the farm products. The problem of allocating scarce means for diversified uses is more crucial in agriculture than any other sector because the land which is the basis of all agricultural pursuit is highly limited. Hence the theoretical frame of agricultural economics should be such which could provide plausible methods and procedure of using precious and limited resources for the maximum satisfaction of society. Agricultural economics is, therefore, both theoretical and applied in its character. It is theoretical because it deals with the development of principles of resource economics, production economics and distribution economics. It is an applied science as well as it deals with the application of these principles in diversified production, consumption and distribution activities related to agriculture.

**M.A. (ECONOMICS) SEMESTER I** **PAPER V (OPTION I)**
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# FACTORS AFFECTING AGRICULTURAL DEVELOPMENT

## Introduction

Agriculture plays an important role in the initial stages of economic development in every economy. With the development industrial sector, development of agricultural sector is very essential. In fact, economists agree that, there is no competition between agriculture and industry but they are complementary to each other. Both are closely related to each other. This will be discussed in detail in the next lesson. In this lesson we discuss why agriculture develops at a faster rate in some economies and at slow pace in different economies. Different factors play their positive and negative roles in the development of agriculture in different countries. For example, lack of irrigation facilities is responsible for less developed agricultural in Arab countries. Nature of people, customs, illiteracy, poverty technical backwardness, lack of capital etc. are responsible for the slow growth of agriculture in most of the third world countries. Factors which affect the development of agriculture are discussed in this lesson. The lesson is divided into three sections. Section I deals with the general factors. Technical factors are included in the section II and institutional factors are discussed in the III Section.

## I. General Factors

### I. Natural Conditions :

Natural conditions have an important role in the development of agriculture. If natural conditions are favourable, it would increase the production and productivity both. In agriculture, climate, temperature, sunlight, season, quantity of rainfall, time of rainfall, humidity, type of land and productivity of land have their influence on the development of agriculture. Irrigation facilities are not fully developed in most of the poor countries, therefore agriculture depends upon rainfall, which may fail and agricultural production is adversely effected. Type of land affects the agricultural production. Despite the development of new techniques of production, productivity on desert land remains low. Ultimately, favourable natural conditions help to develop

agriculture. Diversity in agricultural production is possible because of the diversity in natural conditions. India produces a wide range of products in agriculture, i.e. food crops, cash crops, fibres and so on, an account of diversity of natural conditions.

**II. Availability of Arable land :**

Development of agriculture sector depends on the availability of land as compared to the population. Population pressure on land reduces the size of farms and make the agriculture non-beneficial. Despite suitable investments and hardwork, returns are meagre on small farms. This blocks the development of agriculture. The farmers fall into a vicious circle, less returns reduces the investible funds in the next round and agriculture remains backward for long. Thus appropriate size of farm, helps the growth of agriculture. Relationship between size of farm, productivity and profitability is still a debated issue.

**III. Increase in population :**

Growth of population is linked to growth of agriculture. If the population grows at a higher rate, it increases the pressure on agriculture and reduces the investible funds. Low per capita income results in low savings and less investment. consequently, capital formation does not take place. It reduces the rate of growth in agriculture. Prof. Coale and Hoover, prove in their analysis, that more people means less production. Lewis also suggests the reduction of population in agriculture. On same lines Prof. Nurkse suggest that disguised unemployment can be used for capital formation and economic development.

In fact, increase in population creates many problems for agriculture, such as subdivision and fragmentation of land, low saving and low investment, rural indebtedness, lack of marketable surplus etc. That is why the countries with low population pressure can adopt scientific methods in agriculture. Thus, it is very clear that high population pressure is a major obstacle for the development of agriculture.

**IV. Pattern of production :**

If production is for market, it increases the income of the farmers and further induces him to make investments. It strengthens the infrastructure and productivity in the agriculture. Indian agriculture remained mainly for consumption and there was less marketable surplus. Hence, Indian agriculture remained backward.

**V. Price Stability :**

Agriculture production also depends on the price stability. The demand for agriculture production is demand inelastic. Over production in agriculture in

any season, may reduce the prices of agricultural products. Agricultural products are difficult to store, that is why, excessive production in market during peak seasons, depresses the agriculture prices. Many other factors have their influence on the prices of agricultural products. Stability in agriculture prices create certainty for the farmers and induces them to produce more. Agriculture price Commission was established in 1965 to give support prices and procurement prices to farmers, with a view to provide stability.

**VI. Size of Holding :**

Different economists have different opinions regarding the size of holding. Evidence shows, that if the size of holding is economical, it would lead to higher production. Optimum size of holding helps in the optimum use of resources.

Optimum size of holding depends upon many factors such as population size, pressure on agriculture, cropping pattern, method of farming, type of irrigation and so on.

**VII. Availability of transportation and storage facilities :**

Transport and storage facilities have their influence on agriculture production. Suitable transport facilities help agriculture to get the inputs in time. In addition, farmer can bring his products in the market without any difficulty. Increase in the income of the farmer creates more incentives to produce more. Agriculture products are perishable so they require storage facilities. Farmers can withhold their products until they are able to get reasonable prices in the market. Hence they avoid selling their products on throw away prices. Suitable efforts have been made to develop rural roads and warehousing. Undoubtedly, theses developments have increased agricultural production and productivity. Rural economics are no longer self sufficient economics. They are producing for the markets and linkages with the urban areas have increased. This has improved their living standards and motivated them to work more and produce more.

## II. TECHNOLOGICAL FACTORS

Agriculture development depends upon many technological factors. Technological factors increase the productivity of farms and consequently the income of the farmer. Technological improvements include improvement in irrigation facilities, high yielding variety of seeds, chemical fertilizers, insecticides, hybrid seeds, scientific methods of farming, inventions, research and training for the farmers. Technological improvement either reduces the cost of production or increases the per unit (hectare) production. Here, we discuss these factors in greater detail one by one.

**I. Irrigation Facilities**

Developed irrigation facilities are very necessary for the growth of agriculture. Dependence on rainfall is risky. Assured irrigation helps the farmers in multiple cropping, use of high yielding variety seeds, use of insecticides and pesticides. Modern agriculture is impossible without suitable irrigation facilities. Timely supply of water to the crops helps to flourish them. Since independence, every type of source has been developed including the drip and sprinkle irrigation. Still these facilities are inadequate and Indian agriculture still largely depends upon the monsoons. As Punjab has comparatively more irrigated land, therefore, it has performed well in agriculture.

**II. Availability of Inputs**

For the proper development of agriculture, farmers should get suitable supply of inputs such as high yielding variety of seeds, chemical fertilizers, insecticides, improved instruments etc. In addition, they must have the purchasing power to purchase these inputs. Prof.. Schultz has emphasized the availability of credit facilities. India has developed a network of banking system such as commercial banks, Land Development Banks, Co-operative Bank, NABARD and so on to provide credit to farmers to purchase the required inputs. Sometimes, the credit is supplied in kind also.

**III. New Technology**

New and scientific methods of production have an important role to play in the development of agriculture. Use of new techniques such as drilling, use of green manure, use of vermiculture, drip irrigation, spray irrigation, dry land farming etc. improves the productivity of agriculture manifold. Japan could develop agriculture in unfavourable conditions with the use of new techniques of production.

**IV. Mechanisation of Agriculture**

New machines have significant importance for more production in agriculture. Multiple cropping has become possible due to the use of tractors and machines. Quick harvesting is possible with harvester combine, which helps to save the crop from sudden bad weather. Agriculture can be done with less time and lower cost with the use of drill, disk ploughing etc. Assured irrigation is possible due to the use of tubewells. The use of machines also contributed in bringing about Green Revolution in India. Agriculture of developed countries is fully mechanized. In countries, where manpower is scarce, machines help more.

**V. Research and Education**

Research and education is necessary for technological improvements. High

yielding varieties are developed with the help of new research. Seeds are developed which can mature in shorter period. New implements are developed, which reduces the cost of production. Laboratories and agriculture universities have their significant contribution regarding these aspects. The research will be useless until the farmers are made conversant regarding these researches. They must be trained to use these new methods. Thus, the education of farmers helps in this regard. Propaganda and demonstration also makes the farmers familiar with new research.

## III. INSTITUTIONAL FACTORS

Undoubtedly, technological improvements increase the agriculture production and productivity. Institutional setup of any economy determines who benefits form the development. Institutional factors have their role in the development of agriculture. If the cordial relations and favourable institutional setup is established, it would help the agriculture and the economy as a whole. We discuss the institutional factors which influence the growth of agriculture.

### I. Marketing Facilities

Facilities for the sale and purchase of agricultural products are crucial for the growth of agriculture. Suitable marketing facilities increases the agriculture production and induces the farmers to produce more.

Agricultural inputs should be easily available to the farmers at reasonable prices and markets for their produce should be close to their farms. They should be able to get remunerative price and exploitation by the mediators should be absent. Suitable institutional arrangement is necessary to purchase the produce of farmer. Alongwith markets, storage capacity should be there. Prof. Oorin and Shaw say, "Agricultural development is first of all a human problem. If all the farmers have access to production inputs, the financial system, the market and agricultural knowledge, they can improve the state of agriculture. But most farmers lack access to the market and this leads to shortage of both resources and the incentives to modernize the production method.

### II. Availability of Capital and credit

In modern age agriculture is considered as an industry. Availability of capital and credit is the first condition for the development of industry. Like Industry agriculture also requires capital and credit to purchase inputs and for other payments. Sometimes natural calamities cause the failure of the crop. To overcome this problem farmers require credit. If the credit is available easily at low interest rate, he would be able to survive and agriculture can grow further. Contrary to this, if he gets non-institutional credit on difficult terms, he losses his economic sovereignty and the creditors

try their best to exploit the farmers. In such conditions farmers lack incentives. Consequently, Production and productivity goes down. Modern agriculture is capital based and only those farmers can adopt this type of farming who have access to capital and credit. Rural indebtedness has created problems in the rural economy. Sub-division and fragmentation of holdings has resulted in the concentration of land in the hands of non-agriculturalists, who do not have any interest in the improvement of land and production. They are concerned only in the increase in rent. Thus, suitable arrangement of credit improves the agriculture production and productivity.

**III. Land Tenure System**

Land tenure system tells us about the relations of landlords and tenants. It may be in the form of Zamindari System, in which Zamindars act as mediators between the farmers and the government, Mediators try to exploit the farmers as much as they can. Under Ryotwari system farmers have direct relations with the government and are independent to take their own decisions. Under the Mahalwari system, land remains in the ownership of the village. Here also, the farmer is independent to take decision regarding agriculture production but he does not pay rent to the government directly. Ownership of land gives incentives to the farmer to work hard and produce more. Thus, arrangement to provide ownership rights to the farmer are very necessary for the agricultural growth. Under the tenurial system Zamindars do not show interest in the agricultural growth, they concentrate only on the collection of rent, which is an obstacle for the growth of agriculture demand for agriculture land has increased which has resulted in high rents. High rents leave meagre amounts with the farmer or the tenant. They do not have money for future improvement and investment. Consequently, agricultural growth slows down. Uncertainty of getting land for next year on rent, discourage the farmer for any permanent improvement in land. He does not try to maintain the productive capacity of the land, generally, the land losses its productivity. Thus, it is very clear that favourable arrangement for the tenants can improve the agriculture.

**Conclusion**

All the factors, economic, technological, institutional, social and political have their effects on the agriculture growth. The economies of East Asian countries could take the full benefits of technological change in agriculture, by first adopting the suitable institutional arrangement in agriculture. These factors are interrelated and complementary to increase agricultural productivity. All the factors either those are natural, technical or institutional, alone can not increase agricultural productivity but together these can do wonders.

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**LESSON NO. 1.3** **AUTHOR : DR. VIPLA CHOPRA**

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## INTER-DEPENDENCE BETWEEN AGRICULTURE AND INDUSTRY

In the initial stages of economic development, most of the countries depended heavily on agriculture. Even the developed countries of today initially relied on agriculture. If we look at the history of economic development of various advances nations, we find that the development of their secondary sector and also of the tertiary sector to some extent was preceded by the development of agriculture in the early phases of their industrial development. In most of the western European countries such as France, Belgium, Germany and Sweden, the take off stage rested upon the firm base of 'rising agricultural productivity'. The most developed country of Asia i.e. Japan also owes its present economic position to the development of agricultural sector in the pre-modern industrialization period. Productivity per acre as well as per man in agriculture has increased in Japan tremendously for a long period before the First World War.

The inter-relationship between the growth of agriculture and industry and the contribution that it can make to the other has long interested the economists. The inter-dependence of agriculture and non-agriculture sector limits the usefulness of considering the development of either in isolation from the other.

It is essential to recognize that successful industrialization depends upon the attainment of an agricultural surplus and that the pace of industrialization is limited by the rate of agricultural progress. The relationship between agriculture and industry is of interdependence and complementarity.

As the largest sector of the economy, at least in the earlier stages of development, agriculture is the source of manpower for industrial expansion, it is a source of essential suplies for maintaining a growing industrial population and of exports to be traded for industrial goods and it is the chief potential source of savings for non-agri-investment. For these roles to be fulfilled however, agricultural productivity must be

increased. This requires incentives to farmers to invest in new inputs, attractive markets for their increased output, that a growing non-farm sector can provide. For incentive there must be goods that farmers can buy with their income, the development of this rural market can also provide stimulus to non-agricultural industries. Thus growth in these two sectors support and stimulate each other.

While rising agricultural productivity and industrial urban development clearly have much to contribute to each other and hence to overall economic growth, the problem of establishing priorities, which the development planners face is a very difficult one. Recognising the necessity of choice, economists have fallen into two groups with regard to their judgement as to the relative emphasis which agricultural investment should receive. In the first category are those (e.g. A. E. Kahn, Jacob Viner and Coala and Hoover) who argue that efforts to increase food supply should receive top priority because high demand and great need for additional food or because highest marginal productivity of capital lies in agriculture. In the second group fall an increasing number of economists (among them Albert Hirschman, Leibenstein and Higgins) who, while recognizing the need for raising agricultural productivity conclude that it can be accomplished only by giving top priority to a 'big push' industrialization programme. Admittedly, there is probably no underdeveloped country, which can, at any stage, afford to concentrate all of its investment either for agriculture or for industrial development. In the short run, it is better to concentrate more on agricultural sector and in the long run, when a viable base has been formed, more efforts may be diverted to industrialization.

The nature and strength of these inter-relationship change as development takes place. It would be most helpful if we had a fully elaborated theory of agricultural development and its inter-connections with the rest of the economy at successive stages. Because of conceptual difficulties and still more, the lack of empirical knowledge, an acceptable theory of agricultural development is not yet within our grasp. Moreover, the diversity of agricultural conditions and of the general economic situation in different developing countries and within different farming regions of an individual country make it quite impossible to formulate universally valid policies or prescriptions for promoting agricultural development.

The overwhelmingly agricultural character of most of the less developed countries is a major determinant of the problems they face. The structure of agriculture character differs among countries. Agriculture no longer supports a major part the population in some countries of Latin America.

But elsewhere in Latin America and Asia the bulk of the population continues to find its livelihood in agriculture. This fact has a fundamental influence on the nature of the inter-relationship between agriculture and the rest of the economy and on the process of agricultural development. The role of agriculture in the transition from a traditional agriculture to an individualized economy varies from country to country, conditioned by factor endowment, institutional arrangements, cultural background, historical factors and policy choices among other things. Nevertheless drawing from the experience of both developing and developed countries, one can identify several important roles that agriculture plays in the transition process :

1. Agriculture generates market for industrial products, especially of the light industrial that have ready markets in the agricultural sector;
2. Provides food and agricultural raw material for industrial processing;
3. Builds adequate food supplies in the form of buffer stock which is a crucial factor in sustaining price stability;
4. Provides exports to earn foreign exchange;
5. Supplies non-agricultural sector with capital and labour; and
6. In case of market oriented economy, eases the process of industrialization by providing source of labour, capital and raw materials for other sectors and by generating demand for industrial products.

Johnston and Mellor for example, identify two important relations which distinguish the agricultural sector in an underdeveloped country and its role in economic growth, that in virtually all underdeveloped countries, agriculture is an industry of major proportions. The secular define which occurs in the size of the agricultural sector as the process of economic growth occurs, further indicates the importance of this process of structural transformation and also that the size of capital requirements place a great burden on agriculture to provide capital for the expansion of other sectors.

Johnston and Mellor list five categories of contribution of agriculture in economic development. There are :

(a) Farm products for domestic consumption;
(b) The export of farm products and consequent earnings of foreign exchange;

(c) The transfer of manpower to the industrial sector;
(d) The flow of money into capital formation;
(e) The increased incomes in agriculture as a market for industrial products.

Kuznets, on the other hand identifies three categories of contribution of agriculture in economic development. They are :

(a) Product contribution
(b) Market contribution
(c) Factor contribution

Thus, if agriculture itself grows, it makes product contribution, if it trades with others it makes a market contribution and if it transfers resources to other sectors, it makes a factor contribution.

We now discuss the **role of agriculture in economic growth** as given by Kuznets in detail.

**(a) Product Contribution**

Product contribution can take two forms (i) provision of wage goods (ii) provision of raw material.

**I. Provision of Wage Goods**

When the industrial sector grows, people shift from agriculture sector to non-agriculture sector. They require food for their subsistence even after shifting to new sectors. Their income would increase in the industrial sector and in turn this increases the demand for wage goods. These wage goods are supplied by agriculture sector only. The farming population still left in the agriculture might find its income increased due to higher prices of agricultural products as a result of increased demand. This may spur it to increase its own consumption also. As non-agriculture sector grows, their dependence on agriculture for capital, labour raw material etc. may be reduced. However, dependence on agriculture for wage goods will continue until the other substitutes in the non-agriculture sector are developed.

At the early stages of industrial development agriculture by supplying wage goods, plays a significant role. Along with this the cropping pattern in the agriculture sector also changes and farmers try to incorporate new techniques of production and bio-chemical fertilizers.

**II. Provision of Industrial Raw Material**

A study of the history of industrial development of advanced nations shows that the agro based industries were the first to develop in such countries. At the initial stage of industrialization, when agriculture dominates, agriculture supplies raw material to agro-based industries such as sugar, cotton textiles, jute, grain milling and so on. Agro based

industries are also favoured, because of the flexibility of the technique of production used, as it can use labour as well as capital intensive techniques. This suits all the economies. On the contrary, mineral based industries are generally capital intensive and are not favourable to labour abundant countries. Another factor which favours the development of agro based industries in the beginning is that it is said that it is easier to shift a labourer from a farm to a factory if the factory uses a farm product as a raw material. The psychological cost of transfer of labour from agriculture to industry in such a case is very low.

Thus, product contribution of agriculture to non-agriculture sector is a precondition for development of industry in the beginning. Industrialization provides more income per head, and as population grows, demand for agriculture products is bound to increase Kuznets says, "It is true that income elasticity of demand for agricultural products is not equal to one, but it is definitely more than zero."

**(b) Factor Contribution**

Factor contribution can be in the following forms :

**I. Provision of Capital**

In a closed economy, in the initial stages, it is agricultural sector which commands most of the income, capital and also labour. The agriculture sector transfers capital to the industrial sector in various ways. Agriculturalists themselves invest their savings in the non-agricultural sector. Government through imposing taxes on the agricultural sector, generates capital for the industrial sector. Land tax in Japan is often quoted as an example of this compulsory transfer of funds from agricultural sector to other sectors. It forms 80% of the total tax revenue of the government in the last two decades in 19th century. Forced extraction of surplus from agriculture by taxation, confiscation, imposition of levies or arbitrarily kept low prices of agricultural products, can be the other measures taken by the government to transfer funds from agricultural sector to non-agricultural sectors. Agricultural development itself may bring down the prices of agricultural produce, reduce the cost of production in manufacturing and other sectors, increase their profits and thus indirectly help in the generation of capital in these sectors.

Nurkse has referred to another way, in densely populated agricultural economics, where zero value labour exists. This labour can be utilized in the non-agricultural sector and can become a source of capital for non-agricultural sector.

**II. Provision of Labour**

Non-agriculture sector, for its development, also requires skilled and unskilled labour. This labour supply can be from natural population growth, immigration and farm population. The supply from natural population growth, and immigration can never be smooth and adequate. For rapid development of the non-farm sectors, farm population is the only dependable source of labour supply.

Transfer of labour from the agricultural sector to the developing non-agricultural sectors may not create a serious problem in over-populated countries. There is already a surplus labour force in agricultural sector of these countries and it can be easily drawn into the industrial sector without any fall in agricultural output. The problem is very severe in sparsely populated countries. There is no disguised unemployment and any shifting of labour from agriculture to non-agriculture sector will bring down the agricultural production . Thus in sparsely populated countries it is desirable that transfer of labour from the agricultural sector for the development on non-agricultural sectors is accompanied by an increase in the productivity in the agricultural sector itself.

Kuznets has expressed the importance of transfer of labour from the agricultural sector to non-agricultural sector in another way. He feels that this transfer also, infact, implies a transfer of capital invested in the agricultural labour. He says, "we could still argue that internal migration of labour from agriculture represents a large transfer of valuable resources to non-agricultural sectors and a large contribution to the country's economic growth."

**(c) Market Contribution**

As agriculture grows, marketable surplus is generated, which increase the income of farmers. Therefore, agriculture becomes a market for the products of other sectors. Thus, contribution can take the following forms :

**I. Expanded market for the products of other sectors**

Agricultural provides an expanding market for the products of other sectors in the initial stages of development. Income of farmers increases, which leads to an additional demand for products of other sector, not only for consumption purposes but also for production.

**II. Flow of agricultural products to other sectors of the economy**

As agriculture develops and its production becomes market oriented, many other institutions, non-agricultural in character, come into existence, which

generates employment and further develops the agriculture and non-agriculture sector. Flow of commodities in the form of wage goods and raw material to the non-agriculture sector helps to make agriculture more commercialized.

**III. Development of international trade**

Surplus products from agriculture sector, can be sold in the international market, which helps to earn foreign exchange. It helps to import capital and consumer goods from other countries. So growth process in the economy as a whole can gain momentum. So, in a way, we can say that in the case of development of international trade, agriculture combines market contribution with factor contribution for the development of non-agriculture sector.

Thus, agriculture contributes for industrial and overall development by product, factor and market contributions.

Lewis, Ranis & Fei, and Jorgenson models emphasize the need to examine the role of both the agricultural and industrial sector to promote economic growth. In these models basic emphasis is that rising population, increased urbanisation and rising per-capita income will put pressure on agriculture's capacity to produce. If there is no agriculture surplus, continuation of economic development will cause an increase in the prices of agricultural commodities in comparison to non-agricultural commodities and as such the terms of trade will change in favour of agriculture. Technological change, innovation and mechanization help to improve agricultural productivity.

Thus, development economists have recognized that the performance of agricultural sector is an important factor in determining the overall success of a particular country's programme for development. Agriculture is thought to be the only sector capable of performing such a role (development role) since it is usually the largest and most important sector in the less developed countries.

Several economists have strongly criticized the conventional view of the role of agriculture in the development process. For example, Myint has argued that a policy aimed at the extraction of resource from agriculture will cripple the growth potential of agriculture, thus leading to slow down in the overall development process. This is due to the fact that the agricultural sector of most of less developed countries require significant resource investments before rapid productivity increase can be expected.

**Contribution of the industrial sector to the development of the agricultural sector**

When agriculture grows, its production and productivity improves, agriculture begins to depend upon the industrial sector for its development. Industry helps agriculture in the following ways :

**I. Market for the products of the agricultural sector**

Once the industrial sector gets mature and is able to use minerals as raw materials, its dependence on agriculture for supply of capital or labour or even raw materials, goes down. Demand for wage goods, however, continues. After this stage in industrial development, demand for more raw materials from the agricultural sector is only a matter of choice for the industrial sector. And after this stage, if it is still desired that the demand for agricultural products should continue to grow, it is necessary to ensure that the industrial sector itself grows further. Only a growing industrial sector will provide an expanding market for the products of agricultural sector and thus create incentives for the further growth of this sector. The expansion of the industrial sector will strengthen the commercial motives of the farmers and they are likely to shift from the food crops to the cash crops. In this context Nicholas says, "A favourable market for agricultural products tends to break down the relatively stagnant sector of agriculture."

**II. Modern Agricultural Inputs**

With the introduction of new technology in agriculture, use of insecticides, pesticides, fertilizer, seeds, implements and machinery, the dependence of agricultural sector, on industrial sector has increased tremendously. All these new inputs have been provided by the industrial sector. Not only that, agriculture has, as it is said, moved to barren lands, because of the revolution in the system of transportation and communication. These facilities are obviously a gift from the industrial sector.

**III. Reduction in the burden of population in agriculture**

Withdrawal of agriculture labour, has also helped agriculture, especially in heavily populated countries. Excess population in the agriculture sector too has been responsible for low productivity in agriculture. High pressure of population reduced the per-head production, and encourages sub-division of labour, which results in reduction in productivity. Development of industry and increase in demand for skilled and unskilled labour from agriculture sector helps a lot as size of farm increases, which leads to use of high technology inputs. The size of farms in U.K. and U.S.A. has increased over time mainly because of transfer of

population from agricultural sector to the industrial sector.

**IV. Supply of Consumption Goods**

As agriculture sector grows and becomes commercialized, the income and living standard of farmers increases. Their consumption pattern is diversified. These consumption goods (comforts and luxuries) are provided by industrial sector. On the other hand, in order to maintain the new standard of living, farmers work hard.

**V. Provision of infra - structure for agricultural development**

Agriculture production in modern days is almost impossible, without the development of suitable infrastructure i.e. transport, communication, road, canals, power, schools, colleges, research institutions, ware houses. This all is provided by the industrial sector.

Thus the role of industry sector in the development of agriculture cannot be ruled out. Therefore, from the proceeding discussion it can be concluded that agriculture and industry are inter-dependent. Both of these have their own importance of economic development of less developed country. Though there exists controversy regarding the impact of inter-sector resource transfers on the development process, Johnston and Mellor have argued that net transfer of resources from agriculture to industry can be made without retarding agriculture's growth. Similarly, according to Kuznets, the agricultural sector should transfer to the non-agricultural sector the surplus of investible resources generated in agriculture.

**LESSON NO. 1.4** **AUTHOR : RAKESH KUMAR**

# LEWIS' MODEL OF ECONOMIC DEVELOPMENT



## 1.4.1 Introduction

Agriculture plays a significant role in the development of the economy. Various economists have emphasized the roles in different form. Undoubtedly, all of them agreed on the factor, product and market contributions. Nurkse and Lewis has the different view like the classical economists, they believe that there is unlimited supply of labour in the agriculture and disguised unemployment exists. They have tried to explain how surplus labour can be used in one way or the other way to promote the overall development of the economy.

## 1.4.2 Objectives of lesson

In this lesson we will discuss that how unlimited supply of labour of agriculture sector in an underdeveloped economy can be beneficial for economic development.

## 1.4.3 Explanation of Lewis's model

Lewis believes that in under-developed countries an unlimited supply of labour is available at a subsistence wage. Economic development takes place when capital accumulates as a result of the withdrawal of surplus labour from the 'subsistence' sector to the 'capitalist' sector.

### 1.4.3.1 Definition of capitalist sector and subsistence sector

**Capitalist Sector:**

Capitalist sector is that part of the economy which uses reproducible capital and pays capitalists for the use thereof. It employs labour for wages in different segments of industrial sector for earning profits.

**Subsistence Sector:**

It is that part of economy which does not use reproducible capital. In this sector people live at subsitence level. Economic situations are such that which keep them continueously at subsistence level. In this sector, output per head is lower than the capitalist sector. It mainly includes agriculture which is predominently labour intensive, uses poor techniques of cultivation and has low productivity.

### 1.4.3.2 Assumptions of the model

Lewis starts with the assumption that there is perfectly elastic supply of labour at subsistence wage in the case of number of under developed countries. Such ecnomies are overpopulated relatively to capital and natural resources so that marginal productivity of labour is negligible, zero or even negative.

Due to the existence of unlimited supply of labour, new industries can be established or existing industries expanded without limit at the current wage by drawing upon labour from the subsistence sector i.e. subsistence wage. The main sources from which workers would be coming for employment at the subsistence wage as economic development proceeds are the farmers, the casuals, the petty traders the retainees (domestic and commercial) women in household and population growth.

Capitalist sector needs skilled workers. Lewis argues that skilled labour is only a 'quasi bottleneck' a temperory bottleneck, it can be removed by providing training facilities to unskilled workers.

Lewis assumes that it is the only capitalist sector which utilises its savings productively. The subsistence sector, on the other hand, spend their saving, if any, on the unproductive pursuits like purchase of jewellery, marriages and so on. Prospensity to save of this sector is comparatively low. Lewis feels that if the pace of income generation in the industrial sector is accelerated, even at the cost of some agricultural income, it will lead to more capital formation, consequently, more industrial growth.

**Self check exercise**

Q1. Define capitalist sector.

Q2. Define subsistence sector.

Q3. What are the assumptions of the model?

## 4.3.3 The working of the Model:

What determines the subsistence wage at which surplus labour is available for employment in the capitalist sector? It depends upon the minimum earnings

required for subsistence. The earnings in the subsistence sector set a floor to wage in the captialist sector. In practice, capitalist wages are 30% higher than subsistence sector due to

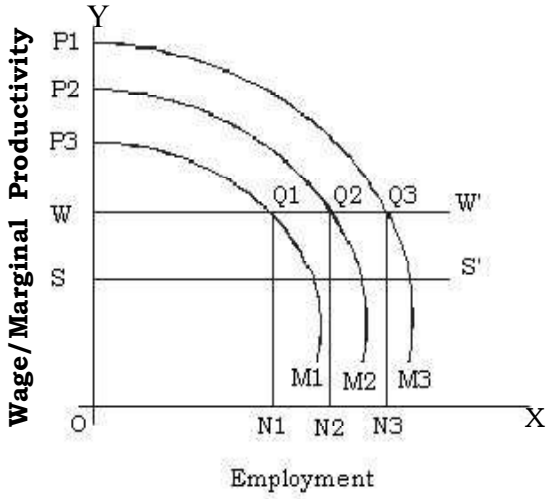
(a) a substantial increase in output of the subsistence sector which by raising real income might induce workers ask for a higher capitalist wage before offering themselves for employment.

(b) If with the withdrawl of labour form the subsistence sector total product remains the same. the average product and hence the real income of those remaing behind will in the capitalist sector.

(c) The high cost of living and some humanitarian considerations may move the employers to raise the real wage or governments may encourage the trade unions and support their wage bargaining efforts.

The supply of labour is however considered to be perfectly elastic at the existing capitalist wage. Since the marginal productivity of labour in the capitalist sector is higher than the capitalist wage, this results in the capitalist surplus.

The savings generated in the capitalist sector through the employment of this labour can be reinvested, leading to more employment of surplus labours form the subsistence sector, more savings more employment and so on. This process of expansion goes on for some time. Following figure explains this process.




Here OS is the institutional wage is rural sector and OW represents the conventional wage in the industrial sector. The supply of labour is unlimited. as shown by the horizontal supply curve WW'. In the beginning, when $ON^1$ labour is employed in the capital sector, its marginal productivity is $P^1Q^1$ and the total output of this sector is $OP^1Q^1N^1$. Out of this workers are paid wages equal to the area $OWQ^1N^1$. The remaining area $WP^1Q^1$ shows surplus output. This is the capitalist surplus or total profit earned by the capitalist sector. When this surplus

is reinvested. The curve of marginal productivity, shifts upward to $P^2$ $Q^2M^2$. The capitalist surplus and employment are now larger than before being $WP^2Q^2$ and $ON^2$ respectively. Further, reinvestments raise the marginal productivity curve and the level of employment to $P^3Q^3$ and $ON^3$ and so on till the entire surplus labour is absorbed in the capitalist sector. After this, the supply curve WW' will slope from left to right upward like an ordinary supply curve, and wages and employment will continue to rise with development.

Thus, capital is formed out of profit earned by the capitalists. According to Lewis, if technical progress is capital saving, it may be considered as an increment in capital and if it is labour saving, it may be considered as an increment in the marginal productivity of labour. As such he does not make any distinction between growth of technical knowledge and the growth of productive capital.

**Self check exercise**

Q4. Why capitalist wages should be more than subsistence wages?

Q5. How are savings generated in capitalist sector?

### 4.3.4 Role of State and Private Capitalists :

According to Lewis, even the state can act as a capitalist and supplement the efforts of the private capitalist. It can even tax the subsistence sector for getting funds for investment. It can also resort to deficit financing for this purpose. The state capitalist accumulates capital faster than the private capitalist Once the capitalist sector has emerged, says Lewis, it is only a matter of time before it becomes sizable.

### 4.3.5 Role of Bank credit

The above explanation gives the impression that capital is created out of profit, but it is also created out of the bank credit. In an underdeveloped economy which has abudant idle resources and shortage of capital, credit creating has the same effect on capital formations as of profits. It will raise output and employment. But expansion of bank credit can lead to inflation, but Lewis says, it is only for some time. When the surplus labour is engaged in the capitalist sector and paid out of created money prices rise because of income increases while consumer goods output remains constant. This is only a temporary phenomenon, as soon as capital goods start producing consumption goods, prices start falling. Lewis, in fact, feels that, "inflation for the purpose of capital formation is very different kind of fish." It is self destructive. Prices begin to rise but are sooner or later over taken by rising output, and may, in the last state end up lower than they were at the beginning.

The inflationary process also comes to an end when voluntary saving increase to level where they are equal to the inflated level of investment. As capital fomation is taking place all the time, output and employment rise continuously and so do profits. Since higher profits lead to higher saving, a time will come when savings increase so much that new investments can be financed without recourse to bank credit. The analysis also applies to the government which recieves back the inflation financed money in

the form of taxes. Secondly, when national income increases with rising output, it is not required to resort to deficit financing.

**Self check exercise**

Q6. What is the role of bank credit in economic development?

Q7. How state can act as capitalist according to Lewis?

### 4.3.6 Decrease in the Pace of Expansion of the Capitalist Sector:

If unlimited supply of labour are available at a constant wage late, the capitalist sector continue to grow and earn profit and reinvest it. As soon as the process of the transfer of the labour from the rural sector to urban sector course to halt, the progress of industrial sector, other things remaing same, slows down. According to Lewis, there are four reasons due to which labour may no longer be available to the industrial sector at constant wages.

(a) With the capital formation gradually the surplus labour is absorbed, and consequently the labour on the constant wages rate does not remain available to the capitalist sector.

(b) If the capitalist sector expands so rapidly that it reduces absolutely the population in the subsistence sector, the average productivity of labour rises in the latter sector because there are very few people to share the product and so the capitalist wages rise in the former sector.

(c) If as a result of the expansion of capitalist sector, the terms of trade turn against this sector with rising prices of raw materials and food, the capitalists will have to pay higher wages to the worker.

(d) If the subsitence sector adopts new techniques of production, real wages would rise in the capitalist sector and so reduce the capitalist surplus.

(e) If the workers in the capitalist sector imitate the capitalist way of life and agitate for higher wages and if successful in raising their wages, the capitalist surplus and the rate of capital formation will be reduced.

**Self check exercise**

Q8. What are the reasons for which labour may no longer be available to capitalist sector?

Q9. How the growth process ends up in Lewis model?

### 4.3.7 Impact of Open Economy:

When the process of capital formation is adversely affected due to non-availability of surplus labour, process can be continued by encouraging mass immigration or by exporting capital to such countries which posses abundant labour at subsistence wage. These possibilities have been ruled out by Lewis himself.

**First:** mass immigration of unskilled labour is not possible because other countries with higher wages do not allow it.

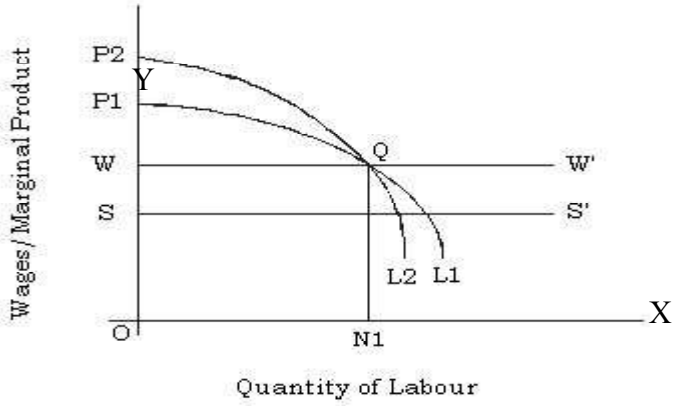
**Second:** Export of capital means the excess of imports over exports and an adverse balance of payments. If the cost of imported goods is high, money wages cannot be reduced. The application of this theory to underdeveloped countries will, therefore, create balance of payment difficulties. Thus Lewis suggests strict exchange control measures for such economies.

### 4.3.8 A Critical Appraisal:

This theory is applicable to the over populated underdeveloped countries. Most of the assumptions of this theory are not accepted by economists and are criticised as below :

1. This model is based on the assumption of the existence of disguised unemployment and removal of these workers form the agriculture sector to industrial sector do not affect the agriculture production. Schultz has tried to prove that there is no disguised unemployement in the underdeveloped countries. According to him, marginal producitivity of workers in the agriculture sector may be quite low but not zero.
2. Higgins's has highlighted the seasonal nature of agriculture. He feels that in any backward economy the whole of labour force in agriculture sector is fully employed for many weaks of the year during sowing and harvesting seasons and as such, no part can be permanently transferred to the industrial sector. This can be done only after. sutiable investment in agriculture has been made for the mechnisation of agriculture.

   Lewis assumes that the capitalist surplus is reinvested in productive capital but if the productive capital happens to be labour saving. It would not absorb the labour and the theory breaks down. This can be illustrated with the help of a diagram.




**Employement**

In this diagram curve $P^2L^2$ has a greater steeper slope than $P^1L^1$ thereby showing labour saving technique. With the shift in the Marginal productivity curve upward from $P^1L^1$ to $P^2L^2$ the total output has risen substantially but the total output has risen substantially but the total wage will have been reduced.

4. In the opinion of Lewis, skilled labour is regarded as a temporary bottleneck, which can be removed by arranging training facilities to the unskilled labour. It takes very long time to educate and train the labourers.
5. Even the transfer of zero labour from the rural sector can lead to an increase in the consumption of agricultural products by the workers still left in the agricultural sector. It may lead to increase in the subsistence wage. Consequently the industries wage rises.
6. Profits of the industrial sector may not be reinvested. The model assumes that entire surplus is reinvested for its further expansion. The industrialist may use their surpluses for speculative purposes. They 'too' can spend their surpluses on unproductive activities.
7. Lewis assumes that landlords in underdeveloped countries are engaged in extravagant consumption, is not correct, they depend upon investment opportunities. The role of the agriculturalist, in industrial development of England or of landlords of Gujarat in development of cotton industry in India or of the landlords of Japan in its overall industrial development was in no way insignificant. In this connection, a quotation of World Bank says, "Farmers contribute to the agriculture investment. All of them, even those farming only a few acres, save a substantial part of any extra income and invest it on their farms."
8. Only higher capitalist wages will not lead to the movement of surplus labour from the subsistence sector to the capitalist sector. People are so intensely attached to their family and land that they do not like to leave their kith and kin. This is the main weakness of the theory.
9. Lewis' view is that inflation for the purpose of capital formation is self destructive is difficult to believe in the face of acute shortage of consumer goods. Production of consumer goods fails to increase rapidly due to structural rigidities. On the other hand, the marginal propensity to consume of the people is nearly unity. So that all increase leads to inflationary rise of prices.
10. It is not correct to say that only 10% of the farmers save. Infact, as Lewis himself admits in the case of Japan, people with low income

also save in underdeveloped countries. In such countries, low income group saves less because they spend more under the influence of the demonstration effect.

11. The Lewis theory is based on the assumption that a capitalist class exists in underdeveloped countries. Infact, the entire process of growth depends on the existence of such a class which has the necessary skill to accumulate capital. In reality such enterprise and initiative conspicuous by its absence in the majority of underdeveloped countries.

12. Lewis, in the analysis of dual economy theory, does not study the problem of aggregate demand. He assumes that whatever is produced in the capitalist sector is either consumed by itself or is exported. He does not even analyse the possibility of the capitalist sector selling its products to the subsistence sector.

**Self check exercise**

Q10. What are the limitations of Lewis's model?

Q11. Critically evaluate Lewis's model of unlimited supply of labour.

### 1.4.4 Summary

In this lesson we have discussed that how unlimited supply of labour is useful for economic development as told by Prof. Lewis. He explains the role of capital formation in less developed countries where capital is scarce and labour is surplus. He has interpreted the various development parameters such as population growth, technical progress, role of government and bank credit etc. This model has some analytical value as it emphasizes the structural and economic differences between urban and rural labour force. It is the process of labour transfer that links them together. The model no doubt has unrealistic assumptions and suffers from various infirmities. However, despite its failure to find any empirical evidence in support of its broad conclusions, it has succeeded in highlighting that in initial stages the surplus agriculture labour has an important role to play in economic development.

### 1.4.5 Keywords

| | | |
|---|---|---|
| Pace of expansion | : | speed at which increase is shown |
| Open economy | : | An economy in which international trade is going on. |
| Dual economy | : | Two types of economies in a country. |
| Subsistence wages | : | Wages required for the survival of labour. |

### 1.4.6 Short answer type questions

a. Write down assumptions of the Lewis's model.

b. How does unlimited supply of labour useful for economic development?

c. What is disguised unemployment?

d. How capital formation is done through bank credit as by Prof. Lewis?

### 1.4.7 Long answer type questions

a. Critically evaluate Lewis's model of unlimited supply of labour.

b. How far Lewis theory is applicable to over populated underdeveloped countries?

### 1.4.8 Suggested readings

Economic Development with Unlimited Supply of Labour: W. A. Lewis
Leading issues in Agricultural Economics: R. N. Soni
Agricutural Economics: R.K. Lekhi and Joginder Singh

# RANIS-FEI MODEL



**1.5.1 Introduction:** There are no two views about the very substantial contribution of Lewis* to our understanding of the problem of economics development. However, there are several conceptual as well as practical difficulties in accepting the Lewis Model. It is difficult, for instance, to accept the argument that increased productivity in the rural sector would reduce capital accumulation in the industry, unless offset by an unfavourable turn in the terms of trade in agriculture vis-a-vis industry, in order to avoid any rise in real wages. The question is why cannot both real wages and profit rise simultaneously with increased productivity? When productivity is improving, the only effective limit to an increase of profit will be in a situation where the rise in wages completely offsets the gains from productivity.Lewis greatly underestimates the problem of training of the labour released from agriculture to industry. The problem of retraining labour remains very real, even if we confine our attention to unskilled labour exclusively.

A further criticism of the Lewis model is that it rests on the assmption that a transfer of surplus labour from agriculture to industry will not affect the size of agricultural output. Many economists have indeed pointed out that in the absence of technological improvements in agriculture, reduction of labour will affect the total agricultural output.

Some of the shortcomings of the Lewis model encouraged certain lines of theoretical advances which led to a more effective appreciation of the role of

agriculture in economic development. One such line of advance is clearly identifiable as Ranis-Fei-Model (1964).

**1.5.2 Objectives of the lesson:**

In this lesson we will discuss the Ranis Fei Model, that how surplus labour can be used for development of any economy, both the sectors agriculture as well as industrial sector and how it is superior to Lewi's Model.

**1.5.3 Explaination of Ranis-Fei-Model**

It starts with the same initial assumptions of Lewis, regarding the nature of surplus labour in agriculture Ranis-Fei proceeds in the following way :

If an underdeveloped country is faced with an excessive pressure of population on land, there is a large stock of surplus labour in rural sector. The surplus labour is unproductive in the sense that it does not make any positive contribution to agricultural production. However, these unproductive workers are unable to move elsewhere because of the lack of job opportunities. They are, therefore maintained by those agricultural workers who are responsible for producing the total agricultural output. It follows that if these unproductive workers can somehow be removed from agriculture, there will not be the slightest decline in agricultural production. On the contrary, the withdrawl of this surplus from agriculture will make available a quantity of agriculture output which these workers normally consume. This will then be equivalent to an agricultural surplus, or saving or capital, which become available for reinvestment if the remaining agricultural workers do not increase their consumption to eat away their surplus. It is possible that a large part of this agricultural surplus will accrue to landlords who will re-invest it for agricultural development. if this happens there will be a further increase in agricultural surplus in the next period. This process will continue so long as the consumption levels of the rural workers can be held low so as not to neutralize the effect of increased productivity on savings. At the same time, though industrial profit may continue to be the principal source of capital accumulation in industry, some of the agricultural surpluses can be channelled into industry as another important source of capital.

**1.5.3.1 Assumptions of the model**

The Ranis-Fei-Model assume a closed economy and conclude that an increase in agriculture productivity can postpone the upward turning point in the supply curve for industrial labour as depicted by Lewis.The model divides the economy into two parts, namely the agriculture sector and the industrial sector.

**Self check exercise**

Q1. In how many phases Ranis Fei have divided the Model?

Q2. Write down assumptions of the Model.

### 1.5.3.2 Explaination of the model

The relevant aspects of production and employment conditions in these two sectors are shown in diagram-1. The diagram is divided into three parts 1.1,1.2 and 1.3; subpart 1.1 deals with development of industrial sector and 1.2 and 1.3 depict the agricultural sector.

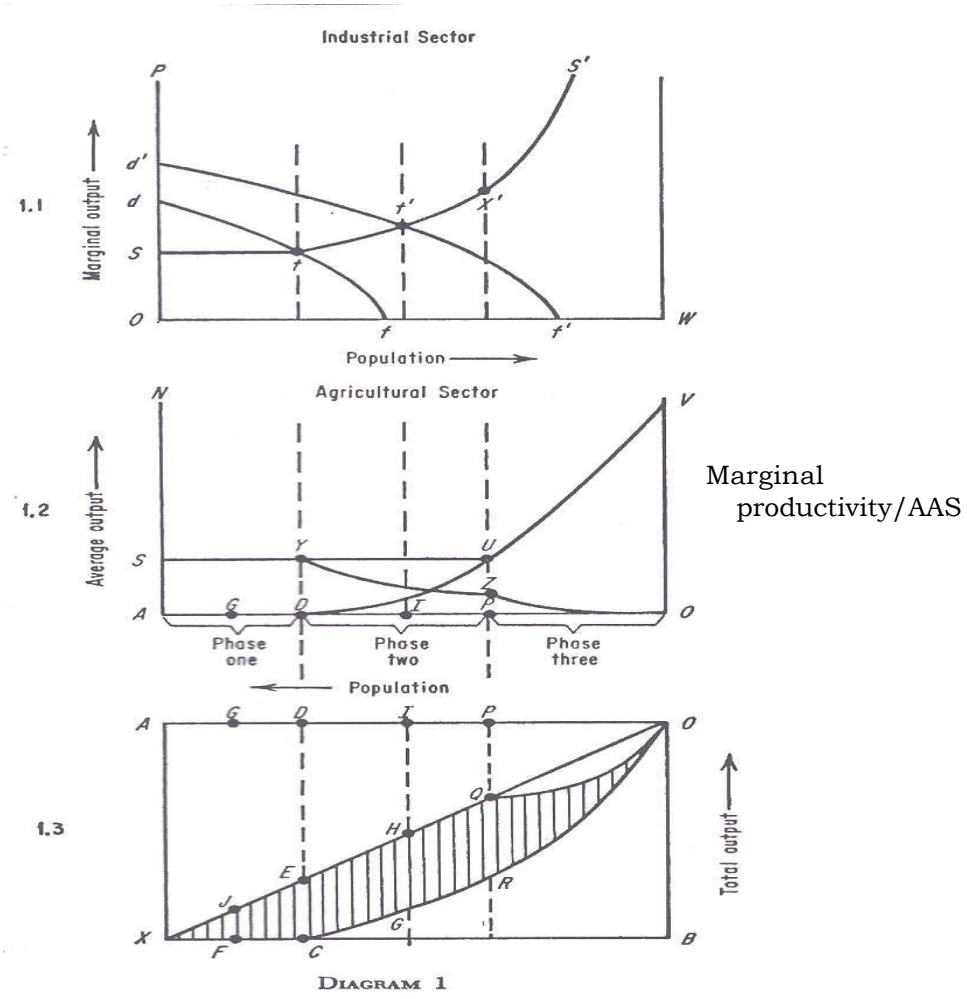



DIAGRAM 1

In diagram 1.1 industrial labour is measured on the horizontal axis OW and its marginal physical productivity (MPP) on the vertical axis OP. The demand curve for the labour i.e. MPP curve together with the supply curve of labour sts' determines the employment in industrial labour force St. Since MPP curve depends on the size of capital stock co-operating with the labour, an increase in capital stock leads to the shift to MPP curve to the right i.e. d't'f'. Lewis's unlimited supply curve of labour is defined by the horizontal portion of the supply curve St. When the supply curve turns up, unlimitedness comes to an end. Our first problem

is to investigate the conditions of this turning point. This leads us to focus attention on the agricultural sector.

In diagram 1.3 the agricultural labour force be measured on the horizontal axis O'A (reading from right to left) and agricultural output be measured on vertical axis O'B (downward from O) the ORCX describes the total physical productivity of labour (TPP in the agricultural sector). The curve is assumed to have a concave portion ORC showing a gradually diminishing marginal productivity of agricultural labour and a horizontal portion XC, where marginal product vanishes. The portion of any labour force in excess of OD may be considered redundant in that its withdrawl from agriculture would not effect agricultural output.

At the initial point, let the entire labour force OA be committed to agriculture, producing a total agricultural output AX. Let us assume that the agricultural output AX is totally consumed by the agricultural labour force OA. Then the real wage is equal to AX/OA or the slope of O'X. The persistence of this wage level is sustained by institutional or non-market forces since under competitive assumptions the real wage would fall to zero at equality with MPP. We shall call this the institutional wage.

Let point 'R' on the total output curve be the point at which the MPP equals the institutional wage; we can then define AP as the disguisedly unemployed agricultural labour force since, beyond P, MPP is less than the institutional wage.

Diagram 1.1, 1.2 and 1.3 are lined up. Any point on the horizontal axis of diagrams 1.1 and 1.3 represent a particular way in which the total population or labour force OA is distributed between the two sectors, for example, at point 'P' in diagrams 1.2 and 1.3, the agricultural labour force is OP and industrial labour force is AP.

The important concepts of disguised unemployment, redundant labour force and institutional wage can be more clearly depicted with the aid of diagram 1.2. In the diagram, agricultural output per worker is measured on the vertical axis AN. Let ADUV be the marginal physical productivity (MPP) curve of labour in the agricultural sector. Let the vertical distance be equal to the institutional wage. Three phases in the re-allocation process may now be distinguished.

(1) Phase-1 is the range for which MPP=O. This phase marks off the redundant labour force AD.

(2) Phase-2 is the range for which a positive MPP is less than the institutional wage. Phase-1 and 2 together mark off the existence of the disguisedly unemployed labour force AP.

(3) Phase-3 is the range for which MPP is greater than the institutional wage rate.

We assume that institutional wage 'AS' prevails during phase-1 and 2 and wage rate equal to MPP prevail in the phase-3. The agricultural real wage in

terms of agricultural goods is defined by the curve SUV in diagram 1.2 consisting of a horizontal portion SU and a rising portion UV. The curve may be called the supply curve of agricultural labour. It indicates for each level of real wage the amount of labour that may be released from the agricultural sector.

With the completion of the transfer of the disguisedly unemployed, there will be advent of fully commercialized agricultural sector.

Returning to diagram 1.3, as agricultural workers are withdrawn the suplus of agricultural goods begin to appera. That portion of total agricultural output in excess of consumption requirements of agricultural labour force at institutional wage is defined as the total agricultural surplus (TAS). The amount of TAS can be seen to be a function of the amount of labour reallocated at each stage. For example, if agricultural workers to the extent of AG are withdrawn in Phase-1 and reallocated JG is required to feed the remaining agricultural workers and a TAS of size JF results. The TAS at each point of allocation, in phase-1 and 2 is represented by the vertical distance between the straight line OX and TPP Curve ORCX.

TAS, may be viewed as agricultural resources released to the market through the reallocation of agricultural workers. Such resources can be siphoned off by means of the investment activities of landlord class and/or government tax policy and can be utilized in support of the new industrial arrivals. The average agricultural surplus may be defined as the total agricultural surplus available per-head of allocated industrial workers.

The AAS curve is represented by the curve SYZO in the diagram 1.2. In phase-1 as TAS increases each allocated worker is carrying his own subsistence bundle along with him. The AAS Curve for Phase-1 thus coincides with the institutional wage curve SY. In phase-2, however since the MPP in agriculture of the new allocated workers was positive and there will not be sufficient agricultural output to feed all the new industrial arrivals at the institutional wage level. Thus, while, TAS is still rising, AAS begins to fall. It can be seen that during phase-3 the AAS declines even more rapidly.

We may now consider the derivation of the Lewis turning point in the agricultural sector. Lewis himself explains the turning point rather loosely as occurring when one of following events puts to the end the horizontal supply curve of labour :

(1) the worsening of the terms of trade for the industrial sector.

(2) the exhaustion of the labour surplus in agricultural sector.

The worsening of the terms of trade for the industrial sector occurs as the result of a relative shortage of agricultural commodities, seeking exchange for industrial goods in the market. In our model, it will be recalled, this surplus is measured by the total agricultural surplus and on per industrial worker basis,

average agricultural surplus (AAS). There is a tendency for industrial supply curve to turn up as phase-2 is entered because this is the time when there begins to appear a shortage of agricultural goods measured in AAS causing a deterioration of the terms of trade of the industrial sector and a rise in the industrial real wage measured in terms of industrial goods. We thus see that the disappearance of the redundant labour force in the agricultural sector is a cause of the Lewis turning point.

The exhaustion of the labour surplus must be interpreted primarily as a market phenomenon rather than as a physical shortage of manpower, It is indicated by an increase in the real wage, at the source of supply. If we assume that the real wage of the industrial worker is equal to the agricultural real wage, then there is a tendency for the industrial supply curve of labour to turn upward when phase-3 is entered. With the dissapearance of the disguisedly unemployed labour force and the commercialization of the agricultural sector, the agricultural real wage begins to rise. This leads to an increase in the industrial real wage level if the industrial employer is to compete successfully with landlords for the use of the now limited supply of labour.

To facilitate our analysis, let us refer to the boundary between phase-1 and 2 as the shortage point and the boundary between phase-2 and 3 as the commercialization point, signifying the beginning of equality between the marginal. productivity and real wage in agriculture. The Lewis turning point thus coincides with the shortage point and the upward movement of the industrial real wage is accentuated at the commercialization point. These are two factors which may lead to a postponent of the Lewis turning point :

(1) Increase in agricultural productivity.

(2) Popuplation growth:

**Self check exercise**

Q3. What are the factors which may lead to postponement of Lewis turning point?

Q4. In which stage commercialization of agriculture starts in Ranis Fei Model?

### 1.5.3.3 Changes in Agricultural Productivity :

We shall examine here, the significance of an increase in agricultural productivity.

An increase in labour productivity in the agricultural sector can be described by an upward shift of the entire total physical productivity (TPP) curve of diagram 1.3. Such productivity increases are depicated in diagram 2.3 by sequence of TPP curve marked by I,II,III etc. Among which the I-curve is the initial TPP curve II, III represent the TPP curves after successive doses of agricultural investement.

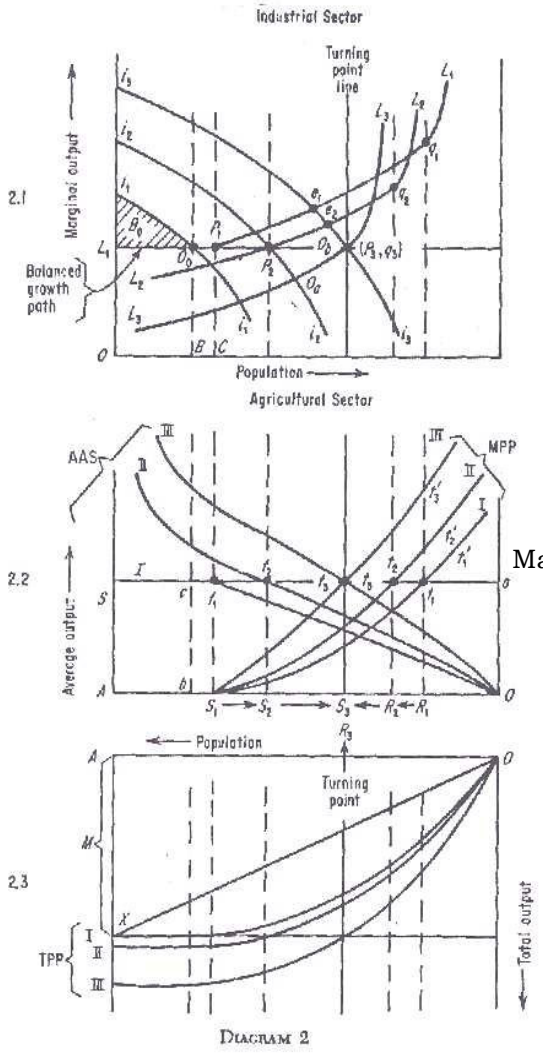
Let us make the assumption that as agricultural productivity increases the institutional wage remains unchanged. In diagram 2.2 we may now plot the

sequence of marginal physical productivity of labour curve marked by, I, II, III.....and the sequence of average agricultural surplus curves marked I,II,III.....corresponding to the total physical productivity curves I,II,III in diagram 2.3. According to the method already indicated, we can now determine the three phases for each level of productivity i.e. the sequence of shortage point $S^1$ $S^2$ $S^3$ and the sequence of commercialization points $R^1$ $R^2$ $R^3$ .....Reference to these points will facilitate our analysis of the effect of a price increase in agricultural productivity on the supply curve of agricultural labour and on the AAS curve.

As depicted in diagram 2.2 for every amount of labour employed in the agricultural sector, an increase in agricultural productivity also shifts the MPP curve upward. As a consequence the agricultural labour supply, price curve is transformed from $St^1$ to $St^2$ to $St^3$ etc. With a shortening of its horizontal portion as the sequence of commercialization point $R^1$ $R^2$ $R^3$ etc. gradually shift from right to left. On the other hand, the sequence of shortage points $S^1$ $S^2$ $S^3$ etc. gradually moves from left to right. This is due to the fact that, for each amount of labour allocated to the industrial sector, the AAS increases with the increase in total physical productivity; the amount of the food consumed by agricultural labour remains unchanged leaving more TAS (and hence AAS) for the industrial worker. Thus the effect of our increase in agricultural productivity is an upward shift of the AAS curve.

Sooner or later, the shortage point and the commercialization point coincidence, the distance $S^1R^1S^2R^2S^3R^3$.....vanishes and phase 2 is eliminated. In diagram 2.2 such a point of coincidence is described by R3=S3. We shall call this point the turning point. There exists one level of agricultural productivity which, if achieved, will bring about this turning point.

Let us now investigate the impact of an increase of agricultural productivity on the industrial supply curve $L^1L^1$ depicted in diagram 2.1 On the one hand, the upward shift of the AAS curve will shift the industrial supply curve downward before the turning point. This is due to the fact that an increase of AAS will depress the terms of trade for agriculture sector and with the same institutional wage paid to the industrial workers, the industrial wage must decline. On the other hand, the upward shift of the MPP curve which is accompanied by a higher real wage in the agricultural sector after turning point raises the industrial supply curve after that point. Thus we see, for example, that the $L^2$ $L^2$ curve from below, indicating that ultimately the 'terms of trade effect'.




Marginal productivity/AAS

DIAGRAM 2

Let us now examine more closely the relative positions of the industrial supply curves before phase 3 is reached. Let the horizontal position $L^1$ $P^1$ of the initial industrial supply curve $L^1L^1$ be extended to $P^3$, the turning point, and let us call this horizontal line segment $L^1P^3$ the balanced growth path. We may then claim that all the industrial supply curves between $L^1L^1$ and $L^3L^3$ cross the balanced growth path in the respective shortage points. This is due to the fact that at the shortage point for each case, the subsistence wage rate and the AAS take on the same value as that prevailing in phase-1 before any increase in agricultural productivity has been recorded. Hence, the same real wage, in terms of industrial goods, must prevail at the shortage point as prevailed previously. In short, before the turning point the industrial labour supply curve lies above (below) the balanced growth path when AAS curve lies below (above) the horizontal SA, causing a deterioration of the terms of trade for industrial sector.

The economic significance of the equality between our turning point and the shortage point is that, before the turning point, the economy moves along its underemployed agricultural labour force by means of increase in agricultural productivity. The economic significance of the equality between our turning point, the industrial supply curve of labour finally rises as we enter a world in which the agricultural sector is no longer dominated by non-market institutional forces but assumes the characteristics of a commercialized capitalistic system.

**Self check exercise**

Q5. What is the economic significance of the equality between turning point and shortage point?

### 1.5.3.4 Balanced Growth and Changes in Industrial Productivity

Apart from investment in the agricultural sector, the other major aspect of growth that must be considered is the simultaneous process of investment in the industrial sector. These activities in two sectors are interdependent. From the output side, both sectors must provide the marketing outlets for each other's products and from input side, industrial sector must provide the employment opportunities for the absorption of workers released by the agricultural sector. Here, we formulate the problem of balanced growth and investigate its significance in the context of our model.

In diagram 2.1 deemed curve for labour $i^1i^1$, $i^2i^2$.....gradually, shifts upwards to the right as real capital is accumulated in the industrial sector. Along with, investment activities in agricultural sector shifts the supply curve of labour $L^1L^1$, $L^2L^2$ downward in the same direction. The central problem of balanced growth concerns the synchronization through time of the shifts of two sequences of curves. Now the question is how should the total investment fund be allocated to the two sectors to ensure that they are harmonious from the point of view of both the input and output criteria. The output criterion states that the terms of trade between the two sectors should not deteriorate substantially against either sector.

Let the initial demand curve for industrial labour at the break out point be indicated by $i^1$,$i^1$ and the initial supply curve by $L^1L^1$ in diagram 2.1 with OB units of labour already employed in industrial sector. At this level of employment, industrial sector is making a profit represented by the shaded area OB which may be taken to represent the economy's investment fund at this stage. This fund is to be allocated in sector and raising industrial capital stock and shifting the industrial demand curve to the right.

If the balanced growth criterion is to be satisfied, the new industrial demand curve $i^2i^2$ and the new industrial supply curve $L^2L^2$ must intersect at a point $P^2$ Lying on the balanced growth path ($L^1P^1$) otherwise the stability of the terms of trade conditions is violated. At $P^2$ where the balanced growth criterion is met, the

industrial sector will have absorbed $OP^2$ additional workers, which is the same number of workers which has been released by the agricultural sector.

Thus as investment activity in both sectors proceeds through time, the balanced growth path describes the actual path if the balanced growth criterion is satisfied. It is likely that the actual growth path will deviate from the balanced growth path in one direction or the other from time to time. Such a deviation will call into play countervailing equilibrating forces which tend to bring it back to the balanced growth path. The actual growth path is, infact, likely to be oscillating around the balanced growth path.

**Self check exercise**

Q6. According to Ranis-fei model, in which way balanced growth path can be attained?

**1.5.3.5 Critical Evaluation of the Model :**

Though Ranis & Fei tried to improve the model over the Lewis model, still it is not free from drawbacks. Here we discuss some limitations of the model.

1. It is based on the assumption that the agricultural labour will shift to the industrial sector at the same wage in real terms it gets in the agricultural sector, which is incorrect. It must get some incentive to shift. There are some social and psychological bottlenecks.
2. It assumes that the per capita consumption of foodgrains of farm workers remain unchanged after the labour is transferred. This may not be correct s even the transferred labour may demand more foodgrains, if they are paid higher wages from the beginning.
3. The transfer of labour from agriculture sector itself can result in better organisation of agriculture resulting in higher productivity of the labour still left in the agricultural sector. It refutes the assumption of independence of the transfer of labour from the agricultural sector and agricultural labour productivity.
4. The model assumes a closed economy. In the present day situation, even underdeveloped countries are exporting and importing various commodities. Under these circumstances economists like Mellor feel that the transformation process can start even through food imports if the domestic sector supplies less foodgrains to the industrial sector.
5. This model assumes, once a zero value labour, always remain a zero value labour. But a labour using improved technology may change this situation and zero value labour may have positive contribution. This is what exactly happened in the Japanese agriculture.
6. The model assumes that only foodgrains are produced in the agriculture sector. This is totally incorrect. Monoculture in any country taken as a whole, is an exception rather than a rule.

7. Ranis and Fei model assumes that the transfer of labour and agricultural surplus from the agricultural sector to the industrial sector will change the terms of trade against that industry and this will hinder the development of industry. This implies the productivity in agriculture should also increase so that costs to be paid by the individual sector do not rise. But there are other factors in the agricultural sector which increase the productivity e.g. capital, technological change and so on.

**Self check exercise**

Q7. Critically evaluate Ranis Fei model

Q8. Compare Ranis Fei model with Lewis' model

**Conclusion:**

Undoubtedly, the assumptions of the model have been criticised and reduced the empirical relevance of the model. However, its emphasis on the importance of increasing agricultural productivity for the development of the industrial sector is quite logical. The conclusion of the model that we do not always need terms of trade unfavourable to agriculture for 'overall economic development is quite sound.

### 1.5.4 Summary

In this lesson we have discussed that how unlimited supply of labour can be used for economic development. Ranis Fei assume a closed economy and they divide economy into parts, namely the agriculture sector and industrial sector. If an economy is faced with an excessive pressure of population on land, there is a large stock of surplus labour in rural sector. This surplus labour is unproductive in the sense it does not make any positive contribution to agricultural production. If these unproductive workers can somehow be removed from agriculture to industry then economic development in both sectors can be increased. Undoubtedly, assumptions of the model have been criticized yet its emphasis on the importance of increasing agricultural productivity for the development of the industrial sector is quite logical.

### 1.5.5 Keywords

- Agricultural surplus: Surplus is that which is left after fulfillment of the needs of farmers in agricultural sector.
- Institutional wages: wages equal to marginal physical productivity
- Closed economy: When in economy there is no international trade
- Zero value labour: When marginal productivity of labour is zero.

### 1.5.6 Short answer type questions

a. What is commercialization of agriculture?

b. Write two differences between Ranis Fei and Lewis model.

c. What is disguised unemployment?

d. What is meaning of "take off" in Ranis Fei model?

**1.5.7 Long answer type questions**

a. Critically evaluate Ranis Fei model.

b. Compare Ranis Fei model with Lewis' model.

**1.5.8 Suggested Readings**

A Theory of Economics Development: Ranis, G and John C.H. Fei
Leading issues in Agricultural Economics: R. N. Soni
Agricultural Economics: R.K. Lekhi and Joginder Singh

LESSON NO. 1.6 AUTHOR : RAKESH KUMAR

# APPROACH TO AGRICULTURAL DEVELOPMENT
# (Mellor's Model)



## 1.6.1 Introduction

There has been a controversy amongst development economists regarding which sector of the economy should get development priority—agriculture or industry. Prof. J.W. Mellor recognised the role of both the sectors in economic development. He was of the view point that both agricultural and industrial sectors should get the priority of development economists. In the present lesson we shall explain agricultural development as conceived by Prof J.W. Mellor. This lesson is based upon his book entitled "The Economics of Agricultural Development", which was published in 1966. In this book, Mellor also suggests ways and means of transforming traditional agriculture into modern agriculture. His analyis and approach is more pragmatic, exhaustive and extensive than Schultz's transformation of traditonal agriculture**.**

## 1.6.2 Objectives of the lesson

In this lesson we will discuss what is traditional and modern economies and how agricultural developmnet takes place in any underdeveloped economy and how transformation occurs.

## 1.6.3 Explanation of the Mellor's model

In order to understand the development of agriculture, Mellor's model is explained in the following parts :

1. Nature of traditional agriculture (Stage 1)
2. Technological Dynamic Agriculture-Low Capital (Stage II)

3. Technological Dynamic Agriculture-High Capital (Stage III)

**1.6.3.1 Nature of Traditional Agriculture :**

Traditional agriculture implies a backward, labour intensive low productivity and less efficient agriculture. Like Schultz, Mellor's definition of traditional agriculture is not merely stagnant.

For Mellor, most of the farms under traditional agriculture are of small size managed by family. These peasant farms supply factors of production, e.g. labour, capital and management from the household itself. Production, productivity and net income tend to be low on these farms. These farms produce marketable surplus just to meet their non-agriculture requirements of goods and services. As a result the peasant is attached with the market and influenced by the market price.

In traditional agriculture, land and labour are the principal factors of production. The capital in traditional agriculture is in the form of crude tools and implements. There is therefore, less scope of using capital. Increase in labour is the principal source of increase in total production. In the models of economic transformation, agricultural labour plays a very vital role. In Lewis' model of economic development unproductive agriculture labour can be transformed to non-agricultural sector without decreasing output in the agricultural sector. However, latest models of economic development have not given much importance to labour in economic development. Mellor is of the view that there is sufficient evidence with us that increase in the use of labour can increase production in the less developed countries.

Anyhow, we should not forget that, with the increase in labour, the total production may increase but average production per labourer as well as income will fall. Let us see what happens when there is an increase in the supply or availability of labour in agriculture.

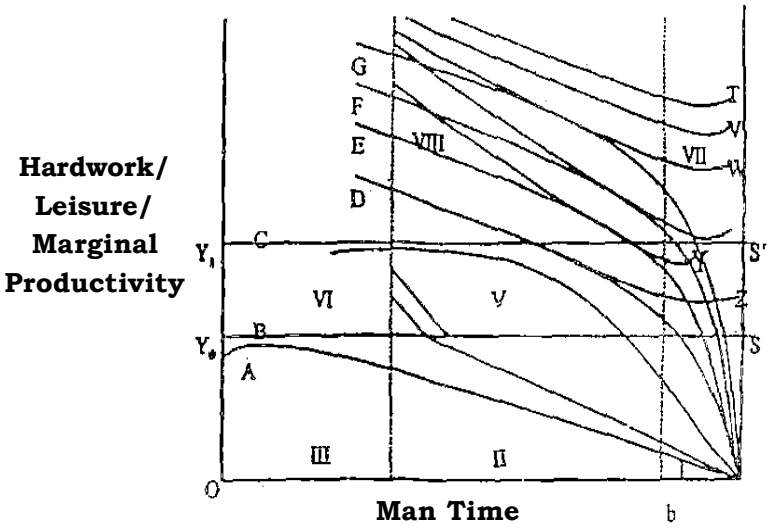
**1. Agricultural Labour in the Models of Agricultural Development :**

There is much evidence that increased quantities of labour can increase production significantly in most of the developing countries. Labour productivity studies examine and show how much labour is absorbed at various levels of productivity. All additional labour would be surplus and theoretically available for transfer to the non-farm sector. Mellor is of the view that in actual practice, transfer of this total surplus would provide some decline in total production, because of the nature of land distribution and other factors. Prof. Mellor studies the available data of farm input structure and showed that available data for India does indicate possibilities for increased productivity with added labour in traditional agriculture. The statistical evidence supports the casual observation in India and other Asian countries that increased labour could improve poor weeding, poorly prepared seedbeds and lack of irrigation water. Japanese labour input per acre is nearly four times as great as in India. Their harvest per acre is nearly twice as great.

**2. Allocation of Agricultural Labour in Traditional Agriculture**

Mellor is of the view that there is much underemployement in traditional agriculture. It may not be there because of the existence of zero value labour. Rather this may be because of unequal distribution of land among farmers. The subsistence farmers may be pushing the use of their family labour upto a point where its marginal productivity is equal to zero. The farmers operating bigger farms will have the option to choose between leisure and work because of their higher incomes.

Mellor uses the diagram (Figure 1) to explain this point:




(Hypothetical Utility Surface Indicating the Effect on labour Input of Various Production Possibilities)

In the diagram, the curves A to G are Production possibility Curves. These curves are based on the law if diminishing marginal returns. Point O shows full work and zero leisure while C is point of full leisure.

The curves T,V,W,X,Y and Z are Iso-utility curves. Iso-utility curve represents various combinations of value of material goods and services and the work, which give a farmer same amount of satisfaction.

According to Mellor, the farms in traditional agriculture can be broadly of two types namely (a) those which provide, at the maximum, the biological subsistence which are shown in the diagram by $OY^{o}$ and (b) those which provide, at the maximum, the culturally defined subsistence income shown in $OY^{1}$.

In case of subsistence farms, the family labour will be utilized till its marginal productivity falls to zero. On the larger farms, the equilibrium level of labour use will be determined by the point of tangency between the given production possibility and one of the iso-utility map.

In diagram I, as production possibility curve moves beyond B, the equilibrium point of labour shows a movement towards right implying that less and less labour will be employed when the size of the farm increases. Production possibility curves A & B refer to subsistence or below and it is only here that the labour is used till its marginal productivity is equal to zero.

According to Mellor, high prices of agricultural products, in traditional agriculture, will persuade the farmer to put in more labour (i.e. reduce leisure). However, as the demand for non-agricultural produce is tradition bound and is rather flexible, a rise in their income because of increases in agricultural prices will tempt the farmer to substitute leisure for work. A point can accordingly be reached, as the prices rise, when the negative income effect fully neutralizes the positive substitution effect on labour use and total production will start falling thereafter.

Mellor also feels that any withdrawal of labour from the agricultural sector is likely to result in decline in total production. Mellor argues that in a traditional agriculture, higher price of agriculture commodities or higher income of the agriculturists will lead to fall in production because of the existence of backward sloping supply curves and that the withdrawal of labour from the agricultural sector will always mean higher per capita income for the remaining labourers, thus leading to fall in output.

According to Mellor, it is not possible to withdraw capital from agriculture for use in non-agricultural sector in traditional agriculture. Saving is low in traditional agriculture because of low production and low income and the modernisation of agriculture is necessary to increase this income.

**Self check exercise**

Q. 1 What are the characteristics of traditional agriculture according to Mellor?

Q. 2 In how many stages Mellor has divided his model. Name and explain those.

**Stage-II**

### 1.6.3.2 Technologically Dynamic Agriculture: Low Capital (Stage II)

The contribution of agriculture to economic development depends on this fact how modern and dynamic it is. The experiences of Japan, Taiwan, Denmark etc. show that they gained much by modernising their agriculture. The experience of these countries can be utilized by less developed countries for policy making.

In the second stage of agricultural development much stress is laid down on increasing per unit productivity of both agriculture and animals. Now inputs with higher marginal productivity and complementary to labour are used in agriculture. The use of modern inputs also shifts the production function for traditional input

upwards. In this phase, there is an increase in modern inputs using more capital but they are not highly capitalised.

In the initial stage of phase II; increase in production is brought by a few people who utilize modern inputs. These technological reforms can be only adopted when there is no imperfection in land tenancy system, credit and marketing facities.

In this stage, agriculture remains a major activity in the economy to generate income and employment. It is observed that with the increase in income and the population in the economy, the demand for agricultural products also rises. The use of machinery in agriculture is limited due to shortage of capital and availability of labour. The farm size cannot be increased.

Mellor is of this opinion that following steps are necessary for smooth progress in the second stage :

**1. Agricultural Research :** In phase II the emphasis is on increasing yield per acre of crops and per livestock unit. For this, there is need to find out new varieties and new methods and production. The research programmes should be adopted to improve the productivity of various inputs. Mellor is of the view that these researches must reach the farmers. According to him.....failure to carry research to the point to find applications under farm conditions probably explain far more of the non-acceptance of the technological change than the more commonly cited cultural factors.

**2. Technological Improvement :** At the beginning of phase II, increase in production is likely to be achieved through spreading acceptance of a small number of technological improvements which individually give large production increase perhaps even in a limited number of geographic areas. These improvements can normally achieve acceptance even when there are remaining imperfections in the land tenure system, marketing situation or credit facilities. For these improvements to be accepted, incentive and services including research and educational activity must be improved. In short, Phase II creates a stream of continuing improvements and changes in technology.

**3. Allocation of Scare Resources :** According to Mellor, the allocation of resources requires distinguishing between inputs such as fertilizers which are imported or are industrially manufactured and remain in adequate supply, and inputs like certain types of administrative and technical personnel whose supply may be very limited. Returns on the former inputs are likely to be high or long or the required additional resources are available, even if costly production facilities are required. Returns on administrative and technical personnel for agricultural development are limited by the specialized nature of their training. However, these are scarce in relation to agricultural needs.

In phase II, the progress of agriculture is a continuous process. The production increase in this phase is due to new innovations and re-employment

of resources saved through innovations. The new technology used is not heavily capital oriented.

**Self check exercise**

Q. 3 According to Mellor which are necessary steps for smooth progress in second stage?

Q. 4 How will technology be helpful in development of agriculture?

**Phase III**

### 1.6.3..3 Technologically Dynamic Agriculture: High Capital Technology (Stage III)

Third phase of agricultural development is implicitly discussed by Mellor. In fact, in the process of development of agriculture in Phase II, the entry into Phase III is imminent. The precondition of entering into this phase is that the non-agricultural sector is developed to some extent.

The non-agricultural sector becomes capable of creating labour saving mechanical innovations and facilities for producing, distributing and servicing of agricultural machinery. These innovations increase labour productivity in agriculture. Labour productivity is also increased through research in plant and animal production. In agricultural sector, sufficient capital and capital formation is available for investment. Size of farm increases due to migration of people to non-agriculture sector.

According to Mellor, "The key characteristic of Phase III is the substitution of capital in form of large scale machinery for labour. At this stage, the agricultural sector has diminished in relative importance, capital formation is sufficient to permit rapid expansion of the non-farm sector and to allow gradual increase of capital use in agriculture, the man land ratio is falling, and the average size is increasing. North America, Western Europe and most other high income countries are in phase III.

Mellor is of the opinion that the development of agriculture should follow the above process. However, it may be possible for countries to move from Phase I to a type of Phase III. This was true of the United States of America. In the U.S.A. agricultural machinery was developed first, and then later yield increasing technology e.g. fertilizers, pesticides, bio-chemical inputs etc. were introduced.

Mellor feels that mechanisation is a legitimate part of Phase II if the labour saved can be put back into production process to increase output even further and if the implements and machinery used are low in capital cost in relation to the labour saved and reapplied. Phase III does put agriculture into competition with industry for resources. Therefore, Phase II must normally be attained before jumping ahead to Phase III.

**Self check exercise**

Q. 5 What is the pre-condition of entering into third phase in Mellor's model?

Q. 6 Which is the key characteristic of phase third in Mellor's model?

### 1.6.3.4 Critical Evaluation :

Mellor's model explains the different phases of agricultural development. His thesis accepts more or less Schultz's Transformation of traditional agriculture. Both Mellor and Schultz agree that if labour is withdrawn from agriculture, the agricultural production would fall. Both agree that there is disguised unemployment in agricultural sector.

Mellor accepts government intervention in agricultural development. He feels that non-intervention is likely to be disastrous. "Government intervention in many other aspects of development will be a necessary condition of rapid development."

**Self check exercise**

Q. 7 Critically evaluate Mellor's model.

Q. 8 Will government intervention be a necessary condition for rapid development of agriculture?

## 1.6.4 Summary

In this lesson we have discussed the Mellor's theory of agricultural development. He started the theory by defining traditional agriculture. His definition of traditional agriculture is more pragmatic. For him traditional agriculture is a backward agriculture, using mainly labour as the major factor of production. He has given his suggestions for transformation of agriculture for that he has divided the whole process into three phases. In first phase he talked about traditional agriculture, in second phase he emphasized that no capital technology will be helpful in transformation process after this the process gains momentum and entry into third phase becomes imminent. Mellor feels that in general, the process of capital formation and its availability for agricultural sector is such that an economy should pass through phase second to phase third rather than jump straight ways to phase third.

## 1.6.5 Keywords

- Dynamic agriculture: A continuous change in agriculture.
- Iso-utility map: When so many iso-utility curves (satisfaction level is same) are taken together on a graph.
- Traditional: Things are same from generations there is no change in them.
- Zero marginal productivity: When there is no positive contribution from labour side in production.

## 1.6.6 Short answer type questions:

a. Briefly state Mellor's model of agricultural development.

b. What are the three phases explained by Mellor for agricultural development.

c. Discuss traditional agriculture as defined by Mellor.

d. Why economy should pass through phase second prior to phase third.

**1.6.7 Long answer type questions**

a. Discuss the different stages of agricultural development as suggested by J. W. Mellor. Point out its limitations.

b. What are the short comings of Mellor's model?

**1.6.8 Suggested readings**

The economics of agricultural development: J. W. Mellor.
Transforming traditional agriculture: T. W. Schulz
Leading issues in agricultural economics: R. N. Soni
Agricultural Economics: R. K. Lekhi and Joginder Singh

LESSON NO. 1.7 AUTHOR : DR. MANISHA

# TRANSFORMATION OF TRADITIONAL AGRICULTURE (SCHULTZ'S FORMULATION)



## 1.7.1 Introduction

Agriculture is an important segment of traditional economy. The development of agriculture is a condition precedent to development of the overall economy. Now the question arises how to develop the agriculture itself. When we know that development of agriculture is prerequisite for the development of overall economy that means development of agriculture is must and there should be transformation of a agriculture from feudalism to capitalism. Many economists have given their views regarding the traditional and agriculture and how to develop the agriculture. Schultz is one of those economists, who have suggested ways and means to develop the agriculture. His book entitled. "Transforming Traditional Agriculture" came in 1964 and is considered as a hallmark in the literature on agriculture development.

There are two types of farmers, one who cultivate farms like their ancestors, cannot produce much even their land is fertile, or they are working hard. On the other hand, there are farmers who have access to and know how to adopt science and new technology, can produce greater production though their land is not of good quality and they are putting less labour. Therefore Schultz argued, "Farming based wholly upon the kinds of factors of production that have been used by farmers for generations can be called traditional agriculture." Again the need is felt to transform traditional agriculture into a highly productive sector of the economy.

## 1.7.2 Objectives of the lesson

In this lesson we will discuss

- Meaning of traditional agriculture
- How to transform traditional agriculture into highly productive sector

### 1.7.3.1 Meaning and attributes of traditional agriculture

Generally people and most of the economists think that traditional agriculture is backward, labour intensive agriculture using no machinery and other inputs, instead of this, they are using the same techniques which were used by their forefathers and having very low productivity. Some economists take the word "Traditional" in another sense means agriculture been stagnant or non-dynamic. But for Schultz traditional agriculture and backward agriculture are not synonymous. Schultz defines traditional agriculture in his own way that it is not necessarily a backward, labour intensive agriculture, using very little of modern machinery and other inputs and having a very low productivity. Schultz has made some observations to clarify the meaning of traditional agriculture. He feels that traditional nature of agriculture does not depend upon the cultural attributes of the cultivating community. Some people might think that if in any society people are conservative, superstitious then agriculture of that society will be of traditional in nature. Schultz does not agree with such views he says that most of the values which effect the production e.g. thrift, attitude towards work, industriousness, have nothing to do with the culture of the society rather they should be treated as economic variables. Traditional character of the agriculture is not determined by the institutional arrangements and technical attributes of factors of production.

Traditional agriculture is associated with a particular type of the equilibrium. When the equilibrium is reached, agriculture is always said to have become traditional in character. According to Schultz, "the critical conditions underlying this type of equilibrium either historically or in the future are as follows:

1. The state of the arts remains constant.
2. The state of preferences and motives for holding and acquiring sources of income remains constant.
3. Both of these states remain constant long enough for marginal preferences and motives for acquiring agricultural factors as sources of income to arrive at an equilibrium with the marginal productivity of these sources viewed as an investment in permanent income streams and with net savings approaching zero."

Agriculture can become traditional only if the art of cultivation becomes static, means farmers will use the same factors of production in the same way as their ancestors have been doing. When no new factors are introduced then certainty in the returns will come and this will encourage agricultural production to move towards equilibrium. Farmers will employ more units till that point where cost of factors becomes equal to marginal returns; at this point equilibrium is reached. After this point there will be no incentive to invest in

agriculture. Simultaneously, incentive to make additional savings will disappear. This equilibrium will indicate that the agriculture has become traditional and it will remain so until the art of cultivation and motives and preferences to hold productive assets remain unchanged.

Schultz's definition, in fact, equates traditional agriculture with a stagnant agriculture. Such a definition helped Schultz to set a theoretical frame work in which he wanted to show that there was optimized utilization of resources in traditional agriculture.

**Self check exercise**

Q.1 Discuss the definition of traditional agriculture as given by Schultz.

Q.2 What is the difference between the definition of traditional agriculture given by Mellor and Schultz?

Q.3 What are the attributes of traditional agriculture?

**1.7.3.2 Main characteristics of traditional agriculture as defined by Schultz**

**1. Allocative efficiency in traditional agriculture**

As others say that sources are not optimally utilized in traditional agriculture but Schultz does not agree with this assertion. He says when marginal cost and marginal returns will be equal (balanced) at this point there is perfect allocation of resources. He also described some assumptions under which perfect allocation of resources will obtain in traditional agriculture

1. There is no significant event taking place as it will disturb the equilibrium e.g. development of infrastructure.
2. Relative prices of various agricultural products should remain constant.
3. There is perfect knowledge about the rate of return to various factors.
4. There are no political problems such as war, curfew etc. in the economy.
5. The society is not using any advance in technology.
6. There are no significant indivisibilities.

**2. Poor but Efficient hypothesis:**

As Schultz already stated that in traditional agriculture there is optimal utilization of resources. This hypothesis signifies that with this does not mean that more income but it will be low as compared to other countries where agriculture is progressing. The hypothesis points to some important conclusions:

1. Farmers in traditional agriculture have already allocated their resources optimally; there is no possibility of increasing their output by reallocating their resources.
2. Optimal allocation of available resources also implies that no resources are left unemployed in the agricultural sector. There is a

full employment of all factors at their prevailing prices. No productive factor remains unemployed; if any factor is unemployed it is unemployed voluntarily.

3. Perfect allocation of resources also proves that even in poor agricultural economies, under normal circumstances, there is no dearth of successful entrepreneurs.
4. Perfect allocation of resources also implies that if the relative prices of various products change, the resource allocation will also change. Farmers will use the resources to the product whose price has gone up. This means farmers in traditional agriculture know how to maximize their profits, after taking the prices into consideration.

**3. Zero value labour:**

Generally economists think that in agriculture there is existence of a zero value labour in agriculture or disguised unemployment. Labour means if some of the labourers are shifted from agricultural sector to other sectors and agriculture production may not suffer at all. The reason for no change in agricultural production is that marginal productivity of labourers is zero but Schultz feels that there is no zero value labour exists in such economies, in traditional agriculture everyone gets employment and gets wages for work that means their marginal productivity is positive i.e. more than zero. He feels that marginal productivity can be very low but can never be zero and transfer of labour from agriculture to other sectors will reduce the agricultural production. To prove his views he has cited two examples from Latin American countries where labour has withdrawn from neighbouring farms in order to meet the increased demand for labour for construction activity. When labour was shifted to Peru and Brazil for construction works then as a result of withdrawal, productivity had declined so Schultz proved that the labour was having positive marginal productivity. He also cited the example of Influenza which raged in India in an epidemic form in 1918-19 and it took a toll of 20 million people in India which was about 6% of the population and constituted 8% of active labour force in agriculture. Due to deaths of workers, area sown was declined by 3.8%. Through such examples Schultz has tried to prove that marginal productivity of labour in agriculture is not zero and as such, there is no disguised unemployment in traditional agriculture.

**Self check exercise**

Q.4 What are the characteristics of traditional agriculture given by Schultz?

Q.5 Write short note on poor but efficient hypothesis.

Q.6 Write a short note on Zero Value Labour.

### 1.7.3.3 Schultz's suggestions for transforming traditional agriculture:

Problem of transforming traditional agriculture is basically a problem of creating new investment opportunities in agriculture. This is possible only if the equilibrium of the traditional agriculture is disturbed through the introduction of new and at the same time more productive factors of production in agriculture. This means art of cultivation should not remain static, it should undergo a change. According to Schultz agriculture transformation will follow only a technological transformation. He has made various suggestions for transformation as follows:

**1. Market approach V/S command approach**

The first suggestion that Schultz makes is with regard to the policy that should be adopted to ensure that the new factors are used by the farmers. The basis of the policy can be either market approach or command approach. In market approach farmers are free to decide whether to adopt a new factor or not. They are guided by the profitability of new factors, as determined by the market forces. The role of the Govt in this approach is to develop and supply of new agricultural inputs, publicity about them, develop the necessary skills through education and training, provision of cheap credit etc.

In the command approach, the farmers who happen to be the ultimate adopters of the new factors are simply directed to use them. They cannot decide, only the Govt. will take the decision what do produce, how to produce and for whom to produce.

According to Schultz, market approach is better than the command approach. In market approach the farmers are the ultimate judges of the efficiency of a factor are given full right to decide whether to use or not. In command approach farmers have to use inputs as directed by Govt. When state owns all the means of production then all types of incentives on the part of the producer and even his skills are lost.

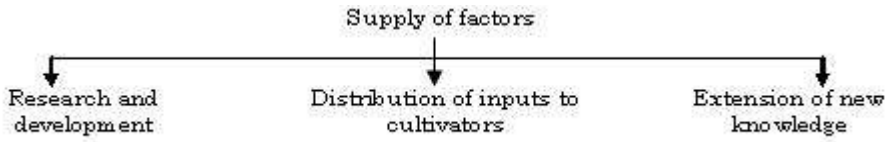
**2. Demand and Supply of new factors**

Schultz feels, when the state of the society has been able to identify the factors or skills which constitute technological transformation then problem arises how to get, adapt and make them acceptable to farmers for use. According to Schultz, the whole process of transformation can be explained in terms of:

2.1 Supply of new factors

2.2 Demand for new factors

**2.1 Supply of new factors:** On the supply side the ultimatum object is to ensure that the new factors are available in ample supply and that too, at reasonable prices. Both of these conditions are necessary for their effective profitability, he says three important steps are involved in the process of supply of new factors to the people.




**2.1.1 Research and development of new factors:** Science and technology play a crucial rule in the modernization of traditional agriculture. Schulz had the feeling that as the art of cultivation is static, it will not be possible to develop a new factor from within, so new factors will have to be imported from those countries which have modernized their agriculture. After importing these inputs into the country, these should be adapted to the physical conditions of the importing country, means that straight away use of the inputs after its import may not be very productive and profitable. Research and development facilities have, therefore, to be provided on an extensive scale so that the imported input can be adapted and produced according to the requirements of the agricultural sector of the input importing country. Now the question arises who should provide these facilities, the state or the private agencies? He suggests it should be carried on in the state run public laboratories or by the non-profit making agencies supported by the state.

**2.1.2 The distribution of new inputs:** When the inputs according to the physical conditions of agriculture have been developed, the next step is to set up an infrastructure for their distribution. Schultz feels that in case of distribution of new input, still untested by the users, certain difficulties crop up like that demand for the input may be very limited in the beginning or on the other hand, cost of entry into the market may be quite high. The cost of entry into the market consists of the cost of adaptation, cost of providing information to the users about the new inputs and others costs of entry. So Schultz suggests that in the initial stages, the distribution of new factors should be taken up by the state or by non-profit making agencies. Once these agencies have been able to generate a demand for new factors, then profit making firms may take over the job of distributing these factors.

**2.1.3 The development of extension services:** Availability of new physical inputs is of no use if the producers do not have any knowledge about the method for its use or about its effectiveness, etc. Even when the new inputs take the form of an agricultural practice only, there is a need for an agency to convey information about it to the farmers. There is, thus, a need for a well developed extension service for passing on the new scientific knowledge to the producers. He feels that due to high costs involved, in the extension, work may be taken up by the state itself.

**2.2 Demand for new factors:** The state has not only to make certain that the new factors are available in the market and the users are made aware of their availability means it has to see that demand is generated for them. In the first instance, Schultz tries to dispel a few misconceptions about the factors promoting or hindering the use of new inputs. For example, according to him, it is wrong to assume that farmers, in traditional agriculture, are so tradition abound that they will not be willing to use the new inputs. Similarly, he points out that differences in the acceptability of new inputs by farmers, in traditional agriculture, do not correspond to the differences in education or in the personality of the farmers or in their social environment. He asserts that farmers in India, Peru or in Guatemala are as ready to accept and introduce the changes in agriculture as those in more advanced countries. Then he points out that the basic factor favouring the use of new factors is purely economic in character.

**2.2.1 Supply price of new factors:** The profitability of any factor depends upon its price and the income through it. He feels that even when any factor is profitable in a developed country it may not be so in any underdeveloped country because the new factor may be relatively more costly due to some specific reasons like if the input is being distributed by the private firms then some additional cost of distribution in the initial stages will be charged and if the use of new input requires some new knowledge and skills, this tool will add to the supply price of the input so in the initial stages it may be necessary for the state to subsidize the production as well as distribution of the new inputs.

**2.2.2 Prospective yield:** To determine the profitability of any input besides the supply price, it's prospective yield is the other factor

that will be considered by the farmers. The Farmers will discount the prospective yield of the new input for these factors and then compare the resultant value with its supply price in order to determine its profitability. Obviously this implies that the claimed demonstrated yield of the input should be quite high not only for compensating the farmers for its higher price when compared with that of the traditional inputs but also for allowing for future uncertainties. He also feels that the land tenure arrangement which determines the ways in which the landlords and farmers share the costs and returns of the new factors also affect the profitability of new factors.

**3. Importance of acquired skills in agricultural transformation:**

Additional knowledge and skills are required for the use of new inputs. If the farmers are not imparted the necessary knowledge or if they themselves are unwilling to acquire it, the new input may not be used at all. This becomes more important when the new inputs happen to be technically far superior to existing ones. That's why Schultz lays much emphasis on the acquisition of knowledge and skills while suggesting various measures for transforming traditional agriculture. Improvement in quality of human capital implies the knowledge and skills of the farmers should be increased. It is the quality of material capital as well as of human capital that determines the rate of agricultural growth. According to Schultz, this objective can be achieved in three ways:

1. Trial and error method
2. On the job training through demonstration, special short courses, vocational schools etc.
3. Schooling

Schultz feels that first method is very slow and he considers schooling i.e., Imparting of general education as the best form of investment in human capital. For this he cited example of Japan that he found a positive relationship between rice output and the education of rice growers.

**Self check exercise**

Q.7 Briefly state the process of transformation of traditional agriculture given by Schultz.

Q.8 What is the role of government in transformation process in Schultz's model?

**DIAGRAMMATIC REPRESENTATION:**

Schultz's analysis of transformation of traditional agriculture can be illustrated in the figure 10.1

In part (A) on the X axis demand and supply of inputs and on the Y-axis price of factor inputs has been taken. In part (B) returns along the vertical and factor combination along the horizontal axes has been taken. Im is the equilibrium in the traditional agriculture which shows that prices of factor inputs are very high. Consequently demand for and supply of factor inputs is low. Total quantum of factors of combination as well as returns to factor inputs is also low when new and cheap sources of income stream are developed in an agriculture sector. As a result, the demand for and supply of factor inputs tend to rise and returns also increase. The new equilibrium point Hm price of factor input is low i.e. OP1. Total demand and supply of factor input increases to OX1 returns would also increase from OR0 to OR1, in between Im and Hm; a large number of transaction equilibriums are possible and the line joining Im and Hm can in modern agriculture. However, a small shift in the prices of factor inputs in modern agriculture may bring about a great change in the demand and supply of factor inputs.

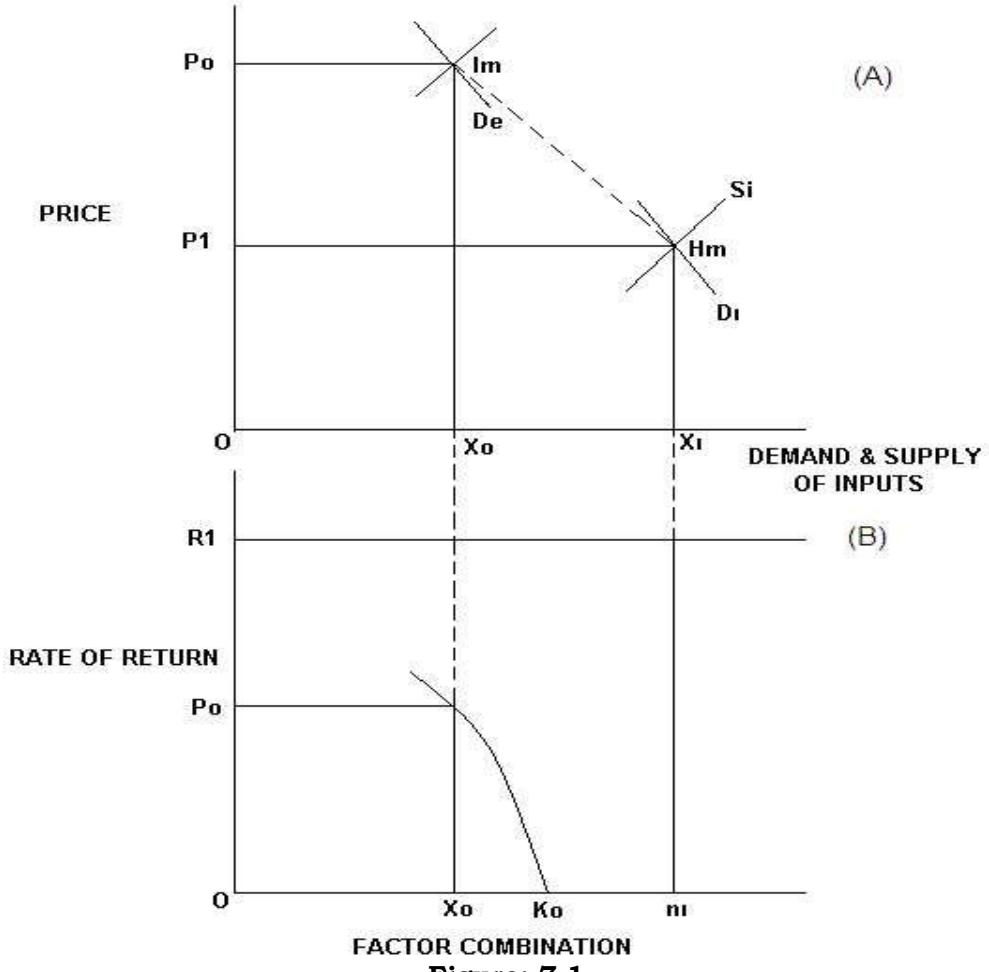



**Figure: 7.1**

### 1.7.3.4 Critical evaluation

Suggestions put forth by Schultz, to transform agriculture are unassailable, nobody will disagree with him so far as his view is about the introduction of new inputs , or about investment in human beings are concerned . His views about the role of the state in making the new inputs available are also acceptable. The green revolution in India which is mainly due to the adoption of new seed –cum-fertilizer technology confirms the validity of Schultz's suggestions. However, this does not mean that Schultz's analysis does not suffer any infirmities.

1. **General concept:** Schultz's theory is too general which is only applicable in specific situations. Schultz has given undue importance to economic attributes of traditional agriculture while the cultural attributes more or less have been ignored. In fact, these attributes are pre-requisites in analyzing and understanding that transformation of agriculture especially in poor economies. In such countries, risk and uncertainties are equally significant which the farmers are facing in the process of production.
2. **Prevalence of disguised unemployment:** Schultz's assertion that there is no zero value labour in a traditional agriculture has been challenged on empirical as well as theoretical grounds. Mellor and Steven's study in Thailand, Majumdar and Desai's studies in India and Rosentein Rodan's study in southern Italy, Mandlebaum's study of Yugoslavia and Greece and U.N.O committee's report on India, Pakistan and Philippines bear ample evidence of zero marginal productivity of labour.
3. **Inefficiency of factor allocation:** In traditional agriculture, factor allocation is not efficient always and in all cases, while Schultz talks about the efficient allocation of various factors of production in the traditional agriculture. This argument of efficient allocation of resources does not apply in third world countries as most of these countries are semi-feudal. In such countries, factor allocation is not motivated by the way of any rational consideration.
4. **Command approach:** In the process of transformation of traditional agriculture Schultz has considered the market approach to be better than command approach. But when he was explaining demand for and supply of new factors he has given every responsibility to the state. Moreover, in the process of transformation and change, social- economic and political factors are equally significant in developing countries.
5. **Self –contradictory:** In the policy measures about the change in the distribution of land and production emerging from traditional agriculture to modern agriculture, Schultz fails to give the scientific analysis of its nature and in his whole analysis he stresses on extension and improvement of the infrastructure of the development of the production forces.

6. **Responsiveness of farmers:** The hypothesis regarding the responsiveness of the farmers to give economic incentives, has not been properly evaluated at macro level in traditional agriculture. This viewpoint is not supported by any sort of evidence.

**Self check exercise**

Q. 9 Critically evaluate Schultz's model.

Q.10 What are the limitation of Schultz's model?

### 1.7.4 Summary

The man who is bound by traditional agriculture, cannot produce much food no matter how rich in fertility the land is. Thrift and work are not enough to overcome the niggardliness of this type of agriculture. To produce in abundance of farm products, requires that the farmer has access to and has the skills and knowledge to use what science knows about soils, plants, animals and machines. To command farmers to increase production is doomed to failure even though they have access to knowledge. Instead, an approach that provides incentives and rewards to farmers is required. The knowledge that makes the transformation possible is a form of capital, which entails investment. This investment is required not only in material inputs in which a part of this knowledge is embedded but importantly also investment in farm people. Schultz's model is a brilliant success as it can be applied in most of the developing countries especially in adoption of the strategy of green revolution. This analysis can be considered outstanding as it emphasizes on agriculture as an engine of growth and acceptance of modern inputs for the promotion of agriculture

### 1.7.5 Keywords

1. Disguised unemployment: the state in which the number of workers is more than required for a particular work, they are actually contributing nothing to production but they looked only busy. If they will be removed from that work then productivity will not change.
2. Optimum allocation of resources: when the resources are fully utilized, in other words we can say that full employment of resources will be existing in society.
3. Prospective yield: the yield farmers are thinking of getting in future.

### 1.7.6 Short answer type questions:

1. What is the role of human factor in transforming traditional agriculture?
2. What are the views of Schultz on zero marginal productivity of labour in agriculture?
3. What is traditional agriculture?
4. Write a note on poor but efficient hypothesis.

### 1.7.7 Long answer type questions:

1. Critically evaluate the Schultz's model of transforming traditional agriculture into modern agriculture.
2. What are the main characteristics of traditional agriculture given by Schultz ?
3. How far Schultz's theory of transforming agriculture into modern agriculture is valid? Comment.

### 1.7.8 Suggested books

1. Leading Issues in Agricultural Economics : R.N. Soni
2. Agricultural Economics : R.K. Lekhi and Joginder Singh
3. Indian Economy : Ruddar Datt and Sundaram
4. Transforming Traditional Agriculture : T.W. Schultz

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# APPROACH TO AGRICULTURAL DEVELOPMENT
## (Boserup's Theory)



### 1.8.1 Introduction

E. Boseurp has discussed the problems and process of agricultural development in historical context like W.W. Rostow has been discussing the stage of economic development. In the process of agricultural development, she tries to demolish the myth of Malthus-the theory of population development. Infact, Boserup's contention is that the agricultural development in due to some kind of compulsion. The main compulsion is posed by growing population in an economy. According to her, this is the main compulsion which causes the development of agriculture. In this lesson, we shall try to refute Malthusian theory of population as represented by Boserup. We shall also try to discuss in detail Boserup's approach to agricultural development.

### 1.8.2 Objectives of the lesson

In this lesson we will discuss :

Problems and process of agricultural development.

Stages of economic development and how expansion in population leads to economic development.

**1.8.3 Explanation of the model.**

We all are aware of Malthusian theory of population. The theory explains that if at any time, food supply changes, population will also change accordingly. A new equilibrium would be restored; population would also increase to wipe out the excess food supply. On the other hand, if the population is more than the means of existence, the positive checks would bring down the population to reach equilibrium between population and means of subsistence.

Boserup has refuted both parts of Malthusian theory of population. First the increase in food is the cause of increase in population and the second, the population would be decreased by positive checks. Regarding first part of Malthusian Theory, Boserup says, "Few observers would like to suggest that the tremendous increase in the two post war decades could be explained as a result of changes in the conditions for food production. It is reasonably clear that the population explosion is a change in the basic conditions which must be regarded as autonomous in the sense that the explanation is to be sought not in the improved conditions of food production but in medical invention and some other factors which the student of agricultural development would regard independent variables."

The second part of Malthusian theory can be easily refuted. Boserup has maintained that whenever there is a population pressure and means of subsistence are less, the population does not go down by positive checks. It rather leads to various technical and other changes which result into agricultural development and increase in food supply. According to Boserup, this happened in early states of development in agriculture when the need to support a larger population from a given area of land is invariably going to call for an increased input of labour per unit of food produced.

Boserup has studied the agricultural development in the following stages:-

**1.8.3.1 Forest Fallow:** Boserup has called the first stage of cultivation as 'forest fallow'.

This stage of agricultural development involves least capital and labour. In this stage mature forest are burnt, the soil becomes loose and is covered with ash. This can be dug with a stick. There is no need of hoes or ploughs. That is why this stage required least labour and capital.

This stage is called 'forest fallow' because the land so prepared by burning forest would be used for agricultural production for a year or two. This land would remain out of cultivation till matured forest has again come up on it for next burning. This used to take 25 years or so.

**1.8.3.2 Bush Fallow:** Anyhow, population continuously grows and its requirement for food also increases. Its requirement for food is not met by merely burning of mature forests. As a result, in order to get more land under cultivation, the community starts burning forests with less 'mature growth'. This repeated burning of less matured forests has been called by Boserup 'bush fallow' stage. In this stage bushes rather than forest

are burnt. When bushes are burnt, many weeds and grass roots survive the fire. Therefore, the soil becomes compact instead of becoming loose as it was in case of 'forest fallow' stage. In order to make soil loose an implement stronger than a stick is required. This required more labour and capital than before. In this stage the period of a land to be fallow declines from 25 years to 6 years or so.

In short, it is the growing population which pushes the community to bush burning rather than forest burning for increasing food supply.

**1.8.3.3 Short Follow:** When population further increases and its need for food grains pushes up, the agricultural development enters into short fallow stage. In this stage, land under grass and weeds is hard. A hoe was an important implement during 'bush fallow' stage. But it cannot loose soil and remove weeds under short fallow stage. Therefore, there is a need for plough. There has been considerable decrease in fertilising ashes because burning of bushes has become less frequent. Therefore, alternative means of manure e.g. dung, pond mud, refuse, litter from surrounding land etc. are needed. This requires more labour and capital. In this stage the period of fallow lasts for a year or two. The farmer returns to the same field after the period.

**1.8.3.4 Annual Cropping:** After some time of short fallow stage, there is no fallow. There is a stage of annual cropping. In this stage some time does lapse between the harvesting of one crop in one year and sowing of the other in the next year. The time intervening between crops is utilised for sowing grain or fodder.

**1.8.3.5 Multiple Cropping:** In this stage the land is intensively used. Here, two or more successive crops are sown every year. The follow period is negligible. This stage of agricultural development requires more labour and capital than the earlier stages besides, simple manuring, green manuring, compost manure, household waste etc. become necessary. Multiple cropping also needs more facilities.

In the above discussion of different stages of agricultural development there is more and more use of labour and capital per unit food produced. Drought animals have also to be used. In the earlier stages, when population density was low, drought animals were paid less attention for their upkeep. But with the increase in population density, there is need for intensive agricultural operations and drought animals will have to be kept more busy. They get attention of the community and are well fed. There is also emphasis on the production of fodder.

Boserup is of the opinion that stages of agricultural development come up as the population grows. The transition from one stage to another is rather slow and may not be surprising. She supplements her answer by giving the example of Sweden.

Boserup supports the different stages of agricultural development by citing the examples from European, African, North and South American history. In these countries agriculture has been developed by bringing about addition to population either through a natural process or through the practice of enslaving weaker natives.

**Self check exercise**

Q1. How many stages Boserup has given for agricultural development?

Q2. Write a short note on Bush fallow.

Q3. How Bush fallow is different from short fallow?

Q4. What is the difference between annual and multiple cropping?

**1.8.3.6 Growing population and some other changes:** As a result of growing population it is not only that agricultural development begins but it brings change in a number of other things. There are continuous changes in the development of tools. In the earlier stages of agricultural development, there were changes in home made tools to be made by local artisans.

There would not have been development of towns unless the population density has not reached a critical minimum. The towns are to be connected with the villages for supply of food through as efficient transport system. In the medieval time, the main cause of famine was not overpopulation but due to sparse population the towns were not well connected.

In the pre-industrial stage, growth in population not only greatly influenced technological development, but it also moulded the social structure. According to Boserup, population growth affects the system of cultivation which affects the social life of the people. For example, 'forest fallow' explains the tribal way of life. The groups of cultivators moved from one forest to another for burning it. In the "bush fallow" stage, life is more settled. Since the period of cultivating a given piece of land was longer, the average, settlement became larger. Some division of labour also emerges. The village market was also established where surplus food was exchanged for non-agricultural goods.

Boserup tries to emphasise the point that in the pre-industrial stage, growing population does not create any obstacles in the way of investment needed for agricultural development. In fact in this stage population is needed for raising new fields, digging of canals, drainage etc.

**Self check exercise**

Q5. How population growth is important for economic development?

Q6. In which way the system of ownership of land is connected with the system of cultivation?

**1.8.3.7 Boserup's Theory and Present Day Underdeveloped Economics:** Boseup asserts that her theory is still valid in agricultural development of modern underdeveloped economics. She says, "The modest increases in output per man hour which can be obtained by the use of industrial products or scientific methods in such communities may not be suffiecient to pay for the very scarce resources of skilled labour and foreign exchange which they absorb. It seems somewhat unrealistic, therefore, to assume that revolution of agricultural techniques by means of modern industrial and scientific methods will take place in the near future in countries which

have not yet reached the stage of urban industrialization (as a result of growing population).

**Self check exersize**

Q7. How Boserup's theory is valid even in modern times for underdeveloped economies?

Q8. Boserup has refuted Malthusian theory of population- discuss.

**1.8.3.8 Critical Appraisal :**

(1) Boserup has made it clear that her theory is not applicable to those economies where urban industrial sector is well developed. This theory is not applicable in USA and Canada. Boserup's theory does not make it clear as to how urbanisation and subsequent industrialization took place in such countries when even population pressure for agricultural development in pre-industrialization was quite low.

(2) Boserup has expressed the view that growing population would be observed in agricultural underdeveloped economies even when there is mechanisation in these countries. This would be because of multiple cropping in these countries. Any how this has not been true in case of India. After independence the modernization of agriculture has not substantially observed population in agriculture sector. This happened even in those parts of the country where large scale mechanization has not taken place. The disguised unemployment in the agricultural sector in traditional agricultural economies of south-east Asian countries again point to the fact that agricultural development fails to absorb the growing population.

(3) Boserup has tried to show that cultivation becomes intensive when population increases and becomes extensive when population falls. This assertion is not fully covering because the agricultural progress can be served.

(4) Boserup has completely ignored the unfavuorable effects of growing population on agriculture. In backward economics land fifties have already been reached, the sub division and fragmentation of holdings must follow. Small firms in turn will obstruct the use of improved technology. Growing population may also adversely affect the process of capital formulation.

(5) Boserup in her attempt to refute the Malthusian Theory of Population called optimum theory of population which too, favoured a limit on population beyond a certain point because of its harmful effect on the economy.

The discussions in the above paragraphs should not imply that Boserup has not found support for her assertion. Quite a few research workers have utilized data from various underdeveloped countries or from different parts of the same underdeveloped country to be her various hypothesis. Simon came out with the conclusion that population growth led to agricultural development as well as more investment in agriculture. R.H. Choudhary also found a position correlation between growing population and agricultural development.

A study by Conlisk and Huddle also support Boserup's finding. Boserup finds an indirect support in Kuznets conclusion that population growth does not have a negative effect on output growth rate".

Most of the above mentioned studies no doubt have aimed at establishing a relationship between population and agricultural development in the present day backward economics. But their conclusions cannot be accepted mainly because these studies suffer from certain limitations as far as their use of testing Boserup's hypothesis is concerned. Firstly, in most of these studies conclusions are based on correlation coefficient which does not indicate the casual relationship. Secondly, most of these studies have used data pertaining to recent time when government of various underdeveloped countries have themselves taken up development of the agricultural sector. At present, the development of agriculture sector is deliberate and is due to a combination of policy measures and the available opportunities.

The fact of matter is the excessive population can affect agricultural production both ways. It may lead to the development of agriculture or may relate its progress depending upon the prevailing situation.

**Self check exercise**

Q9. Critically examine Boserup's theory of agricultural development.

Q10. Is only population growth responsible for economic development – comment.

### 1.8.4. Summary

In this lesson we have discussed Boserup's theory of agricultural development. She has divided whole process into five stages - Forest fallow, bush fallow, short fallow, annual cropping and multiple cropping. She emphasized the cause and effect relationship of population growth and agricultural development, that as there will be rise in population there is development in agriculture because for their different needs people will use different means. With this there will be new inventions and innovations which leads to economic development. No doubt, that this model is also having limitations, we see in present times that there is no such cause and effect relationship between population growth and agricultural development. There are other factors also which are responsible like social, economic, technical and administrative.

### 1.8.5. Keywords

- Forest fallow: When forests are burnt and land is used for cultivation.
- Bush fallow: with the rise in population people can not wait till growth of forests so they burnt the bushes.
- Short fallow: When land under grass and weeds is used.
- Annual cropping: when one crop is grown.
- Multiple cropping: when more then one crop is grown.

### 1.8.6 Short answer type questions

a. Write a note on forest fallow.
b. How Boserup's theory is valid even in modern times for underdeveloped economies?
c. Which type of changes occurs with rise in population?
d. What are limitations of Boserup's theory?

### 1.8.7 Long answer type questions

a. Explain Boserup's theory of agricultural development.
b. Critically examine Boserup's theory of agricultural development.

### 1.8.8 Suggested readings

The Conditions of Agricultural Growth: E. Boserup
Leading issues in Agricultural Economics: R. N. Soni
Agricultural Economics: R.K. Lekhi and Joginder Singh