MODULE I

1

ROLE OF AGRICULTURE

Unit Structure

1.0 OBJECTIVES

- To know the role of agriculture in developing country
- To know the role of agriculture in developed country

1.1 INTRODUCTION

In the economic growth of any nation agriculture plays a very important role. Agriculture has made an immense contribution the economic growth of the developed nations and its role in the underdeveloped or developing nations is equally important. Nearly 75% of the Indian population is depending on agriculture for its livelihood thus making it the largest source of economic activity for the entire nation. Although with rapid development in the technology leading to a substantial growth in the secondary and tertiary sectors, agriculture still remains a very important source of occupation.

1.2 ROLE OF AGRICULTURE IN DEVELOPING ECONOMY

In developing and the underdeveloped nations agriculture has always and is still playing very crucial role in their economic development and employment generation. In our following discussion we will have a look at the detailed role of agriculture in its contribution to the economic growth of such underdeveloped or developing nations.

1. Product Contribution:

Majority of the underdeveloped or developing nations depend on their own agricultural activity for food grains and pluses for their own self consumption. However, as exceptions do exist there are a few nations like Malaysia and Saudi Arabia who exports their natural resources like oil and gas which in turn helps them earn foreign exchange in huge volumes, and

this huge amount of foreign exchange which they earn helps them import their entire food requirements for their population. These countries being exceptions, all the other developing nations don't earn or don't have such a huge reserve of foreign exchange from which they can import the entire food requirement of the population of their entire country, and hence they have to rely on their own agriculture to produce enough quantity of food grains to feed their entire population.

In developing or underdeveloped nations, the farmers have to produce food grains well above their survival requirements as they have to supply necessary quantity of food grains to their urban population. Farmers in the developing nations should have marketable surplus of food grains which will help meet the food requirements of population employed as workforce in both secondary as well as the tertiary sectors which is ultimately necessary for the growth of both these sectors. With the growth of secondary and the tertiary sectors, it is equally important that the agricultural sector also grows at such a rate which matches the food grain requirement of the increasing workforce and helps in sustaining both the growth of secondary as well as the tertiary sector.

The agricultural growth has to match the industrial development because if there is a shortfall in the agricultural production then the food grains import is not possible due to the shortage of foreign exchange reserves. This is turn will adversely affect industrial or the secondary sector as the terms of trade will turn against the secondary or the industrial sector and this will ultimately halt the growth process, as the industrial production will no longer be profitable. This will ultimately result in the economy coming to a grinding halt.

2. Factor Contribution:

Nearly 60% of the population of the developing countries is engaged in the agriculture, so agriculture can supply a huge quantity of workforce to the secondary and tertiary sectors provided if proper training is given to such a workforce employed in the agricultural sector. This can only happen when the productivity in industrial or tertiary sector rises. In Lewis's "Model Of Development With Unlimited Supplies Of Labour" surplus labour mobilization which is disguisedly unemployed in the agricultural sector is necessary for the growth and expansion of the industrial or secondary sector and capital accumulation is necessary for generating employment in the expanding industries. Lower wage rate for workers implies lower will be the cost of production for the industrial or secondary sector which in turn will generate huge profits for the industrialists, who can reinvest these profits for further industrial development and capital accumulation.

In countries like India, where there is a democratic set up and everyone has a right to choose their own occupation, the labour employed in the agricultural sector cannot be forced to migrate to the industrial sector until and unless there is an increase in the agricultural productivity and hence there is a marketable surplus of food grains. Green Revolution of mid

1960s played a crucial role in revolutionizing the use of technology in the agricultural sector and leading to a marketable surplus generation in the agricultural sector. This led to a growth in the industrial sector of many developing countries of South-East Asia using cheap labour so freed from the agricultural sector.

3. Source of Capital:

Agriculture can be a key source capital formation for the industrial growth in the developing nations. In many poor developing nations, the agricultural income is unequally distributed, so people living in the rural areas and having high income can invest their savings in the industrial development.

Land revenue generated from agriculture forms an insignificant source of State income in India. A committee led by late Dr K. N. Raj suggested 'Agricultural Holding Tax' to transfer savings from agricultural sector for economic development.

4. Market Contribution:

reflected in the demand for the industrial products. In the initial stages of development, when the urban sector is not very well developed or very small and export market is still a distant dream, agriculture sector in the underdeveloped nations is a major market for industrial products. The farmers spend their money income on industrial goods which they earn by selling their production of cash crops like sugar, jute, cotton, etc. Income generated by the farmers by selling their marketable surplus of food grains is also used in creating the demand for the industrial goods.

For the industrial growth to be high, the demand for industrial products has to expand or increase. It has been observed in India, that whenever there is a slow or a negative growth in the agricultural sector, there has been no growth in the industrial sector due to deficiency of demand for the industrial products. When there is an increase in the agricultural productivity and production leads to an increase in the demand for industrial goods and services and this leads to an acceleration in the rate of economic development. According to World Development Report of the year 1979, "a stagnant rural economy with low purchasing power holds back industrial growth in many developing countries."

There is a direct relationship between agriculture and the industries, agriculture creates a demand for the various industrial products and in turn supplies food and raw materials to the industries, raw materials include items like sugarcane, jute, cotton, oilseeds etc. Agriculture also provides raw materials to the agro-based industries like sugar manufacturing, rice-husking, oil-crushing, handloom weaving, etc. Hence, when the agricultural growth is slow or sluggish, these agro-based industries will not be able to get regular and required supply of their raw-materials.

From the above discussion it is clear that a rapid and a healthy growth in the agricultural sector is a prerequisite for a rapid industrial growth. This

has an impact on the pricing of the agricultural products in relation to the industrial goods, that is this decides the terms of trade between agriculture and the industry. Lower agricultural prices imply cheaper raw materials and food for the industry which in turn leads to lower cost and which ultimately leads to higher profitability. From the agriculture point of view lower prices means lower income for farmers, which in turn would impact their purchasing power to buy industrial goods.

As lower agricultural prices would only discourage the agricultural productivity. So for balancing of the terms of trade between the agricultural sector and the industrial sector, the agricultural prices should neither be to high to make industrial production an unprofitable bargain, nor should they be so low that leads to the exploitation of the agricultural sector and farmers are not encouraged to increase their agricultural productivity.

5. Foreign Exchange Contribution:

In initial stages of economic development with low industrial development, exports of agricultural products can be the main source of foreign exchange earnings for an underdeveloped country, agriculture earns foreign exchange from its exports of primary goods.

In the initial stages of economic development, the developing countries face a major crisis of foreign exchange or what is often referred to a 'foreign exchange gap' to meet their requirements of imports of industrial goods for their industrial development. Agriculture by exporting primary goods contributes to the foreign exchange earnings thereby enabling the developing nations to be able to import the industrial goods needed for their industrial growth, these are the goods which cannot be produced in the importing country or even if produced will be produced at a higher opportunity cost.

So here we can see that agriculture can play an important role in contributing to the economic development of the nation by earning foreign exchange needed to import the industrial raw materials and capital goods needed for industrial expansion. The shortage or lack of foreign exchange acts as a big hindrance for the growth process of a developing nation. In India's Second and Third Five Year Plan the agricultural sector was relatively ignored in allocation of investment resources, so the growth process too came to a halt as even the basic food requirements were needed to be imported with lack of enough foreign exchange balance, the balance of payments problems were being experienced and it increasingly became more difficult to import even necessary inputs for the industrial growth.

6. Agriculture and Poverty Alleviation:

In India, majority of the poor population lives in the rural areas of the country. Still around 40% of the Indian rural population lives below poverty line, even after 60 years of independence, and majority of them are marginal farmers, Scheduled Castes and Tribes, landless agricultural

labourers. Among others, Montek Singh Ahluwalia the former Deputy Chairman of Indian Planning Commission that agricultural growth leads to a decline in the poverty. Agricultural growth plays an important role in any strategy framed to eradicate poverty. Agricultural growth helps in increasing both the productivity as well as the income levels of small and marginal farmers and improves the employment level as well as the wage level of the agricultural workers. In this way, it helps in both the poverty as well as the disguised unemployment. An increase in the agricultural productivity ensures lower food prices and thus, helps in keeping inflation under control and thus contributes in lowering of the poverty level.

7. Contribution of Agriculture to Employment Generation:

In key growth models for labour-surplus developing nations, eminent among them are 'Lewis' model of growth with unlimited supply of labour,' Mahalanobis growth model of assigning higher importance to basic and heavy industries highlighted the point of withdrawal of surplus labour from the agricultural sector to be employed in the growing or expanding industrial sector. However, it was observed that instead of withdrawing of surplus labour from agriculture, the modern industries were highly capital intensive and generated very little or limited employment opportunities which were not even able to employ the openly unemployed workforce in the urban areas.

Agricultural growth provides a good employment potential, however to generate this employment potential from agricultural growth it is necessary that a proper strategy of agricultural growth is followed. The use of new agricultural technology like High Yield Value Seeds, pesticides, fertilizers accompanied by optimum quantity of water for irrigation purposes will help in increasing the level of agricultural employment. Adaptation of inputs like high-yielding technology helps the farmers to adopt multiple cropping which in turn leads to a large employment potential generation in the agricultural sector.

In order to improve and expand the irrigation facilities and other agricultural infrastructural needs so that the farmers across India can draw benefits from the new high-yielding technology, there is need to increase in the capital investment in the agricultural sector. The extensive dispersion of the high-yielding technology in the rural areas of India will not only raise the agricultural productivity but will also raise the employment level in the agricultural sector. In order to achieve full employment potential agricultural growth, mechanisation in agriculture should be used in a selective manner so that there is no reckless substitution of manpower by machines leading to an increase in the unemployment level. Further to increase the employment level in the agricultural sector, land reforms like tenancy reforms and distribution of land through imposition of ceiling on land holdings should be effectively be implemented as small farmers employ more labour, have higher cropping intensity and higher productivity.

1.3 ROLE OF AGRICULTURE IN A DEVELOPED ECONOMY

Agriculture sector has always played a tactical role in the economic development of any country. It has made an important contribution to the economic well-being of advanced countries.

If we have a look at the history, we find that there is a clear evidence that Agricultural Revolution led to the Industrial Revolution there. Similarly, in U.S. and Japan also we see that the agricultural development aided in a huge way in the process of industrialization.

Over the years it has been witnessed that an increased agricultural productivity and output contributes to the overall economic development of the nation in a big way. So it will be more logical and correct to give greater importance to the further development of the agricultural sector.

According to all leading economists like Prof. Kinderberger, Todaro, Lewis, Nurkse etc. agriculture contributes to the economic development in several ways, viz

1. As it not only provides food for the entire population but also provides raw material to the non-agricultural sectors of the economy.

2. It creates a demand for non-agricultural sectors in the rural areas, as it increases the purchasing power of the rural population which happens when they sell their marketable surplus.

1.3.1 Role of Agriculture in A Developed Countries:

1. Contribution to National Income:

If we have a look at the economic history of many advanced and developed countries, we find that the agricultural prosperity has immensely contributed in encouraging economic progress. It has been rightly said that today's well developed and industrialized economies were once mainly agricultural economies, and today's underdeveloped economies are primarily agricultural countries, and agriculture contributes a major chunk of income to their national income.

2. Source of Food Supply:

Even though, agriculture may not be the prime source of income for the developed nations, it is of significant importance to the developed nations as well, because if there is any shortfall in the agricultural production and it fails to meet the ever-increasing food demand, then it will adversely affect the growth rate of even the developed economies. So increasing the agricultural output has been of prime importance for the economic growth of any nation, whether it's a developed nation or a developing one.

3. Pre-Requisite for Raw Material:

A steady growth and advancement in the agricultural sector is a must for any economy irrespective of the fact whether it's a developing or a developed economy. As far as the developing economies are concerned agricultural sector forms a substantial part of their national income, the importance of agricultural sector is no less in developed countries either, as it provides raw materials to the industries which in turn converts them into finished products. Say, for example flour mills converts wheat into flour which is ultimately supplied to bread manufacturers who manufacture bread from the same flour. There are many such examples where industries take their raw materials from agriculture products and later manufacture them into finished goods for final consumption.

4. Shift of Manpower:

When the economy is a developing economy, agriculture absorbs large amount of workforce. However, it is important for the economy that there is a progress in the agricultural sector through automation, which will force the workforce to shift from agricultural sector to non-agricultural sectors which will ultimately lead to economic development. This will help in reducing the burden of the workforce on land which is always limited in supply. Once the economy turns into a developed economy, the percentage of labour employed by agriculture will be very low mainly due to the fact that the advanced technology has replaced the huge labour force from the agricultural sector. Which ultimately leads to high productivity and limited employment of labour in the agricultural sector.

5. Helpful in Phasing out Economic Depression:

In times like economic depression when the industrial production hits the rock bottom and survival for any economy whether developed or underdeveloped becomes really difficult, it is at this time agriculture plays a vital role in not only the production of necessities of the society but more importantly providing employment to the people and thus creating demand for other goods and services.

1.3.2 Conclusion:

Progress in the agricultural sector is essential as it provides for the ever-growing non-agricultural population of the nation. Agricultural progress is further necessary as it provides raw materials to many industries which in turn helps the nation in earning foreign exchange and in generating employment in the nation.

Check Progress:

1. What is the role of agriculture in Developing country?

2. What is the role of agriculture in developed country?

1.4 SUMMARY

Agriculture's role in the developed countries if we see is mainly limited to maintaining a regular food supply for its population, providing raw materials to the industries which depend on agriculture for regular supply of their raw material these are mainly agro-based industries. Another important role agriculture plays in the developed countries is during depression as it helps revive the economy when all the industrial production is down.

However, if we talk about the role of agriculture in developing countries, it plays really a very vital role, be it creating job opportunities nearly 50% of the population in such countries are still employed in the agriculture. Besides this agriculture still contributes to economic development as it supplies raw material to various agro-based industries which still form the backbone of the economy in such countries. Agriculture still forms a major part of the national income of the developing nations and even supports them in earning foreign exchange in their initial years of development.

1.5 QUESTIONS

1. What is role of agriculture in developing and developed countries.

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2

THEORIES OF AGRICULTURAL DEVELOPMENT

Unit Structure

2.0 OBJECTIVES

- To know the different theories of agriculture development given by different economist and agriculturist.
- The objective of this unit is to provide knowledge about the various theories of agricultural development which are applicable to underdeveloped countries.

2.1 INTRODUCTION

This unit deals with the various theories of agricultural development. The important theories discussed in this unit are Lewis theory, Schultz theory. These theories discuss the problems of labour surplus economy. Lewis theory in particular assumes that the underdeveloped countries have surplus labour in the sense that marginal productivity of labour is zero. He calls for transferring of labour from agricultural sector to industrial for economic development. The unit also contains theories which suggest the ways and means of transforming traditional agriculture. The theories of agricultural development are propounded by Mellor, Ruttan and Hayami.

2.2 LEWIS MODEL

2.2.1 Introduction:

The Lewis model tries to study the structural reformation of an economy in a survival stage to a modern industrial economy through the process of surplus labour. The theory was developed by Nobel laureate W. Arthur Lewis in 1954. For the underdeveloped or developing nations Lewis Model became the general theory of development process in labour surplus.

2.2.2 Assumptions:

1. The model assumes an underdeveloped economy has a surplus of unproductive labour in the agricultural sector.
2. The labour is attracted to the growing manufacturing sector which offers higher wages.
3. It assumes that the wages in the manufacturing sector are more or less fixed, or stable.
4. Manufacturers make profit as they charge a price above the fixed wage rate.
5. The model assumes that the profit earned by charging a price above the fixed wage rate will be reinvested in the business in form of fixed capital.
6. A well developed and an advanced manufacturing sector indicates that the economy has changed from a traditional economy to an industrialized one.

W. A. Lewis divided the economy of a developing country into 2 sectors:

2.2.3 The capitalist Sector:

Lewis has defined the capitalist sector as "that part of the economy which uses reproducible capital and pays capitalists thereof" the capitalist sector get reward in form of profit for the risk undertaken by them for investing their capital. The capitalist controls the use of capital who use the services of labour and pay them wages. Capitalist sector includes activities like manufacturing, trading, plantations etc. The capitalist sector may be private or public, by private we mean when the capital is invested by private individuals, firms or companies whereas when we say public, we refer to capital invested by the government.

2.2.4 The subsistence Sector:

According to Lewis, survival sector is that sector or part of the economy which don't use reproducible capital. It can also be referred to as the indigenous or traditional or "self-employed sector". The per head output in the subsistence sector is comparatively lower as compared to the capitalist sector as it is not able to generate its own ideas with capital. The "Dual Sector Model" is development theory in which surplus labour from traditional (agricultural) sector migrates to the modern industrial sector whose growth rate absorbs the excess labour, encourages industrialization and accelerates sustained development.

In this model, low wages, abundance of labour and low productivity through a labour-intensive production process are the characteristics of the subsistence agricultural sector. As against this, capitalist manufacturing

sector is defined by higher wage rates as compared to subsistence agricultural sector, higher marginal productivity, and a higher demand for workers. It is assumed that the capitalist sector will use a capital-intensive production process, so investment and capital formation and investment in manufacturing sector are possible over a period of time as capitalist's profits are reinvested in the capital. Here, hypothetical developing economy's investment is moving towards the physical capital stock in the manufacturing sector and improvement in the marginal productivity of labour in the agricultural sector is assumed to be of low priority.

2.2.5 Relationship between the two sectors:

The primary relationship between the two sectors can be established from the fact that as the capitalist sector expands it uses labour from the subsistence sector. This increases the output per head of the workers who move from the subsistence sector to capitalist sector. Lewis in his model considers overpopulated labour surplus economies and also assumes that the supply of unskilled labour to the capitalist sector is unlimited. This in turn leads to a situation where new industries can be established and existing ones can be expanded at the **existing wage rate.** A huge part of the unlimited supply of labour consists of the labour force who are in disguised unemployment in agriculture and other occupations like domestic services, casual jobs, petty retail trading etc. Lewis also takes into account factors that cause an increase in the supply of the unskilled labour they are women in the household and population growth.

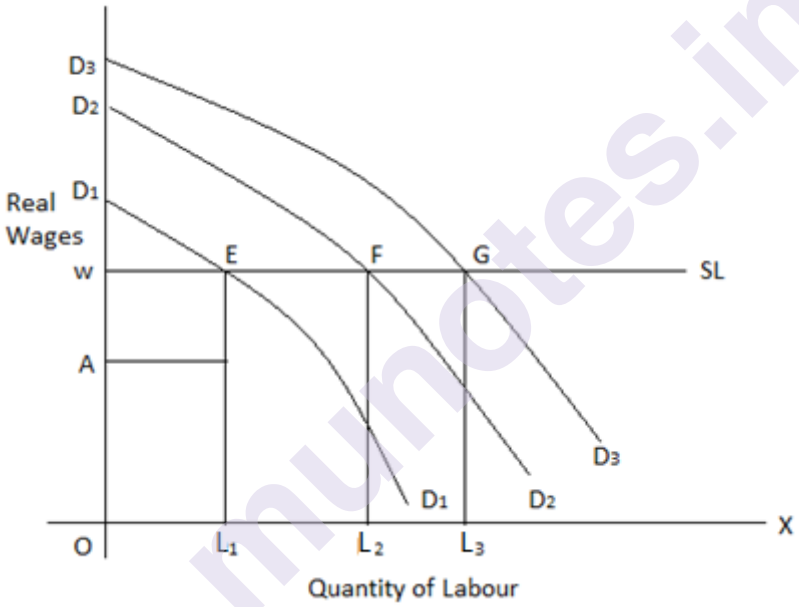
The amount of cultivable land for agricultural sector is limited, so the marginal productivity of an additional farmer is assumed to be zero. As per the law of diminishing marginal returns has run its course due to the fixed input, land. So, the agricultural sector has huge number of farmers who are not contributing to the agricultural output since their marginal productivity is zero. This group of farmers that are not producing any agricultural output are termed as surplus labour as this group of labour can be shifted to another sector without adversely affecting the agricultural output. So mainly due a difference in the wages of the capitalist and subsistence sector, the labour will tend to migrate from the agricultural sector to the manufacturing sector over a period of time to get higher wages. Even though the marginal productivity of the labour is zero, it will still share the total product and will receive wage equal to average productivity.

The general welfare and productivity will improve if the quantity of workers moves from subsistence to capitalist sector which is equal to the surplus labour in the subsistence sector, regardless of the fact who actually transfers. With the transfer of labour from subsistence sector to manufacturing sector the total agricultural production will remain the same while the total industrial production will increase due to addition of labour, however; this additional labour will bring down the marginal productivity and wages in the manufacturing sector. As the transition of labour continues to take place and investment results in an increase in the capital stock, the marginal productivity of labour in manufacturing sector

will continue to rise due to capital formation and will fall by additional workers entering the manufacturing sector. Over a period of time the wage rates for both the manufacturing as well as the agricultural sector will be equal as the workers leaving agricultural sector for manufacturing sector, increasing the marginal productivity and wages in agricultural sector while lowering the productivity and wages in the manufacturing sector.

The end result of the migration process of the labour from the agricultural sector to the manufacturing sector is that the agricultural wages will ultimately be equal to the manufacturing wages and similarly, agricultural marginal productivity of labour will also be equal to the manufacturing marginal productivity of labour. After this point, there will be no further enlargement or expansion of manufacturing sector as the workers no longer have any monetary incentive for transition. Lewis model we can explain with the help of diagram.

2.2.6 Surplus labour and the growth of the economy:



The Lewis model of development of a two –sector economy can be illustrated as follows:

In the figure, the quantity of labour is ensured along the horizontal axis and real wage is measured along the vertical axis. OA is the average rural income and OW is the urban quantity of labour industrial wage rate.

It assumed that OW is at least 30% higher than OA. D_1D_1, D_2D_2 and D_3D_3 are the demand curve for labour in the industrial sector. SL is the supply curve of labour to the modern industrial sector. According to Lewis, there is surplus labour in the traditional sector, in the sense that marginal productivity of labour is zero and rural read wage is determined by the average product.

Initially the demand curve for labour in the modern sector is D_1D_1which is also the marginal product curve of labour. The modern profit-maximizing sector, initially hires OL_1, i.e. to point were their marginal product is equal to real wage. In figure, demand curve for labour D_1D_1intersects the labour supply curve at point E, corresponding to which the total modern sector employment is equal to OL_1. The total output of modern Sector would be given by the OD_1EL_1. The total wage bill would be $OWEL_1$. The total profits of the capitalist would be equal to the area WD_1E. The capitalist would reinvest the entire profits. The reinvestment of profits by the capitalists would increase the total stock of capital and this would shift the demand curve for labour to D_2D_2. A new equilibrium will be achieved at point F will OL_2 workers employed. As a result, the total output rises to OD_2FL_2. The total wages and profits increase to $OWFL_2$ and WD_2F respectively. The capitalist will reinvest the entire profits which further increases the stock of capital and shifts the labour demand curve to D_3D_3. The result is that there is further increase in employment and income in modern industrial sector. The new equilibrium takes place at point G at which the level of employment is OL_3 and total income is OD_3GL_3. The wages and profits increase to $OWGL_3$ and WD_3G. The reinvestment of this profit by the capitalist leads to further expansion of output and employment and promote development of a dual economy.

The above process of growth of modern industrial sector and employment expansion will continue until all surplus labour from the traditional sector is absorbed in the industrial sector. After the exhaustion of surplus labour, additional workers can be withdrawn from the agricultural sector only at a higher wage rate. The supply curve of labour will become positively sloped and wages and employment in modern sector will go hand in hand. The structural transformation of the economy will have taken place by this time.

2.2.7 Criticism of the Lewis model:

Although the Lewis theory is very interesting as it has explained the process of development of a labour surplus economy in a simple and attractive way, the theory suffers from certain drawbacks.

1. **Labour saving capital accumulation:** The theory assumes that the capitalists will reinvest their profits which head to expansion of output and employment in the modern sector. But if the capitalist reinvests their profits in more sophisticated laboursaving capital equipment or technology, it would not lead to expansion of employment. This kind of reinvestment of profits will lead to rise in only output and capitalists' profits. If this is the case, the whole theory breaks down.

2. **Urban wage rate not constant:** The theory assumes that wage rate in urban industrial sector is constant until the supply of labour is exhausted from the subsistence sector. This is unrealistic as urban wage continues to rise due to pressure from powerful workers union.

3. **Capital Flight:** The theory assumed that the capitalist would reinvest their profits within the domestic economy. So, the theory argued that the reinvestment of profits would lead to expansion of output and employment. But if the capitalists tend their profits abroad as a form of capital flight then the expansion of output and employment will not take place in the domestic economy.

4. **Skilled Labour not a Temporary Bottleneck:** Lewis assumes that unskilled labour can be given training and skill can be formed. So, he considered skilled labour as temporary bottleneck. However, skill formation poses as serious problem and it takes a long time and high cost to train the unskilled workers.

5. **Marginal productivity of labour not zero:** The theory assumes that marginal productivity of labour is zero in subsistence sector of overpopulated underdeveloped countries.

2.2.8 Conclusions:

Despite these criticisms, the Lewis theory is extremely valuable as an early conceptual portrayal of the development process through the transfer of surplus labour from the subsistence sector to modern industrial sector. It has explained the process of structural transformation of labour surplus underdeveloped countries in a very clear and simple manner. It explains how capital accumulation can take place in such an economy with reinvestment of profits by capitalists which help in growth of the economy and expansion of employment and output. But the theory needs certain modifications in assumptions and analysis to fit the reality.

Check Progress:

1. What are you understand by capitalist sector and subsistence Sector in agriculture development?

2. What is the relationship between capitalist and subsistence sector?

3. Critically evaluate the Lewis theory of agriculture development.

2.3 THEORY OF AGRICULURAL DEVELOPMENT: SCHULTZ THEORY

2.3.1 Introduction:

The development of agriculture is important for over-all development of an economy. Therefore, many economists have developed various theories suggesting ways and means for development of agriculture in underdeveloped countries. In this regard, T.W Schultz has made a significant contribution.

Schultz, in his books 'Transforming Traditional agriculture which was published in 1964, has suggested various ways and means to develop traditional agriculture. In his theory, he discusses some important aspects of the problem of transformation of traditional agriculture. Schultz's theory of agricultural transformation can be discussed under the following heads.

2.3.2 Definition of Traditional Agriculture:

The definition of traditional agriculture given by Schultz is different from the definition given by other economists. According to Schultz, traditional agriculture is one which is static and non-dynamic. Agriculture can be capital intensive as well as productive yet it can be traditional in character, if its art of cultivation is static and further development does not take place. In that sense, even the agriculture of developed countries like America can be traditional if the art of cultivation does not change and become stagnant. To Schultz traditional agriculture is not necessarily a backward and labour-intensive agriculture. He wanted that even capital-intensive agriculture can assume traditional character in the long period and eventually arrive at the equilibrium where the art of cultivation comes to a halt that characterizes traditional agriculture. The agriculture will remain traditional until the art of cultivation changes.

2.3.3 Characteristics of Traditional Agriculture:

After defining the traditional agriculture in his own ways, Schultz discusses the two important characteristics of traditional agriculture which are as follows:

1. **Perfect allocation of resources:** According to Schultz, there is perfect allocation of resources in traditional agriculture. The static art of cultivation enables the farmers to know, by long experience, about the returns to various factors of production. So, they will allocate resources and factors up to the point where the marginal returns of these factors are equal to their respective marginal costs i.e. (MR = M C). This is the condition for perfect allocation of resources. This conclusion leads to the poor but efficient hypothesis. This hypothesis states that the farmers in traditional agriculture are generally poor because of stagnation of agriculture but due to long experience with

the same art of cultivation, they are able to allocate resources efficiently.

2. **No zero-value labour:** Many economists have argued that in traditional agriculture marginal productivity of labour is zero. However, Schultz is of the view that there is no zero-value labour in traditional agriculture. According to him, marginal productivity of labour in traditional agriculture may be low but not zero. To him, any withdrawal of labour from the traditional agriculture will lead to reduction in total output. He provided evidence to prove his argument. He cited examples from Latin American countries Peru and Brazil where labour was withdrawn from agricultu4re for engaging in construction activity. Schultz found that in both the countries withdrawal of labour from agriculture resulted to decline in agricultural production. Thus, Schultz concludes that marginal productivity of labour in traditional agriculture is positive and not zero.

2.3.4 Schultz's Suggestions for Transforming Agriculture:

Traditional agriculture, according to Schultz, is in equilibrium with static art of cultivation. The traditional agriculture can be transformed by introducing new factors which are more productive than the existing ones. According to him there is a need to create new investment opportunities in agriculture and the art of cultivation should be changed. It implies that agricultural transformation can be achieved only with a etymological transformation which constitutes new factors of production, new methods and new skills. Schultz's suggestions are described as follows:

1. **Policy approach:** According to Schultz, there are two policy approaches which can be adopted to faster the use of new factors by the farmers. These are: market approach and command approach. In the market approach farmers are given freedom to decide about the adoption of new inputs. They are allowed to take decision based on profitability of new factors. The role of government is confined to development and distribution of new inputs, development of skills, publicity, provisions of cheap credit etc. In this approach, farmers are not forced to adopt new inputs. They enjoy freedom to choose whether to adopt new inputs or not. Example, Mexico. On the other hand, under the command approach the farmers not free to decide regarding the use of new inputs. Everything is decided by the State. The State supplies the new inputs and directs the farmers to use them. The farmers have no choice, they have to adopt the new inputs supplied by the state and in return, they have to give a portion of the output to the state example Russia.

2. **Transformation process:** The processes of transformation depend on the demand and supply of new factors production. The new factors should be more productive than the traditional factors and should available in the market at the same time; farmers should be willing to use such factors in their field. There are certain problems in supply of new factors, Schultz discusses those problems and makes suggestions which are as follows:

a) **Supply of new factors:** There is a need to ensure supply of new factors in sufficient quantity and that too at reasonable prices. These are important for their effective use and ensure profitability. According to Schultz, three steps are involved in the process of supply of new inputs which are as follows:

   (i) Research and development

   (ii) Distribution of new inputs to farmers and

   (iii) Extension services to disseminate knowledge for use of new inputs.

According to Schultz, the research and development of new inputs should be done by the state because the private agencies may not have sufficient resources to undertake such activities. A private firm may not be willing to take up research and development as the benefits of such research cannot be retained and is likely to flow to other firms. So the research and development of new inputs should be carried out by the state or non-profit making agencies.

b) **Distribution of new inputs:** Once the new inputs have been developed, the next step is to build up necessary infrastructure for their distribution to farmers; Schultz suggests that in the initial stage there may be some difficulties in the distribution of new inputs. These difficulties include – limited demand, high cost, resistance from the supplies of traditional inputs etc. Therefore, we suggest that in the initial stage the distribution of new inputs should be undertaken by the State or non-profit making agencies.

c) **Development of Extension services:** a well-developed extension services are needed to import knowledge to farmers about the method for using new inputs. Schultz argues that the extension work may be carried out by the state as it involves high cost.

d) **Demand for new inputs:** Supply of new inputs alone is not sufficient for agricultural transformation. The new inputs must also be demanded by the farmers for use in their field. In other words, there is need to generate demand for new inputs.

According to Schultz, the demand for new inputs will depend on the profitability. The profitability, in turn, depends upon two factors

(i) supply price of new inputs and

(ii) Prospective yield.

According to Schultz that in order to encourage the use of new inputs their supply price should be low. He suggests that in the initial stage, the government should supply new inputs at subsidized rates.

Apart from the supply price, the profitability of new inputs also depends on prospective yields. Since the inputs are new the farmers are uncertain about the yields from them. Therefore, the prospective yields of the new inputs should be high so as to convince the farmers to use them.

3. **Importance of skills in Agricultural Transformation:** Skins and knowledge are also important for the use of new inputs and agricultural transformation. Therefore, the farmers should be imported required knowledge about the use of new inputs. According to Schultz, skills can be shaped in three ways:

   (i) On the job training and short term and vocational courses

   (ii) Schooling

   (iii) Trial and Error Method

To Schultz, schooling which impart the general education is the best form of investment and ways to build up human capital and form skills. He cited the example of Holland and Denmark where the rapid growth of agriculture in the last quarter of the19th century was associated with a large investment in schooling.

2.3.5 Criticisms:

Schultz suggestions to transform traditional agriculture are, undoubtedly good and realistic. However, his theory suffers from certain infirmities.

1. **Definition of traditional agriculture not pragmatic:** The definition of traditional agriculture given by Schultz is not pragmatic and its implications have been challenged by many economists.

2. **Market approach:** He favours market approach for agricultural transformation without assessing the economic reality of underdeveloped countries. In such economy's markets are poorly organized and suffer from imperfections. Therefore, in the initial state, state may have to undertake and control activities.

3. **Ignores institutional reforms:** Schultz has ignored the role of institutional reforms in the process of transformation of traditional agriculture.

4. **Ignores differences among poor economies:** Schultz has also ignored the difference among the poor economies with regard to factor endowments, extent of monetization and administrative efficiency etc. The use of new inputs is affected by these differences which he did not consider.

5. **Neglect non-economic barriers:** Schultz has paid attention only to economic factors in the transformation of traditional agriculture. He has neglected non-economic barriers like religious belief, conservatism and fatalistic attitude of farmers which can act as barriers for adoption of new inputs.

2.3.6 Conclusion:

Despite these criticisms, it can be concluded that Schultz has made important suggestions for transformation of traditional agriculture. His analysis will certainly be helpful in formulating policies for agricultural development. However, his suggestions will have to be adopted based on the social and economies conditions prevailing in the given poor economy.

Check Progress:

1. Define Traditional Agriculture.
2. Explain the Characteristics of Traditional Agriculture.
3. What are you understand by transforming agriculture?
4. What are the limitations of Schultz's theory of agriculture development?

2.4 MELLOR'S THEORY OF AGRICULTURAL DEVELOPMENT

2.4.1 Introduction:

W.J. Mellor in his book entitled 'The Economics of Agricultural Development' which was published in 1966 suggested ways and means to transform traditional agriculture into modern agriculture.

2.4.2 Agricultural Development:

According to Mellor, agriculture of an economy passes through three phases:

A. Traditional agriculture

B. Technologically dynamic agriculture- low capital technology and

C. Technologically dynamic agriculture- High capital technology

The main features of agriculture in these phases are described as follows:

A. Traditional Agriculture:

Mellor defines traditional agriculture in a pragmatic way. According to him traditional agriculture is one which is backward, labour intensive agriculture with low productivity. Most of the farms in traditional agriculture are peasant farms in which bulk of labour force, management and capital are supplied by the same household. The farms are generally small in size and productivity production and net income tend to below. But there is a perfect allocation resource in such agriculture.

The principle inputs used in traditional agriculture are land and labour. The use of additional labour is the only source of increasing production and income. But the use of more labour on a given farm heads to diminishing marginal productivity.

Mellor pointed out that in traditional agriculture some non-traditional inputs like fertilizers may be used but their impact on total production will be negligible because of non-use of other complementary inputs like good seeds, pesticides etc. He viewed that both technological changes and institutional reforms are needed to transform traditional agriculture.

Characteristics of traditional agriculture:

1. **Under-employment:** According to Mellor, there is under-employment in traditional agriculture. The main reason for this is inequality in the distribution of land. The farmers having bigger farms have the option to choose between leisure and work because of higher income. This lends to under-employment. But the farmers operating on small farms may have to use their labour up to the point where its marginal productivity becomes zero.

According to Mellor, there are three types of income levels; these are as follows:

(i) Biologically subsistence level of income: It is the level of income which ensures only the biological subsistence, i.e., food, clothing, shelter and other essentials for maintaining human life.

(ii) Culturally defined subsistence level of income.

(iii) Income for a dynamic society.

The farms in traditional agriculture can be broadly of two types:

a) Farms which can provide the biological survival level of income and

b) Farms which can provide at the maximum, the culturally defined subsistence income.

In the first types of farms, labour will be used till its marginal productivity becomes zero. In the second type of farms, the equilibrium level use of labour will be determined by the tangency point of the production possibility curve for the given farm and is utility curves.

1. **Backward Sloping Supply Curve:** According to Mellor, the total supply curve for agricultural produce in traditional agriculture is backward sloping. This is due to negative income effects on use of labour when prices changes. The high prizes of agricultural produces encourage farmers to reduce leisure and use more labour (positive substitution). But when their income increases due to price size, then farmers will tend to work less (negative income effects). Thus, a point is reached when the negative income effect fully neutralizes the positive substitution effect on labour use and total production starts to fall and curve slopes backward.

2. **Impact of withdrawal of labour:** It is generally argued that there exists zero value labour in agriculture and its withdrawal will not reduce the total output. However, Mellor believed that any withdrawal of labour from the agriculture will result in a fall in output. This is because of increase in per capita income of remaining labours which causes the use of less labour.

According to Mellor's view traditional agriculture will not change its traditional character until and unless it is disturbed. The government has to formulate a policy which aimed to bring technological changes.

B. Technologically Dynamic agriculture – Low capital technology:

In this phase, new inputs with high marginal productivity and complementary to labour are used in agriculture. The use of such inputs encourages the use of traditional inputs by raising their productivities. The new inputs are friendly to traditional inputs and do not replace them. Some of the new inputs are friendly to traditional inputs and do not replace them. Some of the new inputs are fertilizers, new seeds and power.

At this point, agriculture still remains main occupation in the economy

As the labour is cheaply available so machinery is not used.

In order for a smooth progress of this phase Mellor points out that the following are necessary

i. Institutional reforms

ii. Encouragement of research

iii. Supply of new and improved inputs

iv. Lifting up of institutions to service agricultural production.

v. Development of communication system

vi. Educational Institutes are being established in order to train people.

vii. Establishment of educational institutions to train people.

In this phase of agriculture development, new technology is used but it is not heavily capital oriented.

C. Technologically Dynamic Agriculture- High Capital Technology:

In this phase, the agriculture become highly capital intensive and uses new technology which is heavily capital oriented. This stage comes when the no agriculture sector come into existence which create labour-saving mechanical innovations. In this agricultural sector, sufficient capital accumulation takes place. Size of farm also increases due to movement of people from agriculture to industrial sector. In this phase, heady investment takes place in agriculture in the form of machinery. In this phase, the new inputs replace labour from agriculture and increase the productivity of the labour which is left in the agriculture.

Mellor pointed out that the development of agriculture should follow these three phases for its smooth progress.

2.4.3 Critical Evaluation of Mellor's Theory:

The definition of traditional agriculture given by Mellor is more pragmatic. He defines traditional agriculture as on which is a backward and uses labour as the main factor of production. He argues that if labour is withdrawn from that agriculture, agricultural production will fall. But he does not insist that there is no disguised unemployment in the agriculture sector. His suggestions for transformation of agriculture emphasis are on institutional changes like land reforms, marketing credit facilities. He favours government intervention for development of agriculture.

Mellor emphasises on the role of labour and other inputs in the process of development. In the traditional agriculture, output is increased by using more labour on land till its marginal productivity become zero. But in dynamic agriculture new inputs are used which increases the productivity of labour.

Check Progress:

1. What are the phases of agriculture development?
2. Explain the Characteristics of Traditional Agriculture.
3. Critically evaluate Mellor's theory.

2.5 VERNON RUTTAN AND YUJIRO HAYAMI'S THEORY OF AGRICULTURE DEVLOPMENT

2.5.1 Introduction:

Syed Ahmad was one of the first agricultural economists to use a micro approach.

He analysed agricultural production through technical innovation using an Innovation Possibilities Curve, IPC. An envelope of different isoquant curves that a given production level using various production functions the entrepreneur plans to develop is called IPC or Innovation Possibilities Curve. Ahmad in his theory assumed that the farmers can acquire new technologies free of cost. In order to save on the factor of production private firms and companies would invest in new technologies. However, the aspect of public innovation has completely been ignored in Ahmad's theory.

Ahmad's theory was used by Yujiro Hayami and Vernon to develop the theory of induced innovation. They introduced iso-cost curves into Ahmad's IPC model to analyse the effects on input prices on induced innovation. They divided induced innovation into technical change and institutional change. Change bought about by the change in the price of a factor of production and technological change is termed as institutional change. Institutional change happens when there is a change in the price of the factor of production accompanied by technological change. This brings us to the Theory Of Induced Innovation which was used to study agricultural productivity on a micro scale.

2.5.2 The Theory of Induced Innovation:

Before we study the theory of induced innovation, we must first understand iso-cost lines and isoquant curves. The iso-cost line identifies all of the different combinations of inputs that can be purchased given the Total Cost, TC. The slope of the iso-cost line equals the ratio of input prices, $-w/r$; which is negative because the iso-cost line is downward sloping. W is the wages paid for the input labour and r is the rent paid for the input capital. w/r is the rate at which one input can be substituted for the other input. Total Cost equals the price of labour, w, times the quantity of labour employed, Q_L, plus the price of capital, r, times the quantity of capital used, Q_K. The iso-cost line moves northeast as the TC increases for the firm allowing the firm to employ more inputs to produce more outputs. The total amount of labour that can be hired equals TC/w and the total amount of capital that can be purchased equals TC/r.

Equation 1: $\boldsymbol{TC = [(w \times QL) + (r \times Q\ K)]}$

The isoquant curves are those possible production functions which the firm could have to reach a certain level of output. The slope of the isoquant curve equals the Marginal Rate of Technical Substitution, MRTS, which is the Marginal Product of Labour divided by the Marginal Product

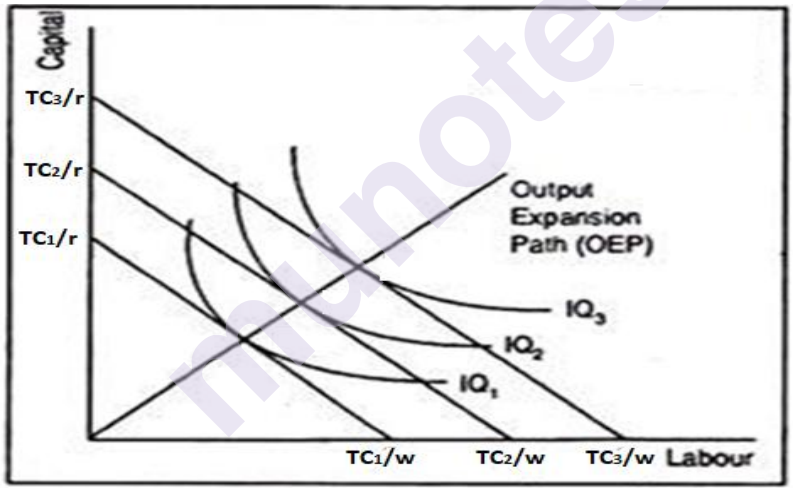
Capital, MP_L/MP_K. The rate at which one input can be exchanged for the other input in production is called Marginal Rate Of Technical Substitution.

When the isoquant curves move up and to the right, on the graph, output increases (shown by the expansion path in figure 1). The tangency point on the graph is the point at which the slope of the iso-cost line equals the slope of the isoquant curve, $MRTS = w / r$. If we break this equation down, we get $MP_L/ MP_K = w/r$. Rearranging this equation, we derive the new equation:

Equation 2: $MP\ L/w = MP\ K/r$.

This is the cost-minimization principle, which says that a firm should employ its inputs in a way where the marginal product of labour per dollar spent on labour equals the marginal product of capital per dollar spent on capital. Minimizing costs also means the farm wants to maximize profits by reducing costs.

Figure 1: Shows the expansion path of the tangency points and as iso-cost line moves northeast total costs increase and as the isoquants move northeast output increases.



Now that we understand the iso-cost lines and isoquant curves, we can develop the theory of induced innovation. When the firm invents new technologies to save or use less of that input(s) whose relative prices have increased in order to attain a certain level of output, it is called **Induced Innovation.** The induced innovation theory is exactly the same as the iso-cost line and isoquant curve theory; however, the IPC from Ahmad's IPC theory is introduced to show the various isoquant curves the farm may operate under. An envelope of different isoquant curves that have various production functions to produce a given output is called the **IPC (Innovation Possibilities Curve)**. The increase in the output is represented by a northeast shift in the IPC and vice-versa. In the following three situations, the farm will try to get back to its original IPC, if there is southwest shift which represents a decrease in the output on the graph.

The cost of both the inputs may change at the same time and at the same rate or the cost of single input may change where both situations cause the farm or the government to innovate in order to save on the cost of that factor of production and increase output.

The first scenario occurs when the price of capital and labour increase at the same rate. Government R&D and policies will occur because an increase in the relative price of both inputs causes the government to invent through R&D and/or grants to save on those inputs called the technical change effect. (see equation 3 below). The increase in relative price for both inputs will also cause the farmer to innovate to save on capital and labour. Increasing the relative price of both inputs means that wage and the rent rise at the same rate. Graphically, this means that the total cost will shift to the left to a new iso-cost line, B, isoquant curve, IQ^I, and IPC^I (see figure 2). A decrease in the output is represented by a shift to the left, however by innovations, the r and w will reduce bringing the output level back to IPC.

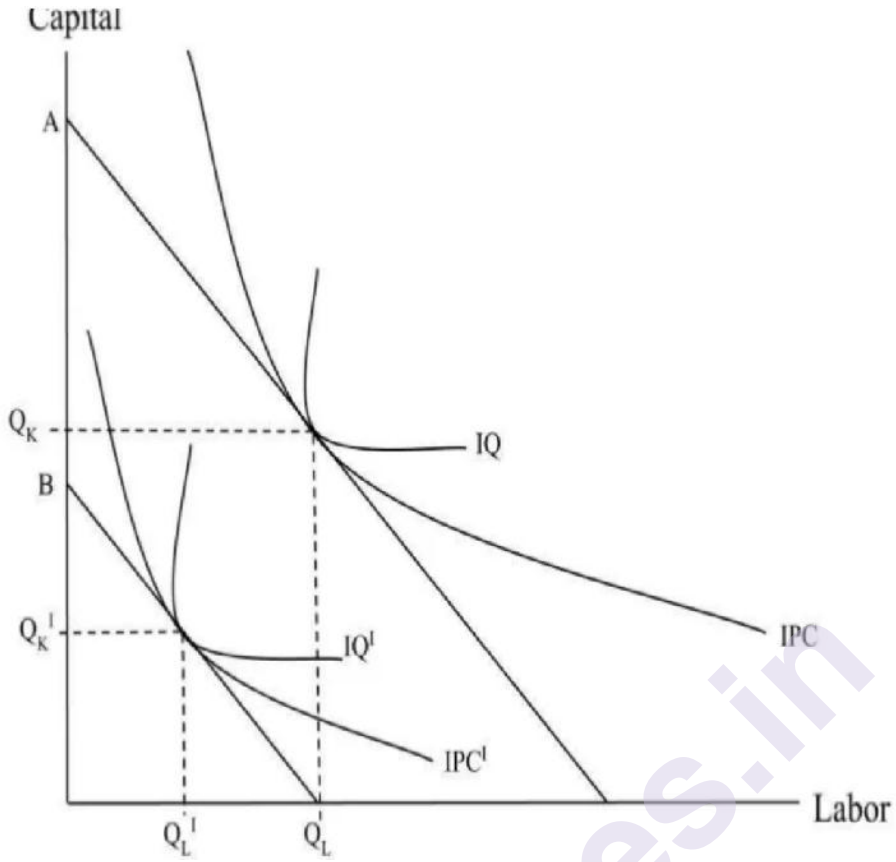
Equation 3: $[(w \times Q_L) + (r \times Q_K)] = \bar{\bar{\bar{TC}}} = Isocost\ Line\ A$

When r and w rise at the same rate and then the consumption of both in quantitative terms of both the inputs reduces and TC does not change.

$[(\uparrow w \times \downarrow QL) + (\uparrow r \times \downarrow Q\ K)] = \bar{\bar{\bar{TC}}} = Isocost\ Line\ B$

Innovation will occur to lower the price of w and r to get back to the output at IPC on iso-cost line A.

Figure 2: Shows that as the price of capital and labour increase at the same rate, meaning the slope does not change from iso-cost curve A to B, will lead a firm and the government to innovate new ways to save on capital and labour that have become more expensive to use to get back to the previous output of IPC.



In 1960, when the price of the staple crop, rice rose in China, this type of induced innovation was initiated. The government was pushed into developing a high yielding, stress resistant rice crop in order to combat the high price of rice. This allowed the farmers to use a fewer unit of expensive inputs like land and labour depending upon the region in order to increase rice production. It was around the same time, that the International Rice Research Institute IRRI, developed similar rice crops which allowed the farmers to produce rice using lesser inputs as well.

The second scenario happens when the price of a single input rises causing one of the two things to happen:

1) increase in the cost of one input moving the iso-cost line to the right or left along the IPC because of the substitution effect or

2) an increase in the price of one input making the iso-cost line pivot on the x-axis and move down along the y-axis.

The effect of the first option is caused by the increase in r lowering the quantity of capital used and lowering called the **substitution effect** (shown by equation 3 and figure 3). In this case, the output stays the same by using less of the expensive capital and more of the cheaper labour. Meaning, the iso-cost line stays on the same IPC and no shift occurs. This means that the output will be the same after the price of capital increases because the farm is on the same IPC curve by employing more labour and

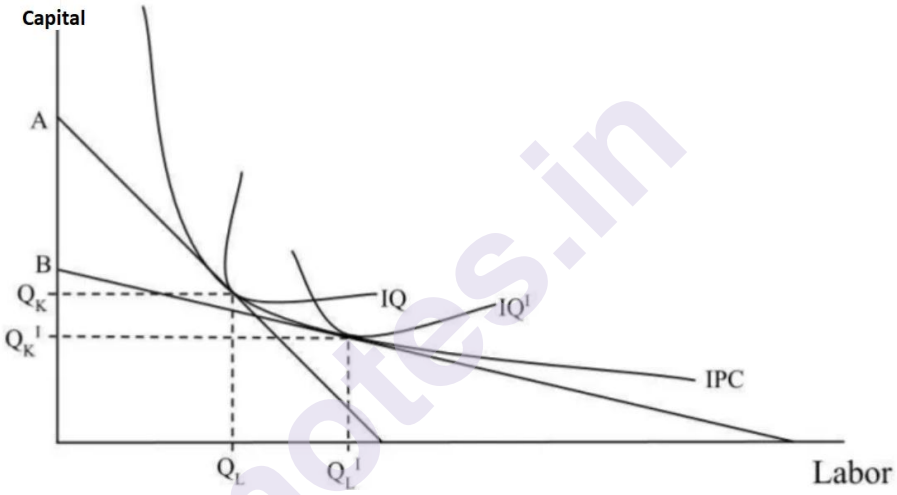
using less capital. The farm would increase output if it moved to a different isoquant curve to the northeast on the graph.

Equation 3: $[(w \times Q_L) + (P_Y \times Q_Y)] = TC = Isocost\ Line\ A$

Where r increases causing the firm to innovate for capital, saves on K, and use more labour in production of that output.

$[(w \times\downarrow Q_L) + (r \times\uparrow Q_K)] = TC = Isocost\ Line\ B$

Figure 3: Shows that as the price of capital rises, the farm will choose to use more labour and less of capital. The rise in the price of capital causes farmers to innovate to save on that factor of production to stay on the same IPC having the same output as before.



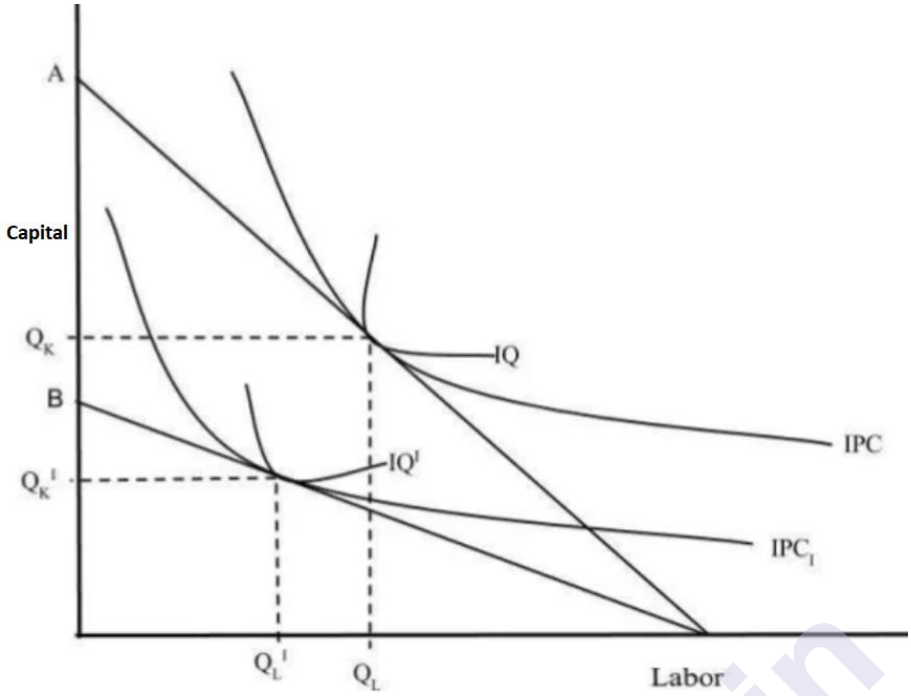
The second option is that the iso-cost line will pivot on the x-axis from A to B causing the farm to be on a new isoquant curve on the IPC to IQ^I producing less output (see equation 4 and figure 4). This occurs because the price increased for capital reducing the total amount of capital that can be purchased and the price for labour stayed the same.

Equation 4: $\mathbf{[(w \times QL) + (r \times Q\ K)] = TC = Isocost\ Line\ A}$

Where r increases causing the farm to use less capital and less labour, but through innovation of capital, the farm can use more capital to shift back to IPC to produce same output as before.

$\mathbf{[(\ w \times\downarrow QL\ ) + (\ r \times\downarrow Q\ K\ )] = TC = Isocost\ Line\ B}$

Figure 4: Shows as the price of capital increases the total amount of capital used will decrease. Therefore, less capital and labour will be used causing the farm to innovate to save on capital to shift back to IPC on iso-cost line A.



This theory was used by Ruttan and Hayami to describe the differences between the agriculture in Japan and the United States from 1880-1890. They did a comparison of the inputs of the farm draft horse power per worker and fertilizer per hectare of agricultural land. Ruttan and Hayami observed that as the price of the fertilizer increased in the United States the agriculture solved this problem by having more draft horse power per worker, more equipment in order to reduce the amount of fertilizer used to produce crops. However, Japan faced another situation where the price for farm draft power per worker was very expensive; therefore Japan preferred using more fertilizer, which was a cheaper option then acquiring more horsepower. This means that farms in the United States chose to use technical innovation to increase horsepower per worker and Japan chose to use institutional innovation by developing new types of fertilizers.

2.5.3 Induced Innovation in the Production Function:

In the first scenario, we saw that the price of labour and the price of capital increased at the same rate causing the farm to innovate. Innovation allowed the farm to use fewer amounts of labour and capital to produce the same or more output than before. So, when the firm produces more output as compared to its inputs the firm used to produce that output or when the current marginal product is more than the previous marginal product then it is called **Increasing Returns To Scale.** If you have a look at this phenomenon graphically, you will see that though the total product will be increasing but it will have a backward bend as the farm is using lesser inputs to produce more output (as shown in the figure 5 below)

Figure 5: The production function is backward bending due to innovation allowing the farm to use less capital to produce a higher output. This graph represents the substitution effect the author graphed earlier in figure 4.

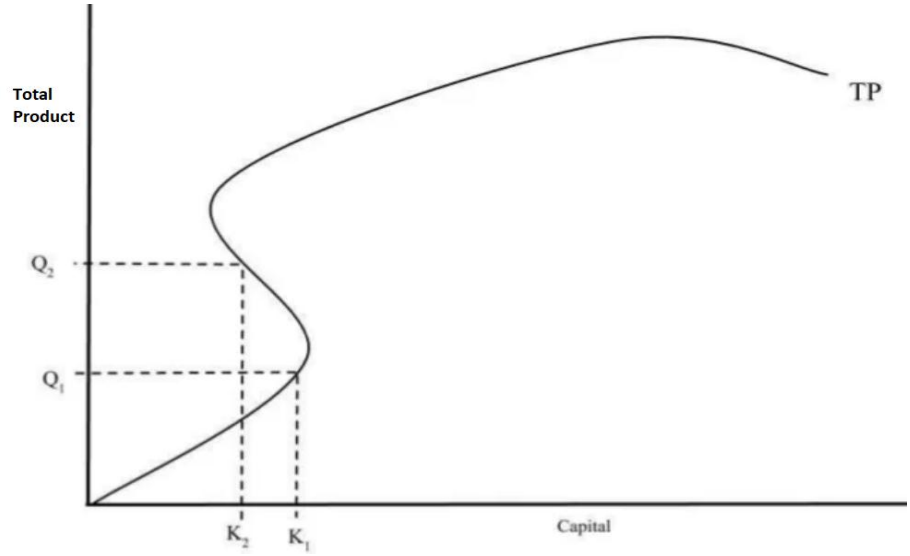


Figure 5 shows the production outcome that is occurring because of innovation. Point Q_1 corresponds to points $Q^1{}_K$ in figures 4.

The output represented by the slope of the Total Product Line, at each point is equal to the Marginal Product of Capital. This graph simply represents how the production is affected by one factor. The next step is to add in land and labour giving the graph two more horizontal axes. This would allow us to see the points at which induced innovation occurred, wherever the backward bend lies, and go beyond the two-variable isoquant-iso-cost graphs. In a typical isoquant-iso-cost graph, a shift to the southwest of the isoquant curve indicates lower output; however, with induce innovation theory, a shift southwest indicates that the farmer or the government will invent new techniques or technologies to reach the same or higher output level when the isoquant shifts southwest.

2.5.4 Conclusion and Limitations:

According to the theory of induced innovation, if the prices of both capital and labour increase simultaneously or as the price of one input increases, the government will innovate through R&D or government subsidies. When this happens, the farms will be able to the cheaper input(s) to produce either same amount of output at cheaper cost or more output at the same cost.

According to the author the next step which needs to be taken is determination of the lag-time to make the innovations fully effective, the cost of R&D to the farm and the government, and develop a production function and induced innovations graph containing land, labour, and capital. The most difficult part to understand is the lag time for R&D to be fully effective on production, and the length of time the innovations to have effect on the production. Lag-time is hard to determine because the observer does not know the exact impact the new innovations are having on production or if something else is affecting production. Though there have been many empirical studies on the subject of who account for lag-time of innovation, but unfortunately, the estimates of various authors

have varied greatly. According to some authors average lag-time is 30 to 40 years however according to some others this period is only 6 to 14 years whereas some others have given lag-time as long as 50 years. The time factor is a tricky variable as it is very challenging to measure its effect and to know when and for how long the lag time affects the production. The next important thing which the author needs to understand is the cost of R&D to the farm and the government. However, land grant universities and USDA agencies have to take into account many costs to develop new technologies because individual farms do not want to take on these costs. Currently, the most R&D is undertaken by the large private companies like Monsanto, Tyson, and Cargill. They have helped in increasing the production with use of fewer inputs steadily over the years by developing new crops, breeds of animals, pesticides and herbicides. The author should understand the fact why government and firms take on R&D even though the cost of the same it quite high even though the benefits may be minimum. Last but not the least the author needs to change or develop his Induced Innovations Theory by including more inputs in his model. This would help him understand each variable's impact on one another, production and understand why innovation occurs (see figures 6 and 7). The author should develop the theory in such a way that it includes lag-time, R&D cost and multiple variables. These will help him understand when R&D and policies take effect and for how long, reasons why governments and firms take on risky endeavours, and the effects different variables have on productivity.

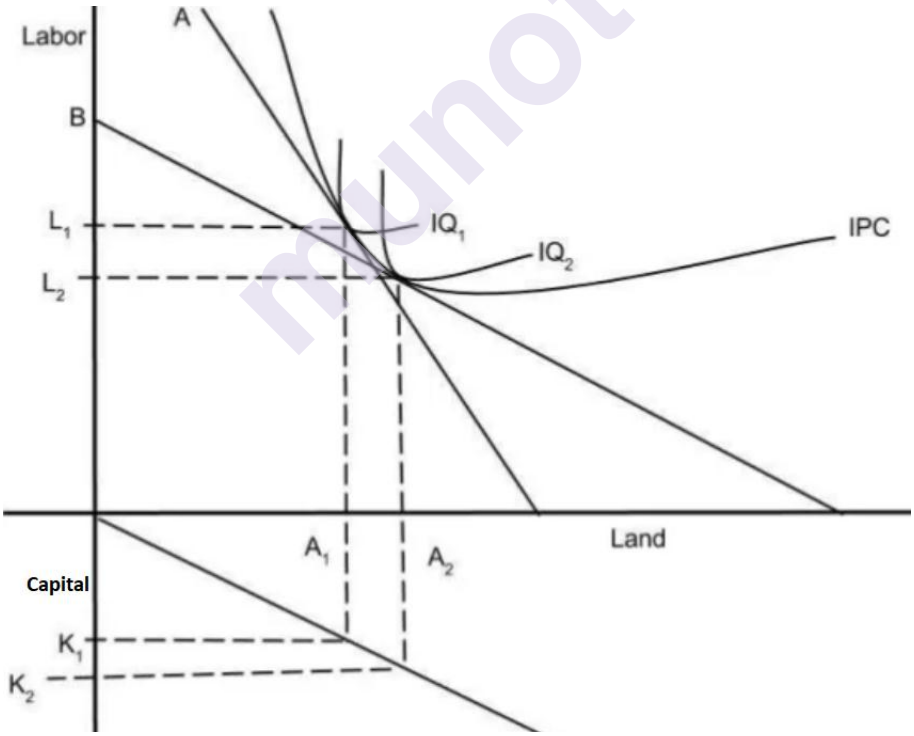


Figure 8: Initially the farm is at iso-cost line A on isoquant curve

1. Then the price of labour increases moving the farm to iso-cost line B and isoquant curve

2. Therefore, the farm uses less labour and substitutes more land for labour.

As labour decreases and land use increase, the amount of capital will increase as well from K_1 to K_2. The use of more capital in response to the increase in the use of land is due to the buying of more equipment and other technologies in place of labour. Output stays the same in this case and innovation occurs so the farm can use less labour and more land and capital.

Check Progress:

1. Explain the theory of induced innovation.

2. Explain induced innovation in production function.

3. What are the limitations of induced innovation theory?

2.6 SUMMARY

This unit discussed the various theories of agricultural development. The Lewis theory focuses on the process of development of a labour surplus country through the transfer of surplus labour from the traditional agricultural sector to modern industrial sector. However, the model calls of generating agricultural surplus for labour transfer the Schultz and Mellor's theories suggests various ways and means to transform traditional agriculture. Ruttan and Hayami's theory explains induced innovations in agricultural development.

2.7 QUESTIONS

1. Critically evaluate Lewis theory of agriculture development.

2. Explain Schultz's theory of agriculture development.

3. Explain Mellor's theory of agriculture development

4. Explain Ruttan and Hayami's theory of agriculture development.

Reference: Soni, R N, Leading issues in Agricultural Economics, Vishal Publishing Co. Ellis, Frank, Peasant Economics, Farm Household and Agrarian Development, Prentice Hall. Basu, K; Analytical Developed Economy, Oxford University Press

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MODULE II

3

SUSTAINABLE AGRICULTURAL DEVELOPMENT AND FOOD SECURITY-I

Unit Structure

3.0 OBJECTIVES

- To know the Impact of Green Revolution in India.
- To know the Spread of technology and its effect on agriculture.
- To know experience in inputs, use efficiency.

3.1 INTRODUCTION

Ever since the mid-1960s, the modern technology and farm practices in India and a veritable revolution is taking place in our country which is gradually replacing the traditional agricultural practice. In 1960-61 Intensive Agricultural District Programme was launched in which pilot project in seven districts in which new technology was tried. This strategy was extended to the entire country once High-Yielding Varieties Programme (HYVP) was introduced. Different names have been given to this strategy which is as follows: modern agricultural technology, seed-fertiliser-water technology, or simply green revolution.

It is mainly due to new agricultural strategy that, area under improved seeds has gone up since 1966. As the new varieties are of a short-term duration, instead of growing one crop, two crops and sometimes, even three crops are grown. In the case of

wheat, there was a huge enthusiasm among farmers in Punjab, Haryana, Delhi, Rajasthan and western U.P. for new Mexican varieties like Larma Rojo, Sonara-64, Kalyan and P.V. 18 this led to a situation where the demand for seeds by the farmers exceeded the supply of the same.

Indigenous inputs such as the use of bullocks, simple ploughs and primitive agricultural tools, organic manures, seeds, etc. were the main inputs for traditional agriculture. Modern technology, on the other hand, consists of Chemical fertilizers, pesticides, improved variety of seeds including hybrid seeds, agricultural machinery, and extensive irrigation, use of diesel and electric power etc. It was since 1966, that the use of modern agricultural inputs has increased at a compound rate of 10 per cent per annum in contrast to the traditional inputs which were rising at the rate of only one per cent per annum during the same period.

Fertilisers, pesticides, agricultural machinery etc. which are produced outside the agricultural sector are the main resources of the new agricultural technology. It is mainly because of this that the industries supplying the modern farm inputs are growing at a rapid rate. Huge programs of farm mechanisation and irrigation have also led to an increase in the consumption of electricity and diesel in rural areas.

3.2 GREEN REVOLUTION AND ITS IMPACT

With the introduction of new techniques of agriculture in early 1960s which became popular by the name of Green Revolution (GR) - firstly these techniques were used for wheat and by the next decade for rice too. It increased the food productivity by increasing the productivity level by more than 250 per cent thus completely changing the traditional idea of food production level. The Green Revolution was centred on the use of the High Yielding Variety (HYV) of seeds developed by the US agro-scientist Norman Borlaug doing research on a British Rockfellor Foundation Scholarship in Mexico by the early 1960s. The new wheat seeds developed claimed to have increased the productivity by more than 200 per cent. After the successful testing of the seeds, the farmers in food deficient countries like Mexico and Taiwan were using it.

3.2.1 The Architects of Green Revolution:

M.S. Swaminathan is one of India's most renowned agricultural scientists and is regarded as the father of Green Revolution in India because of his contribution to the introduction and development of high-yielding verities of wheat in India. His range of research work is very wide and he continues to pursue his research through M.S. Swaminathan Research Foundation. He is the founder and chairman of this institute. The Government of India conferred on him the Padam Vibushan in 1989.

Chidambaram Subramaniam provided visionary leadership for realisation of Green Revolution as the Minister for Food and Agriculture in the second half of 1960s. The Indian government conferred on him the Bharat Ratana in 1998.

Dr. Norman Borlaug was an American agricultural scientist and agronomist who was awarded the Nobel Peace Prize in 1970 for increasing world food supply and feeding the hungry world. For his contribution to ushering in Green Revolution in India, the Indian government conferred on him the Padma Vibhushan in 2006.

3.2.2 Agricultural Diversification during Green Revolution:

The case of Green Revolution in India represents a fine example of technology – induced agricultural diversification. It also represents a typical example of agricultural diversification. It also represents a typical example of agricultural diversification through regional specialisation. The period of mid 1960s is very significant from the point of view of agricultural development in India. Anew high yield varieties of seeds were developed in Mexico, which were adopted by many countries, including India. The use of this HYV seeds required regular and adequate irrigation, fertilizers and pesticides. This new technology created the opportunity of agricultural development through agricultural diversification, mainly towards wheat and rice crops. The area under wheat and rice farming increased substantially, particularly in the states of Punjab, Haryana and Western Uttar Pradesh as these states diversified crops towards wheat and rice in a big way. As a result of diversification towards the production of wheat and rice, these states were able to achieve substantial agricultural

development. There was a spectacular growth in food grains production, as a result of which the country was able to achieve self-sufficiency in food grains.

3.2.3 Components of the Green Revolution:

The Green Revolution was based on the timely and adequate supply of many inputs/components. A brief review on the Green Revolution is given below:

1. **The HYV Seeds:** These seeds were popularly called the 'dwarf' variety of seeds. With the help of repeated mutations, Mr. Borlaug had been able to develop a seed which was raised in its nature of nutrients supplied to the different parts of the wheat plant—against the leaves, stem and in favour of the grain. This made the plant dwarf and the grain heavier—resulting in high yield. These seeds were non-photosynthetic, hence non-dependent on sun rays for targeted yields.

2. **The Chemical Fertilizers:** The seeds were to increase productivity however the primary condition was that they received a sufficient level of nutrients from the land. The nutrient level they required could not be supplied with the traditional composts because they have low concentration of nutrients content and required bigger area while sowing which means that it will be shared by more than one seed. This the reason why a high concentration fertiliser, were required, which could be given to the targeted seed only, the only option was the chemical fertilisers - urea (N), phosphate (P) and potash (K).

3. **The Irrigation:** A means of controlled supply of water is required for controlled growth of crops and adequate dilution of fertilizers. It made two important compulsions – firstly, the area of such crops should be at least free of flooding and secondly, artificial water supply should be developed.

4. **For dilution of fertilizers and controlled growth of crops:** A regulated supply of water was needed. Two things were made compulsory, which were that there should be no flooding in areas of such crops, and secondly artificial resources for water supply should be developed.

5. **Chemical Pesticides and Germicides:** As the new seeds were new and non-acclimatised to local pests, germs and diseases than the established indigenous varieties, use of pesticides and germicides became compulsory for result-oriented and secured yields.

6. **Chemical Herbicides and Weedicides:** In order to prevent costlier inputs of fertilisers not being consumed by the herbs and the weeds in the farmlands, herbicides and weedicides were used while sowing the HYV seeds.

7. **Herbicides and weedicides:** were being used while sowing the HYV seeds in order to prevent inputs of fertilizers not being consumed by the herbs and the weeds in the farmlands.

8. **Credit, Storage, Marketing/Distribution:** Availability of easy and cheaper credit was compulsory in order to make the farmers capable of using new and costlier inputs of the Green Revolution. As specific regions only had this new kind of farmlands, this new kind of farming became concentrated in those few regions namely Punjab, Haryana and Western Uttar Pradesh in India, in this case the storage of the harvested crops had to be done in the region itself until they were distributed in the entire country. It was mainly the food-deficient countries which opted for Green Revolution and were in need that the new yield gets distributed throughout their boundaries which required a proper marketing chain, distribution network and a strong transport framework. All these infrastructural requirements for the Green Revolution where met by the loans borrowed from the World Bank on very borrower friendly terms – the major beneficiary of the same was India.

3.2.4 Green Revolution and its impact:

Modernisation of Indian agriculture began during the mid-sixties, which led to 'Green Revolution'. During the late 1950s and 1960s, there emerged a severe food crisis in the country due to several natural calamities and due to increased demand for food grains resulting from increase in population. The inability of Indian agriculture to meet the demand for food was a matter of serious concern. The Indian agricultural system was not able to produce enough food grains to feed its population as

knowledge and practices followed were traditional from generation to generation which were not able to meet the food grains requirements of the ever increasing population. As a result, the government was forced to import food grains from other countries. The ignominy of our dependence for food on western developed countries and the politics of food aid practised by them made the government realise that the country needed to be self-sufficient in food grains production. There was the need for drastically increasing the production of food grains in the country by modernising agriculture. The Green Revolution became the government's most pivotal programmes in the 1960s.

The term 'green revolution' has been used in the context of a significant breakthrough in the production of food grains, mainly wheat and rice, in India since the decade of mid-1960s by using new agricultural practices, gradually replacing the traditional agricultural practices. Traditional agricultural practices were characterised by the use of indigenous input such as organic manures, seeds, simple plough and other agricultural tools. The modern technology, on the other hand, consisted of use of high yielding variety of seeds, chemical fertilizers, pesticides, extensive irrigation, agricultural machinery, etc. The new agricultural technique was introduced as a 'package programme' to include joint and simultaneous application of HYV seeds, fertilisers, pesticides, agricultural technology, 'seed- fertiliser- water- technology' or simply 'Green Revolution'. The new technology was nick named as Green Revolution because it came suddenly, spread quickly as brought dramatic results in the form of a large increase in agricultural production and productivity over a short span of time. Green Revolution covered a total area of 78 million hectares, i.e., about 55 per cent of the net sown area, in 1998-99.

The main effects of Green Revolution are listed as under:

1. The major achievement of the Green Revolution has been a substantial increase in production of food grains. Food grains production increased sharply from 82 million tonnes in 1960-61 to over 176 million tonnes in 1990-91. It touched the record level of 296 million tonnes in 2019-20.

2. A major achievement of the Green Revolution is that India has become self-sufficient in the production of food grains.

3. The new technology also brought about a sharp rise in the yield of land with respect of food grains. For example, the yield per acre of wheat increased by 3.8 times between 1960-61 and 2017- 18.

4. A significant increase in food grains production and productivity as a result of Green Revolution demonstrates that Indian agriculture is on the move. Agriculture sector is no longer a stagnant sector. This has made agriculture sector a partner in economic development. As a result, income has increased and economic conditions of the farmers have improved.

5. However, the achievements of Green Revolution were at the expense of ecology and environment. Extensive dependence on chemicals and pesticides has started showing its darker side. The modern system of farming in India has resulted in decrease in land fertility of late, damage to environment, chemical contaminations etc. this is reflected in soil erosion, soil salinity, soil contamination, genetic erosion etc.

There were both positive as well as negative impacts of the Green Revolution both on socio-economic as well as ecological fronts on the countries around the world. However, we are going to specifically study India here.

1. **Socio-economic Impact:** The way in which the food production rose for wheat in 1960s and rice by 1970s that many countries became self-sufficient, the concept of self-sufficiency is not be confused with food security and some nations even emerged as the food exporting nations. But the difference in farmers' income, it brought with itself increased the inter-personal as well as inter-regional differences/inequalities in India. An increase in the incidence of malaria due to water-logging, a swing in the balanced cropping patterns in favour of wheat and rice putting pulses, oilseeds, maize, barley on the side-lines, etc., were negative impacts.

2. **Ecological Impact** The most devastating negative impact of the Green Revolution was ecological. When the problems related with it were raised by the media, scholars, experts and environmentalists, neither the governments nor the masses (what to say of the farmers of the GR region - they

were not literate enough to understand the side effects of the inputs of the GR) were convinced. But a time came when the government and other government agencies started doing homework and investigations focussing on the ecological and environmental issues. The major ones among them may be looked in their chronological order:

I. **Critical Ecological Crisis:** On the basis of on-field researches it was found that critical ecological crises in the GR region are showing up –

a) **Soil fertility being degraded:** The major reasons for soil fertility degradation were excessive exploitation of land, repetitive kind of cropping style, crop intensity, lack of suitable crop combination etc.

b) **Water table falling down:** As the new HYV seeds required comparatively very high amount of water for irrigation—5 tonnes of water needed to produce 1 kg of rice.

c) **Environmental degradation:** Due to excessive and uncontrolled use of chemical fertilizers, pesticides and herbicides have degraded the environment by increasing pollution levels in land, water and air. In India it is more due to cutting down of the forests and extension of cultivation in ecologically fragile areas. At the same time, there is an excessive pressure of animals on forests—mainly by goats and seeps.

II. **Toxic Level in Food Chain:** Toxic level in the food chain of India has increased to such a high level that nothing produced in India is fit for human consumption. Basically, uncontrolled use of chemical pesticides and weedicides and their industrial production combined together had polluted the land, water and air to such an alarmingly high level that the whole food chain had been a target of high toxicity.

3.2.5. Conclusion:

The above studies and the reports were eye-openers in the area of ecologically non-sustainable kind of agriculture as well as a big question mark on its. It was mainly due the above studies that the scientists started advocating the evergreen revolution which could revolutionize the agricultural sector. The Economic Survey of 2018-19 showed that India needed to

change its outlook of 'green revolution' led productivity to 'green method' sustainability like 'zero budget natural farming' in order to remove the use of chemical pesticides and also encourage agricultural practices which are eco-friendly and also consume less amount of water.

Check Progress:

1. What do you understand by Green Revolution?
2. Who are is the Architects of Green Revolution?
3. What are the Components of the Green Revolution?
4. What are the positive impacts of Green Revolution?

3.3 MODEL OF SPREAD OF TECHNOLOGY AND EXPERIENCE IN INPUTS USE EFFICIENCY

"The secret of rapid agricultural progress in the underdeveloped countries is to be found much more in agricultural extension, in fertilisers, in new seeds, in pesticides and in the water supplies than in altering the size of the farm, in introducing machinery, or in getting rid of middlemen in the marketing process."– **W.A. Lewis.**

Progressive agriculture will demand among other things (i.e. favourable institutional and organisational structure), improvement in inputs and methods. Irrigation facilities, better seed quality, better quality of manures and fertilisers, land reclamation and soil conservation methods, plant protection, use of mechanisation etc. these are various facets of agricultural inputs which have to be considered here.

3.3.1 Irrigation:

The Planning Commission categorised irrigation projects/schemes in India on the following lines:

i) **Major Irrigation Schemes:** those with cultivable command areas (CCA) of more than 10,000 hectares.

ii) **Medium Irrigation Schemes:** those with cultivable command areas (CCA) between 2,000 and 10,000 hectares.

iii) **Minor Irrigation Schemes:** those with cultivable command area (CCA) up to 2,000 hectares. Expansion of

irrigation amenities, along with consolidation of the existing systems, has been the main part of the plan for increasing production of food grains.

There is need to increase the acreage under irrigation along with adoption of suitable technologies for efficient use of water through apt pricing to raise agricultural productivity in India. This could be done through - (i) Adoption of irrigation tools which improve effectiveness in the use of water is imperative in a scenario where flood irrigation has resulted in wastage of water. (ii) Focus on effective irrigation tools is important with increasing water shortages owing to climate change and indiscriminate wastage of water in agriculture and other uses. Having 'more crops per drop' through effective irrigation tools should be the motto to improve productivity in agriculture which can ensure food and water security in the future.

Irrigation Potential & Use:

According to the latest available statistics on irrigation, the all India percentage distribution of net irrigated area to total cropped area during 2012–13 was 33.9 per cent. There is regional disparity in irrigated farming, with net irrigated area to total cropped area at more than 50 per cent in the states of Uttar Pradesh, Tamil Nadu and Punjab, while it is at less than 50 per cent in the remaining states. There is need and possibility for increasing the coverage of irrigated area across the nation to increase productivity in agriculture. The entire UIP (Ultimate Irrigation Potential) of India is about 140 million hectares (Mha). There is considerable gap between IPC (Irrigation Potential Created) and IPU (Irrigation Potential Utilized). There is noticeable decline in the ratio of IPU to IPC mainly due to:

(i) lack of proper operation and maintenance,

(ii) Incomplete distribution system,

(iii) Non-completion of command area development,

(iv) Changes in cropping pattern and

(v) Diversion of irrigated land for other purposes.

There is need to halt the falling trend in efficient utilization of irrigation potential and also reverse it. A larger share of funds available under the Mahatma Gandhi National Rural

Employment Guarantee Scheme (MGNREGS) and other employment generating schemes need to be deployed for promotion of irrigation - for formation and maintenance of community assets, de-silting and overhaul of tanks and other water resources.

Irrigation Efficiency:

Agricultural productivity can be boosted in a big way by enhancing irrigation efficiency in the use of irrigation systems. Over the time, the conventional systems of irrigation have become nonviable in many parts of India due to:

(i) Increasing shortages of water,

(ii) Wastage of water through over irrigation, and

(iii) Concerns of salination of soil

Economically and technically efficient irrigation tools like – **drip irrigation** and **sprinkler irrigation** can improve water utility; reduce costs of production by reducing both the labour costs and power consumption. With this technology, additional area can be irrigated with the same amount of water when compared to conventional method of irrigation. In addition, water deficient areas, cultivable waste land and surging land areas can be brought under cultivation due to ease of irrigation. There is also good scope for using this technology in closely spaced crops like potato, onion, wheat, rice etc. Farm income has seen a substantial growth caused by multiple benefits which accrue out this technology:

- Saving of irrigation water from 20 to 48 per cent;
- Energy saving from 10 to 17 per cent;
- Saving of labour cost from 30 to 40 per cent;
- Saving of fertilizers from 11 to 19 per cent; and
- Increase in crop production from 20 to 38 per cent.

To promote the cause of enhancing the productivity of water and efficiency of irrigation. Government has taken the following steps in the direction:

i) **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** was launched in 2015-16 with the motto of Har Khet Ko Paani which aims at providing end-to-end solutions in irrigation supply chain (i.e., water sources, distribution network and farm level applications).

ii) **Per Drop More Crop:** component of PMKSY (PMKSY-PDMC) was launched in 2015-16 the main objective of this program is to increase water use efficiency at farm level.

iii) **Micro Irrigation Fund (MIF):** has been created with NABARD (with a corpus of Rs.5000 crore) to enable the States in mobilizing the resources for expanding coverage of Micro Irrigation.

Water Productivity:

Water productivity in India is very low. The overall irrigational effectiveness of the major and medium irrigation projects in India is projected at around 38%. As per the NITI Aayog, efficiency of the surface irrigation system can be enhanced from about 35%-40% to around 60% and that of groundwater from about 65%-70% to 75%. The productivity of water needs to be enhanced by the following methods –

i) Tapping, harvesting and recycling of water,

ii) Effective on-farm water management practices,

iii) Micro irrigation,

iv) Use of waste water, and

v) Resource conservation technologies.

In order to promote judicious use of water ensuring **'more crop per drop'** of water in agriculture for drought proofing, the Government of India recently launched the PMKSY aiming at providing water to every field of agriculture.

3.3.2 Farm Mechanisation:

Introduction of better equipment for each farming operation in order to reduce toil, to improve efficiency by saving on both time and labour, improve productivity, minimize wastage and reduce labour costs for each operation is the need of the hour in

India. Agricultural automation in case of India is increasingly needed as:

i) Due to shortage of labour for agricultural operations owing to rural-urban migration, shift from agriculture to services and rise in demand for labour in non-farm activities, there is need to use labour for agricultural operations prudently, which makes a strong case for automation of farming.

ii) Indian agriculture has a high percentage of female work-force in both the cultivation and processing stages of farming. Therefore, ergonomically designed tools and equipment for reducing labour, enhancing safety and comfort and also to suit the needs of women workers would help in better adoption of technologies in agriculture.

iii) An effective use of agricultural machinery helps in timely farm operations for quick rotation of crops on the same land (necessary in wake of shrinking land). By rising a second crop or multi-crops from the same land, there is improvement in the cropping intensity and making agricultural land commercially more viable (NABARD, 2018).

Though, farm mechanisation has improved in the recent times, which stands at 45 per cent, it is much lower in comparison to USA (95 per cent), Brazil (75 per cent) and China (57 per cent). There are intra-national differences also visible with northern India having higher mechanisation compared to other regions. Farm mechanisation (sales of tractor and power tillers) and tractor industry in the country had compounded annual growth rate (CAGR) of 10 per cent and 7.53 per cent during 2016-2018, respectively.

Important reasons for lower agricultural mechanisation in the country, as per a study (NABARD, 2018), economies of operation due to small holdings, access to power, credit cost and procedures, uninsured markets and low awareness. In recent times (since 2014-15 onwards), several new steps are taken by the government to promote farm mechanisation in the country:

- Assistance is being provided by the state governments to provide training/demonstration, provide assistance to the farmers for procurement of agricultural machineries and for

setting up of Custom Hiring Centre under the Sub-Mission on Agricultural Mechanisation (launched in 2014-15)

- The latest technology agricultural machineries like the happy seeders, laser levellers, power weeders and combine harvesters are being promoted.
- Under the new Central Sector Scheme on 'Promotion of Agricultural Mechanisation for In-Situ Management of Crop Residue in the States of Punjab, Uttar Pradesh, NCT of Delhi and Haryana (2018-19 to 2019-20) individual farmers are being provided with 50% subsidy for agricultural machines and equipment for in-situ crop residue management (aimed at fighting the stubble burning in the region while the Custom Hiring Centres are being provided with 80% subsidy for the same purpose.
- Realising the linear relationship between availability of farm power and farm yield farm power availability is to be enhanced from 2.02 kW per ha to 4.0 kW per ha by 2030 (to cope up with increasing demand for food grains).

3.3.3 Seed Development:

The primary input for increasing productivity in agriculture is seed. On the basis of the estimates it is found that the quality of seed accounts for 20 to 25 per cent of productivity. Thus, the acceptance of quality seeds needs promotion in India. There are numerous challenges to the development and adoption of quality seeds in the form of

i) Insufficient research inputs for development of new seeds especially,

ii) Early ripening and resilience (to pest, moisture variations, etc.) varieties,

iii) Unaffordable cost of seeds for small and marginal farmers,

iv) Shortage of supply of quality seeds,

v) Issues relating to adoption of Genetically Modified Seeds remain unresolved.

vi) Inadequate number of players restricting competition.

The **issues** that require immediate attention are:

i) **Affordability:** Open pollinated varieties of seeds can be developed by farmers from their own harvested crops. However, for high-yielding mix varieties, the farmer has to depend on the market for each crop which gets very costly for the small and marginal farmers.

ii) **Availability:** Quality seeds have shortage in supply. While there is a demand for prohibiting non-certified seeds, certification per-se does not ensure quality seeds. Presence of more competitors (both public and private) and competition in the market for seeds would improve this situation.

iii) **Research and development of seeds and seed technology:** The first Green Revolution was driven by indigenously developed High Yielding Varieties (HYVs) of seeds for paddy and wheat. Insufficient research and genetic engineering have been a constraint in the development of seeds and seed technologies in major crops during the past few decades in India. There is need to encourage development of seed technologies in both private and public sectors to initiate another round of Green Revolution. This 40 41 development should cover all agricultural segments.

iv) **GM crops and seeds:** Concerns about its affordability, environmental and ethical issues, and risks to the food chain, disease spread and cross pollination have resulted in their non-introduction.

3.3.4 Fertilisers:

In improving agricultural output, fertiliser is an important and costly input. Ever since the Green Revolution (mid-1960s), there has been a sharp increase in the use of fertilizers in India. To ease and encourage the use of fertilizers, the Government has been providing fertilizer subsidy to farmers. Currently, the fertiliser subsidies stand at around 8 per cent of the total agricultural GDP.

However, the use of fertilisers has not resulted in proportionate growth in agricultural productivity. The decreasing response ratio or marginal productivity of fertilisers since the 1970s is a pointer to their inefficient use in Indian agriculture. The yield of

grain per kilogram use of NPK fertilizer has reduced from 13.4 kg grain per ha in 1970 to 3.7 kg grain per ha in irrigated areas by 2015-16.

In the post Green Revolution agriculture scenario, there have been inequities in the use of fertilizers such as –

i) Unnecessary dependence on urea owing to low/distorted prices of fertilisers, especially urea and regional imbalance in the use,

ii) Ignore/low use of compost, manure and other forms of natural nutrient providers,

iii) Stopping practices of inter and rotational cropping.

iv) Deviation of the use of subsidised fertilisers to non-agricultural use.

v) Undifferentiating use of fertilisers has not proportionally improved the yield of crops, but has resulted in the depletion of soil fertility and salination of soil in many areas.

Certain developments in fertilisation needed in the Indian farm sector may be summed up as follows:

i) Crop-responsive & balanced use of fertilisers: There is need to enable the optimal use of fertilisers depending on the soil health and fertility status. Connecting the soil health card to provide profile of the soil and fertilizer on the basis of the same profile utilizing fertilizer, (even if not subsidised) can improve the yield of crops.

ii) Micro nutrients & organic fertilisers: Indian soils show lack of micro nutrients (like boron, zinc, copper and iron) in most parts of the country which limiting crop yields and productivity. Fertilisers which increase micro nutrients can provide an additional yield in cereals in the range of 0.3 to 0.6 ton per hectare. This shortage can be overcome if there by expansion in the use of organic fertiliser. Besides, being inexpensive to use organic composting and manure it can help improve and retain soil fertility, too. There is great scope for increasing the use of organic fertilisers as around 67 per cent of Indian soil is characterised by low organic carbon.

iii) **Nutrient management:** To maintain soil health and productivity, thoughtful use of chemical fertilisers, bio-fertilisers and locally available organic manures like farmyard manure, compost, vermi-compost and green manure based on soil testing is essential. With over 12 crore farm holdings in India, it is a big challenge to provide soil-testing facilities for overwhelming the multi-nutrient deficiencies in soils so as to improve agricultural output. Use of information technology and providing soil fertility maps to farmers can go a long way in effective nutrient management.

iv) **Regional disparity in fertilizer consumption:** India has wide regional differences in the consumption of fertilizers. This may be credited to the availability of irrigation facilities in the high consuming states (since irrigation is a requirement for proper absorption of fertilizers). It is necessary to decrease the differences through appropriate soil-testing facilities and other policy measures.

Rising fertilizer subsidy bill (estimated to be □ 80,000 crores in 2019-20 in comparison to about □ 70,000 crores of 2018-19), has been a major concern in the area of fiscal management for the country. In order to rationalize the fertilizer subsidy the government has taken some important steps in recent years –

- All fertilizer subsidies are being distributed through the Direct Benefit Transfer (DBT) system since late 2016-17. Under this system, the subsidies are paid to the fertilizer companies on the basis of actual sales made by the retailers to the beneficiaries (identifying them through Aadhaar Card, KCC, Voter Identity card, etc.).

- The New Urea Policy-2015 has been notified with multiple goals—maximizing home-grown urea production, promoting energy competence, and justifying subsidy burden.

- In case of P (phosphate) and K (potash) fertilizers, the Government is executing the Nutrient Based Subsidy (NBS) scheme under which a fixed amount of subsidy is given based on their content.

3.3.5 Pesticides:

Due to the occurrence of weeds, pests, diseases and rodents, the crop harvest losses range from 15 to 25 per cent in India. Even though insecticides are vital for improving crop yields, per hectare pesticide use is much lower in India in comparison with other countries. Presently, India uses a low amount of 0.5 kg per ha insecticide compared to 7.0 kg per ha in the USA, 2.5 kg per ha in Europe, 12 kg per ha in Japan and 6.6 kg per ha in Korea. Besides, there are certain concerns regarding insecticides use in the country –

i) Use of pesticides without following proper guidelines,

ii) Use of substandard pesticides, and

iii) Lack of awareness about pesticide use.

These practices have given increase to insecticide remains being found in food products in India, posing major threats to the environment and human beings. Some policy steps which may be recommended in this regard are:

i) Farmers need to be taught about the classification of insecticides on the basis of their poisonousness and their suitability for aerial application.

ii) The CIBRC (Central Insecticide Board and Registration Committee) has issued rules for the application of insecticides, their dosage, minimum intervals to be maintained, and the levels of poisonousness. This information needs to be widely spread among farmers.

iii) Greater focus on IPM (Integrated Pest Management) which will include a careful mix of pest control methods by leveraging the cultural, mechanical, biological methods and need-based use of chemical pesticides. It favours the use of bio-pesticides and bio-control agents, too.

Being environment friendly, non-lethal and cost effective, bio-pesticides need to be encouraged among small farmers to improve productivity in agriculture.

3.3.6 Conclusion:

At present, the agriculture sector of the country is undergoing structural changes which are opening up new challenges and

openings. The initiatives taken by the Government in this regard are multi-dimensional and oriented towards changing the sector:

- Agricultural marketing
- Initiation of technology
- Implementation of Direct Benefit Transfer (DBT) mode for timely delivery of extension services, credit and other inputs to small and marginal farmers.
- Encouraging farm diversification so that risks to farm income can be reduced by facilitating the development of agricultural sub-sectors like livestock and fisheries.

The latest Economic Survey 2019-20, has given the following advices to make farm income lucrative and realise the aim of doubling farmers' income in the country:

- Allied sectors (such as animal husbandry, dairying and fisheries) need to be reinforced to provide an assured secondary source of income, especially for the small and marginal farmers.
- As the percentage of small and marginal holdings is substantially huge, land reform measures like liberating land markets can help farmers in improving their income.
- To join the small holdings in better way appropriate use of farm mechanisation is required.
- Irrigation facilities need to be extended together with effective water conservation.
- Regional skewness in the disbursement of agricultural credit should correct.
- Coverage of food processing sector needs to be ascended up to create an additional source of market for agricultural commodities.
- Efforts of farmers need to be accompanied with better coverage of direct income and investment support.

Check Progress:

1. What are the steps taken by the government to improve technology in Irrigation efficiency?
2. What do you understand by farm mechanisation?
3. What are the issues faced by farmers in seed development?
4. What are the measures taken by the government to improve in fertilization?
5. What is the scenario to use pesticides by the farmers ?

3.4 SUMMARY

The term 'green revolution' has been used in the context of a significant breakthrough in the production of food grains, mainly wheat and rice, in India since the decade of mid-1960s by using new agricultural practices, gradually replacing the traditional agricultural practices. Traditional agricultural practices were characterised by the use of indigenous input such as organic manures, seeds, simple plough and other agricultural tools. The modern technology, on the other hand, consisted of use of high yielding variety of seeds, chemical fertilizers, pesticides, extensive irrigation, agricultural machinery, etc. However, the achievements of Green Revolution were at the expense of ecology and environment. Extensive dependence on chemicals and pesticides has started showing its darker side. The modern system of farming in India has resulted in decrease in land fertility of late, damage to environment, chemical contaminations etc. this is reflected in soil erosion, soil salinity, soil contamination, genetic erosion etc.

The rapid agricultural progress in India is very necessary as to cater lager number of populations. For rapid agricultural growth it is necessary we use limited resource efficiently and optimum way by use of technology. Progressive agriculture will demand among other things (i.e. favourable institutional and organisational structure), improvement in inputs and methods. Irrigation, better seeds, better manures and fertilisers, land reclamation and soil conservation, plant protection, use of mechanisation etc. these are various aspects of agricultural inputs which have to be use efficiently to achieve the goal of food security.

3.5 QUESTIONS

1. What do you understand by Green Revolution and its impact on agriculture productivity?
2. What are the main components of Green Revolution?
3. What are measures taken by the Government to improve technology in input use efficiency?

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4

SUSTAINABLE AGRICULTURAL DEVELOPMENT AND FOOD SECURITY-II

Unit Structure

4.0 OBJECTIVES

- To know the importance of Sustainable Agriculture
- To know the management and strategies of Govt. to develop the sustainable agriculture
- To know the importance of food security in India
- To understand the govt. polices and its critical evaluations for steps taking for food security in India.

4.1 INTRODUCTION

Sustainable development can be defined as, development at present meets the needs of the present generation without compromising the ability of future generation to meet their own demand.

Sustainability in agriculture means the land and resources that use for agriculture today should be handed over to the future generations in a sustainable form so that they can continue to practice agriculture and have food security. This means that we have to use lands, water resources, etc. in such a manner that the future generations will also be able to have sustainable development.

Sustainable agriculture is the system of raising crops for greater human utility through utilization of resources with better efficiency without disturbing im-balancing or polluting the environment. Sustainable agriculture is ecologically sound, economically viable, socially just and human.

4.2 MANAGEMENT AND STRATEGIES FOR SUSTAINABLE DEVELOPMENT IN AGRICULTURE SECTOR

In order to make sustainable development in integral part of every nation's development strategy, the United Nations General Assembly, in September 2015, adopted the **2030 Agenda for Sustainable Development** that includes **17 sustainable Development goals (SDGs)**, also called Global goals.

As a signatory, to the Agenda 2030, India needs to develop its vision, strategies and targets to achieve SDGs by **effectively making them as part of its policy.** Thus, this chapter aims at representing a vision and framework for realising the SDG – 2 which focuses upon ending hunger, achieving food security and improved nutrition and promoting the sustainable agriculture.

Agriculture plays a vital role in guaranteeing food security while also accounting for a significant share of India's Gross Domestic Product (GDP). It provides employment to almost two-thirds of the workforce in gainful employment. A large number of industries such as sugar, textiles, jute, food and milk processing etc. depend on agricultural production to meet their requirement of raw materials. On account of its close relationships with other economic sectors, agricultural growth has a multiplier effect on the entire economy.

Presently, the danger of climate change poses a challenge for sustainable agricultural growth. This danger is deepened due to accumulated greenhouse gas emissions in the atmosphere, anthropogenically generated through long-term intensive industrial growth and high consumption lifestyles and preferences. While the global community is collectively engaging itself to deal with this danger, India needs to evolve a national strategy for adapting to climate change and its variabilities in order to ensure environmental sustainability in its socio-economic developmental priorities.

4.2.1 Status of Agricultural Development in India:

India is expected to be the most populated of the world by 2050. In order to meet the increasing needs of the growing population, it is forced to produce more than 210 million tonnes of food grains per year. India has not only met its national requirement but is also exporting to other countries. It also has a respectable cushion of stock of about 40 million tonnes of food grains. The achievement of green revolution was due to the upsurge in yields through the augmented use of high yielding variety seeds. But rigorous use of land without taking enough care to maintain its productive capacity leads to loss of top soil due to erosion, loss of Organic matter, loss of porous soil structure and water logging and build-up of toxic salts and chemicals. Deficiencies in micro nutrients such as zinc, iron, and manganese have also increased in Indian soil. Overuse of pesticides has caused localized health hazards.

Indiscriminate use of modern agriculture technology may endanger ecological security and imbalance the environment. Both agriculturalists and government have made huge investment on irrigation. These investments have not only brought insufficient results but also the use of its inappropriate management system has led to enormous water losses and problems such as soil erosion and compaction, water salinity, acidity and alkalinity. Though we have more than 100 million holdings hardly 4 per cent of the total area is under pasture and grasses. The area under forest cover, pasture and grazing land has considerably declined substantially over the times. The present social forestry programmes often have tended to be government foresting for the people rather than people own foresting for meeting their needs. Thus, Indian agriculture has problems related to

(i) Sustainability viz. Promoted deterioration of renewable resources and of environment and

(ii) Levelling of agricultural yield despite increasing doses of new inputs and high yielding technology.

4.2.2 Meaning of Sustainable Agriculture:

Sustainable agriculture is **farming in justifiable ways meeting society's present food and textile needs**, without compromising the ability for current or future generations to

meet their needs. ... Developing maintainable food systems backs to the sustainability of the human population.

Workable agricultural practices have to balance ecological health and economic profitability in order to promote social and economic equity. Therefore, both natural and human resources have their own importance. In simple terminology, "Sustainable Agriculture" includes the procedures that would allow us to meet the current and long-term societal needs for food, fibre and other resources, while maximising benefits through the conservation of natural resources and maintenance of ecosystem functions. The priority of promoting human capabilities at the individual (farmer) level and ensuring food security at the national level, through effective and equitable use of resources are compatible with the concept of "Sustainable Agriculture".

Definition:

"Sustainable agriculture is the successful management of resources for agriculture to satisfy changing human needs, while maintaining or enhancing the quality of the environment and conserving natural resources" CGIAR/TAC, 1988.

4.2.3 Management and Strategies for Sustainable Development in Agriculture:

Sustainability as defined by International Fund for Agriculture Development (IFAD) comes very close to explaining how to do this. Sustainability here is seen as a process essential for ensuring that the institutions supported through projects and the benefits realized are maintained and continued even after the completion of the developmental projects. It would be useful to take cognizance of the following four sustainability elements while devising the response for achieving the SDG-2 in Indian context:

1. Institutional Sustainability: Establishment and nurturing of functional institutions which are self –sustaining even after the project ends.
2. Household and community resilience: Making communities resilient so that they are readily able to anticipate and adapt to changes through clear decision-making processes,

collaboration and management of resources internal and external to them.

3. Environmental Sustainability: This must be integral to the projects and overall developmental strategy as it has to ensure that environmentally sustainable systems to maintain a stable resource base avoid overexploitation or renewable resources and preserve biodiversity.

4. Structural change: Given the context to poverty and hunger in India, it is essential that the structural dimensions of poverty specified to India are addressed through the empowerment of poor and marginalized rural households.

Attaining sustainable agriculture will require internalizing all the four sustainability elements discussed above. This shall not only give them capacities but also ensure sustainability of the natural resources and ecology of their area to ensure the sustained growth.

There are some initiatives / programs / Schemes started by Govt. to promote sustainable development in Agricultural sector:

1. **Pardhan mantri Krishi Sinchayee Yojana (PMKSY) :** Starts to achieve merging of investments in irrigation at the field level, expand cultivable area under assured irrigation, optimize on-farm water use to reduce wastage of water, improve the adoption of precision irrigation and other water saving technologies (more crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the viability of reusing treated municipal waste water for pre-urban agriculture and attract greater private investment in precision irrigation system. The main objective of scheme are as follows:

- Ensure water security to farm sector through Pradhan Mantri Kirshi Sinchayee Yojana (PMKSY) and provide water to Her Khet ko Pani.

- To provide a comprehensive solution in irrigation supply chain.

- Use micro irrigation technologies widely to save water, increase production and productivity of crops in a manner and help in achieving food security.

- Guaranteed irrigation, enlarged use of micro irrigation technologies will provide higher income to farmers, ushering in much needed prosperity in rural areas.

Broad Strategy:

- As water scarcity is being felt, micro irrigation technologies will be promoted extensively in all crops.
- As far as possible these technologies will be made only method of irrigating plants over time.
- As a short time measure this strategy will be used in water stressed blocks only.
- Special focus will be on use of micro irrigation technologies in water guzzling crops like sugarcane, banana, cotton etc. in arid and semi-arid parts of the countries. To achieve this end, suitable measures such as publicity campaigns, policy provisions and sharing of responsibilities with companies etc. will be initiated.
- The target of field crops, which is presently 25%, will be increased to 50% for bringing them under micro irrigation technologies.

2. **Rashtriya Krishi Vikas Yojana (RKVY):** RKVY aims at:

1) Holistic development of agriculture and allied sectors by incentivizing the states to increase public investment in this sector.
2) Providing optimum flexibility and autonomy to states in planning and executing projects.
3) Building robust infrastructure and creating assets for filling identified gaps.
4) Enabling central government to launch strategic initiatives from time to time reflecting national priorities.
5) Maximising returns to the farmers in agriculture and allied sectors.

3. **National Food Security Mission (NSFM):** It is an initiative directed at achieving the targets under SDG-2. This is supposed to be a Centrally Sponsored Scheme with

an objective to 'End poverty, achieve food security and improved nutrition and promote sustainable agriculture'.

4. **The National Mission for Sustainable Agriculture (NMSA):** Which is one of the nine missions under the National Action Plan on Climate Change (NAPCC) Seeks to address issues regarding 'Sustainable Agriculture' in the context of risks associated with climate change by devising appropriate adaption and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities and conducive to economic steadiness at the national level.

5. **Rain-fed Area Development (RAD) under National Mission on Sustainable Agriculture (NMSA):** To make rain-fed agriculture more productive, sustainable, and remunerative and climate resilient by promoting location specific Integrated or Composite Farming Systems along with preservation of national resources through appropriate soil and moisture protection measures.

6. **Sub-Mission on Agro-forestry (SMAF):** Aims at promoting agro forestry through trees and crops that respond to local priorities and agro-climatic/ biophysical conditions, adoption of suitable management practices and integration of those practices into rural livelihood systems. The new concepts of landscapes approach come across as a practical way to achieve justification, adaptation and agricultural production objectives while ensuring environment sustainability.

7. **National Horticulture Mission:** It was launched in the year 2005-06 as a Centrally Sponsored Scheme to promote a holistic growth of the horticultural sector through an area based regionally differentiated strategies. The schemed has been subsumed as a part of mission for Integration Development of Horticulture during 2014-15. Presently, India is the 2nd largest producer of foods and vegetables in the world.

8. **National Horticulture Board:** Aims at improving integrated development of Horticulture industry and to help in coordinating, sustaining the production and processing of fruits and vegetables.

9. **Soil Health Management (SHM):** Aims at promoting location as well as crop specific justifiable soil health administration including waste management, organic farming practice by way of creating and linking soil fertility maps with macro-micro nutrient management, appropriate land use based on land type, judicious application of fertilizers and minimizing soil erosion through following initiatives:

A. **Paramparagat Krishi Vikas Yojana (PKVY):** Under the scheme organic farming is promoted through farmer's group centric certification system known as 'PGS Certification' in cluster approach. The area envisaged to be covered under PKVY will be about 2 lakhs by end of the 12th Plan.

B. **Organic Value Chain Development for North Eastern Region:** The scheme is for implementation in the all the states of NE region. The main purpose of the scheme is promotion of certified organic production in a value chain mode to link cultivators with consumers and to support the development of entire value chain starting from inputs, seeds, certification, to the creation of facilities for gathering, accumulation, processing marketing and brand building initiative.

C. **Soil Health Card Scheme:** A centrally sponsored "Soil Health Card" has been made operational from the year 2014-15 to ensure balanced/ efficient use of fertilizer, based on soil tests and targeted to provide soil health cards to all farmers in the country once in every 2 years.

10. **National Mission on Agricultural Extension and Technology (NMAET):** It encompasses extension, ICT, seeds, Agricultural Mechanization and plant Protection aims to restructure and strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to the farmers through interactive methods of information dissemination, use of ICT including short messaging service (SMSs), Farmer's portal & other web based applications, capacity building & institutional strengthening. Public-Private partnership is being encouraged in the Extension and Training components of the Mission. Recognized NGOs, para-extension workforces,

Farmers Organisations, dealers and agripreneurs etc. are stimulated to contribute and provide extension and training services and guidance to farmers to improve agricultural production and productivity.

11. **Rashtriya Gokul Mission:** Executed by DADF to encourage indigenous breeds having exclusive characteristics of heat tolerance, tick and pest resistance, resistance to diseases and the ability to thrive under extreme climate conditions.

12. Government of India adopted a mega project called the **National Initiative on Climate Resilient Agriculture (NICRA).** Its four main components include Natural Resource Management, improving crop production, livestock and fisheries and institutional interferences.

4.2.4 Measures for Sustainable Agriculture:

While government has several initiatives/schemes/programmes to optimize the production of various crops and food item but in the absence of sustainability mechanism in place, they do not yield the desired results.

Hence, here we suggest **some measures for sustainable agriculture**. Some of them are:

A Sustainable Agricultural Practices:

- Optimising the Irrigation Potential and Water use efficiency: Increasing the irrigation potential through effective demand and supply side management of water and efficient use of water
- Integrated Nutrient Management (INM) / Bio-fertilisers / Organic Farming / Mechanisation and Technology
- Integrated Pest Management
- Improved Farm Practices / Crop diversification
- Conserving Indigenous Genetic Resources / Conserving Agricultural Heritage / ITK
- Agroforestry

- Promotion of climate resilient practice and conserving Agro-biodiversity through in-situ & ex-situ measures, increase nutritional value etc.
- Forward-Backward linkages
- Cold storage chain
- Warehouses

Supply Chain Management and Sustainability as umbrella concepts for making agriculture sustainable and an instrument of rural transformation as discussed in earlier sections.

Establishing as an attractive viable profession.

Linking knowledge with practices.

Establishment and nurturing of FO/CBOs/NGOs- extension workers as local institutions for rural transformation.

Cutting edge knowledge on Farming and Agricultural Supply Chains: A constant dialogue among multiple stakeholder: ICAR, Agriculture University/ Research centres and Farmers/FO/CBOs/NGOs- extension workers.

Peri-urban Agriculture: Demographic and economic expansion of cities, through processes such as migration and industrialization, trend to be accompanied by spatial expansion, resulting in encroachments by cities upon adjacent peri-urban areas. At the same time, areas that were earlier distant from the city and rural in character will be subsequently started falling within the cities reach. Typically, increased interactions with and access to the city economy, in terms of capital, labour goods and services will subsequently trigger the transformation of rural people to peri- urban areas. The rural-peri-urban-urban range itself is thus dynamic in nature and the changes will be more marked around cities that are rapidly urbanizing or growing both economically and spatially, as compared to the slower- growing or stagnant urban cores.

4.2.5 Conclusions:

Science and Technology shall be integrated in agriculture in their entirety and also in all other related departments to make them more relevant and competitive with the rest of the world.

IT enabled digital infrastructure for dynamic exchange of information is the driving force that can not only play an instrumental role in making agriculture sustainable but also transform the way India manages its natural resources well integrated with the governance system and also address the challenges posed by climatic changes.

Check Progress:

1. What are you understand by Sustainable Agriculture?
2. Explain in brief management and Strategies for Sustainable Development in Agriculture.
3. Write the name of schemes started by Govt. to promote sustainable development in Agricultural sector.
4. Explain the measures for Sustainable Agriculture.

4.3 FOOD SECURITY – CONCEPT, MEASUREMENT, MAGNITUDE

Food security is one of the major concerns of human beings especially in the developing countries where most people are unable to get suitable nutrition. In India, food security is a key issue; where nearly one-third of its total population is unable to survive at their own expense, and half of the Indian children are undernourished from at least the past three decades. Actually, the word 'Food Security' came into light in the 1960s and 1970s in international development related works, when Malthusian theory, recognized as the best theory of its kind, stated that, "If human population grows geometrically, food production grows with an arithmetic progression." As a concept, 'food security' originated in 1974, when World Food Summit, defined food security as an "Availability at all times of adequate world- food stuff to sustain a steady expansion of food consumption and to offset fluctuation in production and prices.

Given the importance of rural India and linkages of agriculture with multiple facets of SDG – 2, sustainability of agriculture becomes central concern within the overall strategy to end hunger, improve nutrition and achieving the food security.

4.3.1 Concept of Food Security:

World Development Report (1986) defined food security as "access by all people at all times to enough food for an active, healthy life."

Food and Agriculture Organisation (FAO, 1983) defined food security is "ensuring that all people at all times have both physical and economic access to basic food they need."

Staatz (1990) defined food security as "the ability to assure, on a long-term basis, that the food system provides the total population access to a timely, reliable and nutritionally adequate supply of food."

In 1996, World Food Summit stated that "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life." FAO again refined the definition of food security in 'The state of food insecurity in the world 2001' and stated that "Food Security is a situation that exists when all people, at all times, have physical social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

From these definitions, the following points emerge:

1. Food security involves suitable physical accessibility of food to the entire population in a country.
2. People have enough buying power so that they can acquire the food they need.
3. For healthy life, the food accessible should be adequate in quality as well as quantity to meet nutritional requirements.
4. A nation may obtain self-sufficiency in food at a point of time, but the concept of food security necessities that, timely, reliable and nutritionally sufficient supply of food should be available on a long-term basis. This implies that a nation has to guarantee the growth rate in food supply so that it takes care of the increase in population as also the increase in demand resulting from increase in the income of the people.

From this viewpoint, the following stages of food security may be visualised for a developing country like India:

Stage 1: The most basic need from the standpoint of human survival is to make an adequate quantity of cereals available to all.

Stage 2: In the second stage, we may think of food security as the sufficient availability of cereals and pulses.

Stage 3: In the third stage, food security should comprise of cereals, pulses, milk and milk products.

Stage 4: In the fourth stage, food security should include cereals, pulses, milk and milk products, vegetables and fruits, fish, eggs and meat.

4.3.2 Food Security – Measurement:

Food security is a multi-faceted idea that involves a whole range of different factors such as social disparities and ecologically sustainable food systems. In the definition of food security, availability of the food is the core component. Food security comprises of the four bases; availability, physical and economic access, utilization and stability. To find appropriate indicators to measure food security have been tough. Chronic malnutrition has been the main indicator comprising estimates based on average availability of calories per person at national level. Giving credit to a certain parameter, program or scheme is another challenge; the degree to which improvements in the food security situation can be attributed to the outcome and results of particular policies, programs and actions

Ever since mid-1960s when the import dependence for cereals had gone up by 16% food security, both at the national and household levels, has been the focus of agricultural development in India. Maximizing the production of cereals was the main aim of the new approach and involved building a foundation of food security on three key elements including provision of an improved agricultural technology offer to the farmers, delivery of contemporary farm inputs, technical knowledge and institutional credit to the farmer. The performance of agriculture, however, has not been acceptable. The share of agriculture in the Gross Domestic Product (GDP) has registered a steady decline from 36.4 per cent in 1982-83 to

13.7 per cent in 2015-16. But agricultural sector still supports more than 50 crore people providing employment to 52 per cent of the workforce.

Cultivation area in rural India is getting reduced mainly due to expansion of non-agricultural businesses and urbanization. However, through increasing productivity by growing High Yielding Varieties Product (HYVP), India is food secure. The food grain production in India rose from 50.82 million tonnes in 1950-51 to more than 260 million tonnes at present showing a remarkable growth in production level of more than 400% over a 7-decade period. But food security has to be scrutinized in terms of vulnerability, utilization, accessibility and most importantly availability. Therefore, apart from production programs and policies relating to distribution, buffer stocking, and monitoring prices become important.

The following are the steps to be taken for achieving food security for growing population through higher food production:

1. **Education and literacy:** Education plays a very important role in improving farm efficiency and technology adoption. Farmers nowadays need information on wide range of topics to acquire knowledge or upgrade their skills this has become necessary as agriculture changed from subsistence level to commercial level. With change in technology, use of machines and modern inputs like fertilizers literacy has become very important for farmers.

   It becomes easier for an educated workforce to train itself and thus acquire new skills and technologies thereby leading to a growth in the productivity. Thus, literacy plays an important role in substantially increasing the yield growth and domestic supply of food.

2. **Crop diversification:** Food availability is a primary condition for food security. India is now almost self-sufficient in cereals but faces a shortfall in pulses and oilseeds. It is mainly due to the changes in consumption patterns, demand for products like fruits, vegetables, dairy, meat, poultry, and fishery products has been increasing. There is a need for a rise in crop diversification and

improve associated activities to produce such crops and produces in which we are deficient.

3. **Tackling climate change:** Food security in India can be achieved by paying more attention to issues such as climatic change, limiting global warming, including the promotion of climate-smart agricultural production techniques and land use policies at a scale to help adapt and ease ill effects of climate change

4. **Integrated water management:** India needs to produce more crops per unit of land and water resources. Shocking rates of groundwater reductions and growing ecological and social problems pose serious threats to mankind. Better management of irrigation water is vital in enhancing production and productivity, food security and poverty alleviation. Agriculture is the biggest user of water accounting for over 80 per cent of the water withdrawals. There are burdens for diverting water from agriculture to other sectors. It has been projected that availability of water for agriculture use in India may be reduced by 21 per cent by 2020, resulting in drop of yields, especially rice, leading to price increase and danger to food security of the poor. The requirements of other sectors for water cannot be overlooked. As a result, it is essential that an integrated water use policy is framed and carefully implemented. Modern procedures of irrigation like sprinkler, drip irrigation, fertigation, among other water efficient tools need to be adopted on larger scale.

5. **Integrated nutrient management:** A proper attention needs to be given to balanced use of nutrients. Phosphorus deficiency is the most widespread soil fertility problem in both irrigated and non-irrigated rain fed areas. To improve the effectiveness of fertilizer-use, what really required is improved location-specific research on efficient fertilizer practices, improvement in soil testing services, development of improved fertilizer supply and distribution systems and expansion of physical and institutional infrastructure.

6. **Improved varieties:** In numerous regions, farmers are not able to get data about the availability of new and improved varieties and some are not having access to quality seeds of these varieties, resulting in lesser yields. This situation has

to be amended by developing a national-level network to monitor and coordinate the activities with the various State government functionaries working in the area of crop production.

7. **Improved technology adoption:** Acceptance of technologies like integrated nutrient management, integrated pest management and integrated weed management need to be made available for adoption to ensure higher production and sustainability of production base.

8. **Awareness on population growth**: The awareness of the burdens of increasing population growth and consumption patterns on environment functioning should be created to sensitize farmers on adoption of sustainable crop cultivation and management practices.

9. **Focus on small farmers:** Rise in food production in the nation does not necessarily ensure food security, if the poor do not have the buying power. Therefore, contribution of small farmers in food production is vital to achieve food security. Most of them being uneducated and having failed earlier either in accepting new technologies or repaying the loan provided under various development schemes. They need backing not only to secure inputs but also to gain confidence.

   The strategy to increase the food production should address the problems of such small landholding farmers, who constitute over 83 per cent of farmers in the country. Their land holding is less than two hectare of land per family, mostly marginal and non-irrigated. They have been working low-external input farming and the crop yields have been substantially low. However, their contribution to the national food production is substantial and meets a significant part of their food needs.

10. **Agricultural research education:** The agrarian education in India is facing one of the biggest tests. It has to recognize its role in preparing the human resources for improved agricultural productivity and sustainable use of natural resources. Agricultural colleges and universities were initially allotted to spread scientific knowledge and skills to

the agricultural community and to train them to use such skills for better output. As a backup for such a mission, agricultural research was stimulated to emphasis on scientific knowledge to suit to the realities of rural societies.

However, these ingenuities could not keep pace with the fast changing scientific and technical enhancements and gradually failed in their objective to promote the most modern skills and attitudes to both agricultural students and farmers. Therefore, updating of the curricula of agricultural education has become imperative. This is very much applicable to research, teaching, and extension functions of the university as they form the inter-related, theoretical and practical basis of modern agricultural education in India.

4.3.3 Dimensions and Magnitude of Food Security:

In view of the above definition, we can say that, food security is a three-dimensional concept, whose mechanism is like prism and it has four gears (availability, approach, allocation, absorption) which are controlling the food security mechanism.

- **Availability:** Adequate food stock to fulfil the public demand is a essential condition for food security and without adequate stock we cannot approach this stage. From our country's perspective, India is now self-sufficient in food grain production. Food grain output in 1950-51 was about 50 million tonnes, while for 2013-14, India is likely to have an output of 264.38 million tonnes of food grains. (Table 2.1). But the growth rate of food grain production is slower than the population growth, and growth rate of food grain production has also declined in recent decades. However, we have buffer stock of food grain which is one necessary condition for food security.

- **Approach:** About one third population of our country is extremely poor and the UN Million Development goals Report 2014, India also has the highest number of less than five years age group deaths in the world in 2012, with 1.4 million children dying before reaching their fifth birthday. On one hand, we are pleased that our country has bumper food grain stock but, on another hand, it is a bitter truth that most people have to sleep at night with an empty stomach. It so happens because of a incorrect policy of distribution of

food grain. Distribution of food must be in the view of the required provisions. Only then every person will get the right benefits of food security.

- **Absorption:** It is the process by which people become skilled to get adequate food for survival with certain ease. In other words, absorption is the real scale by which we can know about the food security's authenticity. Many needy people have RATION CARD or LAL CARD and they get their food right from the Public Distribution System. But question is, do they really take this food for themselves or do they sell the grain received for other needs? Secondly, do they really get healthy and adequate food grain under the food security plan? Replies of these questions must be positive then only the public will find real food security. Food absorption level in India is in the lowest point. About 44% of children are under-weight and about half of the pregnant women are suffering from anaemia due to low food absorption.

The extents of food security prism are -'Maintainable mutual collaboration', 'governmental enthusiasm for food security' and 'distributional precision of food'. Food security gives us a ray of assurance for better feasibility and this is the sum of seven different rays which are passing through three-dimensional food security. These seven rays are as follows:

- All time adequate food accessibility for all people.
- Consumption follows moral and ethical values
- Ensured food acquire
- Distribution and production follow the nature for sustainability
- Personally, and culturally acceptable
- Get food with human dignity
- Nutritionally adequate

Food security is attained when 'when food is available to all people at all times and they have physical and economic access to food that is sufficient to meet dietary needs for a healthy and productive life'. In this sense, achievement of food security

infers producing (or importing) sufficient food and making it available to all individuals throughout the year and on a sustainable basis from year to year. Further, satisfying dietary needs for a productive and healthy life suggests physical and economic access of all people to nutritive food, according to each individual's condition. Food security thus means freedom from starvation and undernourishment.

The position of food security of a country needs to be assessed at three levels:

1. First is the availability of food at national level on sustainable basis, which depends on level and growth of food production, or adequate capacity to import food (if availability elsewhere is assured).

2. Second is the physical and economic access of all households to food. Physical access requires efficient marketing, transport, and storage system to carry the food within an easy reach or at a reasonable distance from human settlements (villages). Economic access of every family to food depends on its purchasing power and prices of food at which it is available.

3. And third is the utilization of available food by individuals, which depends on intra-family allocation of food, and maintenance of reasonable level of health of all individuals to consume and absorb required level of food. Societal factors like education, primary healthcare, gender bias, and role of women in household decisions affect food security at the individual level.

It is in this background that India tackled the hunger and food-insecurity situation through both long-term and short-term measures. As a part of long-term strategy, it adopted a development strategy encompassing maintenance of adequate growth of national food production, and employment and incomes of masses, improvement in marketing infrastructure and access to education and primary healthcare. These apart, the short-term plan involved selective market interference and targeted distribution of sponsored food to reduce hunger and food insecurity. Further, as the nutritive status is also prejudiced by non-food factors such as clean water and sanitation, it was recognised that attention to these aspects will help translate food security into good nutrition.

I. Food security and Nutritional Security in India:

In India, a main share of the population suffers from undernourishment despite the fact that India became self-sufficient in food grain production two decades after freedom. Food grain production in the country increased from 176.39 million tonnes in 1990-91 to 284.95 million tonnes in 2018-19. However, it is important to recognise that self-sufficiency in food production and having enough food available per person for the country is not the only condition to achieve food security; households must also have access to available food to achieve adequate nutrients intakes. Availability and affordability of nutritious diet is crucial to reduce the burden of malnutrition.

Historically, food security in India was always synonymous with food grain security. The per capita accessibility of food grains has reduced from 186.2 kg/year in 1991-92 to 180.3 kg/year in 2018-19(P). This reduction in the cereal accessibility has been associated with a marked increase in the availability of pulses, eggs and dairy and a marginal increase in per capita availability of sugar and edible oil (Figure 9). This changing trend in per capita food availability reflects significant changes in the Indian food basket, away from staple food grains towards high-value horticultural and animal products (Kumar et al., 2007; Mittal, 2007).

Over time, the consumption of cereals (particularly coarse cereals) has declined whereas the consumption of milk, eggs, fruits, vegetables, etc., has increased (Kumar, 2016). In India, there has been a clear growth in calories and proteins from non-cereal items in both rural and urban areas (Table 3). The proportion of household expenditure on cereals has also registered a decline from 18 per cent and 10.1 per cent in 2004-05 to 10.7 per cent India and 6.6 per cent in 2011-12 in rural and urban India respectively (NSSO, 2004-05 and 2011-12).

Diet diversification towards animal and dairy products has a positive effect on nutrition, particularly in terms of the micronutrient content in food; however, increasing consumption of edible oil and sugar may lead to double burden of malnutrition.

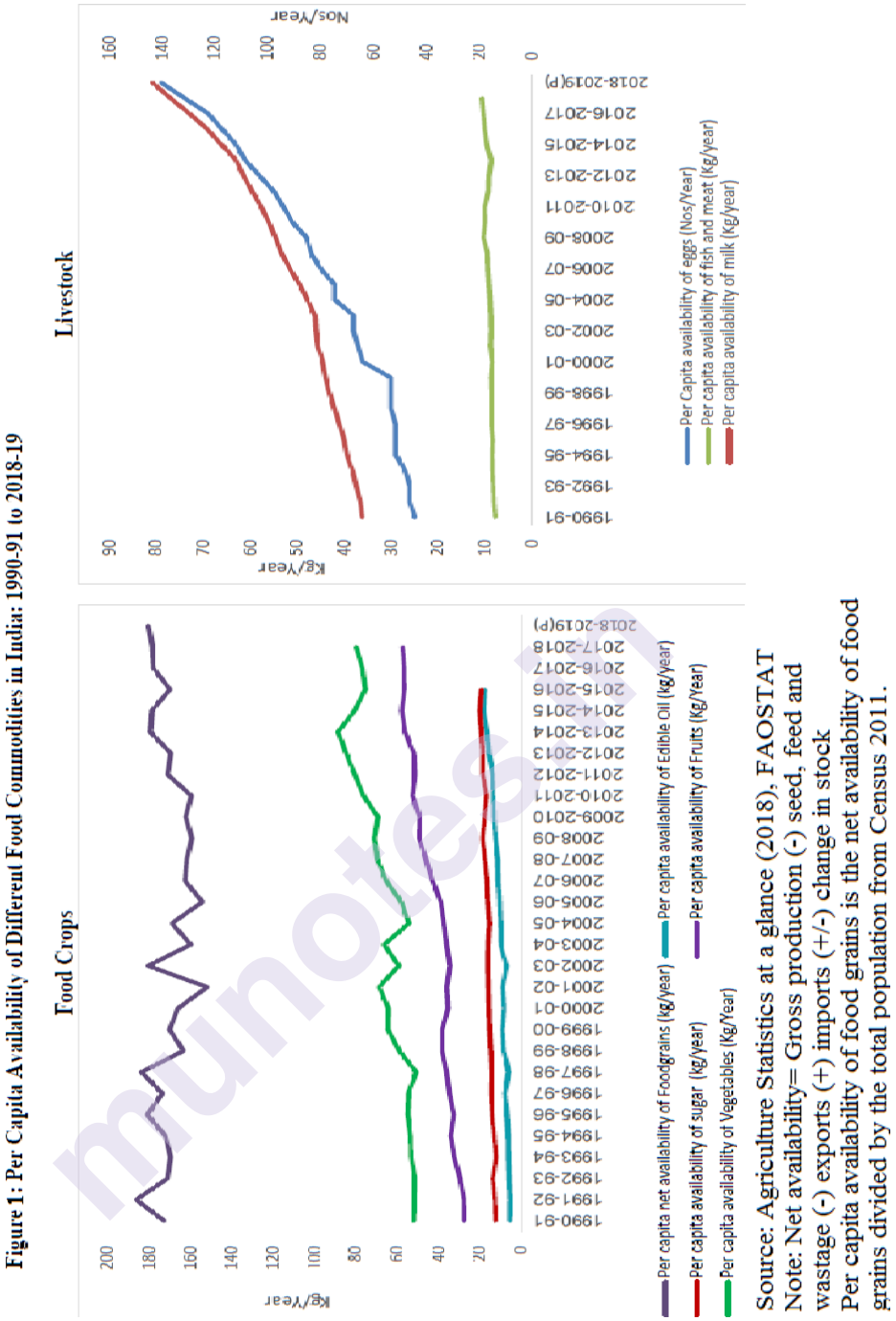


Figure 1: Per Capita Availability of Different Food Commodities in India: 1990-91 to 2018-19

Source: Achieving Nutritional Security in India Vision 2030

Table 1: Percentage Break-Up of Calorie and Protein Intake by Food Group: 1993-94 to 2011-12

Year	Calories (kcal)				Protein (gm)			
	Rural		Urban		Rural		Urban	
	Cereal	Non cereal	Cereal	Non cereal	Cereal	Non cereal	Cereal	Non Cereal
1993-94	71.03	28.97	58.53	41.47	69.42	30.58	59.41	40.59
1999-00	67.55	32.45	55.05	44.96	67.43	32.57	57.03	42.97

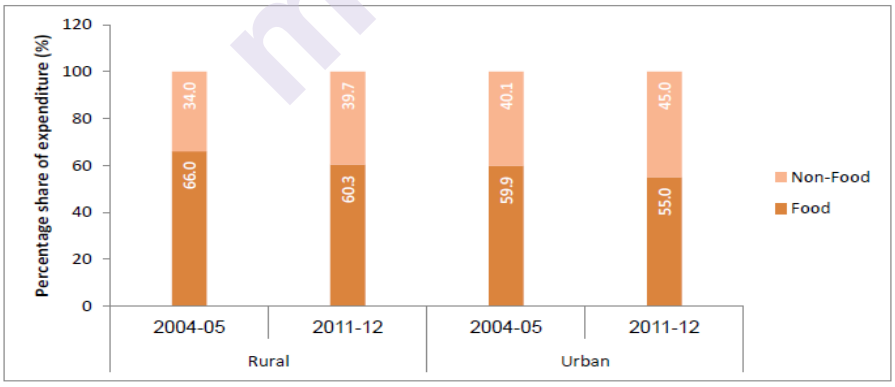
2004-05	67.54	32.46	56.08	43.92	66.37	33.63	56.16	43.84
2009-10	64.16	35.85	55.01	44.97	64.87	35.13	56.39	43.61
2011-12	57.40	42.60	48.00	52.00	58.00	42.00	49.00	51.00

Source: NSS Report No.540, Nutritional Intake in India

II. Food Availability and Affordability:

One of the linkages between food availability and nutrition comes from the fact that increased availability leads to affordability. Increase in agricultural productivity and a relative reduction in food prices enable increased intake of fruits, vegetables, pulses and animal products, which has a significant impact on reducing micronutrients deficiencies. Food prices are important from the nutritional perspective as they have significant implications in terms of access to food and food choices. Food accounts for a large chunk of total expenditure in households with low income and a decline in relative food prices is likely to increase consumption and release purchasing power for other commodities (Figure 2). However, an increase in relative food prices adversely affects food security and affordability, and worsens the incidence of hunger.

Figure 2: Percentage Share of Expenditure on Food and Non-food Items among Poorest (bottom 30 per cent Monthly Per Capita Expenditure Classes), 2004-05 to 2011-12



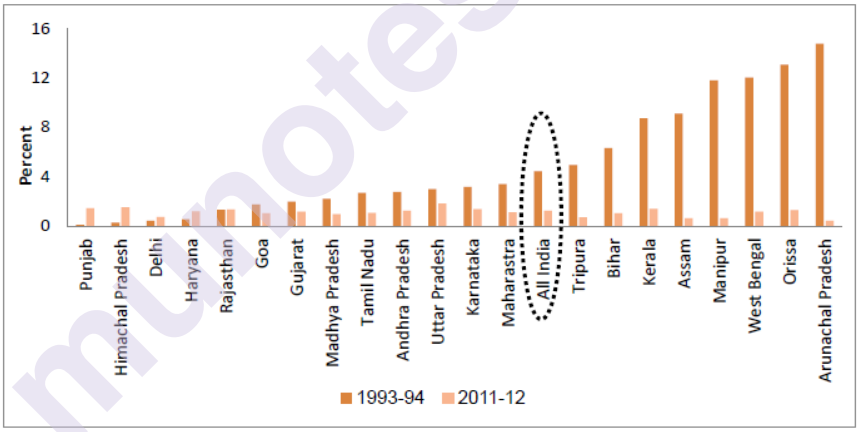
Source: adapted from Food and Nutrition Security Analysis, India (2019) by MOPSI and WFP, GOI, pp 75 (Calculation based on CES, NSSO 61st and 68th rounds)

The Consumption Expenditure Survey (CES) of the NSSO gathers information on the obtainability of two square meals a day, which can be used to measure the incidence of hunger.

Overall, the incidence of hunger has declined from 4.45 per cent in 1993-94 to 1.26 per cent in 2011-1214 (Figure 3). The occurrence of hunger in the states of Odisha and West Bengal, which was more than 10 per cent in 1993-94, has reduced to 1.28 per cent and 1.16 per cent in 2011- 12. The north-eastern states of Assam, Arunachal Pradesh and Manipur have almost eliminated the occurrence of hunger. Against this, there has been an rise in the rate of hunger in Punjab (from 0.12 per cent in 1993-94 to 1.43 per cent in 2011-12), in Himachal Pradesh (0.28 per cent in 1993-94 to 1.51 per cent in 2011-12), in Delhi (from 0.44 per cent in 1993-94 to 0.74 per cent in 2011-12) and in Haryana (from 0.56 per cent in 1993-94 to 1.19 per cent in 2011-12).

However, these numbers need to be interpreted with caution because the question asked differed between the 50th and 68th rounds. However, there is little doubt that there has been a noteworthy decline in the occurrence of hunger across states.

Figure 3 : Incidence of Hunger in India



Source: Calculated by Author from NSS 50th and 68th round. Note: Incidence of hunger is measured by persons reporting not getting two square meals a day.

Despite the marked shift away from the consumption of cereals to non-cereals, the focus of agricultural policies has been on the production of staples, primarily rice and wheat, leading to dietary imbalance. The question that rises is what ways can be used to achieve diet variation and nutritional security in India.

III. Food Grain Security to Diet Diversification:

Various food-based welfare programmes have been implemented by the government over the years to reduce the level of hunger and under-nutrition in the country. These

include the midday meal (MDM) scheme, the anganwadi system under the Integrated Child Development Scheme (ICDS) to provide rations to pregnant and lactating women and subsidised food grains for those living in absolute poverty through the public distribution system (PDS). Additionally, the National Food security Act (2013) was passed to ensure food and nutritive security through associated programs and schemes. However, these food distribution programmes mainly focus on providing satisfactory calories rather than nourishment, and has been termed "calories fundamentalism". A substantial portion of the Indian population suffer from the problem of hidden hunger (chronic micronutrient deficiency) where a person may have access to sufficient calories but lacks adequate micronutrients.

It is a matter of concern that strategies that contribute to a diet rich in micro-macronutrients have been ignored, resulting in continuance of micronutrient deficiencies. Food-based interventions are unlikely to result in a significant reduction in undernourishment if they are not nourishment sensitive. Moreover, a clear synergy is essential between agricultural policies and the nutritional quality of food supply. An innovative way to guarantee accessibility of micro-nutrients in areas affected by chronic undernourishment is to adopt the technique of bio-fortification, which involves incorporating nutrients into the seeds of major food grains to improve the micro-nutrient consumption among populations that are regularly malnourished. There are numerous instances of this having been executed effectively in different countries. For example, orange-fleshed sweet potato in Mozambique has resulted in increased serum retinol in children below five years of age. WHO has also recommended fortification of rice with iron to improve the iron status of the population where rice is a staple food and wheat flour with folic acid to increase the intake of folate by women? The Harvest-Plus programme of the Consultative Group on International Agricultural Research has been working on improving the nutritional status of pre-school children and women of reproductive age by releasing iron and zinc bio-fortified pearl millet, zinc-bio fortified rice and wheat; iron bio-fortified beans and vitamin-A rich yellow cassava and orange maize in 30 countries. In India, the Harvest-Plus program has been endorsing iron stimulated pearl millet and zinc-stimulated wheat to improve nutrition and public health.

Bio-fortification, however, is a short- or medium-term measure but not a long-term measure to reduce under-nutrition among low income households; in the long term, the objective should be to work towards guaranteeing access to an energy and micronutrient rich varied diet.

Conclusion:

There is a need to check the rising food subsidy. Two steps need to be taken in this regard firstly, taking timely decision as how to dispose the surplus food-grain stock of FCI (which often crosses the buffer norms) and secondly, reviewing the prices of wheat and rice for the NFSA recipients (the rates have not been revised since the Act commenced in July, 2013).

4.4 CRITICAL EVALUATION OF GOVT. POLICIES RELATED TO FOOD SECURITY

With nearly 195 million malnourished people, India shares 25 percent of the global hunger burden. Nearly 47 million or 40 percent of the children in India are not meeting their full human potential because of long-lasting under nutrition or stunting. Stunting results in diminished learning capacity, poor school performance, reduced incomes and increased risks of chronic diseases. The impacts are passed on from one generation to another as undernourished girls and women often give birth to low birth-weight infants. There has also been an increase in the occurrence of overweight and obesity in children and youngsters in India, which has life-long consequences of non-communicable diseases in adulthood.

The government administration has huge food security and anti-poverty schemes but there are serious gaps in terms of addition and exclusion errors. Women and girls are particularly deprived. Notwithstanding the success of national food independence, new tasks have emerged: Slowing cultivation growth, climate change, land deprivation and shrinking bio-diversity. Large areas of farmlands in India have become infertile due to imbalanced fertiliser use and excessive use of a single fertiliser, urea.

4.4.1 Government of India Programmes and Initiatives:

Today, India has been self-sufficient in food production but food insecurity still stands in the middle of the way of our

developmental goal. This is in the form of seasonal outage of adequate food in remote and isolated areas, not accessible due to unemployment, insufficient economic condition for ensuring healthy and appropriate food, due to weather condition and many more. Under nutrition and malnourishment also show the situation of food insecurity as these are the main cause of micronutrient (hidden hunger). Most important task of our government is making sure of nutrition for public health and providing sustainable human development. At the earlier time of our democracy, India had many major problems, such as low agrarian output, too much nutritional problems, many economic related natural disasters, lack of infrastructure, inappropriate food distribution system, chronic energy deficiency etc. Now in these days, many socio-economic related national problems have been resolved or are on the verge of being resolved. But one of them still stands over top of the list and worries us. And that is – "Chronic Energy Deficiency". Actually, it is the synonym for food insecurity including development issues. Chronic energy deficiency is rooted in India due to low dietary habits, poor utilization of available facilities and high prevalence of health-related problems. Government of India is well conscious of this problem. To sort out this big issue, government of India is working on these following points continuously since the last five decades:

Building buffer stocks of food production:

- Improving public distribution system
- Materialization household food security programme
- Antyodya Anna Yojna (AAY)
- Food supplementation of the vulnerable groups- integrated child development service (ICDS), Mid-Day Meals Scheme (MDMs)
- Nutrition education especially through Food and Nutrition Board (FNB) and ICDS
- Annapurna
- Mahatma Gandhi National Rural Employment Guarantee Programme (MGNREGP)

- ❖ National Old Age Pension scheme (NOAPs)
- ❖ The national Maternity Benefit Scheme (NMBS)
- ❖ The National Family Benefit Scheme (NFBS)
- ❖ Efforts of the health sector to tackle adverse health consequences of under nutrition; adverse effects of infection and unwanted fertility on the nutritional status; micronutrient deficiencies and their health consequences.
- ❖ The 'Right to Food' campaigning and
- ❖ The 'National Food Security Act. 2013'

With a five-fold increase in food grain production from 50 million tonnes in 1950-51 to about 250 million tonnes in 2014-15, India has moved away from dependence on food aid to become a net food exporter. In 2016, the government launched a number of programmes to double farmers' incomes by 2022. These seek to remove bottlenecks for greater agricultural productivity, especially in rain-fed areas. They include: the National Food Security Mission, Rashtriya Krishi Vikas Yojana (RKVY), the Integrated Schemes on Oilseeds, Pulses, Palm oil and Maize (ISOPOM), Pradhan Mantri Fasal Bima Yojana, the e-marketplace, as well as a massive irrigation and soil and water harvesting programme to increase the country's gross irrigated area from 90 million hectares to 103 million hectares by 2017.

The government has also taken significant steps to combat under- and malnutrition over the past two decades, such as through the introduction of mid-day meals at schools, *anganwadi* systems to provide rations to pregnant and lactating mothers, and subsidised grain for those living below the poverty line through a public distribution system. The National Food Security Act (NFSA), 2013, aims to ensure food and nutrition security for the most vulnerable through its associated schemes and programmes, making access to food a legal right. Recent Government Initiatives:

1. National Food Security Mission:

- It is a Central Government Sponsored Scheme launched in 2007.

- National Food Security Mission aims for growth in production of pulses, wheat, rice, coarse cereals and commercial crops, through area expansion and productivity enhancement.
- It works toward reinstating soil fertility and productivity at the individual farm level and enhancing farm level economy.
- It further aims to enhance the availability of vegetable oils and to reduce the import of edible oils.

2. Rashtriya Krishi Vikas Yojana (RKVY):

- This scheme was initiated in 2007, and allowed states to choose their own agriculture and allied sector development activities as per the district/state agriculture plan.
- Rashtriya Krishi Vikas Yojana was transformed into a Central Government Sponsored Scheme in 2014-15 also with 100% central assistance.
- Rashtriya Krishi Vikas Yojana (RKVY) has been named as Rashtriya Krishi Vikas Yojana- Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR) for three years i.e. from 2017-18 to 2019-20.
- The main objectives of this yojana: Making farming a lucrative economic activity through strengthening the farmer's effort, risk justification and promoting agri-business entrepreneurship. The main focus of this yojana is on pre & post-harvest infrastructure, besides promoting agri-entrepreneurship and innovations.

3. Integrated Scheme of Scheme of Oilseeds, Pulses, Maize and Oilplam (ISOPOM):

The Department of Agriculture & Cooperation has been implementing the following Centrally Sponsored Schemes under TMOP&M for increasing production of oilseeds, pulses, maize and oil palm in the country:

i. Oilseeds Production Programme (OPP)

ii. National Pulses Development Project (NPDP)

iii. Accelerated Maize Development Programme (AMDP)

iv. Oil Palm Development Programme (OPDP)

To provide flexibility to the States in implementation of these programmes based on regionally differentiated approach, to endorse crop diversification to provide focused approach to the programmes and in view of the recommendations of the Planning Commission the above four schemes have been altered and amalgamated into one Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) during the 10th Five Year Plan. The Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) will be implemented from 2004-05.

4. Pradhan Mantri Fasal Bima Yojana (PMFBY):

- The Pradhan Mantri Fasal Bima Yojana **was launched on 18th February 2016**.
- The scheme is being **administered by the Ministry of Agriculture and Farmers Welfare**.
- It provides a comprehensive insurance cover against failure of the crop thus helping in stabilising the income of the farmers.
- The Scheme covers all food & oilseed crops and annual commercial/horticultural crops for which past yield data is available and for which the requisite number of Crop Cutting Experiments (CCEs) are being conducted under the General Crop Estimation Survey (GCES).
- The prescribed premium is **2%** to be paid by farmers for all **Kharif crops** and **1.5%** for all **rabi crops**. In the case of annual commercial and **horticultural crops,** the premium is **5%**.
- On paper, there is no upper limit on subsidy by the government, which bears the expense even if the balance premium is 90%.
- The scheme is compulsory for loanee farmers availing Crop Loan /KCC account for notified crops and voluntary for others.
- The scheme is implemented by empanelled general insurance companies. The selection of the implementing

agency (IA) is done by the concerned State Government through bidding.

Pradhan Mantri Fasal Bima Yojana's Failure in North East:

- Out of Rs. 1,400 crores earmarked annually for the north-eastern States under the Centre's flagship **Pradhan Mantri Fasal Bima Yojana,** only Rs. 8 crore or just over half a per cent was actually spent last year.
- Four north-eastern States like Arunachal Pradesh, Nagaland, Manipur and Mizoram are not covered under the scheme at all.
- The lack of coverage has left thousands of maize farmers devastated by losses from the fall armyworm pest in the Mizoram without any hope of insurance.
- Reasons
- States in the Northeast face challenges such as the lack of interest by insurance companies and the lack of State budgetary resources to pay their share of the premium.
  - Insurance companies have been reluctant to bid for these States, as the **administrative costs are high**.
  - There are no proper land records and also historic yield data is not available for these States, particularly at the gram panchayat and block level.
  - **It is difficult to conduct CCEs (crop-cutting experiments) needed for many horticulture crops.** CCEs are conducted to obtain fair, precise and accurate estimate of the yield of crops.
  - Insurance companies are also not interested because the coverage is so limited. There are **low numbers of loan farmers in the Northeast,** except in Assam.
- **Lack of forecasting infrastructure** has also hampered the penetration of this weather-based insurance scheme in these states.

To make insurance companies serve farmers in the north eastern states, effective marketing of the farm produce is required. Also, state governments either need to go with the

PMFBY scheme or have to have their own set of schemes for the sake of farmers.

5. **E-marketplace:** The government has created an electronic national agriculture market (eNAM) to connect all regulated wholesale produce markets through a pan-India trading portal.

6. **Massive irrigation and soil and water harvesting programme** to increase the country's gross irrigated area from 90 million hectares to 103 million hectares by 2017.

7. The government has also taken significant steps to combat under- and malnutrition over the past two decades, through

- The introduction of **mid-day meals** at schools. It is a Centrally-Sponsored Scheme which covers all school children studying in Classes I-VIII of Government, Government-Aided Schools.
- **Anganwadi systems** to provide rations to pregnant and lactating mothers,
- **Subsidised grain** for those living below the poverty line through a public distribution system.
- Food fortification

8. **The National Food Security Act (NFSA), 2013:** National Food Security bill has become into a legal entitlement – National Food Security Act 2013 on 12 September 2013. It is also called Right to Food Act. According to 27th report of Ministry of Consumer Affairs, Food and Public distribution, providing food security has been the prime duty of the government. So, it has been always focused on governmental planning and policies. For ensuring food security of the people, Indian government announced the new act – the National Food Security Act. The objective of this act is – To provide for food and nutritional security in human life cycle approach, by ensuring access to adequate quality food at affordable prices to people live a life to dignity. Under this act up to 75 per cent of rural and 50 per cent of urban population are receiving subsidized food grain under Targeted Public Distribution System (TPDS). 5 Kgs food grain at subsidised price of Rs. 3/-, 2/-, 1/- per kgs for rice, wheat and coarse grain is providing per person per

month. Antyodaya Anna Yojana will still continue and poorest of poor people will continue to receive per month 35 kg of food grain under this scheme. Providing six thousand maternity benefits and meal to lactating mother pregnant women for nutritional support are other special features of this act.

Salient Features of National Food Security Act:

1. Coverage 2/3rd population under Targeted Public Distribution System (TPDS): Up to 75 per cent of rural population and 50 per cent of urban population. BPL households will continue to get 35 kg. food grain per month at nominal rate under Antodaya Anna Yojana.
2. States have the right to determining eligibility criteria.
3. Pregnant and lactating women received 600 calories or "take home ration" and 6000 rupees for six months under maternity benefit.
4. Children (6 months to 14 years) have right to receive free hot meals or "take home ration".
5. The central governmental has entitled to provide funds to states in case of short supplies of food grains.
6. Allocation of food grain of the states will be protected for six months.
7. State government was entitled to provide food security allowances to the beneficiaries in case of non-supply of food grain.
8. Public distribution system will be reformed.
9. If eldest women in the household (18 years and above) is the head of issuance of the ration card.
10. State and district level redress mechanism.
11. State food commissions will be constituted for implementation and monitoring.
12. Approx. 1.5 per cent GDP (1.25 lac crore) is the implementation cost.
13. Provision for penalty on public servant or authority.

4.4.2 Reality and Implementation of Government Programmes in India:

These programs were formed for eliminate the problem of food insecurity and malnutrition from our country but none of these were run with complete honesty. Corruption has encroached every scheme. Adequate food grain is not reaching the final consumer. Many a times, recipients got lesser food grain as was projected in the provision. Numerous times, quality of food grain was not as good as the prerequisite. The go down authorities sold the food grains in black market. Many studies on MGNREGA indicate that wages paid are lower than mentioned in the provision. Delay in payment is one of the other distressing problems, because people have no other option to feed one self and its family. Then, what does mean if this scheme is unable to provide at least their payment. It has also been observed many times that the payments of wages are not delivered to right person and fake card holders get their payment. In addition, fake construction works and fictitious purchase, payment of ghost companies are other major corruptions that are excavate the main objectives of these schemes. Various scams are also founded in the Midday Meal Scheme as about 22 children died after they took the poisoned midday meal. Many schools show false register of students' enrolment to save food material for selling it in the black market. And at the end, The National Food Security Act has to tackle many ground level problems to ensure food security. For example, food grain distributed through corrupt and leaky system for sure will be a terrible decision. This scheme is capable of disturbing our country's budget because; an extra burden of 23 billion dollars has been uploaded for this.

Steps to be taken to Ensure Food Security:

- The government strategy needs to assume an integrated policy framework to facilitate agriculture productivity.
  - The actions should emphasis mainly on rationale **distribution of cultivable land, improving the size of the farms** and providing security to the tenant cultivators apart from providing the farmers with enhanced technology for agriculture and improved inputs like

irrigation facilities, availability of better-quality seeds, fertilizers and credits at lower interest rates.

- **Aeroponics** and **tank farming** are systems that allow plants to be grown without soil. Plants grown in this way take in water and nutrients efficiently. These methods can be used in the areas of poor soil quality and soil erosion.
- **Adoption of crops and methods with lower water requirements,** such as the System of Rice Intensification (SRI) method of rice production, contributes to resilience by enabling equal or better yields to be achieved with less water withdrawal.
- **Planting crops with lower water requirements and agricultural practices that maintain soil moisture,** such as maintaining vegetative cover between crops, can also contribute to resilience.

Crop diversification: Higher profitability and steadiness in production highlight the importance of crop divergence, e.g. legumes alternative with rice and wheat. Growing of non-cereal crops such as oilseeds, fruits and vegetables etc need to be encouraged.

- Strategies for **better food storage** should be adopted.
- **The Blue Revolution:** Sea, lakes and rivers can be used to provide food and nourishment. Fish are a very good source of protein and do not require good soil.
- **Biotechnology and appropriate technology:** Selective breeding or genetic modification (GM) of plants and animals can be done to produce specific features and **adaptations**.
- For example, selective breeding has been used on dairy cows to increase milk yields. GM has been used on wheat to produce crops that are disease **resistant**.
- **Existing direct nutrition programmes should be revamped** to enable management by women's Self-Help Groups (SHGs) and /or local bodies along with orientation and training of community health workers, Panchayati Raj Institution (PRI) members, other opinion leaders, caregivers and other stakeholders can be another area.

- Efforts should be made by the concerned health departments and authorities to initiate and supervise the functioning of the nutrition related schemes in an efficient way.

  - Annual surveys and rapid assessments surveys could be some of the ways through which program outcomes can be measured.

- Focus needs to be shifted to the workers in the informal sector by providing decent wages and healthy working conditions.

- **Local community education on key family health and nutrition practices** using participatory and planned communication methodologies will be helpful.

- The **cooperatives** play an important role in food security in India especially in the southern and western parts of the country. The cooperative societies set up shops to sell low priced goods to poor people. The cooperatives should be encouraged.

- **Fostering rural-urban economic linkages can be an important** step towards ensuring food security by:

  - enhancing and diversifying rural employment opportunities, especially for women and youth,

  - enabling the poor to better manage risks through social protection,

  - leveraging remittances for investments in the rural sector as a viable means for improving livelihoods.

Conclusion:

- Food security of a country is guaranteed if all of its citizens have adequate nutritious food available, all persons have the capacity to buy food of acceptable quality and there is no hurdle on access to food.
- The right to food is a well-recognized principle of international human rights law. It has grown to include an obligation for state parties to respect, protect, and fulfil their citizens' right to food security.

- As a state party to the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights, India has the responsibility to ensure the right to be hunger free and the right to sufficient food.
- India needs to adopt a strategy that brings together varied issues such as inequality, food diversity, indigenous rights and ecological justice to ensure sustainable food security.

4.5 SUMMARY

Sustainable development is a process of change in which misuse of resources, the direction of interests, orientation of technical development and the institution change are in harmony and enhanced both present day and forthcoming potential to meet human needs and aspirations. Sustainable agriculture is the system of rising crops for greater human utility through use of resources with better efficiency without disturbing, unbalancing or polluting the environment. India has achieved green revolution due to the bigger use of high yielding variety product seeds. But exhaustive use of land without taking sufficient care to maintain its productive capacity leads to loss of top soil due to erosion, loss of organic matter, loss of pores soil structure and water logging and build-up of toxic salts and chemicals. Excessive use of pesticides caused localized health hazards. Unselective use of modem technology may endanger ecological security and imbalance the environment. Thus, the sustainability in Indian agriculture through the prevention of diversification of land suitable for farming to non-farm uses, integrated forest management, through preserving genetic resources and management of marine resources. To achieve justifiable agricultural development in India some policy measures are suggested.

Food security of a nation is safeguarded if all of its citizens have adequate nourishing food available, all persons have the capacity to buy food of acceptable quality and there is no hurdle on access to food. The people living below the poverty line might be food uncertain all the time while better off people might also turn food insecure due to calamity or disaster. Although a large section of people suffers from food and nutrition insecurity in India, the worst affected groups are landless or land poor households in rural areas and people employed in ill paid occupations and casual labourers engaged in seasonal activities in the urban areas. The people

experiencing food insecurity are disproportionately large in some regions of the country, such as economically backward states with high occurrence of poverty, tribal and remote areas, regions more prone to natural disasters etc. To guarantee availability of food to all sections of the society the Indian government prudently planned food security system, which is composed of two components: (a) buffer stock and (b) public distribution system. In addition to PDS, various poverty improvement programmes were also started which comprised a component of food security. Some of these programmes are: Integrated Child Development Services (ICDS); Food-for-Work (FFW); Mid-Day Meals; Antyodaya Anna Yojana (AAY) etc. In addition to the role of the government in ensuring food security, there are various cooperatives and NGOs also working intensively towards this direction.

4.6 QUESTIONS

1. Explain concept and strategies are adopted for sustainable development in agriculture sector.
2. Discuss the Schemes of Govt. of India to promote sustainable development in agriculture sector.
3. Explain concept and measurement of food security in India.
4. Explain dimension and magnitude of food security in India.
5. Critically evaluate the Govt. policies related to food security in India.

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MODULE III

5

COMPETITIVENESS OF AGRICULTURAL PRODUCTS AND MARKETING - I

Unit Structure

5.0 OBJECTIVES

- To understand various components of efficiency in agricultural production
- To know the measurement of efficiency of agricultural product
- To understand agricultural production and globalisation
- To know the difference between efficiency and competitiveness
- To understand efficiency of agricultural market in India
- To make the students aware of agricultural productivity and its efficiency
- To know what type of market structure is suitable for agriculture commodity

5.1 INTRODUCTION

- **Agriculture:**

Agriculture is in practice primary sector, contributor of GDP for Indian Economy. Wherein it cultivates plants and livestock's, the science or

practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products. Agriculture is backbone of developing nation. Major population directly and indirectly employed in agrarian activity. India's main occupation and source of employment is agricultural sector.

- **Agriculture Commodity Contribution:**

Among three important sectors viz, Primary-secondary-tertiary different contribution from various sector take place every year. India is an agrarian economy majorly more than half of its labor market representing agriculture-related sectors and more than 54 percent of the nation's land categorized as arable. India is one among the world's leaders in terms of production volume for various commodities such as rice, wheat, cotton, sugar, horticulture, and dairy. Agriculture and other related sectors such as forestry and fisheries account for 19.9 percent of the country's GDP (Source – India – Country Commercial Guide). Consequently, the agricultural sector plays an important role in Indian economics, politics, and society.

Indian agricultural production for food staples is highly based on nature i.e monsoon (seasonal rainfall) dependent, and farm yields are generally below world averages. Low productivity is caused due to many factors such as inadequate farmer education and training, heavy and tight government regulation, inefficient food distribution system, poor infrastructure (which results in post-harvest losses of up to 40 percent for certain products), unpredictable weather, small average farm sizes (2.7 acres/1.08 hectares and shrinking), and domestic agriculture support programs and subsidies that distort market signals and hamper investment.

The agricultural sector is slowly shifting and taking move from traditional farming towards horticulture and livestock (poultry, dairy, and fishery) production. There is more demand for fresh and processed products of all types is increasing as the population urbanizes, incomes rise, and consumption habits change. The growth of an efficient cold chain network from "farm to fork" will help curb the spoilage rate of agricultural output while helping producers capture value as products retain quality and provide increased benefits to consumers.

Imports of commodity which is consumer-oriented foods, led by tree nuts and fresh fruits, are among the most fastest growing segments of imported agricultural products and reached $5.14 billion in 2020. The market size for imported foods has grown steadily due to a growing middle class, the millennial generation, affluent professionals, brand-oriented importers, modern retail outlets, E-Commerce retailers, and trend-setting restaurants.

Imported agrarian produce like nuts and fruits feed into India's traditional retail channels, with an estimated 90 percent of imported fresh fruit sold in roadside stands and open markets. Imported packaged and consumer-ready foods are found in gourmet grocery stores, imported foods sections of larger store formats, and in thousands of small neighborhood stores

(kirana stores). While opportunities for imported food in the hotel, restaurant and institutional (HRI) and food processing sectors are improving, the Indian market remains relatively small due to high tariffs, ongoing import restrictions, and strong competition from the domestic industry.

As per the sources information India's food and grocery retail business is estimated at $500 billion. This data of retail sector is dominated by traditional trade formats like neighborhood shops or kirana (mom and pop) stores, which hold approximately 88 percent of the total market share in sales. The market share held by modern trade formats such as supermarkets and hypermarkets along with E-Commerce retailers is expected to expand rapidly over the next five years as it fulfills the evolving needs of consumers.

The retail and e-retail sector has experienced noteworthy consolidation through new partnerships and acquisitions this year. India's e-retail grocery market grew by 80 percent to $2.7 billion in 2020 primarily due to COVID-19 and the resulting lockdown. The sector is expected to grow rapidly over the next few years, due to expanding internet connectivity and rising consumer demand for convenience, value, safety/hygiene, ease of payment, and product variety. Opportunities for U.S. exporters exist in consumer-oriented products, especially tree nuts, fruits, and packaged/processed foods.

The emergence of larger chains and stores began around 2005, and the sector has grown to over 8,100 modern retail outlets across India in 2020. While many retailers are expanding and opening new stores, profitability continues to be an issue, including high real estate costs.

India's casual dining and quick service restaurant sector is also on the rise, with nearly 60 foreign restaurant brands across the country. Another emerging trend is the rise of "themed" dining restaurants serving cuisines with a fusion of national and international foods. The use of E-Commerce has also expanded dramatically. Due to lockdown restrictions and social distancing norms, Indian customers turned to E-Commerce platforms to secure essential food supplies. Since the COVID-19 pandemic in 2020, the E-Commerce sector has seen significant changes as many food manufacturers, retailers, distributors, importers, and E-Commerce firms have come together to develop new distribution networks and take advantage of synergies. For example, leading food delivery and cab aggregator apps, such as Swiggy, Uber, Scootsy, and Zomato, have partnered with traditional and modern retails to deliver groceries.

Over time, India has developed export competitiveness in certain specialized products, making it the world's 9th largest exporter in agriculture and related products. In 2020, India realized a $15.8 billion trade surplus of agricultural, fishery, and forestry goods. Leading exports consisted of Basmati rice, carabeef/beef frozen shrimp and prawns, cotton, and refined sugar.

Table 1. India: Market Size of Indian Agricultural Products

Units: $ billion	2017	2018	2019	2020
Total Exports	32.2	32.7	31.0	33.4
Total Imports	27.8	22.3	22.7	22.1
Imports from the United States	1.9	1.9	2.1	1.6

Source: Directorate General of Foreign Trade, Ministry of Agriculture & Farmers Welfare, Trade Data Monitor

5.2 MEASUREMENT OF EFFICIENCY OF AGRICULTURAL PRODUCT IN INTERNATIONAL MARKET

Agriculture is one of the main occupations of Indian Economy. Agricultural contribution to GDP reached to 20% as per the source of Economic Survey in last 17 years hits the contribution in GDP of India for year 2020 -2021. The Finance Minister, Ms Nirmala Sitharaman tabled the Economic Survey 2020-21 on January 29, 2021.As per the Economic Survey Report committee, in 2020-21, the growth rate of agriculture is estimated to be 3.4%. While the contribution of the sector to Gross Value Added (GVA) declined from 18.3% to 17.8% between 2014-15 and 2019-20, it is estimated to increase to 19.9% in 2020-21. This is because the agricultural sector faced fewer disruptions on account of the COVID-19 pandemic as compared to non-agricultural sectors.

Under National Food Security Act, 2013, the central government provides rice and wheat at subsidised rates (called central issue price (CIP)). The difference between the CIP and the market price gives quantum of food subsidy. While the CIP of wheat and rice has not been revised since the introduction of the Act, the economic cost of wheat increased from Rs 1,908.32 per quintal in 2013-14 to Rs 2,683.84 in 2020-21 (an increase of 41%). In addition, the economic cost of rice increased from Rs 2,615.51 per quintal in 2013-14 to Rs 3,723.76 per quintal in 2020-21 (an increase of 42%). The survey observes that revision of CIP to reduce the rising expenses on food subsidy bill.

The Europian Union among the world country member is the first trader in agricultural products, both in terms of exports of agricultural commodity and imports. Agricultural trade helps to answer possible food production shortages due to climatic or other reasons. Ultimately, it contributes to the prosperity and source of income of farmers, industries and consumers. The study and data of WTO's Trade Statistics, share of India's agricultural exports and imports in the world agriculture trade in 2017 was about **2.27% and 1.90%**, respectively. The exports of Agri commodities during March 2020 to June 2020 were Rs. 25552.7 Crore against an export of Rs. There are two ways how commodities can be traded of which the international agricultural Trading in the spot market; which means that the commodities are exchanged immediately when setting a deal, either for cash or other goods. The price is set according to the current market prices and delivery occurs immediately or a few days later.

India ranked into the top 10 list of agricultural produce exporters in 2019 with a contribution in the export of **rice, cotton, soya beans and meat**, according to a World Trade Organization (WTO) report on the trends in world agricultural trade in the past 25 years. The most important agricultural commodity which are exports of India are **cereals (mostly rice - Basmati and non-Basmati), spices, cashew, oilcake/meals,tobacco, tea,coffee and marine products**. There has been significant increase in the Value of agricultural -exports to total exports of the country that has been ranging between 15 to 20 per cent. And if we talk about import, then approximately 54% or more than half the agricultural -imports by India is of **vegetable oils**. India's vegetable oil imports in 2020-21, up to February 2021, are worth Rs. 74,286 crores. There are some other major agricultural -imports are fresh fruits, pulses, spices, and cashew.

- **Reforms undertaken in Indian Agricultural functioning for improvement in agricultural performance (Source – Government of India, Ministry of agriculture and farmer welfare)**

1) E-Compendium of Published Articles on Farm Reforms Act 2020
2) Central Sector Scheme of Financing Facility under Agriculture Infrastructure Fund.
3) Clarification regarding CHC as eligible project under Agriculture Infrastructure Fund
4) Standard Operating Procedure (SoP) for release and use of Grants-in-aid to State Governments for Administrative Cost of Project Monitoring Unit (PMU)- reg.
5) Minutes of VC held held on 02.12.2020 with States on Agriculture Infrastructure Fund
6) Guidelines of Agriculture Infrastructure Fund in Hindi
7) Clarification regarding Interest Subvention in Central Sector Scheme for financing under Agriculture Infrastructure Fund
8) Appointment of M/s NABCONS as KP as part of PMU under AIF

5.3 PRODUCTIVITY AND EFFICIENCY

Productivity and efficiency are considered as an important indicator and measures of competitiveness. The universal definition of **Agricultural Productivity is a ratio of a volume measure of output to a volume measure of input use**.

- Agricultural productivity and efficiency play crucial role in framing policies and measures for farming sector.
- The Sustainable Development Goals undertaken effective initiative on agricultural productivity.

- And also focussed on research on statistical frameworks for additional productivity and efficiency targeted to developing countries is necessary. Information and awareness on agricultural productivity is related to several of the Sustainable Development Goal indicators, in particular: With respect to world economy the global initiatives, such as the 2030 Agenda for Sustainable Development, some of the countries have introduced policies to expand and improvise agricultural productivity, especially in countries where agriculture is a main/major economic sector and the productivity gap is wider among the primary sector and other industries and services.

- Increasing productivity in agriculture is advantageous due to its effective contribution to poverty reduction through improved and better food security and higher income farm generated through farm production.

- The key role of agricultural productivity in the economic and social agenda of developing countries was reinforced by the Malabo Declaration of June 2014, which represent agricultural productivity growth as a significant objective of Africa to achieve agriculture-led growth and achieve targets on food and nutrition security.

- In the Declaration, it is stated that in order to end hunger in Africa by 2025, agricultural productivity needed to be double with effect from current level

- **Concept of productivity and efficiency:**

Technical efficiency and productive efficiency are significant concept for overall improvement in performance of agriculture contribution

5.4 TECHNICAL EFFICIENCY

Technical efficiency is the type of inputs and resources that can be utilise in the production process production technology.

- The concept of technical efficiency is most relevant because it justifies the presence of differentiated productivity targets, taking into account both the resource and input base (the technology), and the distance to the most efficient practices: a holding can be efficient in the sense that it has reached its own potential maximum production, but less productive than a less efficient farm benefiting from higher quality inputs.

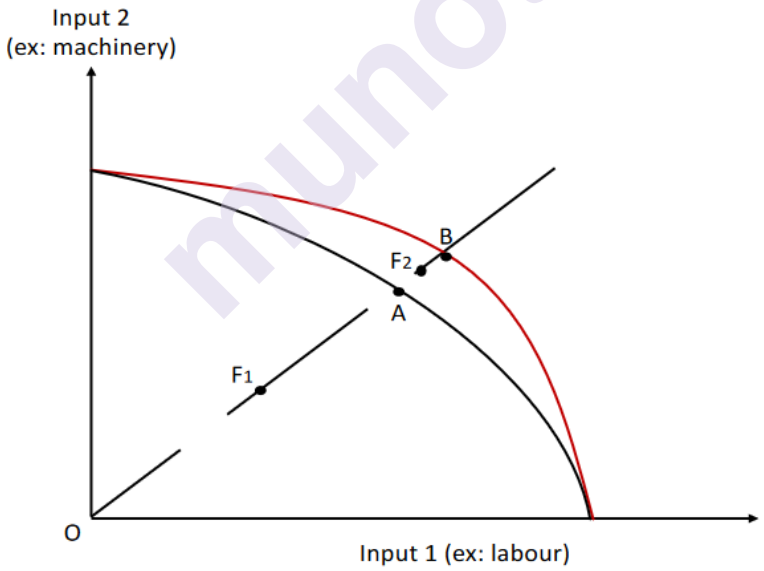
- A meta-analysis applied to review empirical study of technical efficiency in developing country agriculture.

- The objective of the study is to find a better understanding of the factors that influence estimates of mean technical efficiency.

- The factors such as primal versus dual, number of fixed inputs and number of variable inputs increase average technical efficiency estimates.
- In parallel to that, using the Cobb–Douglas functional form and cross-sectional data yields a lower level of technical efficiency.
- Multiple Other factors, consists of number of variables in the model, crop type, stochastic versus deterministic frontiers and sample size, not consider important factors of estimation of technical efficiency.
- A crucial understanding and measurement of efficiency in agriculture is required in the context of lower availability of important resources and production factors, such as land or water in optimum quantity and quality.

Diagrammatical representation of technical efficiency can be explained through production frontier. In fig.1, The production frontier corresponds to the combination of inputs that generate the maximum attainable output. Accordingly, the production frontier is in fact the best practice frontier (Charnes et al. 1978). It differs across countries and regions because of differences in the nature, quality and availability of the inputs, such as soil quality, precipitation levels and qualification of the workforce.

Figure 1. Technical efficiency and productivity: an illustration



Technical efficiency can be explained with the help of suitable diagram Agricultural holding operating with two substitutable inputs, such as labour and machinery, is considered. Any combination of labour and machinery along the black line (point A, for example) corresponds to technical efficiency, in the sense that the farm produces the maximum amount allowed by the technology.

The technology is characterized by aspects such as the type of soil, meteorological patterns or the type of capital and labour available. The bisecting line (black line) illustrates the total production or yield reached with the chosen combination of the two inputs. The farm currently operates at $\mathbf{F_1}$, an inefficient level. To reach the level of efficiency frontier, there is requirement to better use the inputs at its disposal. Consider now a new technology, characterized by inputs of a better quality, such as richer soils or a better-trained workforce or machinery that is more efficient. The efficient production technology can be achieved at higher production frontier in fig. 1 at **point B**. By using better technology production at $\mathbf{F_2}$ by adopting technical efficiency lying between point **A and B** in the given diagram.

5.5 ECONOMIC EFFICIENCY

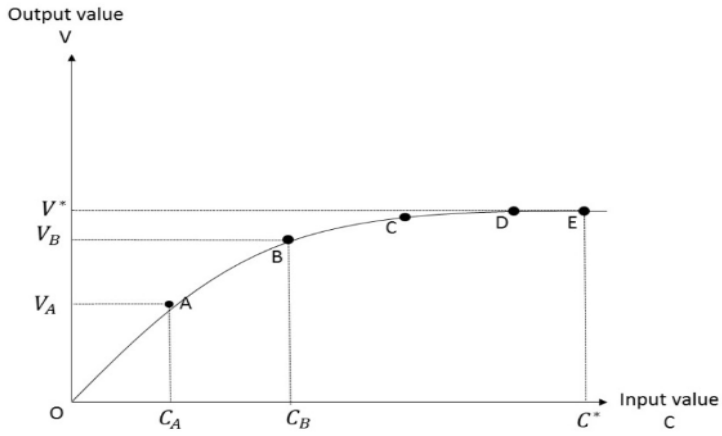
Economic efficiency means to achieve the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials.

- Economic efficiency need to be based on knowledge of the elements that illustrate the production effort and having three important sources: the optimal use of resources, rational use of labour and production management. It is estimated as **quantitative ratio** between the effects **(E)** and the resources or efforts **(R)** made to obtain them. In achieving maxi

- mum effect with a specified level of consumptions, or reaching the determined effect with minimum consumption: **e = E / R** max (maximizing the effects obtained per unit of allocated, consumed resources); **e = R / E** min (minimizing the resource consumption per unit of effect achieved).

- According to Kelly et al. (1996), an agricultural holding reaches economic efficiency when the marginal value of the inputs is equal to their respective unit costs: if the marginal value is higher, the holding can earn higher profits by producing more, thereby becoming more efficient. If the marginal value is lower, the farm should reduce its production to increase its profits.

Figure 2 – Economic efficiency: an illustration



In fig 2 the y-axis represents the output value and the x-axis the inputs costs. The black line indicates how inputs are transformed into outputs: the points situated on this line indicate that the agricultural holding is operating at the highest potential yield or production given the type and quality of inputs used, that is, it is technically efficient. Assuming fixed input and output prices, any increase in production value for technically efficient holdings from V_A to V_B because of an increase in the quantity of input used (from $C_A$to C_B).

The ratio between output value and input value measures the amount of value generated by one monetary unit of input: in other the words, the economic return per monetary unit spent. This indicator is also known as unit margins or profits. The figure illustrates that the additional return generated by an increase in use of inputs declines as more inputs are being used: the additional value created by moving from A to B is higher than for the change from B to C and so on until reaching E. After E, any additional quantity of input used does not translate into higher output, meaning that the additional return is 0. E can, therefore, be understood as the point at which the farm is economically efficient: before E, there is scope to increase the overall profitability by using more inputs; after E, any additional use of input will result in lower profits. This is due to the existence of declining returns to scale in agriculture. Yields can rise as far as more inputs are used, but up to a certain point, after which, the use of additional inputs will have no impact on yields and only result in higher costs.

5.6 COMPETITIVENESS

- There is difference between economic efficiency and competitiveness. Economic efficiency is absolute measure of economic performance of the agricultural farm.

- And competitiveness compares performance to that of the competitors. a farm can be economically inefficient but competitive because other farms are even less efficient.

- Reciprocally, an economically efficient farm is not necessarily competitive if all the other farms are also economically efficient.
- Competitiveness also goes beyond the price/cost performance and extends to the features attached to the output or to the producing firm (or sector, country), such as quality attributes, both true and perceived.
- For example, a firm can have comparatively high unit costs but may benefit from a high "non-price" competitiveness, which allows it to sell its products at a higher price.

5.7 PRODUCTIVITY MEASUREMENT

Its origin is from microeconomics "theory of the firm" in which, based on several assumptions, it can be stated that inputs can be used economically combined in such a way so that the objective of optimum allocation of scarce resources by allowing firms to maximize profits subject to a cost constraint or to minimize costs subject to an output constraint.

- productivity measures describe the relationship between the production of a commodity — good or service — and the inputs used to produce that commodity. It can be the relationship between one or more products and one or more inputs.

Agricultural productivity depends on two components:

(a) The type and quality of the inputs used in the production process

(b) How well these inputs are combined.

- The type and quality of the inputs used in the production process represents the production technology while How well these inputs are combined refers to the technical efficiency of the production process.
- Production technology is characterized by the type of inputs and resources available. For a given commodity, many different technologies may exist, reflecting different economic, environmental and agronomic conditions.
- However, in general, in empirical studies of productivity and efficiency there is no explicit reference to competitiveness is made.
- A common definition of productivity is the ability of production factors to produce the output.
- It can be simply measured as a partial productivity indicator, relating output to one input (e.g. yields or partial productivity of labour), but this does not account for the possibility of either factor substitution or output substitution.
- By contrast, the more comprehensive measure of total factor productivity (TFP) (sometimes called the multi-factor productivity,

MFP) is a ratio that relates the aggregation of all outputs to the aggregation of all inputs.

Productive Efficiency is relevant in a dynamic framework, where change in TFP, that is to say productivity improvement, is investigated. Potential productivity improvement is evaluated when firms are compared to a benchmark: in cross-section data, firms are compared with each other in the same period, while in a time-series approach one firm is considered during two periods. In the first case, a firm can increase its productivity in comparison with other firms by improving its efficiency and/or by reaching an optimal scale of operation. In the second case, all firms can increase their productivity owing to technological progress.

5.8 GLOBALISATION AND AGRICULTURE

The functioning of new economic policy will influence the Indian agriculture to reform pricing policy in agricultural sector basically to drop the drawback of support – procurement - administered prices and farm subsidies mechanism and "also out of its own emergency and in response to GATT challenges and opportunities that will emerge in international markets in the near future, agriculture market can be progressively integrated with the global market.

Significant objective of globalising the Indian Agriculture is based on three expected principle:

1. Cost of production can be reduced with the entry of foreign competitors in to India's domestic market and stimulate local producer.

2. Reduction In the cost of production to the local producer of domestic market will encourage and make them strong enough to export more.

3. Due to liberalisation and globalisation in agricultural sector there will be freedom of access to foreign investment the economy will benefit from an inflow of both financial resources and advanced technology.

- It has been analysed that Over the past decade, international agricultural and food markets found a number of changes, which have brought domestic and international markets closer together.

- Since 2000, trade in agro-food products has grown strongly – more strongly than in the preceding decade at close to 8% in real terms annually between 2001 and 2014 compared to 2% between 1990 and 2000 – as world markets responded to a more rules-based trading environment, falling tariffs, and reductions in trade-distorting producer support.

- Global agricultural production has also continued to increase, driven by rapid growth in a number of developing regions, in particular those of Asia and South America. But agro-food trade is not only increasing but becoming 'global' as well.

- The food and clothing that consumers find in their local stores are increasingly made from a wider range of products, produced in a wider range of locations across the globe.
- From the changes found in agro-food markets, there has been a important increase in trade among emerging and developing countries, which are increasing in importance, both as suppliers and markets for agro-food products.
- Increasing trade has also been accompanied by deeper integration of the world's food system.
- A growing contribution of agro -food marketing is included in global value chain (GVC_s) of agricultural and food processing value chains that are spread over several countries – linking agro-food sectors and other sectors of the economy from across the world.
- With the successful marketing roles and facilities, various marketing organisations and agencies make it possible for commodities, produce and products to move from producers to consumers.
- However, these facilities incur costs, often of significant magnitude.

5.9 AGRICULTURAL MARKETING

Concept And Definitions:

Meaning:

➢ **Market:**

The word market comes from the latin word 'marcatus' which means merchandise or trade or a place where business is conducted. Word 'market' has been widely and variedly used to mean

(a) a place or a building where commodities are bought and sold, e.g., super market;

(b) potential buyers and sellers of a product, e.g., wheat market and cotton market;

(c) potential buyers and sellers of a country or region, e.g., Indian market and Asian market;

(d) and organization which provides facilities for exchange of commodities, e.g., Bombay stock exchange; and

(e) a phase or a course of commercial activity, e.g., a dull market or bright market.

Agricultural Marketing is inclusive of the services involved in movement of agrarian farm product from the farm area towards the reachability of the consumer. These services involve the planning, organizing, directing and handling of agricultural produce in such a way as

to fulfil the needs and requirements of the farmers, intermediaries and consumers. Numerous interconnected activities are involved in doing this, such as planning, production, growing and harvesting, grading, packing and packaging, transport, storage, agro- and food processing, provision of market information, distribution, advertising and sale.

Components of Market Structure:

1. Concentration of Market Power:

This is an important element for determining the nature of competition and consequently of market conduct and performance. This is measured by the number and size of firms existing in the market. The extent of concentration represents the control of an individual firm or a group of firms over the buying and selling of the produce. A high degree of market concentration restricts the movement of goods between buyers and sellers at fair and competitive prices, and creates an oligopoly or oligopsony situation in the market.

2. Degree of Product Differentiation:

Whether or not the products are homogeneous affects the market structure. If products are homogeneous, the price variations in the market will not be wide. When products are heterogeneous, firms have the tendency to charge different prices for their products. Everyone tries to prove that his product is superior to the products of others.

3. Conditions for Entry of Firms in the Market:

Another dimension of the market structure is the restriction, if any, on the entry of firms in the market. Sometimes, a few big firms do not allow new firms to enter the market or make their entry difficult by their dominance in the market. There may also be some government restrictions on the entry of firms.

4. Flow of Market Information:

A well-organized market intelligence information system helps all the buyers and sellers to freely interact with one another in arriving at prices and striking deals.

5. Degree of Integration:

The behaviour of an integrated market will be different from that of a market where there is no integration either among the firms or of their activities

- **Problems of agriculture marketing:**

In agricultural marketing **transportation cost, inadequate market infrastructure, lack of market information, lack of processing units, storage facility, price fluctuation** are the major problems.

❖ **Essentials of a good market:**

1. **Holding Capacity:** The ability of holding the food product produced by farmer till the optimum remunerative price of product is essential. Due to poor economic condition and urgent need of money insist them to sell food produce at less than remunerative price.

2. **Storage:** agricultural food produce are perishable in nature. There is scope of getting food grain spoil if not taken care of, thus proper storage facility should be there.

3. **Transport facility:** one of other essential service which need to be on time available is transportation facility. What is produced by farmer is important and when it reaches to final consumer in the market through proper transportation facility is another most important factor.

4. **Direct access to the market:** this helps to remove the exploitation of middlemen. Maximum of the profitability is captured by the middlemen due to which farmers do not get scope to even earn normal profit.

5. **Communication:** proper channel of communication prevent farmers to both farmers and consumers by providing them correct and complete market situation information and about current exsisting price in the market.

➢ **Structure of Agricultural Market:**

1. Generally agricultural markets are "perfectly competitive," which means homogeneous product is produced by and for many sellers and buyers, they are well aware about prices.

2. Market price is determined by the intersection of supply and demand.

3. Economists operate agricultural markets as an example of perfect competition.

4. The actual right sequence of the market structure from most to least competitive is perfect competition, imperfect competition, oligopoly, and pure monopoly.

5. The identical crops that different agriculturalists grow are mostly interchangeable.

6. A perfectly competitive firm will not sell below the equilibrium price either.

7. Agricultural marketing covers the services included in moving an agricultural product from the farm to the consumer.

8. These services involve the planning, organizing, directing and handling of agricultural produce in such a way as to satisfy farmers, intermediaries and consumers.

9. Agricultural marketing brings producers and consumers together through a series of activities and thus becomes a significant component of the economy.

10. The scope of agricultural marketing is not only limited with the final agricultural produce.

11. It also focuses supply of agricultural inputs (factors) to the farmers. Through this chapter we can measure the of efficiency of agricultural product in International Market. Also, can understand and find the level of efficiency of agricultural product.

12. Firms are said to be in **perfect competition** when the following conditions occur:

a. the industry has many firms and many customers/buyers

b. all firms produce identical/homogeneous products

c. sellers and buyers have complete information to make rational decisions about the product being bought and sold firms can easily enter without any barrier.

➢ **Important functions of agricultural marketing.**

1. Assembling:

Collection of farm produce for sale. This is usually carried out to ensure greater convenience and economy during transportation, grading or processing.

2. Grading:

Grading involves separating the commodities into different sizes, varieties, tastes, quality, colour etc. This is done to enhance market value and uniformity.

3. Processing:

Processing describes the transformation of farm produce into a more consumable form. e.g. conversion of wheat into flour.

4. Transportation:

This is the movement of farm produce from the place of production to the place of final consumption. Transportation of farm products is carried out through various means such as road, rail, air, and water.

5. Storage:

This is the act of keeping or holding large supplies of produce from the period of production until when needed by the consumers.

6. Packaging:

Packaging is described as the process by which farm products are bundled or packed into containers of different attractive shapes, sizes and patterns in order to entice consumers as well as enhance sales.

In this chapter we will learn about measurement of agriculture product its contribution in GDP and its relevance in international market. Difference between efficiency and competitiveness and also technical and economic efficiency can be understood with the help of suitable diagram

Agriculture satisfies the significant basic need of human being by producing various food. About a hundred years ago, farmer used to produce food commodities mostly for self-consumption or for barter system exchange with others (cash or kind) mostly in the same village or nearby places. They were primarily self-reliant. But, now production environment has changed considerably from self- reliance to commercialization producing more of commercial crop. Technological advancement in the form of high yielding varieties production (HYVP), use of fertilizers, insecticides, pesticides, farm mechanization has led to a drastic expansion in farm production and consequently the larger marketable and marketed surplus. The improved production is accompanied by the increasing urbanization, income, changing life style & food habits of the consumers and increasing linkages with the overseas market. Today consumers and the buyer of agricultural goods are not limited to rural areas where food is produced. There has been drastic, increasing demand for further processed or semi-processed food products requires value addition in the raw agricultural produce. These developments require movement of food commodities from producer to consumers in the form of value added products. Agricultural marketing is the source in which producers and consumers together through a series of activities and thus becomes an essential component of the economy. The scope of agricultural marketing is not only limited with the final agricultural produce. It also focuses supply of agricultural inputs (factors) to the farmers.

❖ Key features of agricultural marketing:

1. Agricultural marketing including all activities involved in supply of farm inputs to the farmers and movement of agricultural products from the farms to the consumers.

2. The agricultural marketing system comprises two major sub-system viz. product marketing and input (factor) marketing. The product marketing sub-system are inclusive of farmers, village/primary traders, wholesalers, processors, importers, exporters, marketing cooperatives, regulated marketing committees and retailers. The input sub-system includes input manufacturers, distributors, related associations, importers, exporters and others who make available various farm production inputs to farmers.

3. The agricultural marketing system can be analysed as a link between the farm and non-farm sectors. The innovative, dynamic and growing agriculture sector requires fertilizers, pesticides, farm equipments, machinery, diesel, electricity, packing material and repair services which are produced and supplied by the industry and non-farm enterprises. The growth in the size of farm output stimulates forward linkages by providing surpluses of food and natural fibres which require transportation, storage, milling or processing, packing and retailing to the consumers. These functions are performed by the non-farm enterprises. Further, if the increase in agricultural production is accompanied by a rise in real incomes of farm families, the demand of these families for non-farm consumer goods goes up as the proportion of income spent on non-food consumables and durables goods have a tendency to rise with the increase in real per capita income. Several industries, thus find new markets for their products in the farm sector.

5.10 EFFICIENCY OF AGRICULTURAL MARKET IN INDIA

Agricultural and Marketing in India is multi diversified and flexible. It is managed by both public sector and private sector undertaking. Trade in agriculture sector plays significant role in expanding the size of consumer goods market.

Hence study on margins and costs usually include the topic of marketing efficiency. An efficient marketing system is one which is capable of moving goods from producer to customer at the lowest cost consistent with the provision of the services that customers demand. The idea of cost involved once known to us then accordingly efficient market system can be formed. Efficiency of agricultural product can Increase in a variety of ways: by increasing the volume of business using improved handling methods, investing in modern technology, locating the business in the most appropriate place, implementing better layouts and working practices in production, improving managerial planning and control and/or by making changes in marketing arrangements (e.g. through horizontal or vertical integration).

The word market is derives from latin word marcatus which relates to trade or a place where business is conducted. The Word market has been largely used to mean

(a) a place or a building where commodities are bought and sold, e.g., super market;

(b) potential buyers and sellers of a product, e.g., wheat market and cotton market;

Agricultural marketing is composed of two words-agriculture and marketing. Agriculture, in wider term, means activities aimed at the use of natural resources for human welfare, i.e., it includes all the primary activities of production. But, generally, it is applied in growing and/or

raising crops and livestock. Marketing includes a series of activities involved in moving the goods from the point of production to the point of consumption. It includes all the activities involved in the creation of time, place, form and possession utility. According to Thomsen, the study of agricultural marketing, comprises all the operations, and the agencies conducting them, involved in the movement of farm-produced foods, raw materials and their derivatives.

Expansion in agricultural product provide better marketable surplus. Increase in the agricultural product and marketing of it leads to boost the economic condition of agriculturally based personal, by improving their purchasing power capacity. It will also helpful in inventing new structure of production of agriculture product by investing more in to agricultural sector research areas.

Marketing Efficiency:

The size of production in any sector become irrelevant if we do not consider the marketing aspect of the same. Hence we need to consider the following process.

1. There could be handling of all marketing activities by producer alone.
2. There could be takeover of all marketing activities by the various categories of consumers of agricultural products.
3. There could be total take over by the state.

5.11 RECENT DEVELOPMENT IN AGRICULTURAL MARKETING IN INDIA

In India at present there are approximately thousands of agricultural markets. They charge numerous fees of large magnitude and hence become a source of political power.

In current years the Central and State governments have come up with many changes to improve agricultural marketing in our country.

- **Following are some of the recent developments in agriculture marketing:**

The Ministry of Agriculture had developed a Model Agricultural Produce Market Committee (APMC), Act in 2003. It has asked all the state governments to modify their respective APMC Acts along with lines of Model APMC Act, 2003.

- **The Model APMC:**

(a) provides for direct sale of farm produce to contract farming sponsors.

(b) to set up 'special markets' for 'specified agricultural commodities', mostly perishables.

(c) permits private persons, farmers and consumers to establish new markets for agricultural produce in any area.

(d) to have a single levy of market fee.

(e) replacing licensing with registration of market functioning.

(f) provides direct sale to consumers.

(g) provides for creating required market infrastructure.

The central government through variations of APMCs and using constitutional provisions aims at creating a national market (common market) for agricultural produce.

Recently it was suggested to disband the APMCs as they create more obstacles in the functioning of free markets. It was suggested to have Terminal markets which would operate on 'Hub and Spoke' format, where the terminal market (the hub) would be linked to a number of collection centres (spoke).

Many state exempted the marketing of fruits and vegetables from the purview of the APMC Act.

To improve agricultural marketing, the Department of Agriculture has issued a comprehensive advisory to the states which includes the following measures:

- To declare entire state as single market.
- One licence for the entire state.
- Removing all restrictions on the movement of agricultural produce within the state.
- To develop Common National Agricultural Market (NAM) through Agri-Tech Infrastructure Fund (ATIF).

➢ **Following are some of the Measures which is initiated to allow farmers to sell their products directly to consumers, specially in big cities.**

The Inter Ministerial Task Force on Agricultural Marketing Reforms has listed following priority areas to introduce changes or improve the existing system.

1. Legal reforms
2. Direct marketing
3. Market infrastructure
4. Pledge financing
5. Warehousing receipt system
6. Forward and future markets

7. Price support policy
8. Information technology in agricultural marketing
9. Marketing extension, training and research

5.12 QUESTIONS

1. Explain Features of agricultural marketing.
2. Describe Measurement of efficiency of agricultural product in International Market.
3. What is relevance of concept of technical efficiency?
4. What are various recent reformation in agricultural marketing in India?
5. How does the concept productive efficiency influence functioning of agriculture.
6. Describe commodity contribution of agricultural produce in world market.

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6

COMPETITIVENESS OF AGRICULTURAL PRODUCT AND MARKETING - II

Unit Structure

6.0 OBJECTIVES

1. To know the government intervention in the agricultural market
2. To understand the effects of government intervention on efficiency of agricultural production
3. To understand Commodity market and its impact in economic growth
4. To know various strategies applied in world market for sustainability of agricultural market

6.1 INTRODUCTION

Indian Agriculture Economy:

India's population is 1.27 billion and it is the world's second most populous country. India is the seventh largest country all over the world with an area of 3.288 million sq kms. It has a long coastline of over 7,500 kms. India is a diverse country where over 22 major languages and 415 dialects are spoken (Source: Food and agriculture organisation). With the highest mountain range in the world, the Himalayas to its North, the Thar desert to its West, the Gangetic delta to its East and the Deccan Plateau in the South, the country is home to vast agro-ecological diversity. India is the world's largest producer of milk, pulses, and jute, and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton. It is also one of the leading producers of spices, fish, poultry, livestock and plantation crops. Worth $ 2.1 trillion, India is the world's third largest economy after the US and China.

- India's economic growth in financial year 2018 is expected to accelerate to 6.75 percent in 2018 on improved performance in both industry and services. India is the world's sixth-largest economy

by nominal GDP and the third largest by purchasing power parity (PPP).

- The country ranks 139th in per capita GDP (nominal) with $2,134 and 122nd in per capita GDP (PPP) with $7,783 as of 2018 (World Bank data). Agriculture accounted for 23% of GDP and employed 59% of the country's total workforce in 2016.

- Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal. In 2017-18, total food grain production was estimated at 275 million tonnes (MT).

- India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. India's annual milk production was 165 MT (2017-18), making India the largest producer of milk, jute and pulses, and with world's second-largest cattle population 190 million in 2012

- It is the second-largest producer of rice, wheat, sugarcane, cotton and groundnuts, as well as the second-largest fruit and vegetable producer, accounting for 10.9% and 8.6% of the world fruit and vegetable production, respectively.

Challenges faced by Indian Agriculture:

- India still has many growing concerns. As the Indian economy has diversified and grown, agriculture's contribution to GDP has steadily declined from 1951 to 2011. While achieving food sufficiency in production, India still accounts for a quarter of the world's hungry people and home to over 190 million undernourished people.

- Incidence of poverty is now pegged at nearly 30 percent. As per the Global Nutrition Report (2016), India ranks 114th out of 132 countries on under-5 stunting and 120th out of 130 countries on under-5 wasting and 170th out of 185 countries on prevalence of anaemia. Anaemia continues to affect 50 percent of women including pregnant women and 60 percent of children in the country.

- While agriculture in India has achieved grain self-sufficiency but the production is, resource intensive, cereal centric and regionally biased. The resource intensive ways of Indian agriculture has raised serious sustainability issues too.

- Increasing stress on water resources of the country would definitely need a realignment and rethinking of policies. Desertification and land degradation also pose major threats to agriculture in the country.

- The social aspects around agriculture have also been witnessing changing trends. The increased feminisation of agriculture is mainly due to increasing rural-urban migration by men, rise of women-

headed households and growth in the production of cash crops which are labour intensive in nature. Women perform significant tasks, both, in farm as well as non-farm activities and their participation in the sector is increasing but their work is treated as an extension of their household work and adds a dual burden of domestic responsibilities.

India also needs to improve its management of agricultural practices on multiple fronts. Improvements in agriculture performance has weak linkage in improving nutrition, the agriculture sector can still improve nutrition through multiple ways: increasing incomes of farming households, diversifying production of crops, empowering women, strengthening agricultural diversity and productivity, and designing careful price and subsidy policies that should encourage the production and consumption of nutrient rich crops. Diversification of agricultural livelihoods through agri-allied sectors such as animal husbandry, forestry and fisheries has enhanced livelihood opportunities, strengthened resilience, and led to considerable increase in labour force participation in the sector.

❖ **Indian Government and Agriculture:**

Governments have **employed various measures to maintain farm prices and incomes above what the market would otherwise have yielded**. They have included tariffs or import levies, import quotas, export subsidies, direct payments to farmers, and limitations on production.

- Tariffs and import quotas can be effective only if a country normally imports some of its supply. Export subsidies result in higher prices to domestic consumers than to foreign purchasers; their use requires control over imports to prevent foreign supplies from entering the domestic market and bringing prices down.

- Direct payments to farmers have been used to maintain prices to consumers at reasonable levels, while assuring farmers a return above world-market levels. Limitations on production, intended to reduce supply and thus increase prices, have been used in Brazil (for coffee) and in the United States (for major crops) production.

- The United States and the other parties to the world's foremost international trade arrangement, the General Agreement on Tariffs and Trade (GATT), have formally agreed to participate in an eighth round of multilateral trade negotiations (MTN). The negotiations were launched in Punta del Este, Uruguay, in September 1986 with the signing of the ministerial declaration. The broad objectives and principles for these negotiations, to be called the Uruguay Round, are set forth in the declaration.

- Discussions on organizational matters and trade negotiating plans began in October 1986. Hard bargaining is expected to be under way by spring and agriculture will receive notably greater attention in this process than ever before. One of the major U.S. objectives is to liberalize agricultural trade.

- Other major aims are to reach agreements that would free trade in services. expand foreign investment opportunities and provide guidelines for international transfers of intellectual property rights. The agricultural policies of trading countries are thought to be an important contributor to both falling commodity prices and the slow growth of world trade in the eighties.

- Trade barriers, price and income support programs, and other domestic agricultural policies buffer agricultural producers in many countries from world price movements and discourage supply adjustments. In this policy environment, world supply has continued to grow faster than demand, leading to unprecedented stock accumulations pressure on world prices and putting downward

6.2 FORM AND IMPACT OF GOVERNMENT INTERVENTION IN THE MARKET

Government intervention in agriculture has received increased public attention in domestic as well as international market. Institutional risk results from uncertainties surrounding Government actions. **Tax laws, regulations for chemical use, rules for animal waste disposal, and the level of price or income support payments** are examples of government decisions that can have a major impact on the farm business.

Federal policies impacting the domestic economy, foreign affairs, and trade initiates all can have a significant impact on the agricultural sector. At the state level, government agencies **promote local agricultural products, provide food safety and inspection services, soil conservation and environmental protection**.

Forms of government intervention:

- Economic policy.
- Regulations.
- Tax.
- Price controls.
- Subsidy.

❖ **MARKETING FORMS INTRODUCED BY THE GOVERNMENT:**

In the post-independence period the government introduced different forms of marketing to help the agriculturists market their product in more competitive way.

Forms of Marketing:

(1) Co-Operative Marketing

(2) Regulated Markets

(3) State Trading

1. Co-Operative Marketing:

It has a three tier structure with primary marketing societies at the village level, central societies at the district level and state marketing societies at the state level. However, there are variations from state to state. At present there are about 4000 primary marketing societies in the country.

Chart 6.1 brings out the structure of co-operative marketing.

Chart 6.1: Structure of Co-operative Marketing

Functioning of the cooperative marketing society takes place in the following manner:

(i) Members (farmers) agree to sell their surplus produce to the marketing cooperative societies.

(ii) Members get an advance from the society on their agricultural activities and to meet other needs.

(iii) The society collects the produce of members and even from non-members who are willing to sell their produce to the society.

(iv) Society processes the produce, grades it and then disposes it off in the market at a time when the prices are considered to be appropriate.

(v) Members are then paid the balance money.

By performing the above functions, the cooperative marketing societies save the farmers from exploitation, avoid unnecessary middlemen, enable the farmers get a better price and save them from many problems associated with agricultural marketing.

To provide other services and empower the farmers, cooperative societies like processing, storage (warehouse) etc. are formed. To assist in the task of storage the National Development Corporation was formed. For procurement, distribution, export and import of agricultural products the National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) was established.

2. Regulated Markets:

A regulated market is established under statutory regulation. It is essentially aimed at protecting farmers, consumers, and other market

functionaries from exploitation. A regulated market is administered by a market committee which consists of representatives of the state government, the legal bodies like district board, the traders, the commission agents and the farmers.

- **The market committee ensures:**

i) **Elimination of malpractices** such as incorrect weights, unauthorised charges or deduction, absence of grading and delay in payments etc.

ii) **Fixing market charges** like commission for agents, storage charges, rent for market space etc.

iii) **Remunerative prices** to the farmers through proper supervision of market activities.

iv) **Redressing grievances** after receiving complaints and providing arbitrators if necessary.

v) **Information about prices** by collecting the required data about changes in demand, supply, and other related variables etc.

vi) **Help in securing storage facilities** to the farmers to store their produce at reasonable charges till they get a better remunerative price.

vii) **Bringing down the price spread** by eliminating unwanted middlemen and unnecessary commissions.

At present there are more than 7,000 regulated markets and about 22,000 rural periodic markets of which 15 percent function under the ambit of regulation. Regulated markets have succeeded to a great extent in many of the above tasks.

3. State Trading:

It was introduced by the central government and by some state governments. Food Corporation of India the Maharashtra State Monopoly Procurement Scheme, Jute Corporation of India are some of the examples of state trading. It helps overcome wide fluctuation in agricultural prices in the free market. State trading offers a minimum price to the farmers while procuring commodities to maintain the buffer stock. Government will make a direct purchase from the farmers at the assured minimum price.

Production of agricultural commodities fluctuates due to the vagaries of the monsoon. Demand for these commodities is almost inelastic. Therefore, any increase in output will lead to a drastic decline in its prices. Given the almost constant demand, it helps a farmer produce and supply less at a higher price. To bring farmers out of this situation the government ensures a minimum price even when market price declines to a level below the minimum price.

6.3 EFFECTS OF GOVERNMENT INTERVENTION ON EFFICIENCY

Government has taken various measures in the field of agricultural marketing:

1. **Marketing surveys:** government has undertaken survey on agricultural marketing and published it. The basic objective behind the survey of agricultural product is to remove the problems related with the agricultural marketing. As awareness related to price is necessary as per the rights of consumer thus government publishes to prices of agricultural goods in all major markets.

2. **Grading and standardization:** the agricultural produce grading and marketing act, 1937 the government has established grading stations for commodities like ghee, flour, eggs etc. around 162 agricultural and allied commodities. Further process is applied on agrarian graded commodities by in the form of stamping, sealing, and putting AGMARK. The agricultural product with AGMARK has wider market and has better command at its price. Government also tried to maintain better quality for which Quality control laboratory has been set up at Nagpur and eight other regional laboratories indifferent parts of the country. Special attention has been given on commercial crops.

3. **Setting up of regulated markets:** There are approximately 7062 regulated market. This is one of major reformation taken by the government to remove corruption in agricultural market. The malpractices from mandis have been disappeared due to application of regulated market. About 80% of agricultural produce is sold in regulated market.

4. **Provision of Warehousing facilities:** Distress sale is one of the major issue for farmers basically to small and marginal farmers. And to aid to the farmers government provided warehousing in towns and villages. The Central warehousing corporation was set up in 1957with the basic objective of constructing and running godowns and warehouses for the storage of agricultural produce. Food corporation is constructing its own network of godowns in parts of the country. 35 million tonnes are the total storage capacity.

5. **Organisation of Co – operative marketing societies:** government promoted to multipurpose co – operative societies with more emphasis on credit and marketing. Establishment of various marketing societies has been set in for example – primary marketing at central level, apex marketing at state level and the National Agricultural Co-operative marketing societies and federation through State Bank of India and other Nationalised bank. Government also promoted National Co-operative Development Corporation (NCDC) in 1965. And encouraged programmes for production, processing, storage, and marketing of agricultural produce through co – operative societies.

6. **Setting up of Special Boards:** Development councils has been set up by the government for the commodities like rice, pulses, jute, millets, cotton, tobacco, oilseeds, sugarcane, arecanut, etc. The government of India also framed and set up export promotion councils such as cashewnuts export promotion Council and the Agricultural processed Food Export Development Authority.

7. **Boost to Export of Agricultural Products:** Agricultural Produce has shown positive increasing trend in present scenario. India's agricultural exports include pulses, rice, wheat, tobacco, sugar, molasses, poultry and dairy products, spices, cashew nuts, Seasame and niger seed, groundnuts, oilmeals, castor oil, shellac, fruits and vegetables meat and meat preparation, marine products, etc. foreign trade policy (2004 – 09) of the government of India has emphasized the significance of agricultural exports and has initiated a new scheme - Special Agricultural Produce Scheme – for promoting the export of fruits, vegetables, flowers, minor forest produce. Government is also supporting and assisting states for development of Agro Export Zones(AEZ).

8. **Agricultural Marketing Reforms:** To make agricultural sector more competitive and broadening the size government of India appointed Task Force and submitted report in June 2002 which recommends:

i. Promotion of direct marketing and Contract farming

ii. Development of agricultural markets in private and cooperative sectors

iii. Expansion of future trading to cover all agricultural markets

iv. Introduction of negotiable warehousing receipt system

v. Use of information and technology to provide market – led extension service to the farmers

The Government of India has drafted and circulated a model Act on agricultural marketing, in 2004 state government agreed to adopt the Model Law.

9. **Future Trading:** the government initiated economic reform and permitted the resumption of future trading in gur, potato, castor seed, pepper, turmeric and hessian castor oil. In 2003 – 04 the government of India initiated some major steps towards introduction of future trading in all commodities by setting up the National Level Commodity Exchanges. And the major commodities are Wheat, Kapas, Soya oil, gaur gum, jute, rubber, pepper, turmeric etc. The National Commodity and Derivative Exchange, Mumbai has launched Pilot projects in the states of Gujrat, Madhya Pradesh, and Andhra Pradesh to help farmers understand the concepts and benefits of hedging the price risk on trading platform of an exchange price to harvesting. These innovation in brought out the efficiency in Agricultural Marketing.

6.4 COMMODITY MARKET OPERATION AND LIKELY IMPACTS

Meaning:

A commodity market described as **buying, selling, or trading a raw product**, such as oil, gold, or coffee. There are hard commodities, which are generally natural resources, and soft commodities, which are livestock or agricultural goods.

Features of Commodity market:

1. Commodity Market in India is having aims to stabilise prices of commodity.
2. It supports to create a linkage between the spot market and future market.
3. In India, there are four commodity trading stock exchanges:
   i) **Multi Commodity Exchange of India Limited**(MCX)
   ii) National Commodity & Derivatives Exchange Limited (*NCDEX*)
   iii) **National Multi-Commodity Exchange** (NMCE)
   iv) Indian Commodity Exchange.
   v) Amongst these four, NCDEX and NMCE focuses on agricultural commodities.
4. Agri commodity marketing undertaken **via future contracts**.
5. These contracts generally used for hedging against risk and may be as an opportunity to profit from speculation.
6. A commodity is an essential product.
7. Agricultural commodities fall into the category of soft commodities; hard commodities are usually mined products.
8. There has been a significant government intervention in Agriculture sector since long back basically it tries to protect the interest of Indian farmers.
9. Role of futures market come into picture when there is devastating price crash of crops.

Indian Agricultural Commodity Market and its impact:

- Commodity market in India is in existence since the commodity market of USA and UK. The markets have been facing recurring fluctuations of ups and down since beginning but the country is successfully bringing degree of stability in the commodity market

with progressing technology and transparency. Market forces of demand and supply rule the commodity market.

- Commodity market: It is a market that involves trade in primary sector of the economy. Commodities are classified into two different forms : Soft commodities and hard commodities. Soft commodities are agricultural products such as Sugar, coffee, cocoa, wheat and fruit. Hard commodities are generally mined such as oil and gold. The traditional way of trading and investing in commodities is through futures contract which means buying or selling an underlying asset at a predetermined price on a specified time in future.

- Future contracts are secured by physical assets. Trading in commodity market can either be done physically or through derivatives using spot prices, options, forwards and futures. Farmers generally use derivative trading in the commodity market for managing the price fluctuation risks. Agricultural commodities are staple crops and animals produced or raised on farms or plantations. Most agricultural commodities such as grains, livestock, and dairy provide a source of food for people and animals across the globe.

❖ **Agricultural commodities fall into six categories:**

1. Cereal Grains
2. Oilseeds
3. Meat
4. Dairy
5. Other Soft Commodities
6. Miscellaneous Agricultural Commodities

1. Cereal Grains: The seven principal cereals grown in the world are **wheat, maize, rice, barley, oats, rye and sorghum**. Wheat became very popular because of the bread produced. A Primary Food Source Farmers grow these commodities as: Food source for humans Food source for animals Feedstock for fuels. Depending on price, farmers will choose one grain over the other. As a result, most grain commodities have a strong price relationship with one another. Traders monitor the spread between grain prices to determine the relative values of one grain versus another.

2. Oilseeds: Castor is cultivated around the world because of the commercial importance of its oil. India is the world's largest producer of castor seed and meets most of the global demand for castor oil. India produces 10 to 12 lakh tonnes of castor seed annually, and accounting for more than 60% of the entire global production.

In India, Castor planting season is during July or August and harvested around December or January. The seedpods are dried, de- podded and

brought to the market yards during December or January for trading. Traditionally, castor is a Kharif season crop. Sowing of castor with onset of monsoon is found most beneficial in rainfed condition. However, sowing can be done up to first fortnight of August without reduction in yield under irrigated condition. Gujarat is the leading state in castor seeds production in India followed by Rajasthan and Andhra Pradesh. Castor oil is obtained by pressing the seeds, followed by solvent extraction of the pressed cake. Castor Oil's application range is very wide. The usages. India is one of the largest rapeseeds- mustard growing countries in the world, occupying the first position in area and second position in Production after China. The world production of Rapeseed/Mustard has been increasing at a rapid rate in several countries largely in response to the continuing increase in demand for edible oils and its products.

In India, Rajasthan occupies the first place both in terms of cultivated area and production accounting for over 45% followed by Madhya Pradesh with 13%. Haryana and Uttar Pradesh occupy the third place contributing for 11% of total production each. Thus, the top four states produce about 80% of total rapeseed & mustard production in the country. Major domestic spot markets are Sri ganga nagar, Jaipur, Kota, Alwar, Charkhidadri and Delhi. The sowing of the seeds is done after the harvest of the Kharif crop in the month of November and is mainly cultivated on irrigated land. Rape/Mustard seed is a rabi crop i.e. the plantation of the Rape/Mustardseed is done in the winter History of soybeans is as old as over 2000 years before birth of Christ. Chinese cultivators are said to recognize the real health value of the bean. Chinese Emperor Shen-nong declared it as one of the five sacred crops. He compiled earliest known medical treatise, which is translated as The Medical Bible of Yellow Emperor. He researched the healing properties of over 100 plants and considered the soyabean as most significant. It has been an important food ingredient of China, Manchuria, Japan, Korea, and Malaysia over centuries. Though it originated from Southwest Asia, now it is grown all over the world. It is becoming increasingly popular in Europe and US among health and diet conscious people. Today, it is the world's most cultivated oilseed. The oil content in Soyabean is between 17-18% and it has very high content of protein. Owing to high protein content soyabean meal has varied usage.

In India, Madhya Pradesh tops the list of soyabean producing states. Nearly 88% of soyabean is produced in the state. Main varieties grown are Punjab-1, Braig, Ankur, Gaurav and Jawahar. Farmers grow them for (a) the high oil content in their seeds and (b) the meal that remains after the oil is extracted: Canola Cotton Palm Oil Soybeans In the case of cotton, its plant fibers have an important market in the clothing and houseware industries. Because farmers use the meal from these crops in animal feed, oilseeds often have a strong price relationship with cereal grains.

3. **Meat:** A Food Source Feeder Cattle Cattle via Pixabay Meat commodities include (a) live animals raised for meat, hide, organs, bones, and hooves and (b) cuts of meat produced during the

butchering of animals: Feeder Cattle Live Cattle Lean Hogs Pork Bellies

4. **Dairy:** Post-19th Century Food Products Cheese stallCheese Stall by QMETHODS from Pixabay Dairy commodities include milk, butter, whey, and cheese. Markets for these commodities date back to the 19th century when traders organized the Chicago Butter and Egg Board. Today these products trade on the Chicago Mercantile Exchange (CME).

5. **Other Soft Commodities** Soft commodities refer to commodities that are farmed rather than mined. However, most commodity traders classify cereal grains, oilseeds, dairy, and meat separately. The remaining soft commodities all have developed and liquid global markets: Cocoa Coffee Frozen Concentrated Orange Juice (FCOJ) Sugar

6. **Miscellaneous Agricultural Commodities** Some commodities have well-developed global markets, but don't fit easily into the above categories: Lumber Rubber Wool

6.5 STRATEGIES FOR SURVIVING IN A GLOBALISING WORLD

Meaning of Globalisation:

The term globalization means a set of phenomena of high intensity in quick succession throughout the global of, economic, social, cultural, and ideological aspects. These events gradually lead to the elimination of the tangible and intangible barriers to free movement of goods and people, to the dissemination of knowledge. Although some scholars, economists and sociologists argue that the roots of globalization date back to centuries past, the term was apparently coined by Theodore Levitt (Levitt, 1983), American economist, and since then this term has almost radically replaced the expression often used i.e. "global village".

The beginning of this change can be traced back to the summit of the G6 meeting in Rambouillet (France) in 1975, when the general liberalization of the market process was created, governed by the GATT and later by the WTO, IMF and World Bank Investment. Since then, other definitions of globalization have been proposed, for example, the ODCE has interpreted this phenomenon as "a process through which markets and production in different countries are becoming increasingly interdependent due to the dynamic exchange of goods and services and through movements of capital and technology."

Emerging countries that have experienced their greatest growth in the last two decades are those that have demonstrated a greater trade and financial integration in the global economy; emblematic examples are the countries of Southeast Asia and the new EU partners. The economic growth of these countries has promoted a e more rapid diffusion of new technologies and the formation and the improvement of human resources.

Economic globalization has generated a process of market innovation and communication, through direct and indirect effects, in the primary sector and particularly in the agribusiness sector.

Supply and demand of agricultural products and especially food is centred not only at national or local level but also at a global level.

The actual effects of globalization are those that lead to the standardization of economic conditions and lifestyles of people in accordance with the Western model.

The international economic crisis that began in 2009 is affecting all sectors of production, for the agricultural sector it has been a crisis of business income that according to Eurostat data registered a decline of around 25%. Such a decrease in the income of farmers is unprecedented and was the worst in Europe. This negative result is mainly due to on one hand from the gradual decline in sales prices and on the other hand by the continuous increase in production costs. To worsen the economic situation of enterprises in addition to the volatility of the price system a significant decline in consumer demand to the situation has also contributed, a phenomenon due to the recession that has brought down prices below the threshold of company viability. This situation of crisis has seen a considerable decrease in the added value (VA) of the agricultural sector by 3.1% in 2009 in respect to the previous year, representing 6.4% loss when compared to the added value of the last five years. This decrease translates into a loss of EUR 900 million for 2009 and EUR 2 billion over the last five years. This recession has slowed the capacity to invest and innovate in business and stopped the production processes aimed at economic growth.

One of the important features of economic development is the relative decline of the agricultural sector in growing economies. Also typical for countries with a reasonably high population density is a decline in their agricultural comparative advantage as industrialization proceeds (or when another sector such as mining, manufacturing or services enjoys an export-led boom or there is a sustained inflow of foreign aid). There is a wide dispersion across regions of the world in the importance of agriculture in national GDP and employment, in endowments of arable land and fresh water as well as capital per worker, in the availability of modern farm and non-farm technologies that take account of relative factor prices and hence in agricultural comparative advantage.

Appropriate indicators of agricultural comparative advantage are difficult to assemble, because government policies that distort food markets are so pervasive and because of the range of technologies made available via adaptive research and development (R&D) investments to suit different relative factor scarcities (Hayami & Ruttan 1985; Alston *et al*. 2009 a,b).

Thus, the sector's share of national exports relative to the global average, or even net exports as a ratio of exports plus imports of primary agricultural products are rather poor reflections of comparative advantage, and they also conceal much intra-regional diversity.

- **Strategies adopted in World Trade Organization (WTO) agreement for AOA i.e Agreement on Agriculture:**

After over 7 years of negotiations the Uruguay Round multilateral trade negotiations were concluded on December 15, 1993 and were formally ratified in April 1994 at Marrakesh, Morocco.

The WTO Agreement on Agriculture was one of the many agreements which were negotiated during the Uruguay Round.

The implementation of the Agreement on Agriculture started with effect from 1.1.1995. As per the provisions of the Agreement, the developed countries were to complete their reduction commitments within 6 years, i.e., by the year 2000, whereas the commitments of the developing countries were to be completed within 10 years, i.e., by the year 2004. The least developed countries were not required to make any reductions. The products which are included within the purview of this agreement are what are normally considered as part of agriculture except that it excludes **fishery and forestry products as well as rubber, jute, sisal, abaca and coir.**

The important objective of this agreement is to increase market orientation in agriculture for the member nations. The members are required to alter their non-tariff barriers like quotas into equivalent tariff measures. The tariffs resulting from such transformation and other tariffs on agricultural products are to be reduced on an average by 36 per cent over a period of 6 years in case of developed countries, countries. No such commitments were necessary in case of least developed countries.

The AoA covers the following aspects of agriculture:

- Tariff reduction
- Increase in market access
- Reduction in export subsidies
- Reduction in domestic subsidies

The WTO Agreement on Agriculture contains provisions in 3 broad areas of agriculture and trade policy:

1. **Market access**
2. **Domestic support**
3. **Export subsidies**

1. Market Access:

It consist of tariffication, tariff reduction and access the opportunities. The tariffication is that all non-tariff barriers such as quotas, variable levies, minimum import prices, discretionary licensing, state trading measures,

voluntary restraint agreements etc. need to be remove and abolish and converted into an equivalent tariff.

Ordinary tariffs including those resulting from their tariffication were to be reduced by an average of 36% with minimum rate of reduction of 15% for each tariff item over a 6-year period. Developing countries were required to reduce tariffs by 24% in 10 years.

Developing countries as were maintaining Quantitative Restrictions due to balance of payment problems, were allowed to offer ceiling bindings instead of tariffication.

Special safeguard provision allows the imposition of additional duties when there are either import surges above a particular level or particularly low import prices as compared to 1986-88 levels.

It has also been stipulated that minimum access equal to 3% of domestic consumption in 1986-88 will have to be established for the year 1995 rising to 5% at the end of the implementation period.

2. Domestic Support:

For domestic support policies, subject to reduction commitments, the total support given in 1986-88, measured by the Total Aggregate Measure of Support (total AMS), should be reduced by 20% in developed countries (13.3% in developing countries).

Reduction commitments refer to total levels of support and not to individual commodities. Policies which amount to domestic support both under the product specific and non-product specific categories at less than 5% of the value of production for developed countries and less than 10% for developing countries also excluded from any reduction commitments.

Policies which have no or at most minimal, trade distorting effects on production are excluded from any reduction commitments ('Green Box'- Annex 2 of the Agreement on Agriculture www.wto.org. The list of exempted green box policies includes such policies which provide services or benefits to agriculture or the rural community, public stockholding for food security purposes, domestic food aid and certain de-coupled payments to producers including direct payments to production limiting programmes, provided certain conditions are met.

Special and Differential Treatment provisions are also available for developing country members. These include purchases for and sales from food security stocks at administered prices provided that the subsidy to producers is included in calculation of AMS. Developing countries are permitted untargeted subsidised food distribution to meet requirements of the urban and rural poor. Also excluded for developing countries are investment subsidies that are generally available to agriculture and agricultural input subsidies generally available to low income and resource poor farmers in these countries.

3. Export Subsidies:

The Agreement contains provisions regarding members commitment to reduce Export Subsidies. Developed countries are required to reduce their export subsidy expenditure by 36% and volume by 21% in 6 years, in equal installment (from 1986 –1990 levels). For developing countries, the percentage cuts are 24% and 14% respectively in equal annual installment over 10 years. The Agreement also specifies that for products not subject to export subsidy reduction commitments, no such subsidies can be granted in the future.

- **Strategies adopted in World Trade Organization (WTO) agreement for AOA i.e Agreement on Agriculture with respect to INDIA'S COMMITMENTS**

1. Market Access:

As India was maintaining Quantitative Restrictions due to balance of payments reasons (which is a GATT consistent measure), it did not have to undertake any commitments regarding market access. The only commitment India has undertaken is to bind its primary agricultural products at 100%; processed foods at 150% and edible oils at 300%. Of course, for some agricultural products like skimmed milk powder, maize, rice, spelt wheat, millets etc. which had been bound at zero or at low bound rates, negotiations under Article XXVIII of GATT were successfully completed in December 1999, and the bound rates have been raised substantially.

2. Domestic Support:

India does not provide any product specific support other than market price support. During the reference period (1986-88), India had market price support programmes for 22 products, out of which 19 are included in our list of commitments filed under GATT. The products are – rice, wheat, bajra, jawar, maize, barley, gram, groundnut, rapeseed, toria, cotton, Soyabean (yellow), Soyabean (black), urad, moong, tur, tobacco, jute, and sugarcane. The total product specific AMS was (-) Rs.24,442 crores during the base period. The negative figure arises from the fact that during the base period, except for tobacco and sugarcane, international prices of all products was higher than domestic prices, and the product specific AMS is to be calculated by subtracting the domestic price from the international price and then multiplying the resultant figure by the quantity of production.

Non-product specific subsidy is calculated by considering subsidies given for fertilizers, water, seeds, credit and electricity. During the reference period, the total non-product specific AMS was Rs.4581 crores. Taking both product specific and non-product specific AMS into account, the total AMS was (-) Rs.19,869 crores i.e. about (-) 18% of the value of total agricultural output.

Since our total AMS is negative and that too by a huge magnitude, the question of our undertaking reduction commitments did not arise. As such, we have not undertaken any commitment in our schedule filed under GATT. The calculations for the marketing year 1995-96 show the product specific AMS figure as (-) 38.47% and non-product specific AMS as 7.52% of the total value of production. We can further deduct from these calculations the domestic support extended to low income and resource poor farmers provided under Article 6 of the Agreement on Agriculture. This keeps our aggregate AMS below the de minimis level of 10%.

India's notifications on AMS are available at web site address www.agims.wto.org

1. Export Subsidies:

In In India, exporters of agricultural commodities are not entitled to export subsidies except as those provided under Article 9.1 (d) and (e) of the WTO Agreement on Agriculture under Special and Differential Treatment provisions of the WTO. This flexibility has been provided up to the end of the year 2023 after which all export subsidies will be required to be eliminated as per the Nairobi Ministerial Decision on Export Competition of 2015.

6.6 QUESTIONS

1. What are the features of Commodity Market?
2. Explain different form of market regulated by Government.
3. What are various measures adopted by government for agricultural market?
4. How WTO agreement played significant role at global level for better Agricultural system with respect to India?
5. What are various challenges before Indian Agriculture System?

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MODULE IV

7

HISTORY & POLICIES FOR AGRICULTURAL DEVELOPMENT IN INDIA - I

Unit Structure

7.0 OBJECTIVES

- To know the Agriculture production trends in India
- To know about National Agriculture policy adopted by Govt. of India
- To know about latest agriculture policy implemented by Govt. of India

7.1 INTRODUCTION

Since independence, India has been an agriculturally based economy, though the share of agriculture in Indian GDP has gone down over a passage of time with the growth of the Indian economy. When we compare India with countries like USA and China, we find that our productivity in many agricultural products is quite low. It is mainly due to Green Revolution that despite facing many natural calamities like famines and floods today we have a surplus stock of agricultural products in our country. In 2012-13 our food grain production was roughly around 260 million tons as against 55 million tons at the time of independence. Agriculture still continues to be the main occupation in India which is not the case with many developed countries.

The agricultural sector has been the backbone of the Indian economy representing three major which includes a) increasing rural income b) promoting inclusive growth and c) to maintain food security. As per 2018, agriculture employed more than 50% of the Indian workforce and contributed 17% to 18% to country's GDP.

7.2 TRENDS IN PRODUCTION SINCE 1950

The productivity in the agricultural sector faced a downslide in the initial years after independence as the average yield of cereals per acre declined from 619 lbs in 1946-47 to 565 lbs in 1949-50.

With the concept of economic planning being introduced in 1951, a major thrust was given to agricultural development specially after 1962 the agricultural sector which was lying stagnant showed some positive signs of growth.

1. Steady growth in the average yield per hectare.
2. There was a steady growth in the area under cultivation
3. The total production in the crops showed a uptrend as both the yield per hectare and area under increased steadily.

7.2.1 Trends in Food-grains Production:

The increase in agricultural production has an important impact on the economic development of a country. In India, the increase in the production of food-grains has been given in table 1.

Table 1: Trends in Production of Food grains

Lakh tonnes

Year	Rice	Wheats	Cereals	Pulses	Total food-grains	Percentage increase in production
1950-51	20.58	6.46	15.38	8.41	50.82	-
1960-61	34.58	11.00	23.74	12.70	82.02	61.39
1970-71	42.22	23.83	30.55	11.82	108.42	32.19
1980-81	53.63	36.31	29.02	10.63	129.59	19.53
1990-91	74.29	55.14	32.70	14.26	176.39	36.11
2000-01	84.98	69.68	31.08	11.08	196.81	11.58
2010-11	95.98	86.87	43.40	18.24	244.49	24.23
2011-12	105.30	94.88	42.01	17.09	259.29	6.05
2012-13	105.23	93.51	40.04	18.34	257.13	-0.83
2013-14	106.65	95.85	43.29	19.25	265.05	3.08
2014-15	105.48	86.53	42.86	17.15	252.03	-4.91
2015-16	104.41	92.29	38.52	16.32	251.54	-0.20
2016-17	109.70	98.51	43.77	23.13	275.11	9.37
2017-18	112.76	99.87	46.97	25.42	285.01	3.60
2018-19	116.48	103.60	43.05	23.40	284.95	-0.02
2019-20*	118.43	107.59	47.48	23.15	296.65	4.11

Source: Directorate of Economics and Statistics, * 4th Advance Estimates

It reveals from table 1, that in the last fifty-two years food-grains production has increased by about more than three times. The increase in the production of rice was nearly five times while it was over fifteen times as far as wheat is concerned. Here, it is worth noting that there exists a wide variation in the production of food-grains.

During the course of first two five years plans or in ten years, the production of food-grains was on the increase but in 1970-71 it has shown

a declining trend. Further, in next ten years it has shown more a declining trend, but in 1990-91 production of food-grains has increased to a great extent, but in the subsequent years, the rate of growth of agricultural production was shown fluctuations.

According to the first column of the table, the production of Rice was 20.58 lakh tones in 1950-51 which turned to double i.e. 42.22 lakh tones in 1970-71 year. From 2015-16, its production was recorded increasing trends.

The production of wheat increased from 6.46 lakh tons in 1950-51 to 86.87 lakh tons in 2010-11 indicating an increase of 1244.74% over a period of 60 years. According to the 4th advance estimate the output of wheat would be 107.59 lakh tons in 2019-20 which implies an increase of 23.85% over 2010-11.

The production of cereals increased from 15.38 lakh tons in 1950-51 to 43.4 lakh tons in 2010-11 indicating an increase of 182.18% over a period of 60 years. According to the 4th advance estimate the output of cereals would be 47.48 lakh tons in 2019-20 which implies an increase of 9.4% over 2010-11.

The production of pulses increased from 8.41 lakh tons in 1950-51 to 18.24 lakh tons in 2010-11 indicating an increase of 116.88% over a period of 60 years. According to the 4th advance estimate the output of pulses would be 23.15 lakh tons in 2019-20 which implies an increase of 26.91% over 2010-11.

The production of food grain increased from 50.82 lakh tons in 1950-51 to 244.49 lakh tons in 2010-11 indicating an increase of 381.09% over a period of 60 years. According to the 4th advance estimate the output of food grain would be 296.65 lakh tons in 2019-20 which implies and increase of 21.33% over 2010-11.

7.2.2 Trends in Non-Food Grains Production:

The trends in non-food grains production in India after the introduction of economic planning is shown in table 2.

Table 2: Trends in Production of Non-Food grains

Lakh tonnes

Year	Cotton#	Jute & Mesta@	Sugarcane	Oilseeds
1950-51	3.04	3.31	57.05	5.16
1960-61	5.60	5.26	110.00	6.98
1970-71	4.76	6.19	126.37	9.63
1980-81	7.01	8.16	154.25	9.37
1990-91	9.84	9.23	241.05	18.61
2000-01	9.52	10.56	295.96	18.44
2010-11	33.00	10.62	342.38	32.48
2011-12	35.20	11.40	361.04	29.80
2012-13	34.22	10.93	341.20	30.94
2013-14	35.90	11.68	352.14	32.75
2014-15	34.80	11.13	362.33	27.51

2015-16	30.01	10.52	348.45	25.25
2016-17	32.58	10.96	306.07	31.28
2017-18	32.81	10.03	379.90	31.46
2018-19	27.93	9.82	405.42	31.52
2019-20*	35.49	9.91	355.70	33.42

Source: Directorate of Economics and Statistics, * 4th Advance Estimates, # Million bales of 170 kg. each, @ Million bales of 180 kg. each

The production of cotton increased from 3.04 million bales in 1950-51 to 33 million bales in 2010-11 indicating an increase of 985.53% over a period of 60 years. According to the 4th advance estimate the output of cotton would be 35.49 million bales in 2019-20 which implies an increase of 7.55% over 2010-11.

The production of jute & Mesta increased from 3.31 lakh tons in 1950-51 to 10.62 lakh tons in 2010-11 indicating an increase of 220.85% over a period of 60 years. According to the 4th advance estimate the output of jute and Mesta would be 9.91 lakh tons in 2019-20 which implies a decline of 6.69% over 2010-11.

The production of sugarcane increased from 57.05 lakh tons in 1950-51 to 342.38 lakh tons in 2010-11 indicating an increase of 500.14% over a period of 60 years. According to the 4th advance estimate the output of sugarcane would be 355.70 lakh tons in 2019-20 which implies an increase of 3.89% over 2010-11.

The production of oilseeds increased from 5.16 lakh tons in 1950-51 to 32.48 lakh tons in 2010-11 indicating an increase of 529.45% over a period of 60 years. According to the 4th advance estimate the output of oilseeds would be 33.42 lakh tons in 2019-20 which implies an increase of 2.89% over 2010-11.

This table shows the three largest producing states of major corps.

Table:3 Three largest producing States of major Crops during 2019-20

Groups of Crops	Crops	States	Production* (Million tons)	Share in All India Production (%)
Food Grains	Rice	West Bengal	15.57	13.15
		Uttar Pradesh	15.52	13.11
		Punjab	11.78	9.95
		All - India	**118.43**	**100.00**
	Wheat	Uttar Pradesh	32.59	30.29
		Madhya Pradesh	19.61	18.22
		Punjab	17.57	16.33
		All - India	**107.59**	**100.00**
	Maize	Karnataka	3.96	13.84
		Madhya Pradesh	3.91	13.65
		Telangana	3.00	10.48
		All - India	**28.64**	**100.00**

	Total Nutri/ Coarse Cereals	Rajasthan	7.29	15.35
		Karnataka	6.45	13.59
		Madhya Pradesh	4.82	10.16
		All - India	**47.48**	**100.00**
	Total Pulses	Rajasthan	4.49	19.41
		Maharashtra	4.03	17.40
		Madhya Pradesh	3.80	16.41
		All - India	**23.15**	**100.00**
	Total Food grains	Uttar Pradesh	55.03	18.55
		Madhya Pradesh	33.03	11.13
		Punjab	30.02	10.12
		All - India	**296.65**	**100.00**
Oilseeds	Groundnut	Gujarat	4.64	45.99
		Rajasthan	1.62	16.04
		Tamilnadu	0.98	9.74
		All - India	**10.10**	**100.00**
	Rapeseed & Mustard	Rajasthan	4.22	46.28
		Haryana	1.15	12.61
		Uttar Pradesh	0.96	10.50
		All - India	**9.12**	**100.00**
	Soybean	Madhya Pradesh	5.15	45.90
		Maharashtra	4.60	40.98
		Rajasthan	0.52	4.68
		All - India	**11.22**	**100.00**
	Sunflower	Karnataka	0.12	54.18
		Odisha	0.03	12.11
		Bihar	0.01	5.81
		All - India	**0.22**	**100.00**
	Total Oilseeds	Rajasthan	6.79	20.30
		Gujarat	6.66	19.94
		Madhya Pradesh	6.57	19.66
		All - India	**33.42**	**100.00**
Other Cash Crops	Sugarcane	Uttar Pradesh	178.42	50.16
		Maharashtra	64.67	18.18
		Karnataka	31.60	8.88
		All - India	**355.70**	**100.00**
	Cotton[@]	Gujarat	8.28	23.32
		Telangana	6.83	19.25
		Maharashtra	6.78	19.11
		All - India	**35.491**	**100.00**
	Jute & Mesta[$]	West Bengal	8.06	81.34
		Bihar	0.86	8.67
		Assam	0.77	7.78
		All - India	**9.91**	**100.00**

Source: Directorate of Economics and Statistics
*Production Estimates are as per 4th Advance Estimates
@: Production in million bales of 170 kg. each.
$: Production in million bales of 180 kg. each.

7.2.3 Conclusion:

The above studies and the reports show the trends of food grains and non-food grains products and these trends show the serious revolutionary changes in productions is required in India if we want to achieve food security and 2nd goal of sustainable development goal.

7.3 NATIONAL FOOD POLICY IN INDIA

The question of 'food security has always been a big challenge for India, the government has been continuously been addressing this issue since quite a long time through its Public Distribution System and the Targeted Public Distribution System. On 5th July 2013 the government enacted the National Food Security Act, (NFSA), which depicted a change in the pattern of the approach of food security from welfare-based approach to rights-based approach. The Act entitles 50% of the urban population and 75% of the rural population to receive food grains at a subsidized rate under the Targeted Public Distribution System. Nearly two thirds of the population are covered by the Act to receive subsidized food grains. As another step towards women empowerment, the eldest woman of the household of 18 years of age or above will be mandated to be the head of the family for the purpose of issuing of ration card under the Act.

This Act is being now implemented on all India basis in all the states and union territories of the country. The maximum coverage of the population under this Act is 81.34 crore and currently about 80 crore people under being covered under NFSA receiving food grains at a highly subsidized rate. The identification of the beneficiaries by the states and the union territories is an ongoing process which includes excluding of ineligible, fake and duplicate ration cards and exclusion due to death, migration etc and inclusion on account of birth and those genuine people whose households have been left out.

Life-cycle approach is one of the guiding principles of the Act wherein special provisions have been made relating to pregnant ladies and lactating mothers and children falling in the age group of 6 months to 14 years by giving them a right to receive nutritious meal free of cost through Integrated Child Development Services (ICDS) centres which has got a very widespread network called Anganwadi Centres under ICDS scheme and under Mid-Day Meal (MDM) scheme through schools. For under-nourished children who are up to 6 years of age higher nutritional norms have been prescribed. In order to partly compensate for the wage loss during the period of pregnancy and also supplement nutrition pregnant ladies and lactating mothers are further entitled to receive cash maternity benefit of not less than Rs.6,000.

Under the provisions of the **Food Security Allowance Rules 2015** in case the entitled person under NFSA (National Food Security Act) does not receive the entitled quantities of food grains or meals then such person shall be entitled to receive such food security allowance from the concerned State Government to be paid to each such person, within such a time limit and manner as may be prescribed by the Central Government.

7.3.1 Responsibilities Under Nfsa (National Food Security Act):

NFSA has made both Central, State and Union Territory Governments jointly responsible. While it is the responsibility of the Central Government to allocate the required food grains to States and Union

Territories. The Central Government is also responsible to see to it that the food grains are transported up to the designated depots in respective state and union territory. It is also the responsibility of the Central Government to provide assistance to the state and union territory governments in getting the food grains delivered from designated FCI warehouses to the doorsteps of the FPSs (Fair Price Shops). The responsibilities of the state and union territory governments include an effective implementation of the Act, which among other things include identification of eligible households, issuance of ration cards to them, distribution of food grain entitlements to the eligible households through Fair Price Shops (FPSs), issuing of licenses to the Fair Price Shop dealers and administering the setting up of effective grievance redressal mechanism and strengthening of Targeted Public Distribution System (TPDS).

7.3.2 Coverage and Entitlement Under Nfsa:

Up to 75% of the rural population and 50% of the urban population is covered by NFSA under Antyodaya Anna Yojana (AAY), it also covers priority households. The poorest of the poor households covered under AAY are eligible to receive 35 Kgs of food grains per family per month. Similarly, priority households are eligible to receive 5 Kgs of food grains per person per month. As against the all India coverage of 75% in rural areas and 50% in urban areas, the State wise coverage under NFSA was decided by the former Planning Commission (now NITI Aayog) by using the 2011-12 data of the NSS Household Consumption Survey. Within the coverage under TPDS determined for each State, the work of identifying the eligible households is to be done by the respective states and union territories. The criteria for identification of the eligible priority households and also their identification is the responsibility of the state governments and union territories. According to the Section 10 of the Act the State Government shall identify the households under AAY as per guidelines applicable to the said scheme from the number of persons determined for coverage under TPDS and the remaining households as priority households to be covered under TPDS, in accordance with such guidelines as the State Government TPDS may specify.

7.3.3 Central Issue Price Under Nfsa:

Rice, wheat and coarse grains were made available at a subsidized rate of Rs3, Rs.2 and Re.1 per kg respectively under NFSA initially for a period of 3 years from **13th July 2013** when this Act came into force. After that the prices which never exceeded the MSP were revised by the Central Government from time to time.

7.3.4 Tide Over Allocation:

According to the NFSA if the State or the Union Territories allocation is less than the current allocation, then such a state or union territory will be protected up to the level of average demand under previous normal TPDS during 2010-11 to 2012-13, at prices as determined by the Central Government. Under the previous TPDS prices for APL households were

Rs.6.10 per kg for wheat and for rice it was Rs.8.30 per kg were the issue price for additional allocation under Tide Over.

7.3.5 Direct Benefit Transfer (Dbt):

The main objective of National Food Security Act (2013) was to restructuring the TPDS and other schemes like Cash Transfers for providing food entitlement. In August 2015, the government enabled the provisions under 12 of NFSA for cash transfer by notifying Cash Transfer of Food Subsidy Rule 2015. The DBT aims at (a) reducing the huge physical movement of food grains from one place to another (b) it provides a greater freedom to the buyers / beneficiaries to buy the goods of their own choice as per their consumption pattern (c) increases variety in diet (d) reduces leakages (e) helps in better targeting (f) encourages financial inclusion.

In September 2015 Direct Cash Transfer in food was simultaneously started in the Union Territories of Chandigarh and Puducherry and in part of Dadra & Nagar Haveli from March 2016. NFSA is being enforced in these union territories in cash transfer mode where the cash equivalent amount of subsidy is being directly transferred to the eligible households' bank accounts to enable such households to buy food grains from the open market. The implementation of the scheme is optional for the states and union territories and a written consent of the concerned Government is needed to implement the same. The current system of Public Distribution System may continue to remain the in the areas which are not covered under the scheme.

7.3.6 Power of Central Government to Make Rules:

Under Section 39(1) of NFSA, the Central Government may, in discussion with the State Governments and by notice, make rules to carry out the provisions of the Act. The following Rules have been notified by the Central Government:

i. Provisioning of Funds to State Governments for Short Supply of Foodgrains Rules, 2014.

ii. Food Security Allowance Rules, 2015.

iii. Food security (assistance to State Government Rules) 2015

iv. Cash Transfer of Food Subsidy Rules, 2015

v. Notification of WCD and HRD

Section 40 of the National Food Security Act provides that the State Governments may, by notification and consistent with the Act and the rules made by the Central Government, make rules to carry out the provisions of this Act.

Check Progress:

1. Explain trend of Agricultural production in India.

2. Explain trends of Non-agricultural production in India.
3. What do you understand by National food Policy in India?
4. What do you understand by Direct Benefit Transfer?

7.4 AGRICULTURE POLICY

7.4.1 Overview of National Agriculture Policy 2000:

National Agriculture Policy was introduced on 28th July 2000. National Agriculture Policy was essential to building the inherent strength of the agriculture and allied sectors to address the constraints and make optimal use of resources and opportunities emerging as a result of advancements in science and technology and the emergence of a new economic regime.

The main aim of the National Agricultural Policy is to realize the huge unexploited growth possibility of Indian Agriculture by developing rural infrastructure which would accelerate the agricultural development and growth of agri-businesses, promote value addition and generate employment in the rural areas and secure a fair standard of living for the farmers and agricultural labourers this in turn would lead to a reduction in the migration of these workers to the urban areas. It aims to attain:

1. A growth rate in excess of four per cent annum in the agriculture sector;
2. Growth that is based on efficient use of resources and conserves our soil, water, and biodiversity;
3. Growth with equality, i.e., growth which is widespread across regions and farmers.
4. Growth that is demand-driven and caters to domestic markets and maximizes benefits from exports of agricultural products in the face of the challenges arising from economic liberalization and globalisation.
5. Growth that is can be maintained technologically, environmentally and economically.

Objectives of National Agriculture Policy 2000:

1. Over 4 per cent annual growth rate aimed over the next twenty years.
2. Participation of the private sector by encouraging contract farming.
3. Price protection for farmers along with the launch of the National agricultural insurance scheme to protect farmers in case crops are destroyed.
4. Removing of restrictions on the movement of agricultural commodities throughout the country.

5. Rational utilization of the country's water resources for optimum use of irrigation potential.
6. High priority to the development of animal husbandry, poultry, dairy and aquaculture.
7. Encouraging Capital inflow and ensuring that there are assured markets for crop production.
8. Exemption from payment of capital gains tax on compulsory acquisition of agricultural land.
9. Minimize fluctuations in commodity prices by taking necessary steps and continuous international prices.
10. Plant varieties to be protected through legislation.
11. Adequate and timely supply of quality inputs to farmers.
12. High priority to rural electrification.
13. Setting up of agro-processing units and the creation of off-farm employment in rural areas.

Issues Under Focus in Agriculture Policy 2000:

The plan that has been specified by the New Agricultural Policy (NAP), 2000, covers many serious issues of agriculture in the country so that the targeted growth rate is achieved by maintaining sustainability and impartiality at the same time. The main focus points are:

1. **Sustainable agriculture:** The policy will seek to promote technically sound, economically viable, environmentally non-degrading, and socially acceptable use of country's natural resources-land, water and genetic endowment to promote sustainable development of agriculture. Balanced utilization and preservation of the country's plentiful water resources will be promoted.

The use of bio-technologies will be encouraged for developing plants which consume less water, are drought resilient, pest resistant, contain more nutrition, give better yields and are environmentally safe. There will be a time bound programme to list, catalogue and classify country's vast agro bio-diversity.

From the above, it is clear that the climatic changes may affect agricultural output adversely and bring about a food crisis in the country, along with rising prices. As a plan to tackle this problem, the Government started the National Mission for maintainable Agriculture suggesting certain measures in crops and animal husbandry.

2. **Food and nutritional security:** Special efforts will be made to raise the productivity and output of crops to meet the ever increasing demand for food generated by increasing population and raw materials for expanding agro-based industries. The strategy will take

into account the climatic, environmental and agronomic conditions to realize the full growth potential of every region.

Special consideration will be given to development of new crop varieties, particularly of food crops, with higher nutritional value through adoption of bio-technology particularly genetic modification, while addressing bio-safety concerns.

It has been planned that a major push needs to be given to the raid irrigated horticulture, plantation crops, roots, tubers, medicinal plants, aromatic, bee keeping and sericulture in order to expand the food supply, exports and to generate employment in the rural areas.

Animal husbandry and fisheries have also made their major contribution in agricultural sector by generating considerable amount of both wealth as well as employment. In an effort to diversify agriculture a priority will be given to the development of animal husbandry, poultry farming, dairying and aqua-culture. Steps will be taken to increase the animal protein availability in food basket and also in generating exportable surpluses. The national Food Security Mission was launched in 2007-08 in 311 districts of 17 states with the following objectives: increase production of rice, wheat and pulses through increase in area:

i. Sustainable increase in productivity by maintaining the fertility of the soil and of the farms.

ii. Creation of employment opportunities.

iii. Increase farmer's incomes to make them confident.

The plan is to involve the farmers and all other interested parties in planning, organizing, executing and the monitoring process. The use of latest and improved technology like seed, nutrients, plant protection, farm machineries and tools, soil amendments and resource conservation.

3. **Generation and transfer of technology:** A very high priority will be accorded to evolving new location-specific and economically viable improved varieties of agricultural and horticultural crops, livestock species. High priority will be given to the agricultural research based on regions which will be identified on basis of agro-climatic zones.

4. Frontier sciences like bio-technology, remote sensing technologies, pre and post-harvest technologies, energy saving technologies will be used for environmental protection through national research system as well as individual research will be encouraged. The endeavour will be to build a well-organized, efficient and result-oriented agriculture research and education system to introduce technological change in Indian agriculture.

5. **Inputs management:** The government has made efforts for sufficient and timely supply of raw materials like seeds, fertilizers, bio-pesticides, agricultural tractors, and providing credit to farmers at a reasonable rate of credit. Quality control measures like soil testing,

fertilizer testing and seed testing will be done so as to see to it that a proper quality of inputs is supplied and more importantly on timely basis. These measures will ensure a proper use and optimum utilization of fertilizers will be promoted together with use of organic manures and bio-fertilizers to optimize the efficiency of nutrient use.

High priority will be given to development, production and distribution of improved varieties of seeds and planting material and strengthening and expansion of seed and plant certification system with private sector participation.

In order to ensure supply of seeds especially to the areas affected by natural calamities a National Seed Grid will be established. For the development and strengthening of infrastructural facilities for production and distribution of quality seeds The National Seeds Corporation (NSC) and State Farms Corporation of India (SFCI) will be restructured was launched in 10^{th} Plan. The main aim of the Seed Bank is to provide quality seeds to farmers in difficult times like famines and floods and not only this but to also provide them with good storage facilities. The main aim of SEED Village Scheme which is another important initiative and the New seed policy aims to facilitate production and availability of seeds in time in villages.

6. **Incentives for agriculture:** The government will take all necessary steps in order to create an economic friendly environment for the farmers which will enable the farmers to increase their capital formation process and thereby increase their investment. The government aims to remove the distortions in the incentive regime for agriculture, and also improving terms of trade for the manufacturing sector, by reforming both the external and domestic markets by making domestic tax structure more business friendly.

The tax structure on food grain and other commercial crops needs to be both reviewed as well as rationalized. Provisions in the tax laws will be framed in such a manner so as to keep the agriculturists by and large out of the tax collection system. Farmers need not pay any capital gain tax on compulsory acquisition of agricultural land.

7. **Investments in agriculture:** Public investment for narrowing regional imbalances, accelerating development of supportive infrastructure for agriculture and rural development particularly rural connectivity will be stepped up.

Institutional structure: Indian agriculture is characterized by prominence of small and marginal farmers. Soon the institutional reforms will start to channelize their programs in order to achieve greater productivity and production. The rural development and land reforms will focus on the areas like Consolidation of land holdings all over the country on the design of north-western States.

Thus, redistribution of surplus lands and waste lands among the landless farmers, unemployed persons. Tenancy reforms also take place to pursue the right of tenants. Maintenance of land records, issuing and

computerization of land pass-books to the farmers and women's right recognition in land. The rural poor people will be involved in the implementation of land reforms with the help of Panchayati Raj Institutions, Voluntary Groups, Social Activists and Community Leaders.

7.5 SUMMARY

The first unit explains the trends in production of food-grains and reveals the remarkable increase in production of Rice, Wheat and other cereals and in non-food grains item, we observe that there is a remarkable increase in production of cash crops like sugarcane also. In India the main largest agriculture producing states are Uttar-Pradesh, West-Bengal, Punjab, Madhya-Pradesh etc.

National food policy in India was launched in July 2013, for fulfilling the 2nd goal of SDGs in which govt. has provided food-grains at subsidized rate through targeted public distribution system to BPL people. In this act govt. promotes various schemes like Antyoday Anna Yojana and Direct Benefit Scheme etc.

First time in India, national agriculture policy 2000 was launched to promote more productivity and bring about some institutional and revolutionary changes in agriculture sector. Here, Govt. promoted public-private partnership in agricultural sector.

7.6 QUESTIONS

1. Explain the trends in food-grain production since 1950s.
2. Explain the trends in non-food grain production since 1950s.
3. What do you understand by national food policy in India?
4. Explain the national agriculture policy 2000.

References: Pocket book of Agricultural Statistics 2020

https://nfsa.gov.in/portal/nfsa-act

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8

HISTORY & POLICIES FOR AGRICULTURAL DEVELOPMENT IN INDIA - II

Unit Structure

8.0 OBJECTIVES

- To know the trends of area and productivity status in India
- To know the Employment and wage rate analysis in agriculture sector
- To know the trends of Export and Imports in Indian agriculture

8.1 INTRODUCTION

Since the introduction of economic planning in India, agricultural development has been receiving a special emphasis. It was only after 1965, i.e., from the mid-period of the Third Plan, special emphasis was laid on the development of the agricultural sector. Since then, a huge amount of fund was allocated for the development and modernization of this agricultural sector every year. All these initiatives have led to:

1) A steady increase in areas under cultivation

2) A steady rise in agricultural productivity, and

3) A rising trend in agricultural production.

8.2 TRENDS IN AREA AND PRODUCTIVITY IN AGRICULTURE SECTOR

In India the growth in gross area under all crops has increased from 124.78 million hectares in 2018-19 to 127.59 million hectares in 2019-20. Further, gross area under all production has increased from 285.21 million hectares in 2018-19 to 296.65 million hectares in 2019-20.

Table 1: Area, Production and Yield of Food grains in Major producing states

Area - Million Hectares
Production - Million Tonnes
Yield - Kg. / Hectare

	2019-20 #					2018-19				
State	**Area**	**% to All India**	**Production**	**% to All India**	**Yield**	**Area**	**% to All India**	**Production**	**% to All India**	**Yield**
Uttar Pradesh	19.59	15.35	55.03	18.55	2809	19.49	15.62	54.64	19.16	2803
Madhya Pradesh	15.14	11.87	33.03	11.13	2182	16.35	13.11	32.21	11.29	1970
Punjab	6.64	5.21	30.02	10.12	4519	6.77	5.42	31.53	11.06	4658
Rajasthan	15.81	12.39	23.18	7.81	1466	14.81	11.87	21.29	7.46	1437
West Bengal	6.44	5.05	18.26	6.16	2835	6.36	5.10	18.69	6.55	2938
Haryana	4.59	3.60	17.86	6.02	3891	4.56	3.65	18.15	6.36	3981
Bihar	6.29	4.93	14.39	4.85	2286	6.50	5.21	15.60	5.47	2402
Maharashtra	11.60	9.09	14.01	4.72	1208	9.62	7.71	10.30	3.61	1071
Karnataka	7.77	6.09	12.58	4.24	1618	7.66	6.14	10.89	3.82	1422
Andhra Pradesh	4.12	3.23	12.50	4.21	3038	4.02	3.22	10.84	3.80	2694
Tamil Nadu	3.69	2.89	11.04	3.72	2988	3.50	2.80	10.39	3.64	2972
Telangana	3.20	2.51	11.02	3.71	3447	3.06	2.45	9.28	3.25	3035
Others	22.71	17.80	43.73	14.74	1926	22.08	17.70	41.41	14.52	1875
All India	**127.59**	**100.00**	**296.65**	**100.00**	**2325**	**124.78**	**100.00**	**285.21**	**100.00**	**2286**

Source: Directorate of Economics & Statistics

Note: States have been arranged in descending order of percentage share of production during 2019-20 # 4th Advance Estimates

Uttar Pradesh has the largest share of the cultivable land in India it stood at 19.49 million hectares of land in 2018-19 which accounted for 15.62% of the total cultivable land in India, the total agricultural output was 54.64 million tonnes and accounted for 19.16% of the total Indian agricultural output, the land yield stood at 2803 kgs/hectare the area of cultivable land rose to 19.59 million hectares of land, in 2019-20 and now accounted for 15.35% of the total cultivable land in India the total agricultural output was 55.03 million tonnes which accounted for 18.55% of the total Indian agricultural output, yield stood at 2809 kgs/hectare.

Madhya Pradesh's share of the cultivable land in India was 16.35 million hectares of land in 2018-19 which accounted for 13.11% of the total cultivable land in India, the total agricultural output was 32.21 million tonnes and accounted for 11.29% of the total Indian agricultural output, the land yield stood at 1970 kgs/hectare the area of cultivable land declined to 15.14 million hectares of land in 2019-20 and now accounted for 11.87% of the total cultivable land in India the total agricultural output was 33.03 million tonnes which accounted for 11.13% of the total Indian agricultural output, the yield stood at 2182 kgs/hectare.

Punjab's share of the cultivable land in India was 6.77 million hectares of land in 2018-19 which accounted for 5.42% of the total cultivable land in India, the total agricultural output was 31.53 million tonnes and accounted for 11.06% of the total Indian agricultural output, the land yield stood at 4658 kgs/hectare the area of cultivable land declined to 6.64 million hectares of land in 2019-20 and now accounted for 5.21% of the total cultivable land in India the total agricultural output was 30.02 million tonnes which accounted for 10.12% of the total Indian agricultural output, the yield stood at 4519 kgs/hectare.

Rajasthan's share of the cultivable land in India was 14.81 million hectares of land in 2018- 19 which accounted for 11.87% of the total cultivable land in India, the total agricultural output was 21.29 million tonnes and accounted for 7.46% of the total Indian agricultural output, the land yield stood at 1437 kgs/hectare the area of cultivable land rose to 15.81 million hectares of land in 2019-20 and now accounted for 12.39% of the total cultivable land in India the total agricultural output was 23.18 million tonnes which accounted for 7.81% of the total Indian agricultural output, the yield stood at 1466 kgs/hectare.

West Bengal's share of the cultivable land in India was 6.36 million hectares of land in 2018- 19 which accounted for 5.1% of the total cultivable land in India, the total agricultural output was 18.69 million tonnes and accounted for 6.55% of the total Indian agricultural output, the land yield stood at 2938 kgs/hectare the area of cultivable land rose to 6.44 million hectares of land in 2019-20 and now accounted for 5.05% of the total cultivable land in India the total agricultural output was 18.26 million tonnes which accounted for 6.16% of the total Indian agricultural output, the yield stood at 2835 kgs/hectare.

Haryana's share of the cultivable land in India was 4.56 million hectares of land in 2018-19 which accounted for 3.65% of the total cultivable land in India, the total agricultural output was 18.15 million tonnes and accounted for 6.36% of the total Indian agricultural output, the land yield stood at 3981 kgs/hectare the area of cultivable land rose to 4.59 million hectares of land in 2019-20 and now accounted for 3.6% of the total cultivable land in India the total agricultural output was 17.86 million tonnes which accounted for 6.02% of the total Indian agricultural output, the yield stood at 3891 kgs/hectare.

Bihar's share of the cultivable land in India was 6.5 million hectares of land in 2018 19 which accounted for 5.21% of the total cultivable land in India, the total agricultural output was 15.6 million tonnes and accounted for 5.47% of the total Indian agricultural output, the land yield stood at 2402 kgs/hectare the area of cultivable land decline to 6.29 million hectares of land in 2019-20 and now accounted for 4.93% of the total cultivable land in India the total agricultural output was 14.39 million tonnes which accounted for 4.85% of the total Indian agricultural output, the yield stood at 2286 kgs/hectare.

Maharashtra's share of the cultivable land in India was 9.62 million hectares of land in 2018-19 which accounted for 7.71% of the total cultivable land in India, the total agricultural output was 10.3 million tonnes and accounted for 3.61% of the total Indian agricultural output, the land yield stood at 1071 kgs/hectare the area of cultivable land rose to 11.6 million hectares of land in 2019-20 and now accounted for 9.09% of the total cultivable land in India the total agricultural output was 14.01 million tonnes which accounted for 4.72% of the total Indian agricultural output, the yield stood at 1208 kgs/hectare.

Karnataka's share of the cultivable land in India was 7.66 million hectares of land in 2018-19 which accounted for 6.14% of the total cultivable land in India, the total agricultural output was 10.89 million tonnes and accounted for 3.82% of the total Indian agricultural output, the land yield stood at 1422 kgs/hectare the area of cultivable land rose to 7.77 million hectares of land in 2019-20 and now accounted for 6.09% of the total cultivable land in India the total agricultural output was 12.58 million tonnes which accounted for 4.24% of the total Indian agricultural output, the yield stood at 1618 kgs/hectare.

Andhra Pradesh's share of the cultivable land in India was 4.02 million hectares of land in 2018-19 which accounted for 3.22% of the total cultivable land in India, the total agricultural output was 10.84 million tonnes and accounted for 3.8% of the total Indian agricultural output, the land yield stood at 2694 kgs/hectare the area of cultivable land rose to 4.12 million hectares of land in 2019-20 and now accounted for 3.23% of the total cultivable land in India the total agricultural output was 12.50 million tonnes which accounted for 4.21% of the total Indian agricultural output, the yield stood at 3038 kgs/hectare.

Tamil Nadu's share of the cultivable land in India was 3.5 million hectares of land in 2018-19 which accounted for 2.8% of the total cultivable land in India, the total agricultural output was 10.39 million tonnes and accounted for 3.64% of the total Indian agricultural output, the land yield stood at 2972 kgs/hectare the area of cultivable land rose to 3.69 million hectares of land in 2019-20 and now accounted for 2.89% of the total cultivable land in India the total agricultural output was 11.04 million tonnes which accounted for 3.72% of the total Indian agricultural output, the yield stood at 2988 kgs/hectare.

Telangana's share of the cultivable land in India was 3.06 million hectares of land in 2018-19 which accounted for 2.45% of the total cultivable land in India, the total agricultural output was 9.28 million tonnes and accounted for 3.25% of the total Indian agricultural output, the land yield stood at 3035 kgs/hectare the area of cultivable land rose to 3.2 million hectares of land in 2019-20 and now accounted for 2.51% of the total cultivable land in India the total agricultural output was 11.02 million tonnes which accounted for 3.71% of the total Indian agricultural output, the yield stood at 3447 kgs/hectare.

Rest Of India's share of the cultivable land in India was 22.08 million hectares of land in 2018-19 which accounted for 17.70% of the total cultivable land in India, the total agricultural output was 41.41 million tonnes and accounted for 14.52% of the total Indian agricultural output, the land yield stood at 1875 kgs/hectare the area of cultivable land rose to 22.71 million hectares of land in 2019-20 and now accounted for 17.80% of the total cultivable land in India the total agricultural output was 43.73 million tonnes which accounted for 14.74% of the total Indian agricultural output, the yield stood at 1926 kgs/hectare.

The area under coverage changes from season to season and there are no fixed areas under which the crops are cultivated. However, there is a normal area coverage which is average of the data of many years. The following table shows the average area under cultivation for both Rabi & Kharif Crops.

Table: 2 Year wise Area Under Major Crops

(Million Hectares)

Crops / Year	Rice	Wheat	Nutri Cereals	Pulses	Food grains	Oilseeds	Sugarcane	Cotton	Jute & Mesta
1950-51	30.81	9.75	37.67	19.09	97.32	10.73	1.71	5.88	0.57
1960-61	34.13	12.93	44.96	23.56	115.58	13.77	2.42	7.61	0.90
1970-71	37.59	18.24	45.95	22.54	124.32	16.64	2.62	7.61	1.08
1980-81	40.15	22.28	41.78	22.46	126.67	17.60	2.67	7.82	1.30
1990-91	42.69	24.17	36.32	24.66	127.84	24.15	3.69	7.44	1.02
2000-01	44.71	25.73	30.26	20.35	121.05	22.77	4.32	8.53	1.02
2010-11	42.86	29.07	28.34	26.40	126.67	27.22	4.88	11.24	0.87
2011-12	44.01	29.86	26.42	24.46	124.75	26.31	5.04	12.18	0.90
2012-13	42.75	30.00	24.76	23.26	120.78	26.48	5.00	11.98	0.86
2013-14	44.14	30.47	25.22	25.21	125.05	28.05	4.99	11.96	0.84
2014-15	44.11	31.47	25.17	23.55	124.30	25.60	5.07	12.82	0.81
2015-16	43.50	30.42	24.39	24.91	123.22	26.09	4.93	12.29	0.78
2016-17	43.99	30.79	25.01	29.45	129.23	26.08	4.44	10.83	0.76

2017-18	43.77	29.65	24.29	29.81	127.52	24.51	4.74	12.59	0.74
2018-19	44.16	29.32	22.15	29.16	124.83	24.79	5.06	12.57	0.70
2019-20*	43.78	31.45	24.02	28.34	127.59	27.04	4.57	13.37	0.68

Source: Directorate of Economics & Statistics

* 4th Advance Estimates

Area under rice cultivation has shown a consistent uptrend in the initial years when it increased from 30.81 million hectares in 1950-51 to 34.13 million hectares in 1960-61 showing an increase of 10.78% over a period of one decade. It further increased to 37.39 in 1970-71 recording an increase of 9.55%, the uptrend continued in the decade ending 1980-81when the area under rice cultivation went up to 40.15 million hectares registering a growth of 7.38% from 1970-71 to 1980-81. This cultivation area increased to 42.69 million hectares in 1990-91 recording a growth rate of 6.33% as compared to 1980-81. During 2000-01the total area under rice cultivation was 44.71 million hectares showing an increase in the cultivation area by 4.73%. The rice cultivation area registered a first decrease in 2010-11 when the cultivation area dropped to 42.86 million hectares registering a decrease in the cultivation area of 4.14%. During 2011-12 the rice cultivation area was 44.01 it dropped down to 42.75 in the year 2012-13. In the year 2013-14 there was a rise in the rice cultivation area and was 44.14 million hectares, there was a marginal dip in the year 2014-15 and land under rice cultivation was 44.11 million hectares. In the year 2015-16 there was a further dip in the rice cultivation area and it was 43.50 million hectares it rose to 43.99 million hectares in 2016-17. In 2017-18 it dipped down to 43.77 million hectares though there was an increase in the cultivation area in 2018-19 which was 44.16 million hectares. While according to 4th advanced estimates for 2019-20 it is expected to be 43.78 million hectares.

In the year 1950-51the total area under wheat cultivation was 9.75 million hectares which grew to 12.93 million hectares recording a growth of 32.61%. This area, under wheat cultivation further went up to 18.24 million hectares in 1970-71 showing a growth of 41.06% from 1960-61 to 1970-71. Wheat cultivation area increased to 22.28 million hectares in 1980-81 registering a growth of 22.15% from 1970-71 to 1980-81. The wheat cultivation area rose to 24.17 million hectares in 1990-91 showing an uptrend of 9.12%. The area under wheat cultivation increased to 25.73 million hectares growing at a rate of 6.45%. In 2010-11 the wheat cultivation area was 29.07 million hectares increasing at a rate of 12.98%. In 2011-12 the cultivation area for wheat was 29.86 million hectares, it touched a figure of 30 million hectares in 2012-13. The cultivation area for wheat in 2013-14 was 30.47 million hectares and touched 31.47 million hectares in 2014-15. However, there was a drop in the wheat cultivation area in 2015-16 when it was 30.42 million hectares. In 2016-17 it was 30.79 hectares and dropped down to 29.65 million hectares in 2017-18 it dropped down further to 29.32 million hectares in 2018-19 and

according to 4th advance estimates cultivation area under wheat was 31.45 million hectares.

The area under nutri-cereals cultivation was 37.67 million hectares in 1950-51 it increased to 44.96 million hectares in 1960-61 registering a growth of 19.35%, the area under nutri-cereals increased marginally to 45.95 million hectares between 1960-61 to 1970-71 showing a growth rate of 2.20%. Between 1970-71 to 1980-81 there was a decline in the cultivation area of nutri-cereals and area under cultivation stood at 41.78 million hectares registering a decline of 9.07%. In 1990-91 the cultivation land under nutri-cereals was 36.32 million hectares showing a decline of 13.07% from 1980-81 level. The land under nutri-cereals cultivation in 2000-01, was 30.26 million hectares recording a fall in the cultivation area of nutri-cereals of 16.69%. In 2010-11 the cultivation area under nutri-cereals declined further to 28.34 million hectares indicating a decline of 6.35%. In 2011-12 the area under nutri-cereals cultivation further fell down to 26.42 million hectares, this downward trend continued in 2012-13 as well and the cultivation area got reduced to 24.76 million hectares. During 2013-14 it touched a low of 25.22 million hectares which further slide down to 25.17 million hectares in 2014-15 and to 24.39 million hectares in 2015-16. In the year 2016-17 it showed a marginal recovery and 25.01 million hectares. However, the downside continued in 2017-18 when it was 24.29 million hectares and touched an all-time low in 2018-19 and was at 22.15 million hectares. According to the 4th advance estimates in 2019-20 the cultivation area under nutri-cereals would be 24.02 million hectares.

Area under pulse cultivation in 1950-51 was 19.09 million hectares, this area increased to 23.56 million hectares in 1960-61 showing a growth rate of 23.41%. In 1970-71 the pulse cultivation area was 22.54 million hectares, indicating a decline of 4.33% as compared to 1960-61. The pulse cultivation area in 1980-81 was 22.46 million hectares again showing a marginal decline of 0.35%. However, this area increased to 24.66 million hectares in 1990-91 registering a growth of 9.79%. In 2000-01 the area under pulse cultivation dropped significantly to 20.35 million hectares, representing a considerable decline of 17.48%, however during the period 2000-01 to 2010-11the cultivation area should some appreciable increase and was 26.40 million hectares in 2010-11 scripting an increase of 29.73% as compared to 2000-01. There was a decline in the cultivation areas for two consecutive years that is 2011-12 and 2012-13 and the cultivable land figures stood at 24.46 million hectares and 23.26 million hectares respectively. In 2013-14 the cultivation area increased and was 25.21 million hectares, in 2014-15 the cultivation area stood at 23.55 million hectares. In the year 2015-16 the area under pulse cultivation jumped to 24.91 million hectares and this upsurge continued in 2016-17 as well when the area under pulse cultivation touched 29.45 million hectares. In 2017-18 it was touching a figure of 29.81 million hectares it dropped a little in 2018-19 and was 29.18 million hectares. According to 4th advance estimates in 2019-20 the total area under pulse cultivation will be 28.34 million hectares.

Area under food grain cultivation was 97.32 million hectares in 1950-51 which when compared to 2010-11 has gone up to 126.67 million hectares indicating a growth rate of 30.15% over a period of 60 years. According to the 4th estimates the cultivation area for food grain would be 127.59 million hectares indicating a growth rate of 0.73% from 2010-11 to 2019-20.

Area under oilseed cultivation increased from 10.73 million hectares in 1950-51 to 27.22 million hectares in 2010-11 indicating a growth rate of 153.68% spread over a six decades. According to 4th advance estimates the cultivation area for oilseeds would be 27.04 which indicates a decline in the cultivation area of 0.66% over a period from 2010-11 to 2019-20.

Area under sugarcane cultivation rose from 1.71 million hectares in 1950-51 to 4.88 million hectares in 2010-11indicating a growth rate of 185.38% over a period of 60 years. According to the 4th advance estimates the area under sugarcane cultivation would be 4.57 million hectares in 2019-20 which indicates a 6.35% decline in the cultivation area for sugarcane as compared to 2010-11.

Area under cotton cultivation rose from 5.88 million hectares in 1950-51 to 11.24 million hectares in 2010-11 indicating an increase of 91.15% over a period of 60 years. As per the 4th advance estimates the area under cotton cultivation would be 13.37 million hectares in 2019-20 indicating an increase of 18.95% as compared to 2010-11.

Area under jute and Mesta cultivation was 0.87 million hectares in 2010-11 as compared to 0.57 million hectares in 1950-51 indicating an increase of 52.63% over a period of 60 years. As per 4th advance estimates jute and Mesta cultivation area would be 0.68 million hectares in 2019-20 indicating a decline of land under jute and Mesta cultivation by 21.84% as compared to 2010-11. We can also show distribution of Area under major crops in per centage given following table.

Table: 3 Distribution of Area under major Crops

(Figures in Percentage)

Year	Rice	Wheat	Nutri Cereals	Pulses	Food grains	Oilseeds	Sugar cane	Cotton	Others	All Crops
2007-08	23.31	14.88	15.12	12.54	**65.85**	14.17	2.68	5.00	12.30	100.00
2008-09	24.17	14.73	14.57	11.73	**65.19**	14.63	2.34	4.99	12.85	100.00
2009-10	22.59	15.33	14.91	12.55	**65.38**	13.99	2.25	5.46	12.93	100.00
2010-11	21.85	14.82	14.44	13.46	**64.56**	13.88	2.49	5.73	13.35	100.00
2011-12	22.48	15.25	13.50	12.50	**63.72**	13.44	2.57	6.22	14.05	100.00
2012-13	22.13	15.52	12.82	12.04	**62.51**	13.71	2.59	6.20	15.00	100.00
2013-14	22.07	15.24	12.61	12.61	**62.54**	14.03	2.50	5.98	14.95	100.00
2014-15	22.29	15.90	12.72	11.90	**62.80**	12.93	2.56	6.48	15.23	100.00
2015-16	22.01	15.45	12.39	12.66	**62.60**	13.25	2.50	6.24	15.40	100.00
2016-17	22.19	15.53	12.62	14.85	**65.19**	13.21	2.24	5.46	13.90	100.00
2017-18	22.07	14.95	12.25	15.03	**64.31**	12.36	2.39	6.35	14.60	100.00
2018-19	23.01	15.28	11.54	15.19	**65.01**	12.92	2.64	6.57	12.86	100.00
2019-20	22.06	15.85	12.11	14.28	**64.30**	13.62	2.30	6.74	13.04	100.00

Source: Directorate of Economics & Statistics

Notes:

(1) Area estimates are based on data provided by State Statistical Authorities (SASAs) which is further cross checked and validated with estimates provided by other agencies, viz., MNCFC and CWWG.

(2) Others include Jute & Mesta, Coconut, major Horticulture crops, Tea, Coffee and Rubber

(3) Data for Food grains, Oilseeds and Commercial Crops are as per 4th Advance Estimates for 2019-20

(4) Data for Horticulture crops are as per 3rd Advance Estimates for 2019-20

This table has revealed distribution of area under major crops of food-grain items and non-food grain items. In 2007-08 65.85% area is used for cultivation of food grains which includes Rice, Wheat, Nutri-Cereals, Pulses further it declines 64.03% area used for cultivation purpose due to (i) There has been a gradual shift from cultivation of food crops to cultivation of cash crops, fruits vegetable, etc. (ii) Area under food crop has reduced due to rapid urbanisation. (iii) More areas are being demanded for housing, setting up industries. ... Monsoon is still vital for food production.

Non-food grain production area is increased by 34.15% area in 2007-08 to 35.7 % area in 2019-20. It shows Indian agriculture gradually shift from cultivation of food crops to cultivation of cash crops, fruits and vegetables etc.

8.2.1 Conclusions:

Uttar Pradesh has the largest share of cultivable land in India and it has been distributed unevenly. Thus, Govt. have to pay attention towards the production of other crops and cash crop produced in largest area to get more revenue from agriculture even though India has self-sufficient in production of rice and wheat but area under cultivation of other crops like pulses and edible oil are also very important and have to gain self-sufficiency in these products.

8.3 EMPLOYMENT AND WAGE RATE ANALYSIS IN AGRICULTURE SECTOR

Agriculture has been associated with mankind since its very inception, cultivation and growing of crops has been a very powerful instrument in growth and development of mankind from small villages to well developed countries. Its complex relation with our daily lives has been the major attention seeker of the policymakers and media. A lot of economic factors have their impact on the prices of the agricultural products and wages of the agricultural labourers is one of them.

Table: 4 Population and Agricultural Workers

In Million

Year	Total Population	Rural Population	Total Workers	Agricultural Workers		
				Cultivators	Agricultural Labourers	Total
1951	361.1	298.6 (82.7)	139.5	69.9 (71.9)	27.3 (28.1)	97.2(69.7)
1961	439.2	360.3 (82.0)	188.7	99.6 (76.0)	31.5 (24.0)	131.1 (69.5)
1971	548.2	439.0 (80.1)	180.4	78.2 (62.2)	47.5 (37.8)	125.7 (69.7)
1981	683.3	252.5 (76.9)	244.6	92.5 (62.5)	55.5 (37.5)	148.0 (60.5)
1991	846.4	628.7 (74.5)	314.1	110.7 (59.7)	74.6 (40.3)	185.3 (59.0)
2001	1028.7	742.5 (72.2)	402.2	127.3 (54.4)	106.8 (45.6)	234.1 (58.2)
2011	1210.9	833.7 (68.9)	481.9	118.8 (45.1)	144.3 (54.9)	263.1 (54.6)

Source: Registrar General of India

If we have a look at the above table, we find that in 1951 when the total population of India was 361.1 million, 298.6 million or 82.7% of the total population lived in the rural areas. Out of the total population of 361.1 million, our workforce was 139.5 million or 38.63% of the population was working population and out of the total working population of 139.5 million, 97.2 million or 69.67% of the workforce was employed in agriculture.

According to 1961 census out of the total population of 439.2 million, 360.3 million or 82% of the total population lived in the rural areas. Out of

the total population of 439.2 million our workforce was 188.7 million or 42.96% of the population was working population and out of the total working population of 188.7 million, 131.1 million or 69.47% of the workforce was employed in agriculture.

According to 1971 census out of the total population of 548.2 million, 439.0 million or 80.1% of the total population lived in the rural areas. Out of the total population of 548.2 million our workforce was 180.4 million or 32.90% of the population was working population and out of the total working population of 180.4 million, 125.7 million or 69.7% of the workforce was employed in agriculture.

According to 1981 census out of the total population of 683.3 million, 252.5 million or 76.9% of the total population lived in the rural areas, here for the first time we saw the percentage of rural population falling below 80%. Out of the total population of 683.3 million our workforce was 244.6 million or 35.79% of the population was working population and out of the total working population of 244.6 million, 148.0 million or 60.5% of the workforce was employed in agriculture. Here again due to a fall in the percentage of the rural population, we for the first time saw a decline of nearly 10% in the workforce depending on agriculture as their main occupation.

According to 1991 census out of the total population of 846.4 million, 628.7 million or 74.5% of the total population lived in the rural areas, here again we saw the percentage of rural population falling further down to 74.5% from earlier level of 76.9% in 1981. Out of the total population of 846.4 million our workforce was 314.1 million or 37.11% of the population was working population and out of the total working population of 314.1 million, 185.3 million or 59.0% of the workforce was employed in agriculture. Here again there was a marginal fall in the percentage of the rural population, we saw a decline of nearly 1.5% in the workforce depending on agriculture as their main occupation.

According to 2001 census out of the total population of 1028.7 million, 742.5 million or 72.2% of the total population lived in the rural areas, here again we saw the percentage of rural population falling further down to 72.2% from earlier level of 74.5% in 1991. Out of the total population of 1028.7 million our workforce was 402.2 million or 39.09% of the population was working population and out of the total working population of 402.2 million, 234.1 million or 58.2% of the workforce was employed in agriculture. Here again there was a marginal fall in the percentage of the rural population, we saw a decline of nearly 1% in the workforce depending on agriculture as their main occupation.

According to 2011 census out of the total population of 1210.9 million, 833.7 million or 68.9% of the total population lived in the rural areas, here again we saw the percentage of rural population falling further down to 68.9% from earlier level of 72.2% in 2001. Out of the total population of 1210.9 million our workforce was 481.9 million or 39.79% of the population was working population and out of the total working

population of 481.9 million, 263.1 million or 54.6% of the workforce was employed in agriculture. Here again there was a 3.3% fall in the percentage of the rural population, we saw a decline of nearly 3.6% in the workforce depending on agriculture as their main occupation.

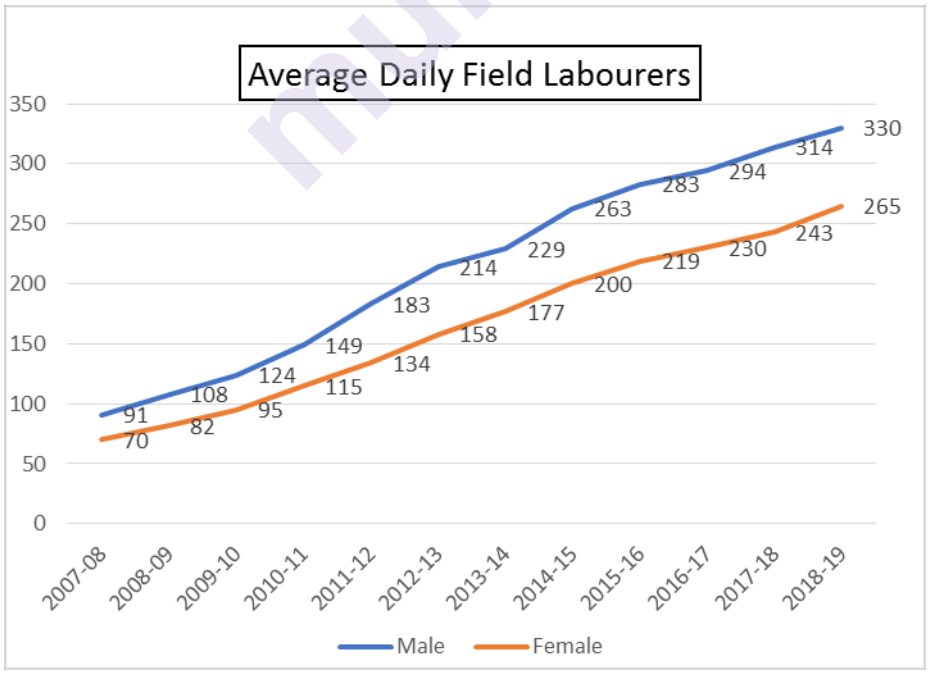
Table 5: All India Annual Average Daily Wage Rate of Field Labourers

Year	Wages (Rs.)	
	Male	Female
2007-08	91	70
2008-09	108	82
2009-10	124	95
2010-11	149	115
2011-12	183	134
2012-13	214	158
2013-14	229	177
2014-15	263	200
2015-16	283	219
2016-17	294	230
2017-18	314	243
2018-19	330	265

Source: Directorate of Economics & Statistics

Note 1. All India annual average is calculated for 21 major States.

Average Daily Wage is taken as average of five major agricultural operations, including ploughing sowing, weeding, reaping and harvesting.



The above table shows annual average daily wage rate of field workers both male workers as well as female workers for the period from 2007-08 to 2018-19. Though we see a gradual increase in the annual average daily wage rate for both male as well as female workers, the rate of increase may not match the inflation rate and in real terms there may have been a decline in the wage rate.

First, if we look at the annual growth rate in the annual average daily wage rate of male workers it rose from 91 to 108 from 2007-08 to 2008-09 which implies a growth rate of 18.68%. Their wages rose from 108 in 2008-09 to 124 in 2009-10 which comes to a growth rate of 14.81%, this wage rate further went up to 149 in 2010-11 showing a growth rate of 20.16% these wage level further rose to 183 in 2011-12 growing at a rate of 22.81% over the previous year. The wage rate rose to 214 in 2012-13 and recorded a growth rate of 16.93%, during 2013-14 the wage rate was 229 recording a growth of just 7%. During 2014-15 the wage rate was 263 registering a growth of 14.85%, in 2015-16 the wage rate went up to 283 indicating a growth rate of 7.6%, in 20016-17 the wage rate was 294 increasing at a rate of as low as 3.88%. The wage rate during 2017-18 was 314 depicting a growth rate of 6.8%, in 2018-19 the wage rate was 330 showing a growth rate of just 5.09%.

If we analyse the above movement in the wage rate, we find that there has been a consistent low annual average wage rate among male workers once it dropped to a single digit growth rate in 2016-17.

Now, if we look at the annual growth rate in the annual average daily wage rate of female workers it rose from 70 in 2007-08 to 82 in 2008-09 which implies a growth rate of 17.14%. Their wages rose from 82 in 2008-09 to 95 in 2009-10 which comes to a growth rate of 15.85%, this wage rate further went up to 115 in 2010-11showing a growth rate of 21.05% these wage level further rose to 134 in 2011-12 growing at a rate of 16.52% over the previous year. The wage rate rose to 158 in 2012-13 and recorded a growth rate of 17.91%, during 2013-14 the wage rate was 177 recording a growth rate of 12.02%. During 2014-15 the wage rate was 200 registering a growth of 13%, in 2015-16 the wage rate went up to 219 indicating a growth rate of 9.5%, in 2016-17 the wage rate was 230 increasing at a rate of as low as 5.02%. The wage rate during 2017-18 was 243 depicting a growth rate of 5.65%, in 2018-19 the wage rate was 265 showing a growth rate of 9%.

If we analyse the above movement in the wage rate, we find that there has been a consistent low annual average wage rate among male workers once it dropped to a single digit growth rate in 2015-16.

8.4 TREND'S IN INDIA'S AGRICULTURE EXPORT AND IMPORT AND ITS IMPLICATIONS

The Indian agricultural exports have shown a steady growth of nearly 7 times over a period of last 15 years while the agricultural imports growth of nearly 8 times during the same period. India is one of largest producers

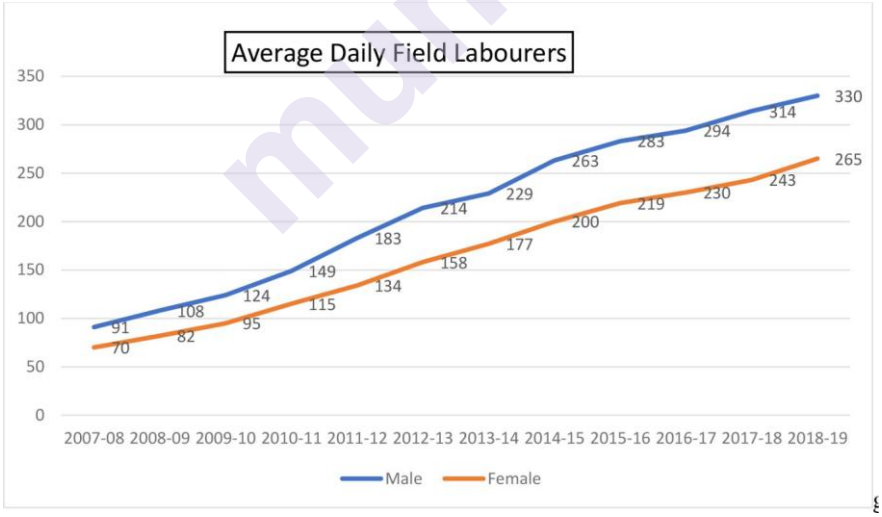
of many agricultural products like wheat, rice, cotton to name a few. During the pandemic proper guidelines were issued to ensure smooth functioning of the agriculture sector. Though there was a considerable improvement in the food grain production during the pandemic and even the exports of the agricultural products increased.

Table 6: Year-wise Imports and Exports of Principal Agricultural Commodities

Year	Agricultural Imports	Total Imports	Share of Agricultural Imports in Total Imports (%)	Agricultural Exports	Total Exports	Share of Agricultural Exports in Total Exports (%)
1990-91	1205.86	43170.82	2.79	6012.76	32527.28	18.49
2000-01	12086.23	228306.64	5.29	28657.37	201356.45	14.23
2010-11	51073.97	1683466.96	3.03	113046.58	1136964.25	9.94
2011-12	70164.51	2345463.23	2.99	182801.00	1465959.39	12.47
2012-13	95718.89	2669161.95	3.59	227192.61	1634318.28	13.90
2013-14	85727.30	2715420.78	3.16	262778.54	1905011.08	13.79
2014-15	121319.02	2736676.99	4.43	239681.04	1896348.42	12.64
2015-16	140289.22	2490303.76	5.63	215396.32	1716384.39	12.55
2016-17	164726.83	2577671.14	6.39	226651.91	1849433.55	12.26
2017-18	152095.20	3001028.71	5.07	251563.94	1956514.52	12.86
2018-19	137019.46	3594674.22	3.81	274571.28	2307726.19	11.90
2019-20 (P)	147445.81	3360954.45	4.39	252976.06	2219854.17	11.40

(Value in Rs. crore)

Source: Directorate General of Commercial Intelligence & Statistics, D/o Commerce. (P) – Provisional



In 1990-91 the agricultural exports formed 18.49% of the total Indian exports. This percentage came down to 14.23% in 2000-01 it further dropped to 9.94% in 2010-11this down fall indicated a shift of our economy from an agro-based economy towards more secondary sector and tertiary sector-oriented economy. However, this percentage rose again to 12.47% in 2011-12 and rose again to 13.9% in 2012-13. The agricultural exports formed 13.79% of the total exports in 2013-14 this percentage

took a dip in the year 2014-15 and it stood at 12.64% it further came down to 12.55% in 2015-16.

In 1900-91 agricultural imports formed 2.79% of the total imports of India this percentage increased to 5.29% in 2000-01. During 2010-11 the agricultural imports dropped down to 3.03% it was 2.99% in the year 2011-12. The agricultural imports share rose gradually and stood at 3.59% in 2012-13 of the total imports of the country. In 2013-14 the percentage of the agricultural imports to that of total imports dropped down marginally to 3.16%. It went up sharply to 4.43% in 2014-15 it took another substantial jump to touch a figure of 5.63% of the total imports in the year 2015-16. In the year 2016-17 there was another increase in the percentage of agricultural imports to the total imports and it stood at 6.39% of the total imports. This rampant increase in the share of the agricultural imports to that of the total imports was arrested in 2017-18 when the agricultural imports formed 5.07% of the total imports of the country. In 2018-19 there was a further reduction in the percentage of the agricultural imports which came down to 3.81% of the total imports of the nation. According to the provisions the percentage of the agricultural imports to that of the total imports is likely to be 4.39%.

Implication of Agricultural Export and Import Goods:

1. Export of wheat increased by over 7 times in 2020-21:

The main drivers of the increase in exports in 2020-21 are wheat (672% increase), vegetable oil (258%), other cereals (245%), molasses (141%) and non-Basmati rice (132%). Marine products, Basmati Rice, Non-Basmati Rice, Spices, and Buffalo meat were among the top five commodities to be exported, in terms of value, both in 2019-20 and 2020-21. Together, these five products accounted for almost 57% of agriculture exports in the first 11 months of 2019-20 and 54% of the exports during the same period in 2020-21. In rupee terms, Marine products are the most exported with over Rs. 40,140 crores worth exports in 2020-21. However, their exports have dropped by 10.18% in 2020-21, compared to Rs. 44691.44 worth marine exports in 2019-20. The exports of Basmati rice have also slightly dropped by 2% in the first 11 months of 2020-21.

2. Vegetable oils constitute more than half the import of agriculture products in India:

About 54% or more than half the agri-imports by India is of vegetable oils. India's vegetable oil imports in 2020-21, up to February 2021, are worth Rs. 74,286 crores. Other major agri-imports are fresh fruits, pulses, spices, and cashew. Together, the five products account for 80% of India's agri-imports.

In the case of other commodities, there is a growth in India's sugar imports in 2020-21 by 88%. Import of other oil seeds grew by 72%, marine products by 25%, pulses by 19%, and fresh fruits by 11%. However, this increase was neutralized by the drop in imports of raw cotton (72%), Non-Basmati rice (71%), other cereals (69%), spices (24%),

oil meals (26%), alcoholic beverages (19%), miscellaneous processed items (18%), and cashew (17%).

3. Demand for various products has increased:

India also exports fresh and processed food to more than 100 countries across the world. The increase in exports has been attributed to the increased demand from other countries. Following specific demand, NAFED exported 50,000 MT wheat to Afghanistan and 40,000 MT wheat to Lebanon under the G2G arrangement. Similarly, the increased export of rice is due to exports to countries such as Timor-Leste, Papua New Guinea, Brazil, Chile, Puerto Rico, Togo, Senegal, Malaysia, Madagascar, Iraq, Bangladesh, Mozambique, Vietnam, Tanzania Republic, and Madagascar. There was also an increase in demand for Pulses, Processed fruits and vegetables, cereals preparations, and other items from the Middle East, Far East, USA, and UK markets.

4. APEDA supervises agriculture exports in India:

Agricultural and Processed Food Products Export Development Authority (APEDA) is responsible for the export promotion and development of listed products including meat products, dairy products, floriculture products, horticulture, medicinal plants, etc. It plays an important role in strengthening India's export potential along with encouraging better price realization.

Some of the actions taken by APEDA to boost agriculture exports during the pandemic include promotion in virtual buyer-seller meets, formation of products specific export promotion forums, hosting product promotion meetings and webinars regularly for understanding problems, and resolving them, and promotion of GI products, among others. Under the Agriculture and Processed Foods Export Promotion Scheme of APEDA, financial assistance was provided for infrastructure development, Quality Development, and Market Promotion.

Conclusion: Agricultural exports are pivotal for helping farmers increase their incomes. Apart from being a source of foreign exchange for the country, the exports help farmers, producers, and exporters to utilize a wider international market and increase their income. Exports have also resulted in increased production in the agriculture sector by increasing area coverage and productivity. Though India aims to double farm exports by 2022, there are some underlying issues, addressing which would help boost India's exports. Some such issues are reduction of post-harvest loss, availability of necessary infrastructure like cold storage, proper monitoring of fertilizer and pesticides usage, and adoption of the latest farm technology.

8.5 SUMMARY

Uttar Pradesh has the largest share of cultivatable land in India. Year wise area under major crops for food grains increased manifold from 1951 to

2019. Largest area in India is being used for producing rice and wheat so that India have self-sufficiency in producing rice and wheat.

When we talk about Employment and wage rate in agriculture sector in 2011, employment in the agricultural sector was more than one million, with most of employment concentrated in two occupations directly related to the major economic activity of the agricultural sector.

As the exports of agricultural products by India are more than the agricultural imports done by it that's why India is called agricultural country, but we have to modernise agriculture sector so that we can achieve self-sufficiency in not only food-grains but fruits and vegetable front also and achieve the 2nd goal of SDGs.

8.6 QUESTIONS

1. Explain area and productivity in major producing states.
2. Explain area under major crops.
3. Explain employment scenario in agriculture sector in India.
4. What are an annual average daily wage rate of field workers?
5. Explain trends of agriculture Import and Export in India and its implications.

Reference: Pocket book of Agricultural Statistics 2020.

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