

M.A ECONOMICS

PAPER-5

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CHAPTER-1: STAGES OF ECONOMIC GROWTH

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1.1: OBJECTIVES

The objective of this chapter is to understand the concept of economic growth and stages through which an economy passes. This chapter discusses the following aspects:

- Meaning and measures of economic growth;
- Comparison between economic growth and economic development;;
- Background of growth theories;

- Rostow's stages of economic growth and the importance of Take-off stage for underdeveloped countries;
- Take-off and the Indian economy; and
- Marx's stages of economic growth and comparison between Rostow and Marx.

1.2: INTRODUCTION

In recent times, economic growth has attracted more and more attention of economists and policymakers. But surprisingly, we cannot find universally acceptable definition of the term. Different economists have used the term 'economic growth' to convey different meanings and have built various theories according to their perceptions. In this chapter, we will try to understand the term 'economic growth' and its various dimensions with a brief overview of its meaning, measurement and background of various theories. Then we will proceed to understand the stages of development propounded by two prominent thinkers, Rostow and Marx.

1.3: THEORIES OF ECONOMIC GROWTH

Economic growth is the process whereby the real per capita income of a country increases over a long period of time. Several factors contribute to economic growth of a country. Growth of population, particularly working population, is the first cause of growth. Technical knowledge and progress are the twin factors in increasing the output per head. Growth in the quantity of capital per head is another factor, which tends to raise the growth rate of the economy. Supply of savings is another factor that determines the rate of growth of an economy. Structural transformation also leads to economic growth. Urbanization is another factor promising economic growth. Another factor, which leads to economic growth is growth of foreign trade.

1.3.1: Economic Growth vs. Economic Development

A clear distinction has to be made between the two terms, 'Economic Growth' and 'Economic Development'. Economic growth is related to a quantitative and sustained increase in the country's per capita output or income accompanied by expansion in its labour force, consumption, capital and volume of trade. On the other hand, economic development is a wider term. It is related to qualitative changes in the entire social system i.e., economic wants, goods,

incentives and institutions, productivity, etc. It describes the underlying determinants of growth such as technological and structural changes.

Economic growth is a necessary but not sufficient condition for economic development. Compared to the objective of development, economic growth is far easier to realise. This is because the process of development is far more pervasive. Apart from a rise in output, it involves changes in the composition of output as well as a shift in the allocation of productive resources so as to ensure social justice. Thus, an economy can grow, but it may not develop because poverty, unemployment and inequalities may continue to persist due to the absence of technological and structural changes. But it is difficult to imagine development without economic growth. Despite these apparent differences, some economists use the terms as synonyms.

Comparison chart: Economic Development vs. Economic Growth

	<i>Economic Development</i>	<i>Economic Growth</i>
<i>Scope</i>	Concerned with structural changes in the economy	Growth is concerned with increases in the economy's output
<i>Growth</i>	Development relates to growth of human capital indices, a decrease in inequality figures, and structural changes that improve the general population's quality of life	Growth relates to a gradual increase in one of the components of Gross Domestic Product: consumption, government spending, investment, net exports
<i>Implication</i>	It implies changes in income, saving and investment along with progressive changes in socio-economic structure of country (institutional and technological changes)	It refers to an increase in the real output of goods and services in the country like increase in income, in savings, in investment etc.
<i>Measurement</i>	Qualitative. HDI (Human Development Index), gender-related index (GDI), Human poverty index (HPI), infant mortality, literacy rate etc.	Quantitative. Increase in real GDP. Shown by PPF.
<i>Effect</i>	Brings qualitative and quantitative changes in the economy	Brings quantitative changes in the economy

Concept	Normative concept	Narrower concept than economic development
Relevance	Economic development is more relevant to measure progress and quality of life in the developing nations.	Economic growth is a more relevant metric for progress in developed countries. But it's widely used in all countries because growth is a necessary condition for development.

1.3.2: Measurement of Economic growth

Economic growth is measured basically in three ways : in terms of national income, per capita income and economic welfare. We may discuss each of this in the succeeding paragraphs.

One of the methods to measure economic growth is in terms of an increase in the economy's real national income over a long period of time. Economists like Kuznets, Meier and Baldwin are of the opinion that an increase in real national income is the most convenient single measure of economic growth because a larger real national income is normally a pre-requisite for an increase in real per capita income. In fact, it is the increase in national income which is the most important criterion for determining development. But, there are certain difficulties which have to be cleared before this method is acceptable. Real national income is total output in real terms rather than in money terms, which is open to fluctuations because variations in prices are inevitable. The phrase "over a long period of time" implies a sustained increase in real income. This measure fails to take into consideration changes in the growth of population. If a rise in real income is accompanied by a faster growth in population, there will be no economic growth but retardation. Allowances will have to be made for changes in national income due to cyclical fluctuations and value of money. Furthermore, there are certain conceptual difficulties in the measurement of national income.

The second measure relates to increase in per capital real income. It is said that economic growth is meaningless if it does not improve the standard of living of people, especially in the underdeveloped countries. If national income increases faster than the rate of growth of population, it is undoubtedly a mark of economic development, taking the country as a whole. Similarly, an increase in the aggregate output may be a sign of development but not in all cases.

The problem arises when the rate of growth of population is greater than the rate of increase in real national income. In developing countries which are characterized by population pressure, a rise in aggregate real income will always mean a rise in aggregate real output. Economists agree with this measure, although the difficulties still remain.

There is also a tendency to define economic development from the point of view of economic welfare. Economic welfare envisages a rise in national income, a rise in per capita income, better distribution of income and more consumer goods for the people. It is also suggested that while taking into account the welfare of the people in a developing society, the nature and degree of pain and sacrifice should also be taken into consideration and this be termed as the 'social cost' of production. But, there are also limitations to measure economic welfare which is very difficult to quantify.

1.3.3: Background of Growth Theory

Economic growth can be defined as "the expansion of a nation's capability to produce goods and services its people want". This definition, though a fascinating one is an insufficient one because the actual growth depends not only upon the changes in the economy's potential production, but also upon the extent to which that capacity is utilized. Economic growth is simply an increase in the economy's output over time.

Growth theory went through a period of unusually rapid development from the 1940s to the 1960s; but economists' concern with the question of economic growth goes back at least as far as 1776 when Adam Smith's "An Inquiry into the Nature and Causes of the Wealth of Nations" was published. The very title of this classic suggests the author's interest in the long-run question of accumulation of wealth, an important aspect of any study of economic growth. In Smith's view of the various processes by which the economy's wealth expands, an important role is assigned to "division of labour" or specialization. The idea of diminishing returns had not yet been "discovered" and Smith saw no obstacle to the increase in returns to labour through greater specialization. Increased specialization would lead to a rising standard of living for a growing population. This optimistic conclusion was replaced a few decades later by a pessimistic one, as a result of the works of Thomas Robert Malthus and David Ricardo. The Malthusian population principle and the Ricardian diminishing returns and rent theory combinedly held out subsistence

standard of living for the majority of economy's population. Between the writings of the classical economists noted above and the writings of the economists of the past forty years, the major contributors to growth systems are Karl Marx and Joseph Schumpeter, both of whom saw the capitalistic process as one in which business people are engaged in an unrelenting drive towards accumulation that would one day lead to destruction of the system.

The phrase "modern growth theory" is usually applied to the large body of theory, which began to appear a few years after the publication of Keynes' General Theory. In view of the impact made by the General Theory, it was only to be expected that economists would proceed to construct theories that would secularize and make dynamic the short-run static theory presented by Keynes. Some of the growth theories were evolved directly from Keynes' work; some were evolved from an altogether different direction.

Three major branches of modern growth theory have been identified. One relates the growth rate of the economy's aggregate output to that of its capital stock. In this approach, capital is the only factor of production explicitly considered and it is assumed that labour is combined with capital in fixed proportions. With regard to the rate at which capital accumulates, this theory is Keynesian in nature and appeared a few years after the General Theory. It holds that under laissez-faire conditions there is no effective adjustment mechanism to equate investment with full employment and saving. If it is true that changes in thriftiness do not automatically lead to equal changes in investment, the rate of growth will not be that which would occur with capital accumulation determined by full employment and saving. This 'fixed-proportion', (Keynesian-based) growth theory will be examined in the next chapter, and is most commonly known as the Harrod-Domar theory.

The development of modern growth theory has been so rapid and varied that the Harrod-Domar theory may now be described as a relatively early and simple approach to the growth question. Most of the growth theories that followed, and dominated the area is known as the neoclassical growth theory. In this theory, which we will study later, a production function is employed, in which capital and labour may be combined in varying proportions. Unlike the Harrod-Domar model, substitutability among factors is taken into account, for in the production process, the neoclassical theory assumes, capital will accumulate at a rate set by the thriftiness of the

economy operating at full employment. The issue whether or not the amount of saving forthcoming at full employment will be matched by an equal amount of planned investment, a prerequisite to the continued full utilization of the factors of production, is, therefore, answered in terms of classical rather than Keynesian theory.

A third branch of recent growth theory is commonly described as the modern Cambridge theory because of its close association with the names of Joan Robinson and Nicholas Kaldor of the Cambridge University. This theory is highly critical of the neoclassical theory in many ways. For example, it rejects the theory's classical approach to saving and investment and returns to the Keynesian approach, in which investment is determined not by saving propensities but by business persons' decisions, which are held to depend on such things as their experiences in the recent past, governmental policies and socio-cultural influences on the willingness to bear risk. It also rejects the neoclassical production function and with it the entire marginal productivity theory of income distribution, offering alternative macro economic theories. The theory of the Cambridge school is, therefore, both a theory of income distribution and a theory of growth, in which one of the unique features is its incorporation of a "Keynesian" theory of income distribution.

Growth theories raise the following questions: (1) How and under what conditions can transformation take place? (2) How is the vicious circle of poverty broken and energies of sustained growth released? (3) They should explain the phenomenon of change, mention the conditions, which favour as well as hamper economic growth and indicate the requisites for maintaining a steady rate of growth, once it has started. (4) They should give us a better insight into the reasons why some countries of the world continue to remain poor, while others have experienced a rapid rise in incomes. The study of economic development includes in itself the causes and removal of poverty and backwardness of nations. It is now an established fact that poverty like peace is indivisible and poverty anywhere is a grave threat to prosperity everywhere. Meier and Baldwin have remarked aptly in this connection: "Maintaining development is a problem for rich countries, but accelerating development is an even more pressing matter for poor countries". A study of "Poverty Nations" has even more urgency than the study of the "Wealth of Nations". Adam Smith, David Ricardo, Thomas Robert Malthus. Karl Marx, Joseph A. Schumpeter and a host of economists have contributed to the development of growth theories.

The basic ideas of these writers in the matter of economic growth relate to the following: (a) Saving and capital accumulation; (b) Development of technology, (c) Role of the entrepreneur; (d) Importance of demand and expanding market; (e) Institutional factors; (f) The decline of capitalism.

The process of economic growth is concerned with the means by which an economy achieves successfully higher levels of productive capacity. The important factors that stimulate this process can be classified into the following categories; (a) Fundamental factors; (b) Socio economic factors (c) Intermediate factors.

The fundamental factors are those, which attempt to define the potential for production of any economy in a fundamental sense. They include such factors as (i) the quantity and quality of natural resources (ii) the quantity and quality of real capital (iii) quantity and quality of the labour force and (iv) the level of technological attainment of the society.

The socio-economic factors are those, which are related to the socio- economic structure of the society. These include: (i) the competitive nature of an economy (ii) the dominant forms of business organization (iii) the distribution of income and wealth (iv) the sociological and cultural structure.

Intermediate factors refer to those factors, which enter into the determination of the level of aggregate demand.

All these factors, apart from numerous other variables determine the change in potential productive capacity of the economy as well as the utilization of that capacity.

The productive capacity, given the inputs of factors is determined by the use of appropriate productive functions. The models of economic growth draw greatly upon one or the other productive function as it explains the relationship between output and different factor inputs. Of various production functions, the following two have been very widely used: (1) the Cobb-Douglas (C-D) Production Function; (2) The Constant Elasticity of Substitution (CES) Production Function.

1.4: ROSTOW'S STAGES OF ECONOMIC GROWTH

Professor W.W. Rostow, an eminent economic historian and a specialist on economic development has analyzed the process of economic growth and advocated the stages through which an economy passes to become developed. Prior to Rostow, approaches to development had been based on the assumption that 'modernization' was characterized by the western world (wealthier, more powerful countries at the time), which were able to advance from the initial stages of underdevelopment. Accordingly, other countries aspiring for a 'modern state of capitalism and liberal democracy should model themselves after the West,. Using these ideas, Rostow penned his classic 'Stages of Economic Growth' in 1960.

Rostow relates social and institutional factors with economic forces of growth through a number of observable propensities of the community, viz., (1) Propensity to develop fundamental science, (2) Propensity to apply science to economic needs, (3) Propensity to accept innovations, (4) Propensity to seek material advance, (5) Propensity to consume, and (6) Propensity to have children. These propensities depend on the attitudes, motives and aspirations of the people, which in turn, depend on the previous political, economic and social factors. The use of these propensities to explain the quantity and quality of labour and capital available in an economy involves a frank abandonment of the effort to make economic behaviour solely a function of what are conventionally regarded as economic motives. Thus according to Rostow, economic development ultimately depends upon both economic and non-economic factors.

Rostow's model asserted that all countries exist somewhere on this linear spectrum and climb upward through five stages in the development process. They are:

1. The Traditional Society: The structure of the traditional society was based on the primitive technology and orthodox ideas of the people. The facilities of modern science and technology were altogether absent. All economic activities in such societies were carried on with simple tools and implements, and were confined only to meet the domestic needs. All the pre-industrial revolution societies can be termed as traditional societies. Agricultural production was the main occupation and this was done mostly to suit the needs of the household with available primitive tools. The attitude of the people was very conservative and adverse. They were interested in spiritual and religious aspects of the world rather than material or physical world. The structure

of such a society was hierarchical in character and it functioned according to the whims and wishes of the rich aristocrats and big landlords.

In short, it is a society that is characterized by primitive methods of production in agriculture, absence of modern science and technology, and operation of the law of diminishing returns in agriculture. The structure of the society is based on inheritance, concentration of political power in the hands of big landlords and population growth along the Malthusian line.

2. The Pre-Conditions for Take-Off: According to Rostow, pre-conditions for take-off is an era, when society 'prepares itself for sustained growth'. He further suggests that the pre-condition for take-off requires radical changes in three non-industrial sectors. First, there should be expansion of social overhead capital i.e., development of transport, communication, roads, etc. Secondly, radical changes should take place in agriculture so as to increase its productivity. Thirdly, there should be an expansion of foreign trade. Foreign capital and technical know-how should be imported to sustain industrialization in the initial stages of development. The pre-condition for take-off requires evolution of modern science, development of technology, expansion of social overhead capital particularly transport, increasing agricultural productivity, widening the extent of the market and expansion of internal and external trade.

3. The Take-off: Self-sustaining growth, according to Rostow, happens in the take-off stage. He defines this stage as: "an interval during which the rate of investment increases in such a way that real output per capita rises, and this initial increase carries with itself radical changes in production techniques and the disposition of income flows, which perpetuates the new scale of investment and perpetuates thereby the rising trend in per capital output".

Prof. Rostow calls this a great watershed in the life of modern societies. Growth, as a matter of fact, becomes automatic during the stages of take-off. Modern writers call it by different names such as "big push", "initial push", "critical minimum effort", "great leap forward", etc.

Rostow has suggested the following three related conditions for making the growth process self-sustained: First, rise in the rate of productive investment from about 5 percent or less to over 10 percent of the national income or net national product. Secondly, the development of one or more substantial manufacturing sectors, with a high rate of growth. Thirdly, existence or quick

emergence of political, social and institutional framework which exploits the impulse to expansion in the modern sector. The potential external economy affects the take-off and gives to growth an on-going character.

Rostow also suggests that the leading sectors of the economy should be given more attention and should be developed. The emergence of the new political, social and institutional framework and organizing parties must be encouraged.

4. The Drive to Maturity: Rostow defines this stage as “the period when a society has effectively applied a range of modern technology to the bulk of its resources”. During this period, many technical changes take place and society reaches technical maturity. The process of industrial development gets differentiated when the new leading sectors gather momentum to supplant the old leading sectors. Here, economic maturity is reached when regular growth becomes the habit of every sector of the economy.

Rostow believes that the economy can attain technological maturity in sixty years after the beginning of take-off or forty years after the end of take-off. On the basis of such calculations, it has been predicted that the India economy may attain technological maturity by the year 2016 i.e., after the 12th Five Year Plan.

Rostow advocated three essential indicators of the drive to maturity situation. They are: (1) composition of working force (2) character of leadership changes, and (3) strive of the society to adopt new miracles of industrialization and advancement.

5. The Age of High Mass Consumption: After attaining maturity, the economy moves to the age of high mass consumption. According to Rostow, being fed up with the fruits of industrial maturity, people try to seek more leisure, increased, welfare, social security, etc. In other words, this is the period of consumer's sovereignty. According to the dynamic theory of production, the level of income rises in each stage of growth of the economy. This is explained in the following figure.

In the figure, time is indicated on the X-axis and income on the Y-axis. In the beginning the growth of income curve is very slow. The income curve starts rising slowly in the period of pre-conditions for take-off. The increase in income is attributed to various economic and social changes. During the take-off period, the curve rises rapidly till it reaches the point S. The curve gets flatter after this point. After the attainment of maturity, the rate of progress slows down. The slow progress of income can be checked if new stimulants are injected into the economy. This income growth curve is popularly known as the 'Gompertz Curve'.

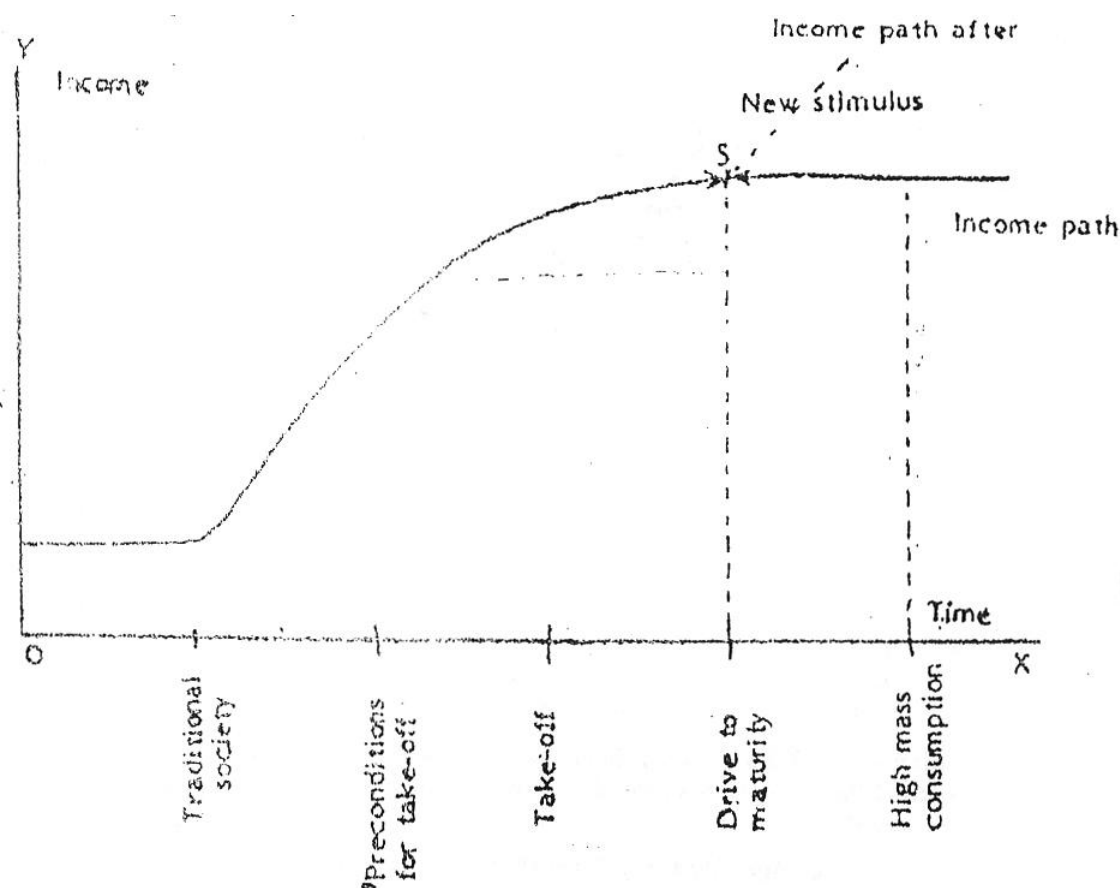


Fig: Rostow's stages of economic growth

Critical Appraisal: Though the efforts of Rostow in implementing stages of economic growth were acclaimed in general, yet these were also criticized on the following grounds:

- 1) The sequence of stages as given by Rostow is unwarranted as the economic system is like that of a human system. Moreover we cannot predict accurate results at any stage and to say that it would lead to the next stage in the prescribed time limit is just thoughtless.
- 2) The pre-condition stage shows overlapping effects as it is not essential that it must precede the take-off.
- 3) The selection of historical dates about the period of take-off to sustained growth is vague, purely intuitive and subjective and hence it is dangerous to rely upon them.
- 4) Rostow's analysis being of poor reasoning may not help economies to take to sustained growth.
- 5) The capital-output ratio advocated by Rostow does not lead us anywhere.
- 6) The thesis of Rostow laying emphasis on increasing importance of the leading sectors has not been found practically viable.
- 7) Pre-conditions for take-off do not occur first in time.
- 8) Puzzling and misleading is the stage of sustained growth as no growth is purely self-sustaining.
- 9) Prof. Ian Drummond's view is that stages, specially the take-off, are inherently plausible. Moreover the stages are not defined with sufficient precision.
- 10) Prof. Higgins feels that Rostow's theory is very general and indeed far from a right and systematic theory of economic development.

However, Rostow deserves praise and complements due to his unique attempt to include non-economic factors in his analysis of economic growth. Thus, the study of Rostow's stages of economic growth has become imperative, analytical and preconditional step to the study of modern economic growth.

1.4.1: Importance of Take-Off for Underdeveloped Countries

Now we will discuss how the take-off stage helps industrialization in the underdeveloped countries. The concept of take-off carries some important messages for these countries attempting to accelerate their economic growth. They are:

First, the underdeveloped countries should make all possible endeavours to raise savings and capital formation for accelerating economic development.

Secondly, the underdeveloped economies should concentrate on the growth of one or more leading sectors which could stimulate development activities.

Thirdly, most of the underdeveloped countries are caught in the web of traditional values, patterns and attitudes. The traditional social system tends to minimize the importance of economic incentives, material rewards and rational calculations. In such a situation, the take-off stage stresses on the institutional changes in social structures for removal of inhibiting institutions and values.

To cite Prof. Dasgupta, “The term lacks precision and yet it is suggestive and can be given interpretation which is useful for an understanding of the process of economic development of an underdeveloped country. It is indeed the vagueness of the term that gives it strength for one can put an interpretation upon it to suit the conditions of the economy in which one is interested.”

Prof. Higgins writes, “It is with both the problems and the cyclical movements of national income in such growing economies in the fourth stage that the bulk of modern theoretical economics is concerned. The students of the contemporary underdeveloped countries are more likely to be concerned with the economics of the first three stages. If we are to have a useful and adequate theory of economic growth, it must obviously be comprehensive enough to embrace these three stages as well, especially the economics of take-off. Thus the concept of take-off is more suitable for the industrialization of poor countries.”

1.4.2: Take-Off and India

It has been a debatable topic, whether the Indian economy is following Rostow’s stages of economic growth path and has entered the stage of take-off. We may thus analyse its performance of Indian economy as follows:

Firstly, according to Rostow, one of the important conditions for take-off is raising of saving and investing ratio from 5 per cent or less to over 10 per cent of national income and maintaining it for two or more decades. Corresponding to this perception, in India the ratio of investment to national income increased from 5.5 per cent in 1950-51 to 10.4 per cent in 1964-65 at 1960-61 prices and the ratio of domestic savings to national income from 5.5 per cent to 10.5 per cent.

Thus, India entered the take-off stage in 1950-51 and can be definitely said to have taken-off in the year 1964-65 when both savings and investment ratios were above 10 percent.

Secondly, as Rostow had advocated, another condition for take-off is the development of one or more leading sectors in the economy. By 1964-65 the Indian economy witnessed considerable development of agricultural, industrial and tertiary sectors. To illustrate, the index of agricultural production (with June 1950 as the base) rose from 45.6 in 1950-51 to 158.4 in 1964-65 and the index of industrial production, (with 1956 as the base) from 73.5 to 186.9 over the corresponding period. Thus, India also seems to fulfill this condition of take-off.

Thirdly, as per another take-off condition, in India planned development has generated the cultural framework that leads to expansion of the modern sector. The skills and attitudes of people are undergoing changes, modern technology is permeating the traditional society and the administrative efficiency and honesty have been showing signs of improvement.

But, there is no hard and fast rule for the presence of all the three conditions for take-off. Nor should we jump to the conclusion that India has definitely taken-off during the Third Five Year Plan on the basis of the existence of the three take-off conditions of Rostow. It appears that India has tried a premature take-off. Prof. Myint warns that a premature attempt at take-off 'can result not only in wastage of scarce resources wrongly or inefficiently invested but also in a sense of disappointment and frustration which may have far reaching psychological and political consequences'. This has probably happened in Indian as analysed below:

- (1) Between 1950-51 and 1964-65, India's net national income increased at a compound rate of 3.8 per cent per annum but per capita income in real terms increased at an annual average rate of 1.8 per cent, the rate of population growth being 2.5 per cent per year.
- (2) Estimates Committee of the Lok Sabha, in its ninth report revealed that there was nearly 80 to 90 per cent of unutilized capacity in some industries in 1965-66 and even in the case of priority industries, idle capacity was 40 per cent.
- (3) Further, the rate of domestic savings declined from 10.5 per cent in 1965-66 to 8.2 per cent in 1966-67 and to 8 per cent in 1967-68.
- (4) In addition to such trends, the existence of high inflationary pressures in the economy casts serious doubts about India having attained the take-off stage.

1.5: MARX'S STAGES OF ECONOMIC GROWTH

Karl Marx, the celebrated author of 'Das Kapital' (1867) is one of the few celebrities in history who cast a spell on hundreds of millions of people by his revolutionary thoughts. He has been epitomized as 'Marx, the Prophet' and is ranked with Christ and Mohammad if we are to judge him by the number of his followers. Marx predicted the inevitable doom of capitalism and it was on this prediction that communism has built its edifice. The Marxian analysis is the gravest and the most penetrating examination of the process of capitalist development. It had the greatest influence in shaping policies in the erstwhile Soviet Union, China, and other communist countries. However, our purpose here is to examine the Marxian process of economic development and not the Marxist system as a whole.

Marx's analysis of stages of growth is based on his 'materialistic interpretation of history', in which he attempts to show that all historical events are the result of a continuous struggle between different classes and groups in the society. According to him, the main cause of this struggle is the conflict between 'the mode of production' and 'the relations of production'.

Karl Marx introduced the theory of stages of economic development, which complemented his theory of class struggle. He categorized economic evolution into five stages: primitive communal, slave, feudal, capitalist and socialist. We will discuss them one by one.

1. The Primitive Communal Stage: The primitive communal stage is the first stage in the evolution of society. During this stage, man learnt to cultivate crops, raise livestock and make fire. The development of new tools and implements increased productivity of labour. Gradually the barter system began to develop when people started exchanging products and paying for work in kind. In this process of evolution, some producers began to produce more products than required for subsistence of the family. Appropriation of the surplus produce, provided scope for the exploitation of others. This paved the way for emergence of the slavery and slave society.

2. The Slave Stage: In the slave stage, the development of productive forces was based on the corresponding production relations. In these relations, the slave-owners owned both the means of production and the slave along with his produce. Gradually, with improved tools, implements and irrigation facilities, labour productivity in agriculture increased. Ore mining, weapon

making, ship building and cloth weaving also developed. This led to the growth of trade and commerce, and new towns grew up.

However, in the slave society, there existed domination, coercion, subjugation and exploitation of slaves by a few slave-owners. For sometimes slaves were used as the main productive force. But with the passage of time, the slave society's class structure led to conflict between the productive forces and the production relations. As a result, the exploited slaves rose against their enslavers which overthrew the entire structure of the slave society and on its ruins emerged the feudal system.

3. The Feudal Stage: In the feudal stage, the development of productive forces was based on feudal production relation where the feudal lord owned the land and the serfs were the main agents of production. The serfs worked like slaves for the feudal lord. Productive forces continued to develop and there was an increase in productivity of agriculture, textile and paper manufacturing units etc. This led to more intensive division of labour and specialization leading to higher labour productivity. The manufacturing process further developed with growing demand for manufactured products.

But, feudalism gave rise to two types of class struggle: one, between the serfs and feudal lords; and two, between the proletariat and urban bourgeoisie. This led to revolutions which replaced the feudal relations of production with capitalistic system.

4. The Capitalistic Stage: Industrial Revolution led to generation and spread of scientific ideas and introduction of new technology in many sectors. Technological improvements initially benefited agriculture resulting in increased productivity. This led to displacement of labour from agriculture and their shifting to manufacturing sector. Agricultural activity was located in the rural areas whereas textile and mineral companies were located in urban areas. This led to shift of population from rural areas to urban areas.

In this society, the capitalist owns the means of production and uses them for profit. The labour had to work for the capitalist and sell his labour power. The labourer was poor and his labour was perishable. In the bargaining process he was helpless vis-à-vis the Capitalist who exploited him mercilessly. Thus the capitalist forces the labourer to work for longer hours. He is paid

subsistence wage and for the extra hours he works, he receives nothing. Marx calls it “surplus labour” and this leads to “surplus value” which increases the capitalist’s profit. Gradually, to raise the surplus value or profit, the capitalist brings about technological changes which increases labour productivity and increases output with a lower cost of production. In the next stage, the emergence of big enterprises, called monopolies introduced labour saving machines to replace labour in order to earn high profit.

This process of replacing labour by machine creates an “industrial reserve army” (i.e., the unemployed workers) which increases with the growth of capitalism. Ultimately, capitalism leads to a fierce class struggle between the proletariat and the bourgeoisie. This is the economic basis for the revolutionary transformation from capitalism to socialism.

5. The Socialist or, Communist Stage: The last stage is communism which is brought about by the proletarian revolution whereby the “dictatorship of the proletariat” is established. According to Marx, in this stage, the state will “wither away” and each individual will contribute to the national product according to his ability and receive according to his needs.

Under the socialist system, the means of production are owned and regulated by the state. There is no class struggle, neither the exploiter nor the exploited exist. The entire production and distribution is controlled and regulated by a central planning authority for public welfare.

1.6: ROSTOW VS. MARX

Rostow presented his Stages of Economic Growth as an alternative to Marx’s stages. He described his Stages of Economic Growth as a “Non-Communist Manifesto” as against Marx’s “Communist Manifesto”.

Thus, it is interesting to note certain similarities between Rostow's stages of growth analysis and the Marxian analysis of the historical evolution of an economy.

1. Both view, how the whole society evolves, from an economic perspective.
2. Both accept the fact that economic changes have social, political and cultural consequences.

3. Both accept the reality of group and class interests are linked to economic gains in the political and social process.
4. In terms of economic technique, both analysed sectoral growth process, although Marx confined himself to consumption goods and capital goods sectors, while the stages of growth are rooted in a more disaggregated analysis of leading sectors which flows from a dynamic theory of production.
5. Both the theories would pose, in the end, the goal of true affluence for human society.

However, there are also certain differences between the two approaches, which are noted below:

1. The most fundamental difference between the two analyses relates to the view taken regarding human motivation. Marx interpreted human behaviour only in economic terms. Economic factors, according to him, constitute the most potent sources of human motivation. Marx reduced the complexities of man to a single economic dimension. According to Marx profit-maximization is the only dominant motive of man in his economic activities. On the other hand, Rostow's stages of growth analysis is, no doubt, an economic way of looking at the whole society, yet it does not ignore the non-economic influences. Man is viewed as a complex entity, subject to a number of social, political, cultural and emotional influences.
2. From the above it follows that Marx considers behaviour of the society as determined by economic considerations. But, Rostow's analysis does not accept that view. In Rostow's view, cultural, social and political forces, and others, also influence the performance of a society. Even economic performance is conditioned by the above forces.
3. A contrast between Rostow's analysis of post-traditional and Marx's post-feudal phases of capitalism is also worth noting. Marx held that the decisions of capitalist societies are made under free-market conditions and profit motive. The Marxian analysis fails to explain the emergence of a welfare state. But Rostow's analysis of the breakdown of traditional societies is based on convergence of motives of private profit in the modern sectors with a new sense of affronted nationhood.
4. As per The Marxian analysis, history moves forward by the clash of conflicting interests and outlooks. According to Rostow, however, "the outcome of conflict in a regularly

growing society is likely to be governed by ultimate consideration of communal continuity."

5. Marx's analysis of history was based only on the experience of British take-off and drive to maturity. At that time, no other country had reached the take-off stage. By generalizing the British case, Marx missed the variety of experience in the evolution of different societies. This makes the Marxian historical sequence unduly rigid and artificial. According to G.M. Meier, Rostow's analysis can claim to be a superior alternative to the Marxian sequence. Rostow's stage theory helps us "to isolate the strategic factors that constitute the necessary and sufficient conditions for determining the transition of an economy from a preceding, stage to a succeeding stage."
6. Cairncross holds that, Rostow like, Marx, adopts a stage approach to history, but he has failed to show how the major variables of social and economic development operate in different situations. He says, "he (Rostow) is perhaps too anxious like Marx to dramatize history not merely to make it dramatic and give it meaning but to reduce it to a set pattern to compare the texture of events into too narrow a framework of logic. An approach to history in these terms may make good drama or supply the element of myth required for a popular manifesto; but it does not make good theory or, for that matter, good history."
7. Again in the opinion of Cairncross, one of the greatest weaknesses of stage approach to history is that it provokes, but cannot answer the question that comes next. The engine of growth in the Marxist system is assumed to break down completely when capitalism fulfils its destiny. Marx has nothing to say about the laws of motion of a post-capitalist society. In Rostow's exposition, the last but presumably not the final stage is an era of high mass consumption. Although he broods on what lies beyond affluence he cannot tell us what comes next.

1.7: SUMMARY

In this chapter, we discussed the concept and measures of economic growth with an understanding of the basic difference between economic growth and development. This chapter also gave you a brief overview of the background of growth theories. We also discussed about the various stages of economic development that are essential to understand the process of

economic development and ended the chapter with comparison between the Rostow's stages of growth with that of the Marx.

1.8: KEY WORDS

Growth: It is a normative and quantitative concept which signifies sustained increase in output of goods and services over a long period of time.

Development: It is a wider concept which encompasses growth plus change. It not only reflects the changes in output, but also states the technical and institutional arrangements by which the output is produced.

Materialistic Interpretation of history: This famous concept was coined by Marx and it explains the application of the principles of dialectical materialism to the growth of the society. This term has been used by him to explain that all historical events that have been influenced by economic conditions.

Take-Off Stage: It is an interval during which the rate of investment increases in such a way that real output per capita rises and this initial increase is accompanied by radical changes in production techniques and disposition of income flows, which perpetuates the new scale of investment, and perpetuates thereby the rising trend in per capita output.

1.9: SELF-ASSESSMENT QUESTIONS

1. Distinguish between economic growth and economic development. As between per capita income and national income, which would you consider as the more reliable indicator of economic growth?
2. Explain some basic measures of economic development.
3. What are the five stages of growth in Rostow's theory and what are the general characteristics of these stages?
4. Critically examine Rostow's theory of growth.
5. Explain the concept of take-off. Discuss whether Indian economy has achieved the stage of take-off.
6. Give an assessment about the Marxian stages of economic growth.

7. Distinguish between Rostow's stages of growth analysis and Marxian analysis.

1.10: FURTHER READINGS

- 1) Meier, Gerald M. and Rauch, James E (eds.) (2000). *Leading Issues in Economic Development*. (7th edition), Oxford University Press, Oxford.
- 2) Bardhan, Pranab, and Udry, Christopher (1999) *Development Microeconomics*. Oxford University Press, Oxford.
- 3) Todaro, Michael P. and Smith, Stephen C. (2003). *Economic Development*. (8th edition) Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- 4) Thirlwall, A. P. (2006), *Growth and Development*, (8th Edition), Palgrave Macmillan.

CHAPTER-2: THEORIES OF ECONOMIC GROWTH

(KEYNESIAN AND POST KEYNESIAN)

STRUCTURE:

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Harrod-Domar Model
- 2.4 Robinson's Model
- 2.5 Mead's Model
- 2.6 Solow Model
- 2.7 Kaldor Model
- 2.8 Summary
- 2.9 Key Words
- 2.10 Self-Assessment Questions
- 2.11 Further Readings

2.1: OBJECTIVES

This chapter tries to give you an overview of some important growth models. After going through this chapter you will be able to:

- Develop an integrated view of the Harrod and Domar model, and get a clear idea of the usefulness and limitations of this integrated model;
- Understand the concept of Golden-Age in Joan Robinson's growth model and its applicability to underdeveloped countries;
- Analyse the conditions of steady growth under Meade model of growth;
- Discuss the neo-classical model of long-run growth put forwarded by R. M. Solow and point out its difference with Harrod-Domar model; and
- Explain Kaldor model of distribution.

2.2: INTRODUCTION

After the publication of Keynes' General Theory in 1936, a number of growth theories appeared in economic literature. These theories have tried to study the process of economic growth unfolding the past especially within the free market framework. These theories of economic growth are also referred to as growth models, by highlighting rigorously the quantitative interrelationships among the critical variables in the growth process. The earliest model was formulated by Harrod and Domar which is also known as fixed-proportion theory. Both developed their theories as a reaction to Keynes' analysis. The Harrod-Domar model is presented to you both as a unified model as well as separately the models of Harrod and Domar.

Further, the weakness of Harrod-Domar model led many economists to evolve theories, which allowed changes in labour and capital combination. Robert Solow was perhaps one of the first economists to work along these lines. This approach was further generalized and improved upon by economists like, Joan Robinson, James Meade and Nicholas Kaldor. Let us discuss these growth models in this chapter.

2.3: HARROD-DOMAR MODEL

R.F. Harrod and E. Domar have made a distinct contribution in evolving dynamic models to suit the changing conditions of an economy. Both the models are very similar and try to answer the questions posed by the post-Keynesians. In fact, one can say that Domar's model is the American version of Harrod's model or alternatively Harrod's model is the English version of Domar's model. Both these models stress on the conditions which are very essential for achieving and maintaining steady growth.

Like classical economists, Harrod and Domar assign a crucial role to capital accumulation and investment in the process of growth. Investment plays a double role. On the one hand, investment (through the operation of multiplier) generates income and on the other hand, it raises the productive capacity by enlarging the capital stock. In other words, investment affects the level of income as well as production. The effect of investment on income is known as 'multiplier effect' and that on production is known as 'Productivity Effect' or 'Sigma Effect'. Multiplier effect is the Keynesian tool and productivity effect is the classical tool. Harrod-Domar

analysis takes into consideration both the tools. In short, Harrod-Domar model strikes a synthesis between the multiplier effect and the productivity effect. The simultaneous operation of these two effects is an essential condition for dynamic equilibrium.

Assumptions: The main assumptions of the Harrod-Domar model are as follows:

1. An initial full-employment level of income has already been achieved.
2. There is no government interference in the functioning of the economy, i.e., the policy of laissez-faire prevails.
3. The model is based on the principle of “closed economy”, i.e., there are no exogenous factors or forces influencing the growth variables of the economy. In short, government restrictions on trade and the complications caused by international trade are ruled out.
4. There are no lags in adjustment, i.e., the economic variables, such as saving, investment, income and expenditure adjust themselves in the same period of time. To make it clearer, it can be stated that any change in saving brings about corresponding changes in the level of investment in the same period of time. All these variables relate to the same period of time.
5. The average propensity to save (APS) and the marginal propensity to save (MPS) are equal to each other. In other words, $APS = MPS$ or $\frac{S}{Y} = \frac{\Delta S}{\Delta Y}$; i.e., the absolute change in saving is equal to the relative change in saving.
6. Propensity to save and “capital coefficient” (i.e., capital-output ratio) are constant. The law of constant returns operates in the economy because the capital-output ratio is assumed constant.
7. Income, investment and saving are all defined in the net sense, i.e., they are over and above depreciation. In other words, depreciation charges are not included in these variables.
8. Saving and investment are equal in ex-ante as well as ex-post sense, i.e., there is accounting as well as functional equality between saving and investment. The equality can be expressed as:

$$S_0 = I_0 \quad (\text{accounting equality})$$

$$S_e = I_e \quad (\text{functional equality})$$

S_o and I_o are observed saving and observed investments respectively.

S_e and I_e are expected saving and expected saving and expected investment respectively.

These assumptions are made just to simplify the solution of dynamic analysis, but these can be relaxed whenever necessary.

1. Domar's model

Domar's analysis shows that he is very emphatic about the necessity of viewing growth from the demand as well as the supply side. He is of the opinion that pre-Keynesian analysis emphasized the capacity (supply side) of the problem and the Keynesian approach concentrated on the demand side alone. But his emphasis on the dual character of the investment process makes the approach to the equilibrium rate of growth from investment (capital) point of view more promising. Investment increases the productive capacity and also generates income, thus providing us both the sides of the equation, the solution of which yields the required rate of growth.

The following symbols are used in Domar's model:

Y_d = level of net national income or level of effective demand at full employment (demand side)

Y_s = level of productive capacity or supply at full employment level (supply side)

K = real capital

I = net investment, which results in the increase of real capital i.e., ΔK

α = marginal propensity to save, which is the reciprocal of multiplier i.e., $\frac{1}{\text{multiplier}}$

σ = sigma or productivity of capital or of net investment.

It would be interesting to explain Domar's model with the help of equations used by K.K. Kurihara and the above notations are used in the equations given below:

$$Y_d = \frac{I}{a} \quad \dots(1)$$

This equation explains (i) that the level of effective demand (Y_d) is directly related to the level of investment (I). Any increase in the level of investment will directly increase the level of effective demand and vice versa. (ii) The effective demand is inversely related to the marginal propensity to save (α). Any increase in MPS (α) will decrease the level of effective demand and vice versa. This is the demand side.

$$Y_s = \sigma.K \quad \dots (2)$$

This equation explain that the supply of output (Y_s) at full employment depends upon two factors i.e., productive capacity of capital (σ) and amount of capital (K). Any increase (decrease) in any of these factors will raise(reduce)the supply of output. If the productivity of capital (σ) increases, that will favorably affect the supply. Similar will be the effect of real capital on supply of output. This is the supply side.

For equilibrium, the demand and supply should be equal. Therefore,

$$Y_d = Y_s$$

$$\frac{I}{a} = \sigma.K \text{ or, } I = \alpha.\sigma.K \text{ (by cross multiplication)} \quad \dots(3)$$

This is the condition for ‘‘achieving the steady growth’’. Now we proceed further to explain the condition for maintaining the steady growth. For that we have to add increments to demand as well as the supply equations discussed above. The demand and supply equations in the incremental form can be written as follows:

$$\Delta Y_d = \frac{\Delta I}{a} \quad \dots (4)$$

Increments have been shown in the level of effective demand and investment, because they are variables, but increment has not been shown in ‘ α ’ because it is assumed to be constant on the basis of the assumptions employed.

$$\Delta Y_s = \sigma . \Delta . K \quad \text{..... (5)}$$

Change in the supply of output ($\Delta . Y_s$) can take place because of change in real capital (ΔK), as the productivity of capita (σ) remains constant. Moreover the change in real capital is equal to net investment. Therefore,

$\Delta K = I$. Substituting the value of ΔK in equation (5) we get,

$$\Delta Y_s = \sigma . I \quad \text{.....(6)}$$

The equality between equations (4) and (6) will provide us the condition for the maintenance of steady growth. Equating these two equations (4) and (6) we get,

$$\Delta . Y_d = \Delta . Y_s \quad \text{or,}$$

$$\frac{\Delta I}{a} = \sigma . I \quad (\text{cross-multiplying we get})$$

$$\frac{\Delta I}{I} = \sigma . a$$

This shows that the rate of growth of net investment $\left(\frac{\Delta I}{I} \right)$ should be equal to the product of marginal propensity to save (α) and the productivity of capital (σ). This equality must be ensured to maintain the stable and steady growth of the economy. In Kurihara's words, "It is an increase in productive capacity (ΔY_s) due to increment of real capital ($\Delta . K_d$), which must be matched by an equal increase in effective demand (ΔY_d) due to an increment of investment (ΔI), if a growing economy with an expanding stock of capital is to maintain continuous full employment". So, the essential and sufficient condition for maintaining the steady growth of an expanding economy is

$$\frac{\Delta I}{I} = \sigma . a \quad \text{or,} \quad \frac{\Delta Y}{Y} = \sigma . a \left(\because \frac{\Delta Y}{Y} \text{ is also equal to } \frac{\Delta I}{I} \right)$$

In the words of Meier and Baldwin, “The answer to the problem of what rate of growth is necessary to maintain continuous state of full employment is that, investment and real income must grow at a constant annual percentage rate (or compound interest rate) equal to the product of the propensity to save and the average productivity of investment (the inverse of capital coefficient or accelerator)”.

Domar’s equation of steady growth rate can be explained with the help of a numerical example. Suppose the productivity of capital (σ) is 25 percent and the marginal propensity to save ‘ α ’ is 12 percent then the growth rate of investment $\left(\frac{\Delta I}{I}\right)$ would be equal to $\sigma.a$ i.e., $\frac{25}{100} \times \frac{12}{100} = \frac{3}{100}$ or, 3 percent. Thus income or investment must grow at the annual rate of 3 percent if full employment growth rate or steady growth rate is to be maintained. In brief, “full employment requires that investment and income grow at a constant annual relative (or compound interest) rate equal to the product of the propensity to save and the average productivity of investment”.

Path of Disequilibrium: If the investment grows at a constant rate ($\sigma.a$), the productive capacity, although continually growing, will be fully used. On the other hand, if investment grows at a higher or lower rate than ($\sigma.a$), and the following two types of situations will arise:

- (i) When $\frac{\Delta I}{I}$ or, $\frac{\Delta Y}{Y} > \sigma.a$
- (ii) When $\frac{\Delta I}{I}$ or, $\frac{\Delta Y}{Y} < \sigma.a$

Under the first situation, inflation will appear in the economy because higher rate of income will provide greater purchasing power to the people. This will result in the expansion of demand, leading to the emergence of inflation as the productive capacity ($\sigma.a$) will not cope with the increased level of income or investment. The first situation will, therefore create inflation in the economy.

The second situation, under which growth rate of income or investment $\left(\frac{\Delta Y}{Y} \text{ or } \frac{\Delta I}{I}\right)$, is lagging behind the productive capacity will result in overproduction. Lesser income growth will put a constraint on the purchasing power of the people, thus reducing the level of demand and resulting in overproduction.

Under these situations, maintenance of stable and steady growth is impossible and economy will be under constant strain of either inflation or overproduction and unemployment. The state of disequilibrium can be explained with the help of the following Figure 1.

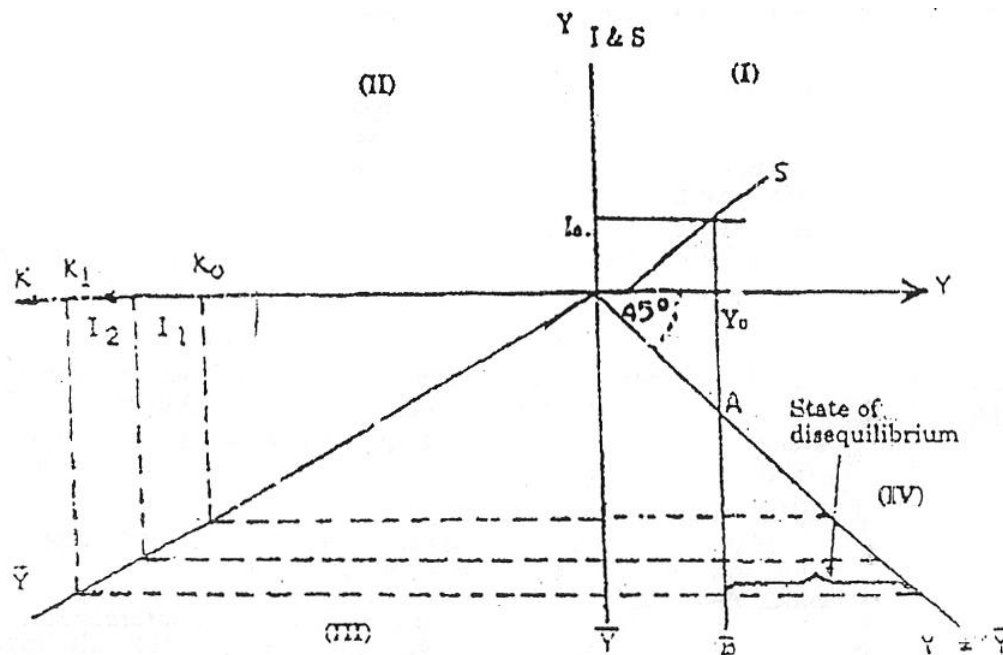


Fig. 1

In the above Figure-1, income (Y) is shown on the right side of the origin on X axis, and capital stock (K) on the left side of the margin. Saving and investment (S and I) are shown on the Y axis above the origin and the productive capacity (\bar{Y}) on the Y axis below the origin.

In the first quadrant (I), the level of income Y_0 is determined by saving- investment equality, which is essentially a Keynesian approach. We start with the initial capital (K_0) and the successive doses of investment are shown as I_1 and I_2 , which take place in the successive

periods. Due to successive doses of investment, initial capital K_0 will grow towards K_1 as shown in the diagram. In the third quadrant (III), we have shown the relationship between capital stock and productive capacity. In Domar's model, we have already discussed that productive capacity is proportional to capital i.e., $\bar{Y} = \sigma.K$. So, with the continuous increase of capital stock from K_0 to K_1 , the productive capacity rises correspondingly. The increase in productive capacity raises the level of income too. But in this case the level of income is sticking at Y_0 and (as shown in the first quadrant), the productive capacity is continually growing because of the successive doses of investment. If the initial situation were one of full use of capacity (point A), the growth of idle capacity (or the state of disequilibrium) can be measured by the horizontal distance between the line AB and 45° line $Y = \bar{Y}$. This disequilibrium would disappear, if the level of income does not stick to Y_0 , but increases with the increase in level of investment.

2. Harrod's Model

So far we have discussed Domar's model, which explains the conditions for achieving and maintaining the dynamic equilibrium. Harrod's growth model also concentrates on these issues. Broadly speaking, R.F. Harrod has raised three sets of issues:

- (i) How can steady growth rate be achieved in the model with a fixed capital-output ratio (capital-coefficient) and the fixed saving income ratio (propensity to save)?
- (ii) How can the steady growth rate be maintained? Or, what are the conditions for maintaining the stable growth?
- (iii) How do natural factors put a ceiling on the growth rate of the economy?

In order to discuss these three sets of issues, Harrod has explained three growth rates. These growth rates are: (i) Actual growth rate, (ii) Warranted growth rate, and (iii) Natural growth rate. Now we discuss these growth rates separately.

(i) Actual Growth Rate: It is the growth rate, which is determined by the actual amount of saving and investment in the country. In other words, it can be defined as the ratio of change in income (ΔY) to the total income (Y) in a given period. If the actual growth rate is denoted by G ,

then $G = \frac{\Delta Y}{Y}$. According to Harrod, actual growth rate G is determined by two factors, saving-income ratio and capital-output ratio, which remain fixed in a given period. The relationship between the actual growth rate and its determinants can be expressed in the form of an equation given below:

$$GC = s \quad \dots\dots(1)$$

Where, G is the actual rate of growth, C represents the capital output ratio or $\frac{\Delta K}{\Delta Y}$, and 's' refers to the saving-income ratio $\left(\frac{S}{Y}\right)$. This equation explains the simple truism that saving and investment (in the ex-post sense) are equal to each other. This simple truism is explained below:

$$\text{Since } G = \frac{\Delta Y}{Y}, C = \frac{\Delta K}{\Delta Y} = \frac{I}{\Delta Y} \quad [\because \Delta K = I]$$

$$s = \frac{S}{Y}$$

Substituting the values of G , C and s in equation (1), we get

$$\frac{\Delta Y}{Y} \times \frac{I}{\Delta Y} = \frac{S}{Y}$$

$$\frac{I}{Y} = \frac{S}{Y} \text{ or, } I = S.$$

Thus, equation (1) explains that the condition for achieving the steady growth rate or dynamic equilibrium is that ex-post saving must be equal to ex-post investment. In other words, there should be accounting equality between saving and investment, if dynamic equilibrium is to be achieved.

(ii) Warranted Growth Rate: Warranted growth rate refers to that growth rate of the economy, when it is working at full capacity by making full and optimum use of machine and manpower. It is also known as “full-capacity growth rate” or “full-employment growth rate” or “Potential

growth rate”. This growth rate is denoted by G_w and has been defined by Meier and Baldwin in these words, “ G_w is interpreted as the rate of income growth required for the full utilization of a growing stock of capital, so that entrepreneurs will be satisfied with the amount of investment actually made.”

Warranted growth rate (G_w) is determined by two factors, capital-output ratio and saving-income ratio. The relationship between the warranted growth rate and its determinants can be expressed in the form of an equation.

$$G_w \cdot C_r = s$$

Where G_w refers to warranted growth rate, C_r denotes the amount of capital required to maintain the warranted growth rate or the growth rate of output, and s the saving-income ratio.

Having discussed the two rates of growth (i.e., actual and warranted), we now discuss the issue as to how to achieve the steady growth. According to Harrod, the economy can achieve stable growth if $G = G_w$ and $C = C_r$ i.e., actual growth rate must be equal to the warranted growth rate. In other words, growth rate of income must be equal to the growth rate of output. Secondly, the capital-output ratio needed to achieve G , must be equal to the required capital-output ratio to maintain G_w , given the saving coefficient (s). This amounts to saying that actual investment (ex-post investment) must be equal to the expected investment (ex-ante investment), if an economy were to achieve the objectives of stable growth.

Instability of Growth

We have just discussed that the stable growth of economy requires equality between G and G_w on the one hand, and C and C_r on the other. But the reader should bear in mind that this type of equality is rarely found in the economy, howsoever planned and regulated it may be. Harrod analyses this situation when these conditions are not satisfied.

- (i) When $G > G_w$ then $C < C_r$

(ii) When $G < G_w$ then $C > C_r$

Proof:

$$GC = s \qquad G_w C_r = s$$

or

$$G = \frac{s}{C} \qquad G_w = \frac{s}{C_r}$$

If, $G > G_w$

$$\frac{s}{C} > \frac{s}{C_r}$$

or

$$\frac{1}{C} > \frac{1}{C_r}$$

Cross multiplying, $C_r > C$ or $C < C_r$

Similarly it can be proved, when $G_w < G$ then $C > C_r$.

We take up the discussion of the first situation when G is greater than G_w . Under this situation the growth rate of income being greater than the growth rate of output, demand for output (because of higher level of income) will exceed supply of output (because of lower level of output) and the economy will experience chronic inflation. It can be explained in another way too when $C < C_r$. Under this situation the actual amount of capital falls short of the required amount. This will lead to deficiency of capital, which in turn would adversely affect the volume of goods to be produced. Full in the level of output will result in scarcity of goods and hence inflation, and growth of the economy under inflation can never be stable.

If, on the other hand, when G is less than G_w , the growth rate of income will be less than the growth rate of output. Under this situation there would be more goods for sale, but income would

not be sufficient to purchase those goods. In Keynesian terminology we can say, that there would be deficiency of demand and the economy will face the problem of chronic deflation. This situation can also be explained when C is greater than C_r . Under this situation, the actual amount of capital is more than the required amount of capital for investment. When the capital available is more, it would dampen the marginal efficiency of capital and lead to chronic depression and unemployment. Thus growth of the economy under the situation of chronic depression can never be stable.

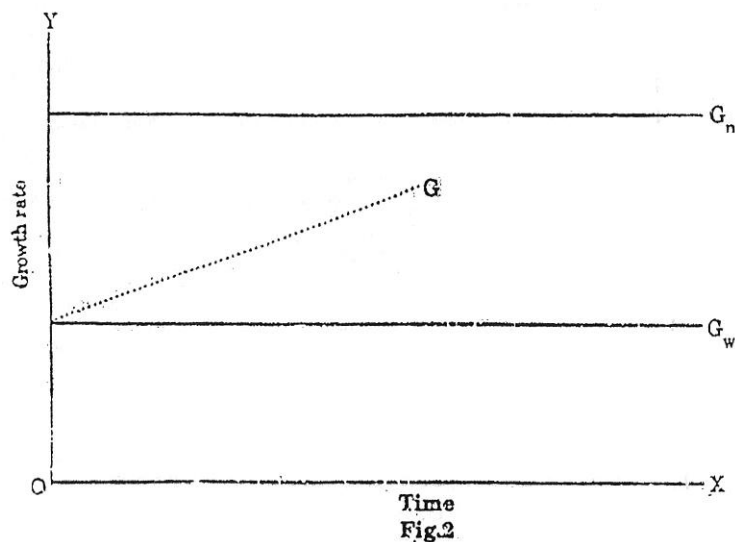
On the basis of the above discussion, we can conclude that stable growth or steady state growth can occur only when $G = G_w$. Any deviation of G from G_w will result in cumulative departure from the path of steady growth. In other words, the economy will be in a state of instability when G and G_w are not equal to each other. The equilibrium between G and G_w is called “Steady-state” equilibrium or “Knife-edge” equilibrium.

Harrod also states that deviation of G from G_w are unstable. If G departs from G_w , then it will depart farther and farther from it as departure from the path of steady growth is self-sustaining. It feeds on itself. In contrast, if G is less than G_w , then desired saving would exceed desired investment, the entrepreneurs will be pessimistic about the future and they will keep the level of output below G_w , which would further retard growth.

(iii) Natural Growth Rate: If it is assumed that propensity to save or capital-output ratio does not change what will stop income from shooting up or down without limit? Harrod points out that generally there is an upper limit to the expansion of output, which is determined by natural conditions such as size of the labour force, natural resources, capital equipment and state of technical knowledge. This limit is called “Full employment ceiling”. This upper limit may change as the factors of production grow, and technological progress takes place. Harrod calls the growth in this upper full employment ceiling the natural growth rate. In other words, it is the maximum growth rate, which an economy can achieve with its available natural resources. Natural growth rate is denoted by G_n .

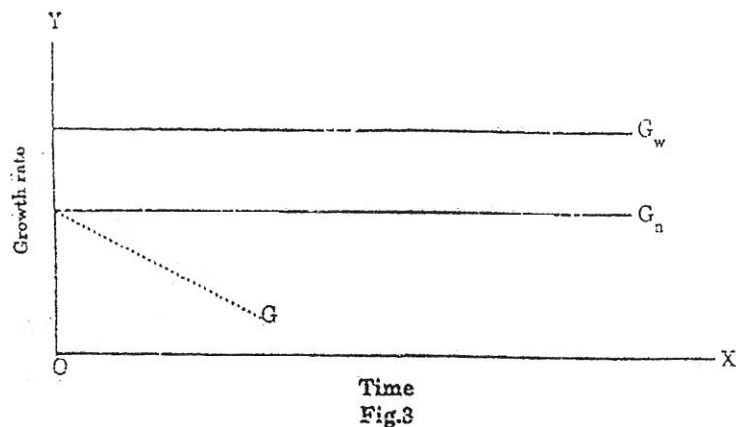
Interaction of G , G_w , G_n

While discussing the interaction of three rates of growth, Harrod points out that in the years after recession G may be higher than G_n for a considerable period of time, but will not continue to rise indefinitely. When G (actual growth rate) is higher than G_w (warranted growth rate), there is continued expansion until G_n is reached. In other words, the process of expansion cannot go on indefinitely as it is limited by the availability of natural factors. The ceiling fixed by labour and natural resources prevent further rise. This has been shown in the following Figure-2.



The economy cannot remain at the ceiling level: it has either to rise or fall.

When G touches G_n , G_w cannot lag behind, but will tend to catch up with it. Since the rate of rise of G cannot be maintained, G_n will exceed G and then the downtrend starts. The downtrend will result in over-production, which in turn will lead to a cumulative downswing. The economy will face the problem of secular stagnation and chronic unemployment. This has been shown in the diagram (Fig 3). But this downtrend cannot continue indefinitely. The reason is that the lower limit of depression is set by the minimum consumption level. As the consumption level cannot fall below a minimum level, so the fixed capital too cannot fall though working capital may be reduced. In this way gross investment cannot be negative. This position combined with the investor's expectation for the bright future generated by the actual resources position, will gradually set the wheels of recovery in motion. The economy will once again be in the upward phase. This has been shown in Figure-3 below.



Analysis of Business Cycle

From the study of this model, it is quite evident that the process of growth of a capitalist economy is never steady because of its inherent characteristics. There cannot be a steady growth of income and output in such an economy and there will always be ups and downs in a capitalist economy. Therefore, cyclical fluctuations are implicit in the growth process in such an economy.

Business cycles are not free to vary without limit. In upward direction G_n provides a limit in the form of a “full-employment ceiling”, beyond which real income cannot expand in a short period because of the shortage of labour and capital. In the downward direction, there is also a limit set by a floor of autonomous investment, because gross investment cannot be negative.

Main Points: The main points of the Harrod-Domar analysis can be summarized as:

- (i) Investment is the centre of the problem of steady and stable growth because it plays a double role; on the one hand, it generates income and on the other, it increases the productive capacity of the economy.
- (ii) Increased capacity can result in greater output or greater unemployment, depending on the behavior of income.

- (iii) Conditions can be stated for the behavior of income that will allow full employment to be maintained over time. These conditions specify the growth rates which can ensure full-employment of labour and full utilization of capital stock.
- (iv) These conditions, however, designate only a steady line of growth for the economy. The actual growth rate may differ from the warranted rate of growth. If the actual growth rate is greater than the warranted rate of growth, the economy will experience chronic inflation. If the actual growth rate is less than the warranted growth rate, the economy will slide towards chronic deflation.
- (v) The business cycles are viewed as deviations from the path of steady growth. These deviations become self-aggravating and self-cumulating, but are limited in the upward trend by the “full-employment ceiling” and in the downward direction by the floor of autonomous investment and consumption.

Comparison between Harrod and Domar models

Now we discuss in what sense these models are similar and in what sense they are different.

Similarities:

- (i) Both the models are based on similar assumptions. It is for this reason that the names of Harrod and Domar are bracketed together in the context of growth models.
- (ii) Both the models employ the Keynesian saving-investment equality as the equilibrium condition for the steady growth in an economy.
- (iii) Harrod’s warranted growth rate G_w signifies the same thing as the product of marginal propensity to save (α) and the productivity of capital (σ) in Domar’s model. In other words, $G_w = \alpha \cdot \sigma$. Both these models stress that Knife-edge equilibrium path for an economy is highly unstable. It is due to the inherent characteristic of a capitalist economy.
- (iv) Both the models have been discussed in the context of advanced economies where capital is found in abundance. So, these models solve the problems of advanced economies rather than those of backward and poor economies.

Differences:

No doubt both the models have been evolved in a similar set of circumstances, yet slight differences between the two models are explained below.

- (i) Harrod and Domar have used marginal propensity to save in their models, but this is represented by different notations. In Domar's model, marginal propensity to save is denoted by ' α ' (Alpha- Greek letter) and in Harrod's model it is denoted by 's'. Both ' α ' and 's' are the propensities to save expressed as ratios.
- (ii) In Domar's model, productivity of capital is represented by ' σ ' (Sigma- Greek letter), which means that it (the output-capital ratio) is the inverse of capital-output ratio. In Harrod's model capital-output ratio is represented by C, which is less than one. So Domar's σ is equal to $\frac{1}{C}$ (reciprocal of C), in Harrod's model.

The only numerical difference between the two co-efficients is that one is the inverse of the other. This co-efficient belongs to the supply side and is known as the acceleration coefficient. When investors invest an additional amount in production, it accelerates increase in income. We shall not explain here, what precisely is the function of accelerator. All we have to say is that Domar and Harrod use the acceleration coefficient in their models.

- (iii) Though Harrod and Domar have employed the same acceleration coefficient with only different symbols in their models, there is a hidden difference between C and σ . Harrod's acceleration coefficient may be called psychological and Domar's technological. Harrod is of the opinion that producers invest C times the increment in income. It means that when income increases, the producer's psychology is to make net investment C times of that increase. It is true that there are technical considerations behind the operation, but immediately it is the producer's psychology that determines how much to invest. Hence the acceleration coefficient is psychological.

Domar's acceleration coefficient is technological. Domar has used productivity of capital (σ) in his model and it explains the relationship between investment and output. Investment is the independent variable and output or income is the dependent variable. Since output is determined

by the nature of technology. The relation it is technological. It is the technology that determines the amount of income or output to be obtained by a given rise of investment.

Limitations of these Models

Some of the assumptions made by these models make it quite unrealistic.

1. The constancy of the propensity to save and the capital-output ratio are unrealistic as they tend to change in the long-run.
2. The assumption that labour and capital are used in fixed proportions is untenable. In normal practice, labour and capital enjoy a certain degree of substitutability.
3. Both the models overlook changes in price levels. In the words of Meier and Baldwin, "If allowance is made for price change and variable proportions in production, then the system may have much stronger stability than the Harrod model suggests".
4. The assumption of constancy of interest rates is irrelevant to the analysis. A reduction in interest rates during periods of over-production can make capital intensive processes more profitable by increasing demand for capital and thereby reducing excess supply of goods.
5. The model ignores developmental programmes undertaken by the government, which help speed up the process of development.
6. The model has not dealt with the distinguishing factors between capital and consumer goods.

Conclusion: Despite limitations, Harrod-Domar growth models are important in the field of economic growth because it represents a stimulating attempt to dynamize and secularise Keynes' static short-run saving and investment theory.

2.4: MRS. JOAN ROBINSON'S MODEL

Mrs. Joan Robinson in her book "The Accumulation of Capital" builds a simple model of economic growth based on the 'capitalist rules of the game'. The thrust of this model has been on capital accumulation and capital is considered an engine of growth. Hence, this model is known as capital accumulation model of growth.

Mrs. Joan Robinson builds her model of economic growth on the following assumptions:

1. It is assumed that the economy is closed. Such an economy reflects the conditions of laissez-fairer capitalism;
2. There are only two factors of production, viz., capital and labour, and labour is an abundant factor;
3. The technical co-efficient of production are fixed, i.e., capital and labour are combined in fixed proportion to produce a given level of output;
4. The entire national product is distributed between the “entrepreneurs” and the “workers”, and there is no third recipient;
5. Entrepreneurs constitute the only saving-investing class in the economy; and
6. Price level is assumed to be constant.

On these assumptions, Mrs. Joan Robinson builds her verbal model which has been formalized by Prof. K.K. Kurihara. Using the notations adopted by Prof. K.K. Kurihara we describe below the working of Mrs. Robinson’s model.

The net national income is conceived of as being composed of the total wage-bill and total profits. As such distribution of income among the “entrepreneurs” and the “wage-earners” can be shown by the following equation.

$$py = wN + \pi pK \quad \dots(1)$$

Where, y = Net national output; N = Number of workers employed; K = Amount of capital stock being used to produce the output; W = Money wage rate; π = Gross profit rate (inclusive of interest rate); p = Average price of output

From equation (1), we have

$$\pi pK = py - wN$$

$$\pi = \frac{py - wN}{pK}$$

$$\pi = \frac{y - w/pN}{K}$$

$$\pi = \frac{\frac{y}{N} - W/p}{K/N}$$

$$\pi = \frac{p - w/p}{\theta} \quad \dots\dots(2)$$

Where $p = y/N$, i.e., labour productivity and $\theta = k/N$, i.e., the capital-labour ratio.

Equation (2) indicates that profit rate is a function of labour productivity (P), real wage rate (w/p) and capital-labour ratio (θ). For maximizing profits, the entrepreneurs must operate on these variables in conformity with Equation (2). The profit rate can be increased with increase in labour productivity, decrease in the real wage-rates and capital-labour ratio.

Now the expenditure side of the economy is represented by the familiar Keynesian identity namely.

$$Y = C + I \quad \dots\dots\dots(3)$$

$$\text{And } S = I \quad \dots\dots\dots(4)$$

Where, C , S and I have the usual meaning.

Since savings in Mrs. Robinson's model are the sole prerogative of the entrepreneurs, and wage earners being assumed to consume their entire income, we can write Equation (4) as follows:

$$S = \pi k = I \quad \dots\dots\dots(5)$$

Instead of I , we can substitute ΔK which is the increase in real capital, i.e., $\Delta K = \pi k$

$$\pi = \frac{\Delta K}{k} \quad \dots\dots\dots(6)$$

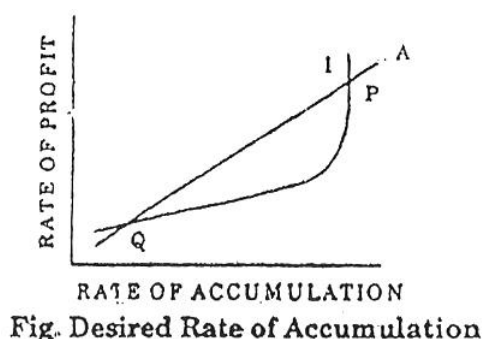
For getting the equilibrium we simply have to juxtapose the income and expenditure sides. The equilibrium condition is:

$$\pi = \frac{p - w/p}{\theta} = \frac{\Delta K}{k} \quad \dots\dots\dots(7)$$

This equilibrium condition shows a double-sided relationship between rate of profit and rate of accumulation. One, it tells us that the rate of accumulation determines rate of profits; two, it shows that the rate of profits itself governs the rate of accumulation. In simple terms, anything that determines the rate of profit would also determine the rate of growth of capital. Accumulation and profit are linked with each other in a circular way. If they have no profit, the entrepreneurs cannot accumulate and if they do not accumulate, they have no profit.

Mrs. Joan Robinson draws a distinction between the “desired rate” of accumulation similar to Harrod’s “warranted rate” and the “possible rate” analogous to Harrod’s “natural rate”. The desired rate of accumulation is that rate which generates just that expectation of profits which is necessary to cause it to be maintained; it is the rate which would make the firms feel satisfied with the economic conjecture in which they find themselves. To understand the significance of this concept, it is necessary to know the relation between rate of profit caused by the accumulation and the rate of accumulation which rate of profit will induce. Mrs. Robinson uses the following diagram to bring out this distinction.

The curve A depicts the rate of profit as a function of the rate of accumulation that gives rise to it. On the other hand, the curve I shows the rate of accumulation as a function of the rate of profit that induces it. The two curves are shown to intersect at the points P and Q in Figure below:



When the firms operate in the region lying to the right of the point P, the rate of accumulation that takes place in the economy exceeds then what is justified by the rate of profit that it entails. Such a situation may arise when the ratio of plant and equipment as between the basic and commodity sectors is unduly high so that any further investment in the former is unlikely to be

profitable. In the immediate future, therefore, this ratio is likely to fall and consequently the rate of accumulation would also fall.

If, however, the rate of accumulation that is taking place at present happens to be lower than the rate of profit that it entails, a situation quite converse of the one described above will be faced. In terms of the figure, if the firms are operating in the region bounded by the points P and Q, they shall tend to step up the rate of accumulation. This is likely to happen when the ratio of machinery as between the capital-goods and the consumer-goods sectors happens to be low so that a higher proportion of current investment will tend to flow to the capital-goods sector. This would result in increasing the rate of accumulation.

The lower point of intersection of the curves I and A, i.e., the point Q is indeed a crucial point. It is a point where the rate of accumulation is generating just that expectation of profit which is essential to cause it to be maintained. This is the 'desired rate' of accumulation. It is desired in the sense that the firms feel contented in the situation in which they find themselves. Evidently, the 'desired rate' of accumulation is quite analogous to Harrod's 'warranted rate' of growth.

The possible rate of growth is that rate of growth which is made possible by the physical conditions resulting from the growth of population and technical knowledge. On the basis of the various possibilities arising out of the juxtaposition of the 'deserved' and 'possible' rates of growth, Mrs. Robinson makes distinction between alternative types of equilibrium growth path. She designates the various equilibrium growth paths as "ages".

Golden Age

The situation of smooth steady growth with full employment arising out of equality of the 'desired' and 'possible rates' of accumulation has been designated by Mrs. Robinson as the 'golden age' equilibrium.

Assuming θ to be constant under conditions of full employment, then from the equation $K/N = \theta$, we get

$$K = \theta N$$

$$\therefore \Delta K = \Delta N \theta$$

$$\text{Or } \Delta N = \frac{\Delta K}{\theta}$$

$$\text{Or } \frac{\Delta N}{N} = \frac{\Delta K/\theta}{N} = \frac{\Delta K/\theta}{K/\theta} \dots\dots(8)$$

$$\text{Or } \frac{\Delta N}{N} = \frac{\Delta K}{K}$$

The equation (8) implies that if θ is constant at the full-employment level, Then labour and capital grow at the same rate.

This is the situation of ‘golden age’ equilibrium. The equality between the desired and possible rates of accumulation coexists with full employment of labour and capital. Besides, both labour and capital grow at the same rate. The economy is thus on a tranquil steady growth path– “a steady rate of accumulation then rolls smoothly on its way”. There is a harmony in all respects.

The entrepreneurs are in a state of equilibrium as their desired rate of accumulation is being realized. The wage-earners, on the other hand, are in an equilibrium state because there comes to prevail an overall harmony in the demand for and supply of labour. In the Harrodian terminology, Mrs. Robinson’s ‘Golden age’ is that state of the economy where the ‘warranted rate’ gets equated with the ‘natural rate’ and full employment is maintained throughout.

Stability of ‘golden age’ equilibrium: If certain forces operate so as to disturb the ‘golden age’ equilibrium of the economy, equilibrating mechanisms automatically come into being to restore the equilibrium. Let us see how.

The divergence from the ‘golden age’ equilibrium path will take place if:

$$(a) \quad \frac{\Delta N}{N} > \frac{\Delta K}{K}$$

$$\text{Or } (b) \quad \frac{\Delta N}{N} < \frac{\Delta K}{K}$$

In the first case, when, $\frac{\Delta N}{N} > \frac{\Delta K}{K}$, population will grow faster than capital stock. This, therefore, signifies the situation of underemployment. With the prevalence of surplus labour, money wage rates get depressed. But if price level is to remain unchanged, real wages will have to fall.

Now if real wages start falling, then as is clear from the basic equilibrium equation (7), rate of profit will ascend gradually. As such, rate of growth of capital accumulation will go on moving up till it catches up with the rate of growth of population. And the 'golden age' equilibrium would thus again be established.

However the equilibrium would fail to be restored if money wages remain inflexible or if price level falls in consonance with fall in the money wages.

The second possibility for divergence from the 'golden age' equilibrium occurs when

$\frac{\Delta N}{N} < \frac{\Delta K}{K}$, i.e., the rate of population growth falls short of the growth rate of capital stock. Such a situation manifests a state of excess capital accumulation. It can be seen that under such circumstance, appropriate changes in the capital-labour ratio (θ) or the labour productivity (ρ) can help to regain the 'golden age' equilibrium. Another way is that the whole production function as such may be shifted up so that with the increase in capital accumulation, more and more labour gets absorbed in the production process. In any case, it is relatively easier to re-establish 'golden age' equilibrium when the divergence from that path stems from a slower growth of population than capital.

State of Economic Bliss: This is a special case of 'golden age' equilibrium. When the rate of accumulation is zero, profit rate is also zero and the entire output of the industry is drained out in the wage stream and consumption would be at its highest pedestal. It could be possible, says Mrs. Robinson, to maintain consumption at such a maximal level under the given technical condition. This then is the 'state of economic bliss'.

Genesis of Cyclical Fluctuations: So far we have discussed the stability conditions of the 'golden age' equilibrium. Let us now see as to how the emergence of cyclical fluctuations can be explained in Mrs. Robinson's golden age' equilibrium framework.

Mrs. Robinson asserts that fluctuations would disturb the conditions of tranquil growth in the 'golden age', if there occur certain random shocks or chance events, viz., the occurrence of a bout of exceptionally attractive innovations or a sudden burst of consumer expenditure and/or

things like that. The manner in which the fluctuations get apace and are maintained is explained below:

Any disturbance that pushes up profit rate tends to raise the desired rate of accumulation. Consequent thereupon, investment increases to prop up higher levels of accumulation and new equipment gets installed. The result, therefore, is that the productive capacity of the economy moves ahead of the level of effective demand. This naturally leads to a decline in the profit expectations so that forces retarding fresh investments come into being. On the other hand, any chance disturbance that pushes down the profits tends to set in the downward movement.

Mrs. Robinson also mentions about a more radical type of cyclical instability that may sway the economy. When the expectations are influenced not only by the existing situation but also by the projection of the experiences of recent past, the system develops what is known as 'inherent instability'. The experience of a rise in profits in the immediate past would give rise to expectations of a further rise. Conversely, the recent past experience of a fall in the profits, would bring expectations of a further fall. Mrs. Robinson feels that under such exigencies, it would be difficult for the firms to settle down on any one perch of steady rate of accumulation. When, for instance, the profit rate is ascending, the firms are prone to pitch their desired rate of accumulation at a high level. However, the moment this desired rate of accumulation gets realized, the profits stop rising any further. As such the desired rate would no longer continue to be the desired one. A new rate of accumulation at a lower level would then be the one that is desired.

Such fluctuations are thus the outcome of the volatility of expectations. All that entails uncertainty, which continually makes the firms to adopt self-contradictory policies. The net result is the emergence of an unsteady or disequilibrating rate of accumulation in relation to the desired rate. In consequence thereof, the path of growth also turns unstable. The point to be noted is that fluctuations of this type are endogenous to the system. They have not been generated by the entry of a random shock or chance event. What has happened in this case is that the system has become inherently unstable.

This part of Mrs. Robinson's exposition enables us to discover a common source of growth and fluctuations. It is the fortuitous nature of expectations and enterprise in a system governed by

profit that explains growth and fluctuations together. This aspect of Mrs. Robinson's model is, therefore, particularly laudable in that it succeeds in coordinating the theories of cycles and growth.

Critical Appraisal

Mrs. Robinson's model represents a major step in enriching our understanding of the fundamental nature and process of capital accumulation in a capitalist economy. It also provides deep insight into the properties of equilibrium growth.

The Robinsonian model is essentially of the Harrod-Domar breed. Mrs. Robinson's equilibrium condition is the same as that of Domar's stable rate of growth ($\alpha \sigma$) or Harrod's 'warranted rate' of growth (G_w). However, Mrs. Robinson's model has an edge over the Harrod-Domar model in the following respects:

Firstly, in the Harrod-Domar models, capital accumulation is determined by the saving-income ratio and capital productivity. But, Mrs. Robinson distinctly links capital accumulation with profit-wage relation and labour productivity. This marks a big step forward in that she has brought growth theory closer to a market economy.

Secondly, while in the Harrod-Domar models, the prime-motive of capital accumulation is capital itself, in Mrs. Robinson's case, it is the labour. The latter is more realistic for labour is the ultimate source of all capital.

The chief merit of Mrs. Robinson's model lies in its successful synthesis of the classical value and distribution theory with the Keynesian saving-investment analysis into a single coherent stream of thought. The close connection between distribution and growth has been brought out exquisitely through the demonstration of mutual interdependence between the effect of income distribution and proportion of income saved on the one hand, and between rate of profit and capital accumulation on the other.

Further, great credit goes to Mrs. Robinson for bringing to fore the much neglected problem of measurement and composition of capital. She outrightly discards the dictum of homogeneity and malleability of capital stock. Her model demonstrates that a given set of machinery cannot by

itself get adapted to more or less labour-intensive forms of production. In other words, ex-post substitution is not possible. However, substitution is possible in the ex-ante sense, i.e., at the time when the choice of techniques is being made. Once the techniques are chosen and machines built a particular technique gets permanently associated with them. The chosen technique is embodied in the machines and it will remain embodied throughout their life time. It is only in the long run when the existing machines get completely depreciated that they can be replaced by plants that embody a different technique.

Furthermore, the Robinsonian model provides a realistic meaning and significance of the 'steady-state growth' so as to analyse the various ingredients, properties and types of equilibrium growth process. The idea of steady growth had been haunting economists since long. Cassel was the first to visualize it as a generalization of stationary state, i.e., a 'regularly progressing state' of the economy. Harrod introduced this concept in his comparative dynamic framework with a view to analyse the short run instability implications arising from the divergence between the warranted and natural rates of growth. But it is not possible to employ the Harrodian concept of Knife-edge equilibrium as a datum to compare different types of equilibrium growths.

Finally, an extension of the above-mentioned lines of argument sledge-hammers another heroic assumption of Mrs. Robinson. Her model assumes that labour and capital are tethered together in a fixed proportion to produce a given level of output. Absence of substitutability of factors of production would make sense only under fixed and static technical conditions. But in a dynamic setting where technical progress is inherent in the system, technical coefficients of production can no longer remain fixed.

Applicability to Underdeveloped Countries

Mrs. Robinson's model being essentially Harrodian in nature has limited usefulness for an underdeveloped economy. The concepts embodied in her model and the framework of her analysis has hardly any immediate relevance to the conditions prevailing in the underdeveloped countries.

The picturesque idea of 'golden age' is just an imaginary 'cliché' that cannot be practically used to describe the reality of underdeveloped countries. It cannot even be used to sort out ideas or to

deploy it as a tool of analysis in their context. The unchanging continuity envisaged by this concept is conspicuous by its absence in the underdeveloped countries. Accelerating development in their case involves spurts and discontinuities. As such for the underdeveloped world we need a growth theory that relies mainly on practical ideas and techniques which could be made operative in their prevailing socio-economic environment.

Besides, the backdrop in which the Robinsonian model has been constructed renders it completely otiose to the development problems of the underdeveloped countries. The placid assumption of non-existence of institutional factors in the process of economic development is from the standpoint of underdeveloped countries nothing short of building a house in the air. Any growth theory especially if it is to apply to underdeveloped countries should not dispense with the role which the institutions and traditions play in the process of economic development. The underdeveloped countries, pre-industrial as they are, are characterized by distinctive socio-cultural arrangements which are rooted in the past. These institutional hurdles, more often than not, stand in the way of rational use of available resources. They, indeed, are the main explanation for the slow development of these economies.

2.5: MEADE'S NEO-CLASSICAL MODEL OF ECONOMIC GROWTH (*STEADY GROWTH MODEL*)

Prof. James Edward Meade has put forward a model which examines the process of equilibrium growth. According to him there are three principal means by which an economy can grow. They are (1) Capital accumulation, (2) Growth of working population, and (3) Technical progress. In his model, Prof. Meade analyses the manner in which a perfectly competitive economy would behave during the process of equilibrium growth when real capital is being accumulated, the labour force is growing and technical progress is taking place. His model analyses the conditions under which 'steady growth' is possible. For this reason, the model is called 'Steady Growth Model'. This model is designed to show the way in which the simplest form of economic system would behave during a process of equilibrium growth.

Assumptions: Meade constructed his model around the following assumptions.

1. There is a closed economy without any economic or financial relationships with other economies.
2. There is no state or governmental economic activity involving taxation or state expenditure.
3. There prevails perfect competition (with its corollaries of prices equal to marginal costs and net factor rewards equal to the value of their marginal net products).
4. The production is subject to the law of constant returns.
5. There are only two commodities i.e., consumption good and a capital good are produced in the economy.
6. There is perfect substitutability in production between capital goods and consumption goods.
7. There is full employment of land, labour and machinery.
8. All machines are alike and the ratio of labour to machinery can be varied with equal ease in the short period as in the long period.
9. There is a constant money price for consumption goods.
10. The ratio of labour to machinery can be easily varied; hence there is perfect malleability of machinery.
11. A certain percentage of any given stock of machines, no matter how old or new they are, gets replaced every year. Meade calls this phenomenon the assumption of 'depreciation by evaporation'.

According to Meade, net output produced in an economy depends upon four things, viz., (1) the amount of the existing stock of machines; (2) the amount of labour available for productive employment; (3) the amount of land or natural resources available for productive use in the economy; and (4) the state of technical knowledge which is assumed to be improving over time. This simple relation may be put in the form of a production function of the form:

$$Y = F(K, L, N, t) \quad \dots(1)$$

Where, Y stands for net output or real national income; K is existing stock of capital or machinery, L is the labour force, N is land and natural resources, and t is time factor signifying technical progress.

Assuming the amount of land or natural resource to be fixed, net output can increase in any one year with the growth in K , L and t . this relationship is shown as:

$$\Delta Y = V\Delta K + W\Delta L + \Delta Y' \quad \dots(2)$$

Where, Δ in each case represents an increase, V is the marginal product of capital, W is the marginal product of labour and Y' is used in place of t .

Thus, increase over the year in the rate of annual net output (ΔY) is equal to the increase in the stock of machinery (ΔK) multiplied by its marginal products (V) plus the increase in the amount of labour (ΔL) multiplied by its marginal product (W) plus the increase in the rate of annual output due to technical progress ($\Delta Y'$). The annual proportionate growth rate of output is:

$$\frac{\Delta Y}{Y} = \frac{VK}{Y} \cdot \frac{\Delta K}{K} + \frac{WL}{Y} \cdot \frac{\Delta L}{L} + \frac{\Delta Y'}{Y} \quad \dots(3)$$

Here, $\frac{\Delta Y}{Y}$ shows ratio of growth rate of population; $\frac{\Delta K}{K}$ shows capital stock growth rate; $\frac{\Delta L}{L}$ shows ratio of labour growth rate; $\frac{\Delta Y'}{Y}$ shows annual proportionate rate of growth due to technological improvement.

Let these proportionate growth rates be expressed as y , k , l and r respectively, the proportional marginal product of capital $\frac{VK}{Y}$ as U and the proportional marginal product of labour $\frac{WL}{Y}$ as Q .

Now the basic relationship is:

$$y = Uk + Ql + r \quad \dots(4)$$

This shows that growth rate of output (y) is the weighted sum of three other growth rates: the sum of the growth rate in the stock of capital (K) weighted by the proportional marginal product of capital (U) plus the growth rate of population (L) weighted by the marginal product of labour (Q) plus the growth rate of technology (r).

Growth of the economy is shown by the rise in the per capita real income, which is symbolically indicated as $(y - l)$. Thus, if y or total income increase by 15% per annum and l or labour force

grows by 10% per annum, income per head will increase by 5% per annum. The growth rate of real income per head can, therefore, be expressed as follows:

$$\begin{aligned}
 y - l &= Uk + Ql + r - l \\
 &= Uk - l + Ql + r \\
 &= Uk - (1 - Q)l + r \quad \dots\dots(5)
 \end{aligned}$$

In the above equation, $(y - l)$ represents the difference between the growth rate of total output or income and the growth rate of real income per head. According to the above equation this growth rate in real income per head $(y - l)$ is the result of three factors.

1. It is raised by an increase in real capital (K) weighted by its proportional marginal product (U);
2. It is depressed by the growth rate in the labour force (l) weighted by minus the proportional marginal product of labour $(1 - Q)$;
3. It is raised by technical progress.

The middle term on the right-hand side of this equation, i.e., $[-(1 - Q)l]$ indicates the tendency for diminishing returns to labour as the supply of labour is increased.

One of the important factors contributing to the growth rate of output is the annual rate of capital accumulation in the economy. This fact is implied in the element UK . $U = \frac{VK}{Y}$ and $k = \frac{\Delta K}{K}$, but ΔK , the addition to the stock of capital is equal to the saving out of the net national income. Therefore $\Delta K = SY$ and $k = \frac{\Delta K}{K} = \frac{SY}{K}$ where SY represents the amount annually added to the stock of capital through savings.

Hence, $UK = \frac{VK}{Y} \times \frac{SY}{K} = VS$, and the basic growth relationship can be expressed as:

$$y - l = VS - (1 - Q)l + r \quad \dots\dots(6)$$

If the growth of labour force (l) and the development of technology (t) are assumed to be constant, then the changes in income (output) per head would depend on the changes in the values of V , S and Q over time.

If l and t remain unchanged and S increases, then capital per head would increase and the marginal product of capital would decline. But this decline in the marginal product of capital could be slowed down if there is a possibility of substituting capital for other factors. Similarly, if we could allow an increase in r , or improvement in technology, the decline in the marginal product of capital would be offset. In other words, if the labour force is assumed to be constant, then an increase in income will depend on three factors: (i) the size of savings; (ii) the productivity of capital; and (iii) the state of technology. Symbolically,

$$y = VS + r \quad \dots(7)$$

The State of Steady State: Further, Meade analyses the conditions of a state of 'Steady Economic Growth'. It is a state in which the growth rate in total output (income) is constant and so is the growth rate in per head. It is assumed that population is growing at a constant proportionate rate (l) and the rate of technical progress does not change.

The state of steady economic growth requires the existence of the following three conditions to ensure a constant growth rate in total income:

1. All elasticities of substitution between the various factors are equal to unity;
2. Technical progress is neutral towards all factors;
3. The proportions of profits saved, of wages saved and rent saved are all constant.

Conditions (1) and (2) mean that the proportions of the national income going to profits (U), wages (Q) and rents (Z) remain constant. So do the proportions of national income saved out of these remunerations of factors remain constant as per condition (3). Let these savings out of profits (U), wages (Q) and rents (Z) be represented by S_v , S_w and S_g respectively, so that total savings:

$$S = S_vU + S_wQ + S_gZ \quad \dots(8)$$

Since all the elements in this equation are constant under conditions, (1), (2) and (3), it follows that the ratio of total savings to total national income (s) will also be constant.

The growth rate of income is represented by the basic relationship, $y = Uk + Ql + r$ wherein, U , Q , l and r are assumed to be constant. Therefore, for y to be constant (as required by the state of steady economic growth), K should be constant. We know that $k = \frac{SY}{K}$ but S is constant as seen in the preceding paragraph. So k will be constant if $\frac{Y}{K}$ is constant. And $\frac{Y}{K}$ is constant if the rate of growth of Y and K is the same which implies the equality of y and k itself, i.e., $y = k$.

The obvious conclusion follows that the growth rate of income will be constant if the growth rate of capital stock (k) is equal to the growth rate of national income (y).

Criticism: Professor Meade's neo-classical model has been subject to severe criticisms by a number of economists, due to its unrealistic assumptions.

1. The assumption of an economy operating on the wheels of perfect competition was very diverse from reality.
2. Further it was wrong to assume that production units were independent of one another.
3. The assumption of neo-classical theory that there are only constant returns to scale was also considered defective. In reality, increasing returns to scale (rather than constant) were in consonance with the growth process.
4. The model also suffered from another major defect. It assumed that all kinds of machinery were perfectly malleable. It assumed that the labour-machinery ratio could be altered both in the long and short run. Alteration in the short run was definitely not possible.
5. The fact that the model gave no place or scope for uncertainties was viewed inadequate. The inter-relations of all variables were regarded as being certain. Thus, the practicability of the model was lost. This issue was raised by Butterick.
6. Like Harrod-Domar and John Robinson models, Meade's model took into its reckoning a laissez-faire economy free of foreign trade which was a departure from reality.

7. The roles played by institutions were totally ignored from the point of view of economic growth.

Conclusion: Despite these defects, Meade's model demonstrated the influence of population growth, capital accumulation, and technical progress on growth rate of national income and per capita income over time. Further, the state of steady growth is indeed Mrs. Robinson's Golden Age explained in a more realistic manner by studying the behaviour of those variables which she assumes to be constant.

2.6: SOLOW'S NEO-CLASSICAL MODEL OF LONG-RUN GROWTH

Prof. Robert M. Solow presented a neo-classical model of economic growth as an alternative and advancement over the Harrod-Domar model. Solow postulates a continuous production function linking output to the inputs of capital and labour which are substitutable.

Assumptions: Solow model is based on the following assumptions:

1. A single composite commodity is produced in the economy.
2. Law of constant returns operates, i.e., the production function is homogenous of first degree.
3. There are two factors of production, i.e., labour and capital, and they are paid according to their marginal physical productivity.
4. Output produced is regarded as net output, i.e., the proper allowance for the depreciation of capital is made.
5. Flexible system of price-wage-interest prevails. This system plays an important part in the neo-classical adjustment process.
6. Technical neutrality, i.e., technical progress does not affect the balance between capital and labour in terms of their relative shares in national income.
7. There is perpetual full-employment of labour.
8. Available capital stock is fully utilized.
9. Substitutability between capital and labour exists, i.e., labour and capital can be substituted for each other.

Now let us focus on some main components of the Solow model:

- (i) Savings constitute a fixed fraction (s) of national income (y). So savings (s) is equal to (sY). Symbolically, $S = sY$.
- (ii) Production function is subject to constant returns to scale. Smooth substitution of capital for labour and vice versa is possible. Factors are rewarded according to marginal productivity and factor payments exhaust the total product.
- (iii) Labour grows at an exogenously determined rate ' n '.
- (iv) Saving are always equal to investment, i.e, addition to capital stock K' (indicates the change in the quantity of that variable; the rate of change of a variable is denoted by the change in the variable divided by the original value of the variable. For example, rate of change of capital stock is denoted by K'/K).

The neoclassical production function is of the usual type:

$$Y = F(K, L) \quad \dots(1)$$

This can be written in what is known as the intensive form by dividing the equation by L :

$$\frac{Y}{L} = f\left(\frac{K}{L}, \frac{L}{L}\right) \quad \text{or} \quad \frac{Y}{L} = f\left(\frac{K}{L}, 1\right) \quad \dots(2)$$

$$\text{If 'q' = } \frac{Y}{L} \text{ and 'k' = } \frac{K}{L}, \text{ then the above equation can be written as } q = f(k) \quad \dots(3)$$

The above equation is known as the per worker production function as ' q ' denotes output per worker and ' k ' stands for capital per worker.

The advantage of the constant returns production function is that it can be reduced to this form.

As stated above, total savings $S = sY$; in per worker terms, it is written as being equal to $sf(k)$. $f(k)$ represents output per worker; so $sf(k)$ represents savings per worker.

If savings are always equal to investment, i.e., addition to capital stock (K'), this equality can be denoted by the following equation: $K' = S = sY$... (4)

It has been already stated that labour grows at a constant rate 'n'. Therefore the rate of growth of 'k' (i.e., capital per worker) is: $\frac{k'}{k} = \frac{K'}{K} - \frac{L'}{L}$... (5)

$\frac{L'}{L}$ represents the rate of growth of labour supply which is assumed to be equal to the constant 'n'. So the equation (5) can be written as: $\frac{k'}{k} = \frac{sY}{K} - n$... (6)

In equation (4), K' is said to be equal to sY ; so, sY is substituted for K' in the first term on the right.

Now if we divide and multiply the first term on the right by L ; we get.

$$\frac{k'}{k} = \frac{sY}{L} \cdot \frac{L}{K} - n \quad \dots (7)$$

$$= \frac{sf(k)}{k} - n \quad \dots (8)$$

Recall $\frac{Y}{L} = q = f(k)$ (equation 3)

$\frac{L}{K}$ becomes 'k' as a denominator.

$$\text{So, } k' = \frac{sf(k)}{k} \cdot k - nk$$

$$k' = sf(k) - nk \quad \dots (9)$$

k' represents the rate of growth of capital per worker. Equation (9) is called the fundamental equation of neoclassical growth theory. Variation in the capital to labour ratio (k) is determined by the difference between the amount of investment per worker that actually occurs and the

amount required to keep the capital to labour ratio constant as population grows. The significance of the previous statement can be understood if one remembers that the neoclassical growth theory aims at explaining steady state growth. Steady state growth or balanced growth implies that capital labour and output grow at the same rate.

Diagrammatic illustration of the neoclassical model – Steady State Growth

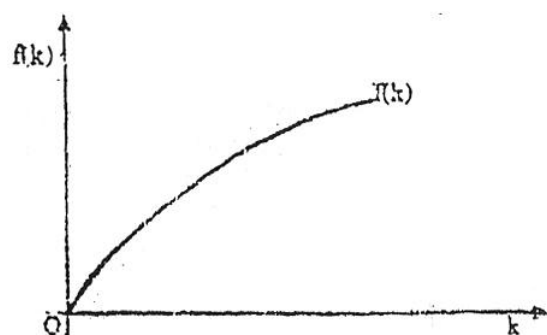


Figure 1

In figure 1, on the vertical axis $f(k)$, output per worker is given. On the horizontal axis, ' k ' or capital per worker is given. The curve $f(k)$ represents output per worker ($\frac{Y}{L}$ or q). The slope of the curve indicates diminishing returns. As we move toward the right, i.e., as k increases, the slope of the curve decreases.

In figure 2, the straight line ' nk ' has a constant slope equal to ' n '. The curve $sf(k)$ represents savings per worker. It is just a displacement of $f(k)$ by a factor ' s '. It also represents investment per worker as it is assumed that savings equal investment always.

Steady state growth is indicated by the point of intersection (e) of the curve $sf(k)$ and the straight line ' nk '. At that point (e) the rate of growth of capital

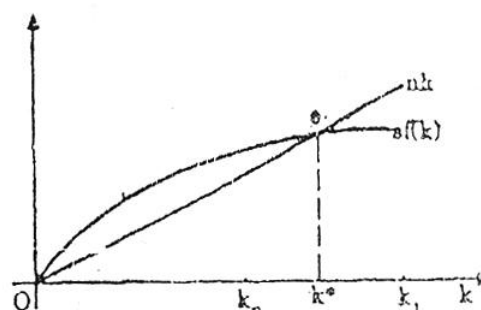


Figure 2

per worker and the rate of growth of labour are the same. At that point, output also grows at the same rate. It is a steady state growth point where saving is just enough to keep capital per worker constant. In other words, at the intersection saving generates just the right amount of investment to stay on the balanced path. It means that at this point, the actual amount of investment determined by saving is just the amount needed to keep the capital stock growing at the same rate as growth in labour supply. If the economy starts at the steady state point, it will stay there.

What happens if the economy starts at a point to the left of the intersection point? Suppose it is at the point corresponding to K_0 . Actual savings and investment- $sf(k)$ – will exceed the amount of capital required to maintain a growth rate of capital equal to the growth rate of labour. So according to equation (9), the growth rate of capital ' k ' is positive. The first term on the left side, $sf(k)$, is reached. If $sf(k)$ is less than ' nk ', ' k ' and $f(k)$ will fall until the steady state point is reached. This situation refers to the point k_1 .

In the neoclassical model there is a mechanism for restoring the economy to the steady state point. The main feature of this model is that the steady state rate of growth is ultimately determined by the rate of growth of labour supply, an exogenous factor.

In the simple model, technology is assumed to remain constant. Even if it is assumed to change it does not change the structure of the model. It will only shift the $f(k)$ curve upward. Again, technology is an exogenous factor.

If a theory rests upon exogenous factors for explaining growth, it cannot be of much use. It means that government policy does not matter at all in respect of economic growth. Another feature of the model is that any increase in savings can only bring about a temporary rise in growth rate; eventually, the economy will settle down on the point of steady state growth determined by the labour growth rate. The only benefit is a permanent rise in output per worker. But the growth rates in the old and now balanced growth paths will be the same. The neoclassical growth theory implies the convergence of productivity growth rates in all the countries of the world. If growth depends only on technology and if technology is available to all, then less-developed countries will catch up with the advanced countries in the long-run. But recent empirical studies have disproved this conclusion.

Solow model vs. Harrod-Domar model: Solow model is a major improvement over the Harrod-Domar model. It differs from the Harrod-Domar model in the following respects:

The H-D model assumes a single production process: it implies a fixed capital labour ratio. But, in the neoclassical model, infinitely large numbers of production processes are assumed to be possible; this implies an infinite substitutability of capital for labour and vice versa. It dispenses with a constant output to capital ratio, a basic assumption of the H-D model.

The neoclassical model assumes automatic full utilization of capital and labour. This is a classical assumption. Perfect competition with absolute flexibility of prices of inputs and outputs ensures balancing of supply and demand in all the markets.

So it focuses on the growth path that will be followed by a system in which labour and capital resources remain fully utilized as the quantity of these resources grows over time. So the growth-rate of the economy's potential output and the growth-rate of its actual output are the same. The H-D model rests on a distinction between the two.

Critical Appraisal: Solow model has been criticised on the following grounds:

1. Solow model is criticised for assuming perfect competition and perfect flexibility of factor prices, i.e., wage and interest rates. In reality, we have neither perfect competition nor flexibility of wage and interest rates.
2. This model does not explain the duration of time period required to bring about restoration of steady growth. A long adjustment period could cast doubts on the usefulness of stable growth. So, there might be quite long-periods of disequilibrium growth.
3. Solow model neglects the role of business expectations.
4. This model takes up only the problem of balance between Harrod's G_w and G_n , and leaves out the problem of balance between G and G_w .
5. Solow model is based on the assumption, that technical progress and capital growth are independent of each other. But it is realistic to assume, that two are interdependent. In fact, increase in capital per head is accompanied by technical progress. The technical is thus a function of capital accumulation.

Conclusion: Although, in some respects, Solow model describes a developed economy better than a developing one, it remains a basic reference point of literature on growth and development. It implies that economies will conditionally converge to the same level of income, given that they have the same rates of savings, depreciation, labour force growth and productivity growth. Thus, the Solow model is the basic framework for the study of convergence across countries.

2.7: KALDOR'S GROWTH MODEL

Salient Features of Kaldor's Growth Model: In his attempt to formulate a model of growth reflective of the economic process as it actually operates, Kaldor conceives of certain hypotheses in respect of the interrelationship between various variables and their sequential links. Kaldor maintains that for a steady state growth path, the hypotheses concerning economic changes and development ought to rest on the followings six contentions which he calls the “**Stylized Facts**”.

1. There is a steady rate of growth in the aggregate value of production and in the productivity of labour so that there is tendency for the rate of growth of productivity to fall.
2. Irrespective of as to what statistical measure of ‘Capital’ is chosen, it (i.e., capital) should keep on increasing continuously.
3. A steady rate of profit should be accruable on capital. And this rate of profit should be considerably more than the “pure” rate of interest as manifested by the yield on gilt-edged bonds and securities.
4. The secular capital-output ratio should be steady. In other words, there ought not to be long-term fluctuation after allowing for the differences in the degree of utilization of the productive capacity. To be more specific, this implies that the rates of growth of productive capacity and the capital stock should be identical. As such, for the economy as a whole, the income and capital would grow at the same percentage rate in the long-run.
5. There should exist a strong association between the share of investment in output on the one hand, and the share of profit in income, on the other. Also the rate of profits and wages should be steady in times when the investment proportion of output is stable.
6. Lastly, there are cognizable differentials in respect of the rate of growth of labour productivity and of aggregate output for different societies. And this variation in fast developing economic may be to the tune of 2-5 per cent. And these variations accompany similar variations in the investment coefficient and the profit share. However, the previous propositions regarding the steadiness of capital-output ratio and that of the relative shares of profit and income apply to countries possessing varying growth rates.

Kaldor builds up his model of growth on the foundation of these “stylized facts”. However, quite apart from these facts he bases his model on certain assumptions. Now we turn to these.

Assumptions:

1. The availability of resources and not effective demand is the limiting factor of the level of output attained in a growing economy.
2. Savings are assumed to be derived from two sources, viz., profits and wages. However, the savings out of profits are assumed to be quite in excess of the savings out of wages.
3. The model assumes that the mechanics of income distribution is such that the elements of monopoly power among the firms enable the profit margin to vary freely , quite independent of the capital-labour ratio under conditions of full employment. The variations in profit margin occur through the changes in price relative to money wages in consequence of the excess aggregate demand (positive or negative) or difference between planned savings and investment. Income distribution determines the aggregate propensity to save of the economy in a manner wherein S/Y is responsive to I/Y , so that in equilibrium, the two are equal.
4. It is assumed that the acceleration principle is the chief determinant of the of the investment demand function. Actually, Kaldor did not stick to any one function in his different models. However, in all his models, the investment demand is taken as an increasing function of the (prospective) rate of profit and hence output. He visualizes a set of psychological premises for regarding entrepreneur’s investment demand function as an increasing function of output and profit. In a nutshell, these aforesaid premises point that the investment demand is a function of the change in the rate of profit on capital in the preceding period. This, in fact, amounts to saying that the acceleration principle governs investment demand.
5. As regards technical progress, Kaldor assumes that its principal determinant is the rate of capital accumulation. Also, capacity of the society to absorb technical knowledge in any given period is not unlimited.
6. Kaldor constructs his model on the basis of aggregate concepts of income, capital, investment, savings, profits and wages. Further these aggregates are measured in terms of constant purchasing power.

7. Population is assumed to be constant in the initial part of the model. This simplifying assumption is necessary in order to bring out a precise relationship between per capita capital and per capita output. If this assumption does not hold good, the factor proportions as between capital and labour would be upset, which would ultimately affect the validity of constant returns to scale. Kaldor, however, gives up this assumption at a later stage when he expounds the expanding population version of his model.

In the backdrop of these assumptions, Kaldor in his model concretizes his ideas about the growth process. First we take up the constant population version of his model.

Symbols used: Y = Income; K = Capital; P = Profit; S = Saving; G = Equilibrium state of productivity growth; S_p = Propensity to save out of profits; S_w = Propensity to save out of wages; T = Time; 1,2,3,4 – Points of time

Basic Framework of the Model: Using the above-noted symbols, Kaldor builds up the framework of his model comprising two parts, viz., (i) Basic Functions- savings, investment and technical progress functions, and (ii) The Growth Frame. We now take these in turn.

Basic Functions: Kaldor expresses the savings, investment and technical progress functions in the form of linear equations as under:

1. Savings Function: Kaldor expresses the savings function in terms of the sum of certain constant proportion of profits and wages.

$$S_t = \alpha P_t + \beta (Y_t - P_t) \quad \dots(1)$$

Where $1 > \alpha > \beta \geq 0$

The above equation is valid provided the values of the two constants lie between 0 and 1. And also $\alpha > \beta$, i.e., the relative value of the constant associated with profits is higher than that associated with wages. This, in fact, is reflective of the fact that the savings are a function of the income distribution.

2. Investment Function: Kaldor formulates his investment function on the presumption that there exists a strong correlation between the share of profits on the one hand and investment on

the other. To start with, he formulates the capital stock function. This again is expressed in a linear form as follows:

$$K_t = \alpha' / Y_{t-1} + \beta' \left(\frac{P_{t-1}}{K_{t-1}} \right) Y_{t-1} \quad \dots (2)$$

The equation (2) given above relates capital stock of a particular period of time (t) to the income of the preceding period (t-1). This shows that the magnitude of capital stock at any period equals a constant fraction of the income of the proceeding period plus a constant proportion of the rate of profit, ' $\left(\frac{P_{t-1}}{K_{t-1}} \right)$, multiplied by the income of the preceding period.

From the capital stock function given by (2), Kaldor derives the investment demand function. This is done by finding out the difference between the capital stocks at two successive points of time. Thus,

$$I_t = K_{t+1} - K_t$$

$$\text{Or} \quad I_t = (Y_t - Y_{t-1}) (\alpha' + \beta') \left(\frac{P_{t-1}}{K_{t-1}} \right) + \beta' \left(\frac{P_t}{K_t} - \frac{P_{t-1}}{K_{t-1}} \right) Y_t$$

$$\text{Where } \alpha' > 0, \beta' > 0 \quad \dots (3)$$

Equation (3) determines investment as a function of the increase in output i.e., $(Y_t - Y_{t-1})$ over the period (t-1) and (t) expressed as multiplicand of the relationship between the desired capital and output in the preceding period plus a constant fraction (β') of the change in the rate of profit expressed as a multiplicand of the income that obtains in the current period. The investment demand function holds good only under the constraints imposed by the fact that α' and β' (which are related to the preceding period's income and rate of profit respectively) have values greater than zero.

In nutshell, the investment function (3) shows that given the rate of profit, investment depends upon the growth of income. But then, the question arises, how is the rate of growth of income determined. This as we shall see in the following paragraph is determined with the help of technical progress function.

3. Technical Progress Function: Kaldor envisages the rate of growth of income as being determined by the rate of growth of capital and the technical progress. This relationship is quantified by the following equation:

$$\frac{Y_{t-1} - Y_t}{Y_t} = \alpha'' + \beta'' \frac{I_t}{Y_t} \quad \dots(4)$$

Where $\alpha'' > 0, 1 > \beta'' > 0$

The equation (4) given above shows that the rate of growth of income is an increasing function of the rate of growth of investment measured as the proportion of capital stock in the current period multiplied by the capital per head β'' plus the coefficient of technical progress α'' .

The equations (1), (2) and (3) taken together provide the totality of the mechanism underlying saving and investment. It is clear from the savings function that savings are determined by propensities to save out of profits and wages respectively. The investment function shows in broad terms that investment is determined by the rate of profit and the changes associated with it. Given the propensities to save and given that the rate of growth of income (under conditions of constant rate of profit) is equal to the investment rate, the changes in income alone should bring about the equality between savings and investment. Equation (4) shows that rate of growth of income is a function of the rate of investment and the combined effect of per capita capital and technical progress. This last function, in fact, provides the equilibrating mechanism between savings and investment in the event when the functions (1) (2) and (3) fail to do so.

After having understood the implications of the three functions, viz., the savings, investment and the technical progress functions, we proceed to study the constant population version of Kaldor's model.

Constant Population Version of Kaldor's Model: Using the framework outlined in the preceding section, Kaldor, to start with, analyses the process of growth under the situation of constant population.

At any point of time, say t_1 , the existing stock of capital K_1 is the one inherited from the past. As such K_1 can be taken as a datum. The income Y_1 corresponding to the capital stock K_1 at full

employment level of labour can, therefore, be regarded as given. Likewise, Y_0 and K_0 , the income and capital respectively of the preceding period are given.

Now capital stock K_1 in the current period t_1 , bears the following relationship with the capital stock, income and profits of the previous period.

$$\frac{K_1}{Y_0} = \alpha' + \beta' \frac{P_0}{K_0} \quad \dots(5)$$

With, K_1 , K_0 and Y_0 regarded as datum, we can rewrite the equation (3) as follows:

$$\frac{I_t}{Y_t} = \frac{Y_t - Y_0}{Y_0} \cdot \frac{K_1}{Y_1} + \beta' \left(\frac{P_1}{K_1} - \frac{P_0}{K_1} \right) \quad \dots(6)$$

Equation (6) is, in fact, the basic growth and distribution equation of the system. From this we can derive the savings and investment functions. They are as follows:

$$\frac{S_1}{Y_1} = \alpha \frac{P_1}{Y_1} + \beta \left(\frac{Y_1 - P_1}{Y_1} \right) = \beta + (\alpha - \beta) \frac{P_1}{Y_1} \quad \dots(7)$$

$$\frac{S_1}{Y_1} = \left\{ \frac{Y_1 - Y_0}{Y_0} \cdot \frac{K_1}{Y_1} - \beta' \frac{P_0}{Y_0} \right\} + \beta' \frac{Y_1}{K_1} \cdot \frac{P_1}{Y_1} \quad \dots(8)$$

The savings function embodied in the equation (7) shows that savings measured as proportion of income are equal to the sum of constants α and β expressed respectively as proportion of the relative shares of profits and wages out of income.

In a like manner, the investment function embodied in the equation (8) shows that investment measured as a proportion of income is equal to the increment of income multiplied by the current capita-output ratio minus β' expressed as a proportion of the preceding period's rate of profit plus a constant fraction of the current rate of profit.

Now equations (7) and (8) jointly determine income distribution between profits and wages as well as the savings and investment expressed as proportion of income. As such given an income distribution, the level of profit is the key variable underlying the equilibrating mechanism between savings and investment.

SAavings would exceed investment if the level of profits as a proportion of income increases above the equilibrium value. But the changes in the level of profit brought about through relative changes in prices and costs would re-establish the equilibrium growth path. Stability of this equilibrium path would be maintained if the following condition is fulfilled.

$$\alpha - \beta > \beta' \frac{Y_1}{K_1} \quad \dots(9)$$

The implication of condition (9) is that stability of the equilibrium growth path depends upon the changes in the acceleration coefficient which itself depends on the changes in the rate of and, therefore, ultimately on distribution of income. What this profit actually means is that in the condition of stable equilibrium, the growth rate of savings would be steeper than that of investment. Kaldor, however, opines that this is only a necessary condition for the stability of the equilibrium growth path. The sufficient conditions to ensure unobstructed working of the system would in his opinion be as follows:

$$P \leq Y_{t-w} \text{ (minimum wages)} \quad \dots (10)$$

$$\frac{P_t}{Y_t} \geq m \text{ (m, the minimum margin of profit)} \quad \dots(11)$$

The above noted inequalities impose restrictive conditions upon the stability of the equilibrium growth path. In essence they signify that the level of profits should not be more than income net of wages (i.e., income minus wages). And also the prevailing rate of profit should be in excess of a minimum margin of profits that the entrepreneurs must obtain so as to continue making further investments.

Herein lies the crux of Kaldorian dynamics of growth process. The level of profits should be such as to be accommodative of any redistribution of income between profits and wages. And the prevailing rate of profit should be adequate enough to induce the entrepreneurs to continue investing. Thus, we find that the equilibrium between savings and investment so established will not be a stationary equilibrium. Rather it will be a moving equilibrium moving under the influence of the technical progress function. For technical progress would operate itself in such a manner that it continues to shift upwards rate of growth of income and capital from the starting

point of time t_1 towards the steady-state growth path. Actually, the equilibrium growth path or the steady-state growth path that would thus be established through the action of the technical progress function would be given by the following condition.

$$G = \frac{\alpha''}{1-\beta''} \quad \dots(12)$$

Equation (12) determines the equilibrium growth rate of productivity (G), entirely in terms of the technical progress function and quite independently of savings and investment functions. It thereby shows that at the level of equilibrium rate of growth of productivity, growth rates of income and capital are identical as the former (i.e., G) equals the latter (i.e., growth rates of income and capital). In sum, it deduces a situation where the technical progress function by itself propels forward the steady growth path.

In, the above discussion, we kept aside the complications arising from an expanding population. Kaldor modifies the above analysis to take into account of relationship between the growth rate of income and population. This he does by introducing, suitable changes in the technical progress function. How he achieves this is explained in the following section.

Expanding Population Version of Kaldor's Model: The foregoing exposition was modified by Kaldor by taking into account the expansion in population. He starts from the simple Malthusian argument that population growth is a function of rate of increase in the means of subsistence. But he takes into account two limitations of the Malthusian contention. These are as follows:

1. Irrespective of the rate at which the income is rising, the percentage rate of growth of a population group with a given fertility rate cannot exceed a certain maximum.
2. Before the maximum limit is reached, the rate of growth of population rises only moderately as a function of the rate of growth of income over some time interval of the latter.

With these limitations in view, Kaldor frames his population income growth relationship. Assuming that the actual population growth is denoted by I_t , the maximum rate of growth of population by λ , and rate of growth of income by g_t , we have the following three possibilities:

$$g_t = \lambda$$

$$g_t < \lambda$$

$$g_t > \lambda$$

Kaldor treats the first two possibilities jointly and the third one separately. Also, he makes the intuitive presumption for steady-state growth:

if $g_t \leq \lambda$, then $I_t = g_t$ and,

if $g_t > \lambda$, then $I_t = \lambda$.

With these formulations in mind, Kaldor proceeds to examine the third case where $g_t > \lambda$ ($\lambda = I_t$) and tries to determine its relationship with the rate of growth of income. Actually, what it really amounts to is that the rate of growth of income is subtracted by an equivalent amount of rate of growth of population. That is to say, the technical progress function gets subtracted on both sides by λ . Thus,

$$\frac{Y_{t-1} - Y_t}{Y_t} - \lambda = \alpha'' + \beta'' \frac{1}{K_t} - \lambda \quad \dots(13)$$

Now as per equation (12) both $\frac{Y_{t-1} - Y_t}{Y_t}$ and $\frac{1}{K_t} = g_t$

$$\therefore g_t - \lambda = \alpha'' + \beta'' (g_t - 1)$$

$$\text{i.e. } g_t - \lambda = \frac{\alpha''}{1 - \beta''}$$

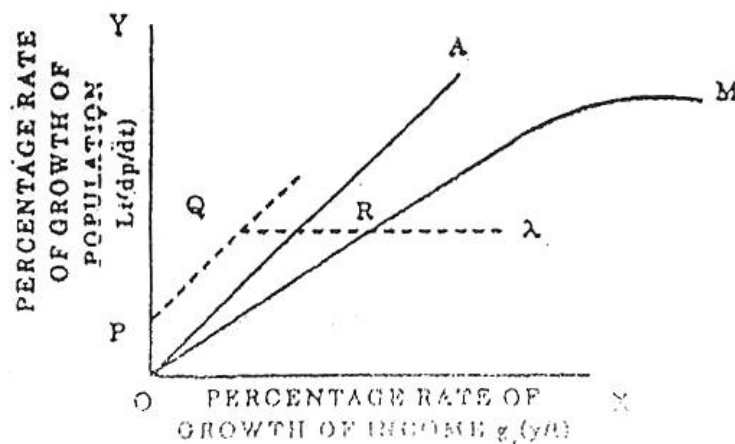
$$\text{But, } g_t = \frac{\alpha''}{1 - \beta''}$$

$$\therefore g_t = g_t + \lambda$$

Thus, we obtain an income growth rate in the long-run equal to $g_t + \lambda$. As such in Kaldor's model, at any given level of technical progress function, income growth and population growth behave in a complementary manner. Kaldor depicts this relationship with the help of a diagram reproduced in the following figure.

In figure below, percentage rate of growth of income is measured along the X-axis, while percentage rate of growth of population is measured along the Y-axis. The maximum rate of growth of population is given by OA which is the 45° line. And the income growth path is shown by OM curve.

As it is, the curve OM manifest $g_t < I_t$ (and therefore $I_t < \lambda$). In consequence thereof, the growth rates of income and population keep on rising till the rate of growth of population approaches λ as at point R. In the long-run perspective, growth rate of population would reach maximum as shown by the horizontal part of the OPQ λ curve.



In the event of population growth rate having reached the maximum level, there would occur constant returns to scale. That is, with a given amount of capital per head, an increase in population (and, therefore, labour force) would leave the per capita output at an unchanged level. What this actually implies is that the position and form of technical progress function (i.e., the coefficients α' and β') remain unaffected by population change. In simple words, rate of growth of productivity is not affected by change in population.

But in reality, the form and position of the technical progress function may be affected favorably or otherwise depending upon the stage of development of the economy. Generally, in the developed countries where the pressure of population is low and the condition of increasing or constant returns to additional doses of labour prevail, the technical progress function (and thereby the rate of growth income and capital) gets further strengthened by the value of λ .

On the other hand, in case of the underdeveloped countries where there is scarcity of land and capital, an increase in the growth rate of population may lower down the technical progress function and hence productivity. So, under these conditions for the per capita output to be maintained at a given level, it is necessary that capital per head should grow at a certain percentage rate. Actually, in this case, the technical progress function would provide two points of equilibrium, one at a very low level of income and the other at a high level of income. But it is only the latter one, i.e., the equilibrium and high level of income which is stable.

It needs to be pointed out that things may turn out to be entirely different if the rate of growth of income is not sufficient enough to keep the output at a constant level. Falling this, the technical progress function would slip down, with income and capital continuing to diminish, till the growth of income and capital ceases to occur. Actually, this may result into a situation of stagnation in the economy.

From the above analysis, it is clear that the resultant effect of the growth of population on the growth of income is contingent upon the following two factors:

- (i) The maximum rate of growth of population, and
- (ii) The percentage change in productivity resulting from technical progress.

As is evident, the expanding population version of Kaldor's model comes closer to the real situation as they prevail. It also extends the applicability of the model to underdeveloped countries where rapid growth of population is the most characteristic phenomenon.

Critical Appraisal: Kaldor's model is based on the Keynesian tools of analysis and follows Harrod's dynamic approach in regarding the rates of change in income and capital as the dependent variables of the system. But, his model is quite different from the Harrodian and other models. Moreover, the model explains not only the steady growth path of the economy but also certain features of the growth process which are not explicitly dealt with by the other neo-classical model builders.

Again, division of the model into two stages, i.e., constant population and expanding population, is an attempt to reconcile the Harrodian warranted and natural rates of growth by demonstrating the long-run tendency for the two to converge by mutual interaction. The expanding population

version of the model is particularly useful in demonstrating the effect of population growth on the growth of income in underdeveloped countries.

One of the highlights of Kaldor's model is the introduction of the "technical progress function" in place of usual production function. The technical progress function relates technical progress to growth of productivity and capital accumulation, while the usual production function relates output per head to capital per head. Thus, the former is superior to the latter in that it brings in the role of income, wages, profits, capital, saving and investment.

Further, the technical progress function can be equally applied to an underdeveloped economy, having low capacity to absorb technical progress due to the scarcities of capital and other resources. Thus, Kaldor's growth model is more realistic than the earlier neo-classical models, because it is equally applicable to developed as well as underdeveloped economies.

Despite these virtues of Kaldor model, it is not free from certain weaknesses and has been criticised on the following grounds:

Kaldor model does not explain the determination of the rate of growth of the economy, as has been explained in the Harrod-Domar models in terms of the volume of investment, saving-income ratio, and the capital-output ratio.

Unlike the Harrod-Domar models, this model does not give reasons for stability or instability in the economic system. Rather, it analyse certain features of the growth process which emphasise 'convergence and stability'.

2.8: SUMMARY

In this unit, we learnt some concepts and tools useful for studying growth theory and discussed certain theories of growth and distribution put forward by a group of eminent economists like R. F. Harrod, E. D. Domar, Joan Robinson, J. E. Meade, R. M. Solow and N. Kaldor. Let us summarize these growth models below.

The study of Harrod-Domar growth model throws light on the important determinants and policy implications of economic development. The model was developed in the context of advanced

market economies. But with some modifications, it has been widely used in formulating plan models in developing economies.

John Robinson model derives its strength from neo-Keynesian argument which states that ex-ante saving adjusts to ex-ante investment through changes in income distribution. The thrust of this theory has been on capital accumulation and capital is considered an engine of growth. It is for this reason that, this model is known as capital accumulation model of growth.

J. E. Meade in his model demonstrates the effect of population growth, capital accumulation and technological progress on economic development. This model also explains the conditions of steady growth, which developing countries like India would aspire to achieve.

The neo-classical model, associated with the name of Robert Solow, presented the first major extension to the Harrod-Domar model, by endogenising the capital output ratio. Although, in some respect Solow model describes a developed economy better than a developing one, it remains a basic reference point of literature on growth and development. Solow model is the basic framework for the study of convergence across countries.

The study of Kaldor model makes an interesting reading. It has emphasised on the parameters like, saving, employment and technical progress, which are vital for the development and progress of a society. Kaldor also gave some suggestions about technical change being endogenous.

2.9: KEY WORDS

1. **Capital-Output Ratio:** The number of units of capital required to produce a unit of output.
2. **Investment:** That part of national income which is spent on the acquisition of capital goods.
3. **Natural Growth Rate:** Refers to the maximum growth rate which an economy can achieve with its available natural resources.

4. **Savings:** That part of national income which is not spent on the purchase of consumer goods.
5. **Warranted Growth Rate:** It refers to that growth-rate of the economy, when it is working at full capacity and making optimum use of machine and manpower.
6. **Steady State:** A condition in which the key variables are not changing.

2.10: SELF-ASSESSMENT QUESTIONS

1. How does Harrod define warranted growth rate and the natural growth rate ? What are the implications for a country if natural growth rate exceeds the warranted growth rate ?
2. What are the basic features of the Harrod-Domar Model of growth? Also state the limitations of this model.
3. Compare and contrast Harrod and Domar models of growth. Also make a critical appraisal of Harrod-Domar model.
4. Explain the meaning, condition and types of golden age. How can Joan Robinson model of growth help in providing solution to the problems of underdeveloped country like India ?
5. Explain the relation between desired rate of accumulation and possible rate of accumulation. And make a critical appraisal of John Robinson model of growth.
6. Discuss the conditions of steady growth as laid down in the Meade's neo-classical model. On what grounds Meade model of growth has been criticised ?
7. Explain the assumptions and significance of Solow model. Also discuss how Solow growth model is an improvement over Harrod-Domar model.
8. Make a critical appraisal of Solow model of long-run growth.
9. Briefly discuss the salient features of Kaldor's growth model. Give merits and demerits of the model.
10. Write short notes on:
 - (i) Actual growth rate
 - (ii) Warranted growth rate

- (iii) Natural growth rate
- (iv) Steady growth
- (v) Golden age
- (vi) Technical progress function

2.11: FURTHER READINGS

1. Meier, Gerald M. and Rauch, James E (eds.) (2000). *Leading Issues in Economic Development* (7th edition). Oxford University Press, Oxford.
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CHAPTER-3: STRATEGIES OF DEVELOPMENT

STRUCTURE:

- 3.1 Objectives
- 3.2 Introduction
- 3.3 Lewis Model With Unlimited Labour Supply
- 3.4 Leibenstein's Theory Of Critical Minimum Effort
- 3.5 Rosenstein Roden's Big-Push Theory
- 3.6 The Doctrine Of Balanced Growth
- 3.7 The Doctrine Of Unbalanced Growth
- 3.8 Balanced Vs.- Unbalanced growth (Nurkse Vs. Hirschman Thesis)
- 3.9 Singer's Critique
- 3.10 Summary
- 3.11 Key Words
- 3.12 Self-Assessment Questions
- 3.13 Further Readings

3.1: OBJECTIVES

The objective of this chapter is to understand some of the theories of underdevelopment which were addressed to break the vicious circle of poverty. This chapter discusses the following aspects:

- Role of surplus labour in initiating the process of economic growth in underdeveloped economy;
- Role of critical minimum efforts to push growth at the initial stages of development;
- Role of large comprehensive programme or big-push to launch a country into self-sustaining growth path; and

- Whether a balanced growth approach or an unbalanced growth strategy is appropriate for the underdeveloped economies.

3.2: INTRODUCTION

Beginning of the 20th century took a new direction in the literature of economic theory. Earlier economists were mainly confined to the capitalist economy of western countries which were very rich and developed. But, after the emergence of a new world order, particularly after World War II, many newly liberated countries emerged from the colonial dominance, which were very poor and underdeveloped at that time. This turned the focus of economists towards the problems of these underdeveloped countries. And a whole mass of literature addressing itself to the problems of underdeveloped countries emerged during the fifties and the sixties of the 20th century. In this chapter we will discuss some of these theories which were focused on the transformation subsistence economy.

3.3: LEWIS MODEL WITH UNLIMITED LABOUR SUPPLY

Nobel Laureate, W. Arthur Lewis, propounded a very systematic theory of ‘Economic Development with Unlimited Supplies of Labour’ in the mid-1950. This theory focused on the structural transformation of primary subsistence economy which became the general theory of the development process in labour-surplus underdeveloped economies.

Like classical economists, Lewis also believes that due to the increasing growth of population, most of the underdeveloped countries have unlimited supply of labour, which is available at the subsistence wage rate. The large reservoir of such labour force is generally found in the subsistence sector of the economy and withdrawal of this labour force from the “subsistence sector” to the “capitalist sector” results in capital formation and thus economic development takes place. The capitalist sector is that part of the economy which uses reproducible capital, whereas the subsistence sector does not use it. In this sector, the average productivity of worker is lower than that in the capitalist sector and so the average wage in the subsistence sector is comparatively lower than that in the capitalist sector. In subsistence sector, the people are generally backward, illiterate, simple and unskilled. In contrast, the people are advance, literate, sophisticated and skilled in the capital sector. Thus, there are very little similarities between the

two sectors of the economy and development is lopsided. In short, it can be observed that only some islands of development exist in the vast sea of stagnation.

Under such circumstance, the central problem according to Lewis is to provide gainful employment to the unlimited supply of labour. In other words, more attention is to be paid to the development and expansion of subsistence sector. This requires a high rate a saving and capital formation. In his own words, “The central problem in the theory of economic development is to understand the process by which a community, which was previously saving and investing 4 or 5 per cent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 to 15 percent of the national income or more. This is the central problem because the central idea of economic development is rapid capital accumulation (including knowledge and skills with capital).” Thus it is quite clear that gainful employment can be provided to unlimited labour force when rate of saving and investment is at least 15 per cent of the national income.

Conversion of Surplus Manpower into Capitalist Surplus: Now the main question is how the unlimited supply of labour can be converted into capital formation, which is an essential pre-requisite for economic development. Lewis is of the opinion that when unlimited supply of labour is available, there can be enormous scope for starting the new industries and expanding the existing industries. But this does not mean that the availability of unskilled labour alone can do the trick for economic development. Development requires not only the availability of unskilled labour, but also of skilled labour. There may be shortage of skilled labour like engineers, professionals, administrators, technocrats, etc. Lewis fully realizes the shortage of skilled workers as bottleneck in the expansion process, but he argues that this is only temporary bottleneck or “quasi bottleneck” (the term as used by Marshall) and it disappears when capital is available for development. The capitalists and the government would provide facilities for training more people. Then the real bottlenecks to expansion are capital and natural resources and not the skilled labour.

When capital is scarce and labour is abundant, we know from the law of variable proportions that capital will not be spread thinly over all the labour. Only that much quantity of labour would be used with capital, which will reduce the marginal productivity of labour and wage rate to zero.

But in actual practice, labour is not available at zero wage. Therefore, capital will be applied only up to that point where the marginal productivity of labour is equal to the current wage rate. This is illustrated by Figure 1.

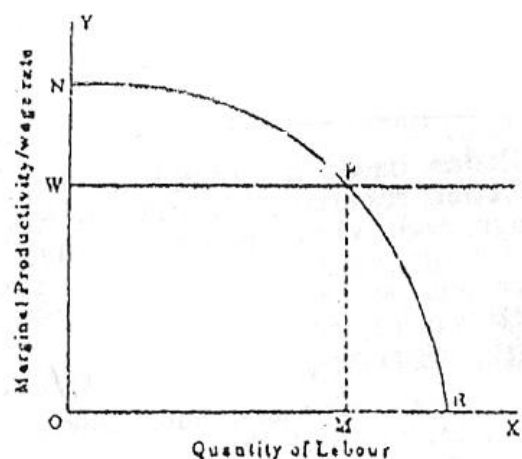


Fig. 1

Quantity of labour is shown on horizontal axis, and marginal productivity/wage rate on vertical axis. OW is the current wage and NR is the marginal productivity curve. The amount of a capital is fixed. If the marginal productivity of labour would have been zero, then OR workers would have been employed. But this does not happen in actual practice. Only OM workers would be employed at the current wage OW, WNP is the capitalist surplus. OWPM will be paid as wages to workers in the capitalist sector. The workers outside this sector (i.e. beyond OM) would earn what they can earn in the subsistence sector of the economy. In other words, the earnings in the capitalist sector are higher than the earnings in the subsistence sector. It is estimated that there is a gap of 30 per cent or more between the capitalist wage and the subsistence wage. This gap may attribute to the higher cost of living, higher transport costs and higher rents in the capitalist sector. This gap may be required because of the psychological cost of transferring the workers from the easy-going way of life of the subsistence sector to the more regimented environment of the capitalist sector.

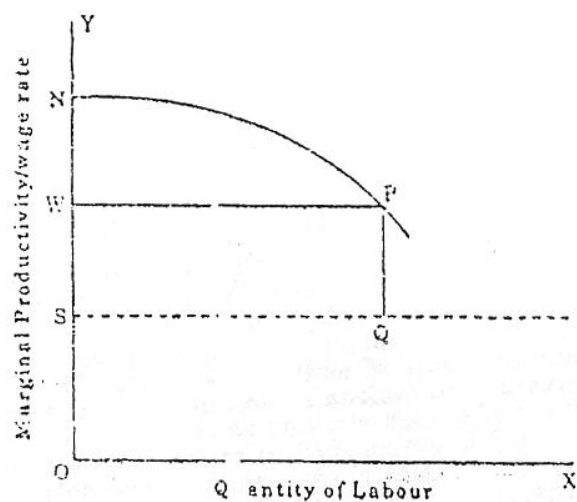


Fig. 2

Another reason for the gap between the two types of earnings may be due to the fact that even unskilled worker is of more use to capitalist sector after he has been there for some time than the raw recruit from the rural sector. Still another reason for the high capitalist sector wage is that the workers organize themselves into trade unions and try to protect their wage differentials. The wage differentials do exist even if there are no unions. The effect of this gap is shown

diagrammatically in Figure 2.

Quantity of labour is shown on the horizontal axis and marginal productivity/wage rate on vertical axis. OS represents the wage rate prevailing in the subsistence sector and OW represents the wage rate prevailing in the capitalist sector. OW is higher than OS for the reasons explained above.

Even though wage rate in the capitalist sector is higher than that in the subsistence wage rate, yet capitalist sector is earning the surplus WNP, because marginal productivity is higher than the

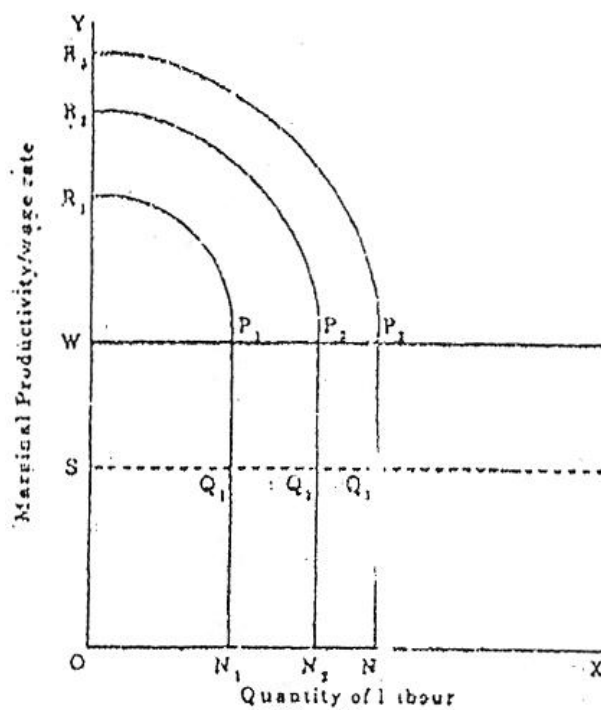


Fig. 3

capitalist sector wage. The re-investment of this surplus sets the process of expansion in motion and the development starts. The re-investment of surplus creates new capital, the capitalist sector expands, taking more people into capitalist employment out of the subsistence sector. The surplus grows still larger and capital formation greater. Such a process of expansion continues and gathers momentum until the entire labour surplus disappears. The cumulative process of expansion is explained diagrammatically in Figure 3.

Quantity of labour is shown on the horizontal scale and marginal productivity/wage rate on the vertical scale. OS is as before, the subsistence wage and OW the capitalist wage, $N_1P_1R_1$, $N_2P_2R_2$ are the productivity curves. WR_1P_1 represents the capitalist surplus in the initial stage. When this capitalist surplus is re-invested, the amount of fixed capital increases. The curve of marginal productivity of labour also rises from $N_1P_1R_1$ to $N_2P_2R_2$. The capitalist surplus also rises from WR_1P_1 to WR_2P_2 . The employment in the capitalist sector rises from ON_1 to ON_2 . In this case, capitalist surplus as well as capitalistic employment are larger than before. Further re-investment raises the curve of marginal productivity of labour to $N_3P_3R_3$. Capitalist surplus rises to WR_3P_3 and employment rises ON_3 . This process of

expansion continues until the labour surplus disappears. Thus, the expansion of employment in the capitalist sector depends on the capitalist surplus.

Relationship between Capital, Technical Progress and Productivity: Lewis discusses the relationship between capital, technical progress and productivity as these are the variables of development. In theory, it may be possible to distinguish between the growth of capital and the growth of technical knowledge, but in practice, it is neither possible nor necessary. Lewis is of the opinion that the growth of technical knowledge outside the capitalist sector would be fundamentally important since it raises the level of wages and thereby reducing the capitalist surplus. But inside the capitalist sector, technical knowledge and capital work in the same direction to raise the surplus and to increase employment. Capital formation and technical progress result not in raising wages, but in raising the share of profits in national income. The application of new technical knowledge usually requires new investment and whether new knowledge is capital-saving or labour-saving, it hardly makes any difference to the present discussion. Capital and technical knowledge also work together in the sense that in the economics where techniques are stagnant, savings are not channelized for increasing productive capital, but they are used for building memorial, churches, and other durable consumer goods and vice versa. Hence in the present analysis the growth of productive capital and the growth of technical knowledge are treated as a single phenomenon, and both tend to raise profits and employment but not wages.

Bank Credit and Inflation: So far we have discussed that re-investment of capitalist surplus helps in the capital formation. The other source of capital formation, according to Lewis, is the expansion of supply of money – especially bank credit. In an underdeveloped economy, characterized by the unlimited supply of labour and scarcity of capital, the effect of bank credit on the capital formation is similar to that of re-investment of profit. Bank credit helps in the expansion of employment, output, effective demand and purchasing power of the community. This way the development process operates. But the limitation of bank credit policy is that it results in the inflationary rise in prices. The reason is quite obvious. When surplus labour is put to capital formation and is paid wage out of credit money, prices tend to rise as the output of consumer goods remains constant for the time being. But this is a temporary phenomenon. The inflationary process will out go on for ever. According to Lewis, “Inflation for the purpose of

getting hold of resources for war may be cumulative, but inflation for the purpose of creating productive capital is self-destructive. Prices rise as capital is created and fall again as its output reaches the market.” The inflationary process for the purpose of development would be self-liquidating on account of the following reasons:

1. Voluntary savings would increase to a level, where they are equal to inflated level of investment.
2. Profit would increase and the new investment can be financed out of them. Hence there would be no need for further expansion of bank credit.
3. Government would mop up the extra-purchasing power by way of taxes, for financing the development.
4. Output of consumer goods will expand after some time and prevent inflationary rise in prices.

Lewis has also explained the liquidation of inflationary process with an example. “Suppose that investment of \$ 100 a year yields \$ 20 a year profit, of which \$ 10 a year is saved. Then, if capitalists invest an extra \$ 100 a year all of which in the first year is financed out of credit, by the eleventh year profits will be \$ 200 a year or greater. Saving will be \$ 100 a year greater and there will be no further monetary pressure on prices. All that will remain from the episode is that there will be \$ 100 or more useful productive capital at work than there would have if the credit creation had not taken place.” But it should not be presumed that inflation is always conducive for development. Inflation has its evil effects such as unfavorable balance of payments, foreign exchange problems, hardships to the salaried people, economic inequality and social discontent, etc. Lewis suggests that government should adopt effective and appropriate steps for liquidating the evil effects of inflation; otherwise inflation will not be self-destructive rather it will become self-cumulative.

End of the Growth Process: The growth process does not go on endlessly, but it comes to an end. According to Lewis, the growth process comes to an end because of the following reasons:

1. When capital accumulation proceeds faster than the population growth, the absolute number of people in the subsistence sector declines. The average product per worker rises automatically, because there are few mouths to share the product. After sometime the

capitalist wage begins to rise, which lowers the capitalist surplus. The lower capitalist surplus reduces the capital formation and reverses the expansionary process.

2. The increase in the size of capitalist sector relatively to the subsistence sector may turn the terms of trade against the capitalist sectors; the reason being that the demand for the capitalist goods would decline because of the increase in the prices of consumption goods. Such a situation will force the capitalist to pay higher wages to the workers in order to keep their real income intact. The payment of higher wages will reduce the size of capitalist surplus and capital formation.
3. Another possibility is that subsistence sector may adopt improved technology and may become productive. As a result, the wage rate will rise in capitalist sector, which in turn would diminish the capitalist surplus. Thus the capital formation would decline.
4. Another reason for the reversal of expansionary process is that workers in the capitalist sector may initiate the capitalist way of life and may agitate for higher wages. If the workers succeed in their campaign for higher wages that would reduce the capitalist surplus and capital formation will decline.

It can therefore, be concluded, that the expansion of the capitalist sector may come to a halt because of the increase in the prices of the subsistence (consumption) goods, or because the price is not falling as fast as subsistence average productivity is rising or because capitalist workers agitate for higher wages. Any of these would raise wages and reduce surplus. If none of these factors is strong enough to stop capital accumulation, the capitalist sector will continue to expand until no surplus labour is left. After that, expansion of the capitalist sector will stop.

Open Economy: When expansion of the capitalist sector is adversely affected by any of the reasons discussed above, the capitalists can still encourage capital formation by two ways: (i) by encouraging immigration, and (ii) by exporting their capital to the countries with abundance of labour force. Both these possibilities must be examined before arriving at some conclusion.

So far as the first possibility is concerned, i.e., encouraging the capital formation by mass immigration, it is not a very practical measure. It can be explained by an example. Suppose there was free immigration from India to U.S.A., the wage level of U.S.A. would certainly be pulled down towards the Indian level. But the fall in the wage level of U.S.A., would be strongly

resisted by the workers in U.S.A. and trade unions would be bitterly hostile to immigration. Small immigration of special categories (just as professionals, technocrats. etc.) of people may be possible, but not mass immigration of unskilled workers. So the possibility of mass immigration for raising the level of capital formation at home is ruled out.

The second possibility is the export of capital. The effect of exporting capital would be the reduction of fixed capital at home and the reduction in demand for labour. Under such a situation, the wages will fall in the capital-exporting countries. The fall in wages may be offset wholly or partially, if capital is used for cheapening the goods which workers import. But the reduction in wages would be aggravated if capital is used in such a way which would raise the cost of imports. This capital importing countries with surpluses labour may not gain an increase in real wages from the investment of foreign capital, unless the capital results increased productivity of the commodities which they produce of their own consumption.

The discussion of these possibilities reveals that neither mass immigration nor capital export is a practical solution for expansion of the capitalist sector. So both these possibilities are ruled out by Lewis himself.

Critical Appraisal: This model explains how the available surplus labour can be used as an instrument for development and Lewis attempt in this direction is praiseworthy. Yet, objections have been raised against this model on theoretical and practical grounds. The major limitations of the model are as follows:

1. This theory assumes a constant wage rate prevails in the capitalist sector till surplus labour from the subsistence sector is added. But, it is unrealistic because, the wage rate continues to rise over a period of time even without additional labour supply due to various other factors.
2. Lewis assumes that the capitalist surplus is reinvested in productive capital. But according to Reynolds, if the productive capital happens to be labour saving, it would not absorb labour and hence the theory fails.
3. Further, Lewis assumes that skilled labour is a temporary bottleneck. But in reality, it takes a very long time to create skilled and well trained work force in the underdeveloped countries due to lack of resources.

4. Another weakness of this theory is that the higher capitalist wage rates tend to labour mobility from subsistence sector to the capitalist sector. But it is not so easy due to their family and land, differences in language and custom, the problem of congestion and high cost of living in the capitalist sector.
5. Schulz criticizes Lewis model on the ground that, the marginal productivity of labour in overpopulated underdeveloped countries is zero or negligible. If it were so, the subsistence wages would also be zero.
6. Lewis assumes that when surplus labour is withdrawn from the subsistence sector to the capitalist sector, agricultural production remains unaffected in the subsistence sector. But the fact is that withdrawal of workers from the farms will reduce output.

Conclusion: Despite these limitations, Lewis' theory has the merit of explaining in a very clear cut way the process of development. This two sector theory has great analytical value. It explains how low capital formation takes place in the underdeveloped countries, which have plethora of labour and scarcity of capital. His study of the problems of population growth, technological progress and capital accumulation gives the theory a touch of realism.

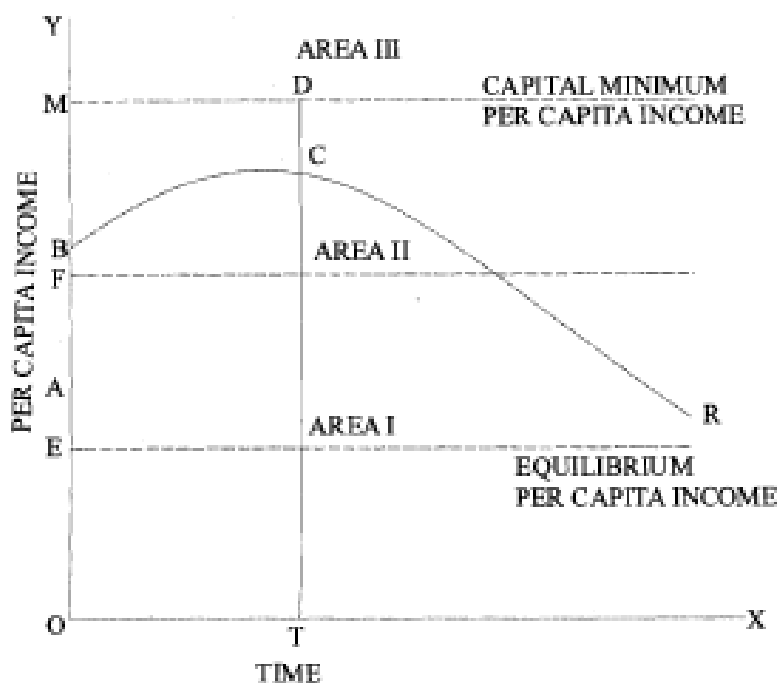
3.4: LEIBENSTEIN'S THEORY OF CRITICAL MINIMUM EFFORT

Harvey Leibenstein has propounded his thesis of critical minimum effort as an attempt to provide a solution to the problems of vicious circle of poverty in underdeveloped countries. This theory argues that there exists an environment of inertia, which makes development variable (i.e., income, employment, saving, investment, etc.) move in the backward direction and reverse the process of development. Thus, minimum effort is needed to overcome the inertia. In other words, minimum effort is necessary to achieve steady secular growth for raising per capita income in the long-run.

According to Leibenstein, every economy experiences the influence of two forces i.e., 'Shocks' and 'Stimulants'. Shocks refer to those forces which tend to reduce output, income, employment and investment etc. Shocks dampen and depress the development forces and are called 'income-depressing forces'. On the other hand, stimulants refer to those forces which help raising the level of income, output, employment, investment, etc. Stimulants impress and encourage development forces and are called 'income-generating forces'. Thus, an economy is said to be

underdeveloped, if the impact of shocks is stronger than that of stimulants. On the other hand, a country is said to be developed if the impact of shocks is weaker than that of stimulants. It is thus imperative for developing countries to strengthen the forces of stimulants and weaken the shocks through policy options available to them.

This theory of critical minimum effort explains the struggle between the forces of shocks and stimulants. It is seen that the impact of shocks is more than that of stimulants in the early stages of development (due to the presence of vicious circle of poverty and other depressants), as such the economy remains in a state of underdevelopment. To lift the economy from underdevelopment to development, minimum efforts are required.



Leibenstein believes that it is not necessary to make critical minimum effort in a single stroke. It can be split up into a series of smaller efforts provided these are optimally timed. This can be explained with the help of the above figure.

In the figure, time is shown on horizontal axis and per capita income on vertical axis. OE is the equilibrium per capita income and OM is the critical per capita income. Suppose the level of per capita income is OA. This level is low as compared to the critical minimum level. It would fail to

take the economy out of stagnation. The effect of income depressing forces would be strong in relation to the effect of income-generating forces. When the level of income is raised to OB, the growth curve will follow the path BCR. It is evident that per capita income is rising up to point C, and thereafter per capita income is declining. It means, OB level of income is insufficient to generate the growth momentum in the economy. If sufficient investment is injected into the system to raise per capita income to OM, sustained growth will occur and effect of stimulants would be strong than that of shocks. There, any level of investment lower than the critical minimum cannot ensure sustained growth.

The term 'critical' is indicative of the fact that investment should at least be of such a level which could raise per capita income to OM for achieving sustained growth. However, it would be convenient and cheaper to make effort in two doses. The initial injection of investment might be enough to raise per capita income to OB. Then at time T, the second dose of investment could be injected to raise per capita income to OM, thereby taking the economy to the critical minimum level of income required for sustained growth.

According to Leibenstein, a critical minimum effort is necessary for the following reasons:

1. Some of the factors of production are indivisible, such that unless used in full or in minimum amounts, they will lead to internal diseconomies. To overcome these diseconomies, some minimum critical investment may be necessary.
2. There is a sort of mutuality and interdependence between a number of firms and industries. As these develop, there emerge external economies. These economies can be reaped only when there are at least the minimum numbers of industries operating which make these economies possible. In their absence, these economies may not arise at all.
3. The economy may be subjected to autonomously generated income depressing factors at any time and also may be subject to depressants induced by some aspects of process of growth at the same time. A certain minimum investment is necessary to overcome them and initiate sustained growth.

However, there are some difficulties particularly in the underdeveloped countries which come in the way of implementing this thesis. These are: Lack of entrepreneurs; Limited investment opportunities; Deficiency of capital; and Scarcity of other resources.

Critical Appraisal: The critical minimum effort thesis has been regarded as a prescription for economic backwardness of underdeveloped countries. But, it has also been criticised on the following grounds:

1. Leibenstein assumes that, population increases with rise in income above the subsistence level. And beyond a particular level of income, population declines. It implies that rise in income has a direct bearing on the growth of population. But in reality, in underdeveloped countries growth of population is influenced by social attitudes, customs and traditions of the people and not merely by the per capita income.
2. According to Myint, the functional relation between per capita income and income growth rate is not as simple as assumes by Leibenstein. It is complex and has two stages. In the first stage, the level of per capita income influences the rate of saving and investment which, in turn, depend on the pattern of income distribution and effectiveness of financial institutions in mobilizing saving. In the second stage, the relation between investment and resultant output depends upon the economic and social system of the country. The relationship can be improved through innovations. The meaningful innovation is possible when updated technology, skilled labour and necessary infrastructure in the country. However, these are not available in the initial phase of development, and the critical minimum runs into difficulties.
3. Leibenstein has been criticised for ignoring the role of state in tackling the population problem. No government could afford to wait for the per capita income to rise above the critical minimum level for the population growth to decline. The government has to make policy to keep population growth under control particularly in the underdeveloped countries (for example in India, we have National Population Policy to control population growth).
4. This theory also neglects the role of external forces. In underdeveloped countries external forces play an important role in the initial stages of development. This theory does not explain clearly the role of external forces like foreign capital, foreign trade, international economic relations, etc. These forces exert a vital impact on development and these factors play an important role in the development process.

In spite of the above criticisms, Leibenstein's theory of critical minimum effort is a brilliant effort to break the vicious circle of poverty in which underdeveloped countries are caught. The path of sustained growth is not even and smooth, it is rather difficult and complex one. Thus, minimum efforts are essentially required to overcome the difficulties and achieve sustained growth, which is the ultimate objective of a development strategy.

3.5: ROSENSTEIN RODAN'S BIG-PUSH THEORY

This theory has been propounded by Prof. Paul N. Rosenstein Rodan. According to this theory, a "big-push" or a large comprehensive programme is needed in the form of a high minimum amount of investment to overcome the obstacles to development in underdeveloped countries so as to initiate it on the path of growth. Prof. Rodan believes that isolated and small efforts will not make a sufficient impact on economic growth. To quote him, "...launching a country into self-sustaining growth is a little like getting an airplane off the ground. There is a critical ground speed which must be passed before the craft can become airborne. Proceeding "bit-by-bit" will not add up in its efforts to the sum total of the single bits". If the process of development is to be initiated, a big-push in investment is needed.

According to Rodan, a major hurdle in the process of industrialization is the small size of the market. To overcome this hurdle, he has explained the role of indivisibilities or external economies. Four kinds of indivisibilities have been discussed by Rodan to explain the implications of big-push theory, which is discussed briefly as follows:

- (i) **Indivisibility in the production function:** Indivisibilities of inputs or factors lead to increasing returns. The most important form of these indivisibilities is the social overhead capital like power, transport and communications. The basic characteristics of social overhead capital are: Firstly, it is irreversible in time, i.e., investment in social overhead capital must precede investment in directly productive activities. Secondly, it has a minimum durability. Thirdly, it has a long gestation period. Fourthly, it has an irreducible minimum industry mix of different kinds of public utilities. These indivisibilities of supply of social overhead capital are the major obstacle to economic development, and to be removed require large initial investment. The crux of the matter is that sustained economic development requires creation and expansion of social overhead capital, which

in turn, requires large amount of investment called 'lumpiness of capital'. Lumpiness of capital creates external economies which pave the way for economic development.

(ii) **Indivisibility of demand:** The importance of indivisibilities lies in the expansion of market size. Capital investment in underdeveloped countries is limited by the fact that these provide only small markets to producers. The small size of markets generates uncertainties, which deter prospective investors. If, instead, a large number of industries, which work as complementaries to each other, are set up simultaneously, these will create demand for each other's products and thus provide the necessary incentives to investors. In other words, indivisibility of demand requires simultaneously large investment in a number of industries.

(iii) **Indivisibility in the supply of savings:** A large quantum of investment requires a large volume of savings, which is difficult to achieve in an underdeveloped economy because of its low levels of income. Small increases in income, consequent upon small additional investment are likely to be consumed. Therefore, what is required is a large lump of investment, which may produce large additional incomes, a large part of which may take the form of savings.

(iv) **Psychological indivisibilities:** Rodan also suggest another important indivisibility, which he refers to as 'psychological indivisibilities'. It implies that a proper psychological environment conducive to economic development should be created. The need of development should be impressed upon the people. Progressive institutional framework should be evolved to mould people's psychology in the direction of development. They should be made to put in big efforts, as isolated and small efforts do not carry significant impact on growth. The psychology of big efforts should, therefore, be created among the masses.

These indivisibilities make a large lump of investment imperative; and then only it would be possible to reap various external economics that have made economic development of underdeveloped countries of yester-years possible.

Critical Appraisal: Rosenstein Rodan regards his theory of development superior to the traditional static equilibrium theory because it appears to contradict the latter's motto that nature does make jumps. His theory is based on more realistic assumptions of indivisibilities and non-

appropriabilities in production functions. It examines the path towards equilibrium and not merely the conditions at a point of equilibrium. It is thus primarily a theory of investment concerned with imperfect markets in underdeveloped countries. It is a high minimum quantum of investment rather than price mechanism in such imperfect markets that takes an underdeveloped economy towards an optimum position.

However, the theory of big-push is not free from certain defects and has been criticised by economists on the plea that, it creates more problems than it solves. Following are some main points of criticism:

1. Hla Myint has argued that this theory stresses the need for big efforts and large quantum of investment, but it neglects the problem of shortages. In underdeveloped countries there is less availability of dynamic entrepreneurs, skilled labour, domestic capital, etc. The variables could create problems in the implementation of big push programmes.
2. H.E. Ellis has pointed out that this theory ignores the shortage of saving and risk involved in the investment. A large quantum of investment might not yield desired results due to market imperfections and structural obstacles.
3. The theory assumes that simultaneous development would create indivisibilities or external economies in the form of training and skilled labour force in the long run. But there could be a possibility that in the short run each firm might pay each other. The possibility of external diseconomies has, perhaps, not been visualized in the theory.
4. The theory emphasises on the lumpiness of investment in different industries such as capital-goods industries, consumer goods industries and social overhead capital, etc. But it ignores the development of agriculture. It should be remembered that agriculture and industry are complementary to each other. It is difficult to raise the super-structure of industrialization on depressed agriculture.
5. Hla Myint is of the view that it is very difficult to coordinate various complex development plans started under the banner of big-push. At times the problems of coordination may be beyond the competence of strong and efficient administrative machinery. Governments are likely to face difficulties not only in drawing up of development plans, but also in the execution of various development projects. In the

execution of various development projects, there are possibilities for the revision of original plans, delays and departures from the original time frame.

6. Jacob Viner has pointed out indivisibilities, or external economies, generally result in reducing the cost rather than expanding the output. In a development theory, expansion of output is as important as the reduction of cost. The theory should have explained both the aspects of development. It, however, explains the cost-reduction aspect and ignores the aspect of output expansion.
7. J. H. Adler has criticized the theory on the ground that it ignores the importance of small investment. His statistical analysis of economic development reveals that a relatively low level of investment pays off well in the form of additional investment. The possibility of small push has not been explored by Rodan.

3.6: THE DOCTRINE OF BALANCED GROWTH

Western economists like Ragnar Nurkse, Arthur Lewis, Allyn young, Rosenstein Rodan have advocated the strategy of balanced growth for the underdeveloped countries.

Balanced growth implies growth in every kind of capital stock. It refers to full employment, a high level of investment, overall growth in productive capacity and equilibrium. It aims at investment in the depressed sector. Balanced growth can occur when the growth rates of consumption, investment and income are equal to each other. This can be expressed as:

$$\frac{\Delta C}{C} = \frac{\Delta I}{I} = \frac{\Delta Y}{Y}$$

According to R.F Harrod, balanced growth requires equality between growth rate of income (G_y) growth rate of output (G_w) and growth rate of natural resources (G_n). This can be expressed as:

$$G_y = G_w = G_n$$

Mrs. Joan Robinson's concept of 'golden age' also implies balanced growth. The golden age is characterized by the equality between growth rates of capital ($\Delta K/K$) and labour ($\Delta N/N$).

The theory of balanced growth, according to Prof. Nurkse, is a true summation of the idea of vicious circle of poverty. On the supply side, there is small capacity to save due to low level of

income. The low level of income is a reflection of low productivity, which in its turn is due to a lack of capital. The lack of capital is a result of small capacity to save. Thus, the vicious circle is complete.

On the demand side, inducement to invest may be low because of small purchasing power of the people, which is due to their small real income, which again is due to low productivity. Low productivity may be due to small amount of capital used in production, which in turn may be due to a small inducement to invest. Again, the operation of vicious circle is complete. The best way to break this vicious circle of poverty is through the application of capital over a wide range of activities which raises the general level of economic efficiency and size of the market is enlarged.

The doctrine of Balanced Growth calls for a balance between different sectors of the economy, i.e., a balance between agriculture and industry. Both sectors should be interdependent in their needs and expansion of the manufacturing industries should help the development of agriculture and vice versa. Planners should not concentrate on resources for the development of one particular sector of the economy at the expense of the other sector. While drawing up the pattern of priorities, the planners should take into account the local conditions such as availability of resources, level of technological development institutional factors, level of development already attained and similar other factors.

This doctrine also calls for a balance between investment in human capital and investment in material capital. These capacities should be enhanced continuously and simultaneously to raise the level of national output, which is the centrifugal force of economic development. Economic development implies both capital formation and skill formation.

There should also be a balance between the domestic sector and foreign sector. The underdeveloped countries should reshape their foreign trade policy to meet the requirements of their development. They should adopt restrictive trade policies to protect themselves against the world market fluctuations. The government of underdeveloped countries should make consistent and earnest efforts to earn as much foreign exchange as possible by promoting exports and reducing imports. Restrictions must be imposed on the import of luxury goods. Money saved on these accounts should be used for domestic investment.

However, a few essential conditions for balanced growth are: (i) state intervention (ii) formulation and implementation of plans (iii) coordination among the different departments of the government (iv) cooperation between people and government.

The various advantages of balanced growth are: (i) balanced regional development, (ii) wide extent of the market, (iii) division of labour, (iv) external economies, (v) creation of social overhead capital, (vi) innovations and researches, and (vii) modern technological development.

3.7: THE DOCTRINE OF UNBALANCED GROWTH

Prof. Albert Hirschman has propounded the theory of unbalanced growth in his book “Strategy of Economic Development”. It was further supported by H.W. Singer, C.P Kindleberger, Paul Streeten and W.W. Rostow.

According to Hirschman, imbalances and tensions should be created in an economy for attaining accelerated economic development. The best way to create imbalances and tensions is to assign top priority to the leading sectors in the matter of development.

Prof. Alok Ghosh explains the concept of unbalanced growth with stress on the planning period investment and income at a rate higher than consumption. This definition explains the concept of unbalanced growth in terms of growth rates of investment, income and consumption.

If $\frac{\Delta I}{I}$, $\frac{\Delta Y}{Y}$ and $\frac{\Delta C}{C}$ denote the growth rates of investment, income and consumption respectively, then unbalanced growth implies: $\frac{\Delta I}{I} > \frac{\Delta Y}{Y} > \frac{\Delta C}{C}$. In other words, these three growth rates should not be uniform.

Prof. Rostow has explained the concept of unbalanced growth in terms of the conditions of take-off. Take-off refers to the time interval during which growth of the economy becomes self-propelling or automatic and for that the following conditions are essential.

- (a) The rate of the productive investment should be raised from 5 per cent or less to 10 per cent or more of the national income.

- (b) The productive investment must be made for the development of the leading sectors of the economy.

According to Hirschman, the series of investment can be of two types: (1) convergent series of investment and (2) divergent series of investment. The convergent series of investment are made in the Directly Productive Activities (DPA) and divergent series of investment are made on Social Overhead Capital (SOC).

According to Hirschman, SOC refers to “those basic services without which primary, secondary and tertiary productive activities can not function”. The expansion of basic services through the investment in SOC is an essential condition for encouraging and stimulating the private investment in DPA. Some SOC investment is required as a prerequisite for DPA investment. This sequence of investment (from SOC to DPA) is called the “pressure relieving investment” or “development via excess capacity of SOC”. Another strategy of the doctrine to unbalance the economy is shortage of SOC, which may raise the cost of production and price level as well. Increase in price level may create uncertainty and unfavourable climate for fresh investments in DPA. In this way, the process of development may be hampered. As such pressures and tensions will arise during the course of development. The sequence of investment (from DPA to SOC) is called “pressure creating investment” or “development via shortage of SOC”.

The doctrine of unbalanced growth create advantages like the creation of economies, self-reliance, generation of economic surplus, skill formation, short-term strategy, practical policy, better use of resources, expansion of social overhead capital and rapid industrialization.

3.8: BALANCED *VERSUS* UNBALANCED GROWTH

(NURKSE *VERSUS* HIRSCHMAN THESIS)

Having discussed the two strategies, it would be worthwhile to have a comparative study of balanced and unbalanced growth. The main points of difference are as follows:

1. Balanced growth aims at simultaneous development of all the sectors of the economy, whereas unbalanced growth suggests development of only the leading and growing sectors.

2. Balanced growth aims at harmony, consistency and balances in the growth rates of various sectors, whereas unbalanced growth suggests creation of disharmony, inconsistency and imbalance in the growth rates of development parameters.
3. The implementation of balanced growth requires huge capital investment for the simultaneous development of various sectors. The implementation of unbalanced growth requires relatively less capital as only leading sectors are developed in the first instance.
4. Balanced growth is a long term strategy as the development of different sectors is possible in the long period. The objectives of balanced growth are difficult to be realised in the short period because of stress and strain in the early stages of development. But, the unbalanced growth is a relatively short term strategy, as the development of leading sectors is possible in the short period.
5. The doctrine of balanced growth assumes that the bottlenecks in the form of shortages are fairly widespread in the economy and as such, it suggests the policy of frontal attack for minimization and elimination of bottlenecks. Unbalanced growth, on the other hand, assumes that bottlenecks are not widely spread in the economy.
6. The balanced growth theory assumes that supply of production factors is elastic, the condition so essential for simultaneous expansion of various sectors. The unbalanced growth doctrine assumes that supply of production factors is inelastic in some sectors and elastic in others, thus warranting investment in the sectors with elastic supply conditions.
7. Another difference between balanced and unbalanced growth doctrine is that the former assumes that all sector generate external economies whereas, the latter assumes that some sectors generate larger external economies than the other.

Of course, there are certain points of similarities between the two strategies. These are as follows:

First, both the strategies believe in the existence of a private enterprise system based on market mechanism under which they operate. At the same time, they imply operation of state planning.

Second, both ignore the role of supply limitations and supply inelasticities.

Third, both the doctrines assume interdependence, but of different degrees. Under balanced growth, development of one sector is dependent on that of the other sectors. On the other hand,

under unbalanced growth, the economy gradually moves on the path of economic development via tensions, disproportions and disequilibria, and ultimately reaches balanced growth.

Reconciliation: The controversy between balanced and unbalanced growth has been stretched too far and has become almost barren. Keeping in view the scarcity of resources in a developing country, the best course is to adopt the strategy of unbalanced growth. Under this strategy, social overhead capital should be developed first and this would encourage subsequent investments in directly productive activities, when the economy will ultimately move on the path to balanced growth. The experience of many developing countries like India reveals that if social overhead capital such as power, irrigation, manpower, transport, etc. are developed first, development of agriculture, industry and commerce is retarded.

3.9: SINGER'S CRITIQUE OF BALANCED GROWTH MODEL

Sir H.W. Singer, a strong supporter of unbalanced growth strategy has criticized the theory of balanced growth on several grounds. The main points of Singer's critique of balanced growth are as follows:

According to Singer, balanced growth strategy is beyond the capabilities of underdeveloped countries. Simultaneous development of different sectors requires lumpiness of capital and it is difficult for the less developed countries to mobilize necessary capital investment in the early stages of development. Also in the underdeveloped countries, supply of other resources like infrastructure, trained labour, research and development, etc. are also inadequate to support balanced growth. Moreover, inadequacy of essential resources leads to wastages and the optimum allocation of resources becomes difficult. The whole doctrine thus appears to be a contradiction in itself. In this context Singer argues, "Perhaps guerilla tactics are more suitable for the circumstances of underdeveloped countries than a frontal attack".

It is generally presumed that under the balanced growth model, capital lumpiness is needed for simultaneous development of social and economic overheads. The experience of many developed countries, however, shows that many over heads can be built up at low costs. For example, electricity can be generated through thermal plants, nuclear plants and diesel generating sets rather than building huge dam on a river. The generation of electricity by the first process

may entail low cost as compared to the second process. Moreover, capital lumpiness is not needed if labour-intensive techniques are adopted in the initial stages for promoting development. H. W. Singer has aptly remarked in this context , “Think-Big, is a sound advice to underdeveloped countries but ‘Act-Big’ is unwise counsel if it spurs them to do more than their resources permit”.

Launching of balanced growth in the underdeveloped countries is just like asking a weak person to take a long jump. If a weak person ventures to take a long jump, he may get his legs or arms fractured. Similarly, if an underdeveloped country launches ambitious programme of balanced growth with limited resources, then imbalances, tensions and disequilibrium may emerge and it might be difficult to maintain balance among different sectors. It is worthwhile again to quote Singer again, “The advantages of multiple developments may make interesting reading for economists, but they are gloomy news indeed for underdeveloped countries. The initial resources for simultaneous developments on many fronts are generally lacking”.

H. W. Singer believes that the doctrine of balanced growth is based on the assumption of zero development, i.e., underdeveloped countries start their development process from scratch. This logic appears to be unconvincing. The underdeveloped economies start their development from a stage of low but not zero development. Even if it may be presumed that development starts from zero level, then priority would be accorded to the most strategic sectors. In that case, other sectors would not receive equal priority and the strategy of balanced growth would be defeated.

Thus, we may conclude in the words of H.W. Singer, “The doctrine of balanced growth is premature rather than wrong in the since that it is applicable to subsequent stages of sustained growth rather than to the breaking of deadlock”.

3.10: SUMMARY

A large number of development strategies have been put forwarded by the economists to solve the problems of the underdeveloped countries trapped in the vicious circle of poverty. In this chapter we discussed some important and popular strategies. We started with Lewis model of unlimited of labour supplies that focused on the structural transformation of the primary subsistence economy. Then we proceeded to understand the critical minimum effort thesis,

which makes an attempt to explain why the developing countries should put in more than minimum efforts to break the vicious circle of poverty and release the forces of growth. Further this chapter explains the big-push approach of Rosenstein Rodan who advocates for a large comprehensive programme in the form of a high minimum amount of investment to overcome the obstacles to development in an underdeveloped economy. This chapter also discusses the balanced and unbalanced growth strategies and makes a comparison of the two. The chapter ends with the discussion of some points of criticisms made by Singer against the strategy of balanced growth.

3.11: KEY WORDS

1. **Vicious Circle of Poverty:** A circular constellation of forces tending to act and react upon one another in such a way as to keep a poor , country in a state of poverty.
2. **Social Overhead Capital:** Also known as infrastructure, the supporting structure for production units engaged in production of goods and services.
3. **Indivisibilities:** Refer to the external economies of scale.
4. **Shocks:** Refer to those forces which tend to reduce output income, employment and investment, etc.
5. **Stimulants:** Refer to those forces which help in raising the level of income, output, employment, investment, etc.

3.12: SELF-ASSESSMENT QUESTIONS

1. What does Lewis mean by an unlimited supply of labour? What is the main mechanism for growth in his model?
2. Why does Lewis stress the importance of shifting income to the capitalist class? Also show with diagram how the process of growth eventually slows down in the Lewis theory?
3. Critically examine Lewis model of economic growth.
4. Explain the theory of critical minimum effort. Also bring out its limitations.
5. What do you mean by critical minimum effort? How can this development strategy help in solving the problems of underdeveloped countries?

6. Why does Rosenstein Rodan support a big-push approach to development? Give a critical appraisal of big-push theory.
7. Critically examine the theory of balanced growth.
8. Explain the conditions essential for the process of balanced growth strategy. And explain the relevance of balanced growth theory for developing countries like India.
9. What is the role of convergent and divergent series of investment in the theory of unbalanced growth? Distinguish between development via excess capacity of SOC and development via shortage of SOC.
10. Compare and contrast between balanced and unbalanced growth. How can these two approaches be reconciled?
11. Enumerate on what grounds Singer has criticised the theory of balanced growth.

3.13: FURTHER READING

1. Bardhan, Pranab, and Udry, Christopher (1999). *Development Microeconomics*. Oxford University Press, Oxford.
2. Meier, Gerald M. and Rauch, James E (eds.) (2000). *Leading Issues in Economic Development*. (7th edition), Oxford University Press, Oxford.
3. Thirlwall, A. P. (2006), *Growth and Development*, (8th Edition), Palgrave Macmillan.

CHAPTER-4: TECHNIQUES OF DEVELOPMENT

STRUCTURE:

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Planning And Plan Models
 - 4.3.1 Aggregate Models
 - 4.3.2 Sectoral Models
- 4.4 Mahalanobis Model
- 4.5 Input-Output Model
- 4.6 Accounting Prices
- 4.7 Capital-Output Ratio
- 4.8 Optimisation in Planning (Linear Programming)
- 4.9 Summary
- 4.10 Key Words
- 4.11 Self-Assessment Questions
- 4.12 Further Readings

4.1: OBJECTIVES

The objective of this chapter is to make you familiar with some essential techniques of development planning. After going through this chapter, you will be able to:

- Understand the concepts of Aggregate and Sectoral models;
- Get an idea of Mahalanobis model
- Analyse the main features, classifications and uses of Input-Output model;
- Explain the concept of shadow prices and its importance in underdeveloped countries;
- Know the use of Capital-Output as a tool in planning; and
- Grasp the basic ideas of Linear Programming principle.

4.2: INTRODUCTION

The theories of economic growth are also referred to as growth models, especially when the quantitative inter-relationships among the critical variables in the process of economic growth are set out in a rigorous form. Development models may be considered operational, decision or policy models. When development models are used to solve certain planning problems, they may also be referred to as planning models.

In this chapter, we will begin with the study of planning models i.e., Aggregate and Sectoral models. Then we will try to understand Mahalanobis model, based on which our Second Five Year Plan was formulated. Further, we will proceed to get an idea of some basic tools of development planning like Input-Output analysis which is a method of analysing how an industry undertakes production by using the outputs of other industries in the economy and how its output is used up in other industries or sectors; Accounting or Shadow prices, signifying the opportunity costs of an activity or project to the society, is computed where the actual price is not known or, if known, does not reflect the real sacrifice made; Capital-Output ratio, means the relationship of investment in a given economy or industry for a given period to the output of that economy or industry for a similar time period; and finally, we will get some basic ideas about Linear programming which is a technique used for deriving optimal use of limited resources.

4.3: PLANNING AND PLAN MODELS

Planning models have been increasingly used in underdeveloped countries for drawing up of plans for economic development. A model expresses relationships among economic variables which explain and predict post future events under a set of simplifying assumptions. In other words, a model consists of a series of equations, each of which represents the association among certain variables. In this sense, a planning model is a series of mathematical equations which help in the drawing up of a plan for economic development.

Broadly, a model may have 'endogenous' and 'exogenous' variables. Endogenous variables are those whose values are determined from within the system such as national income, consumption, saving, investment, etc. On the other hand, exogenous variables are determined from outside the system such as prices, exports, imports, technological changes, etc. Thus, a

planning model specifies relationships between endogenous and exogenous variables and aims at ensuring consistency of the proposed plan for economic development.

Planning models are classified under different categories. These may be classified as optimisation and consistency models. An alternative classification is descriptive or projection models, and operational, decision or policy models. However, a more acceptable classification is on the basis of the comprehensiveness or complexity of these models. According to this classification, planning models are of two types, viz., aggregative or macroeconomic models, and sectoral models. These are distinguished by the levels of disaggregation and requirements of data they make. A country can choose any one of the three.

4.3.1: Aggregate Models

Aggregate models are those which apply to the entire economy and deal with production, consumption, investment and the like as single aggregates. They are used to determine possible growth rates in national income, division of national product among consumption, investment and exports, the required volume of domestic savings, imports and foreign financial assistance to carry out a given plan.

The relations most commonly included in an aggregate model are: (i) consumption-income relation; (ii) production function relating national product to inputs like capital and labour; (iii) import function relating import requirements to the level of national income or its components; (iv) domestic product on the expenditure or income disposal side and; (v) certain constraints or limitations on resource use, such as demand for labour cannot exceed its supply, investment cannot exceed domestic savings plus net import of capital or imports cannot exceed foreign exchange earnings plus net receipts from foreign loans and grants. Harrod-Domar type of planning model is an aggregative model. When constraints are imposed on it, the solution of the model is reached by a process of successive approximation. Attention centres first on one restriction, that of the assumed key factor and; other restrictions are considered by trial-and-error procedure, in the subsequent round of calculations.

The usefulness of the aggregative model lies in evaluating the major alternatives from among which the society will choose. Societies have multiple goals, and aggregate models can be

helpful in estimating logically the “costs” of attaining them, i.e., how much of one goal must be sacrificed in order to obtain another. The advantage of analytic models is that they can be solved mathematically so as to yield the general behaviour of the system. We know, when the model is solved, how sensitive each of the goals is to the instruments available.

In formulating an aggregative planning model, we have to specify the major economic quantities; guess the variables or factors influencing their magnitudes; stipulate the likely relationships between these variables; and estimate the values of the parameters (constants) in the equations. Once we have done this, we have to find the outcomes or the implications.

Thus, in the initial stages of the process of plan formulation, the planner may be interested in finding answers to some simple macroeconomic problems. For instance, we may be required to work out the rate of growth of national or per capita output when the size of the plan in terms of savings and investment is exogenously specified. Alternatively, the decision regarding the growth rate may be independently taken at the political level and then it may be left to the planner to work out the saving or resource requirements to attain that growth rate. Thus, the problem at hand is of an aggregative and macroeconomic nature where it may not be necessary to go into the sectoral details.

4.3.2: Sectoral Models

The sectoral models are a little more detailed. These models are of two types: (i) single-sector project models and (ii) complete main sector models. In the case of the former, a single sector is separately treated as huge project. Such separate projects are individually appraised for requirements of capital, skilled labour, foreign exchange etc. By aggregating the requirements of individual sectors, the total resource requirements are arrived at. If the aggregate resource requirements turn out to be more than the available resource, some of the projects may be excluded from the plan. Such models are capable of producing a co-ordinated, internally consistent plan. Yet there is always the possibility that the plan may merely remain a bundle of several projects.

The complete main-sector planning models are a more developed form of sectoral models. In most of the less developed countries, the main planning problem is that of bringing about

structural changes. Therefore, it is necessary to distinguish the main sectors of the economy and specify the appropriate growth rates of each sector in the plan. Thus, the main sector planning models are based on differentiation of main sectors of the economy, specification of their individual growth rates and taking an explicit note of their inter-dependence.

The main-sector planning models have to satisfy certain general conditions. These are as follows:

- (i) The model should be complete in the sense that it must cover the entire economy. Even a two-sectoral model can be complete. For example, in a bi-sectoral model, the differentiation of sectors may be: agricultural sector and non-agricultural sector, so that the latter includes all the residual sectors.
- (ii) The model should be realistic. Realism can be built into the model in two ways. Firstly, the aggregate resource requirement of the plan should not be more than what is available. Secondly, the model must specify the most important relationships among various variables.
- (iii) The model must be internally consistent. It merely means that the inter-sectoral relations must be such that, for instance, non-agricultural sector should not demand more raw materials from agricultural sector than the latter can supply.

Besides the division of main sectors into agricultural and non-agricultural sectors, some other pairs of sectors could be consumption goods and investment goods sectors or exports and home market sectors.

Though different types of planning models available to a developing country, it is important to choose the optimal one, which suits the domestic conditions of the country. An intelligent and informed choice of the planning model or framework depends on four main considerations: (i) stages of development; (ii) institutional structure; (iii) availability and reliability of data; and (iv) resource constraints.

The usefulness of the planning models in actual plan-making are to provide: (a) a frame for the checking of the consistency or optimality of the official plan targets; (b) a framework for the actual setting of targets; (c) a frame for the evaluation and selection of projects; and (d) an insight into the structure of the economy and its dynamics to help better policy decisions.

4.4: MAHALANOBIS' MODEL

Harrod-Domar models throw light on the rates of investment, income and consumption for successive periods which could be consistent with steady growth (on the assumed values of α and σ). But it is only the broad dimensions of investment programme and presentation of growth perspectives which are elucidated by these models. However, the actual approach to investment planning required to be adopted for the execution of a plan has not been brought out clearly in these models. This lacuna has been bridged up by Prof. Mahalanobis in his growth models developed over the period 1952-55. Professor Mahalanobis, in constructing planning models, has gone a step ahead of Harrod-Domar formulations by introducing 'sectoral' analysis in his models. In a way, therefore, Professor Mahalanobis has perfected the growth models of Harrod-Domar. Although Mahalanobis' models are, in terms of economic conception, somewhat similar to Harrod-Domar-Feldman models, yet these differ essentially in their formalism. These models are closed ones for they assume away any scope for international trade.

Mahalanobis' models are indispensably laid down in terms of the Keynesian type net aggregates. In them, national income (or output) grows because there is a positive net investment which gives rise to additional flows of income in subsequent periods. The functional relationship between investment and additional flows of income is visualized in terms of productivity of investment or the reciprocal of capital-output ratio.

For convenience in planning, so far as the degree of aggregation is concerned, Prof. Mahalanobis has two models, a bi-sector (two-sector) model and a four-sector model. However, for our basic understanding we will discuss here only the two-sector model briefly.

Prof. Mahalanobis in his two-sector model divided the economy into two sectors: producing capital goods and consumption goods respectively, and the policy decision was the share of total investment to be allocated to each sector. His key assumption is that the "Incremental Capital-Output Ratio" (ICOR) is technologically determined by each sector, i.e., his model is an extension of the Harrod-Domar model to two sectors. For each sector the growth in output from one period to the next depends upon how much new investment occurred in that sector and the productivity of the additional capital. The change in output of the capital goods industry is:

$$I_t - I_{t-1} = \beta_k \cdot T_k \cdot I_{t-1} \quad \dots (1)$$

Where, β_k is the ICOR of the capital goods sector, T is the share of total investment allocated to the capital goods sector, and the t subscripts refers to time periods.

Similarly, the change in output of the consumption goods industry is:

$$C_t - C_{t-1} = \beta_c \cdot T_c \cdot I_{t-1} \quad \dots (2)$$

Where, T_c is the share of investment allocated to the consumption goods sector ($T_k + T_c = 1$) and β_c is the change in output per unit change of investment in that sector.

Current production of capital goods can be related back to the level of investment at any time in the past. From equation (1), current investment is equal to investment in the previous period multiplied by $(1 + \beta_k \cdot T_k)$ and investment in the previous period is related to investment in the period before that in the same way. If β and T coefficients are constant (in this model the former is technologically determined and the latter policy determined), then capital goods output is related to the investment level and the choice of T in some base period, time O, by:

$$I_t = I_o (1 + \beta_k \cdot T_k)^t \quad \dots (3)$$

Because the output of consumption goods also depends upon the production of capital goods in the previous period, it too can be related to investment in the base period:

$$C_t - C_{t-1} = (\beta_c \cdot T_c / \beta_k \cdot T_k) \cdot I_o \cdot [(1 + \beta_k \cdot T_k)^t - 1] \quad \dots (4)$$

And then, using the $(C + I)$ identity, total output can be related to output and investment in the base period.

The conclusion from the Mahalanobis model is that the long-run growth of both consumption and GNP is dominated by the expression $(1 + \beta_k \cdot T_k)$. Since this is raised to the power t in equation (3) and (4), it will become the asymptotic growth rate, i.e., the rate to which growth will tend in the long run. Because β values are technologically given, the policy rule is to maximize T_k , the share of investment going to the capital goods sector. Diverting investment away from the consumption goods sector must reduce consumption in the short run, but, by sacrificing

current consumption, the stream of consumption goods available over the long run will be higher.

Mahalanobis' underlying viewpoint is clearly 'structuralist'. The line between capital goods and consumption goods is rigid and once capital goods are produced they define the aggregate investment/output ratio. Given the allocation of new capital goods between the two sectors, future output is then mechanically determined by the given ICOR. There is no room for demand; people consume the consumption goods which are produced, and, because they cannot eat or wear or otherwise consume capital goods, output of capital goods determines the savings rate. International trade is not mentioned, importing capital goods would break the link between consumption and last investment allocation decisions. Altogether, technological and behavioural flexibility are ruled out, and prices have no role as signals to influence economic decisions.

4.5: INPUT-OUTPUT MODEL

The Input-Output analysis is also known as multi-sectoral interdependent instantaneous approach. The input-output analysis of inter-industry dependence has been developed by Wassily Leontief. This technique is an extension of the national income sector accounts and adds a new dimension to the economic accounting i.e., economic system is viewed with a more realistic purpose. An input-output table is a framework of data that provides a detailed disaggregated view of the productive process and analyses how the final demand for output is related to the requirements placed on individual industries.

Input-output analysis is the name given to the attempt that takes into account a general equilibrium phenomenon in the empirical analysis of production. Three important elements in this statement are crucial and merit further discussion. Firstly, the analysis deals almost exclusively with production and demand theory plays no role in the hard core of the analysis. The problem is essentially technological. The investigation seeks to explain what can be produced, and the quantity of each intermediate product which must be used in the productive process, given the quantities of available resources and the state of technology.

The second distinctive feature is devoted to empirical investigation. This is primarily what distinguishes it from the work of Leon Walras and later general equilibrium theorists. The input-

output technique employs a model which is more simplified and also narrower in the sense that it seeks to encompass fewer phenomenon than does the general equilibrium theory.

The third feature is its emphasis on general equilibrium phenomenon. Input-output technique seeks to take account of the interdependence of the production plans and activities of the industries which constitute the economy. The inter-dependence arises out of the fact that each industry employs the output of other industries as its inputs. Its output, in turn, is often used by other producers as productive factors, sometimes by those very industries from which it obtained its ingredients.

The input-output analysis tells us that there are innumerable inter-relationships and interdependencies in the economic system as a whole. The inputs of one industry are the outputs of another industry and vice versa, so that ultimately their mutual relationships lead to equilibrium. A major part of economic activity consists in producing final goods (outputs). There are flows of goods in “whirlpools and cross currents” between different industries. The supply side consists of large inter-industry flows of intermediate products and the demand side, of the final goods. In essence the input-output analysis stated that in equilibrium, the money value of the aggregate output of the whole economy must be values of inter-industry inputs and the sum of the money economy’s final product. They do not show the inter-industry flows of output and their relationship with goods and services demanded. The input-output analysis, analyses these relationships. It is, thus an extension, if not an improvement over the National Income Accounting method. The input-output analysis thus brings into focus the inter-industry relationship in the economy and the computation of national income and output is made through the aggregation of output in all the industries.

Classification of Input-Output Models: Recently much elaborate research concerning input-output models have been undertaken by economists. These models have been broadly classified as:

1. Open and Closed Input-Output Models: So long as one of the sectors at least stays outside the system of functionally inter-related productive activities, the system of input-output is open; otherwise it is regarded closed.

2. **Static and Dynamic Input-Output Models:** The dynamic input-output model extends the concept of inter-sectoral balancing at a given point of time to that of inter-sectoral balancing over time. In other words, the model becomes dynamic when it is closed by the linking of the investment part of the final bill of goods to output.

Main Features: the input-output analysis is the finest variant of general equilibrium. As such, it has three main elements: first, the input-output analysis concentrates on an economy which is in equilibrium. It is not applicable to partial equilibrium analysis; secondly, it does not concern itself with the demand analysis. It deals exclusively with technical problems of production; and finally, it is based on empirical investigation.

Assumptions: The input-output analysis is based on the following assumptions:

- (1) There are constant returns to scale, i.e., each additional unit of output is produced by an unchanging proportional combination of inputs from other sectors.
- (2) There exists single process of production function, i.e., there is only one process or method of producing a commodity in each industry.
- (3) It is further assumed that, each industry produces one homogenous product, i.e., no two products are produced jointly.
- (4) It has also been assumed that, there is no technical progress, as it may change the input coefficients leading to the failure of the theory.
- (5) Further, there are no external economies or diseconomies of production, i.e., output grows proportionately with the growth of inputs only without any interventions.

Mathematics of Input-Output Analysis: Basically, the input-output analysis consists in nothing more complicated than the solution on n simultaneous linear equations in n variables. To illustrate this, let us consider a four-industry economy which produces services (S), agriculture (A), basic industries (B), and finished goods (F). Each of these industries employs the products of others in its manufacture in certain proportions.

The input-output technique answers two basic questions, namely, what should be the level of output of each industry with the existing stages of technology so that, the total output goal for the consumer and the industrial use of the product get fully satisfied ? and what level of output of

each producing sector in the economy can bring about an equilibrium for its product in the economy ?

An example will clear the ideas contained in these queries posed. Let us suppose that there are four sectors in the economy.

- | | |
|----------------------|-----------------|
| (1) Services | QS total output |
| (2) Agriculture | QA total output |
| (3) Basic industries | QB total output |
| (4) Finished goods | QF total output |

Now what should be the values of QS, QA, QB, and QF? This is done with the help of “Production Coefficients” which are given in the Table below.

Production Coefficients

Production Sector	Using Sector				Final Demand
	S	A	B	F	
Services (S)	0.1	0.1	0.1	0.2	30
Agriculture (A)	--	0.1	--	0.3	120
Basic industry (B)	--	0.1	0.3	0.1	60
Finished goods (F)	--	--	--	0.2	400

Output to be produced is determined by adding all intermediate demands plus final demand, i.e., by adding QS + QA + QB + QF + Final Demand.

$$QS = 0.1 QS + 0.1 QA + 0.1 QB + 0.2 QF + 30 \quad \dots (1)$$

$$QA = \quad + 0.1 QA + 0.3 QF + 120 \quad \dots (2)$$

$$QB = \quad + 0.1 QA + 0.3 QB + 0.1 QF + 60 \quad \dots (3)$$

$$QF = \quad + 0.2 QF + 400 \quad \dots(4)$$

There will be as many equations as there are unknowns. Since there are four unknowns S, A, B, and F there are four equations.

The solution is found out by applying the method of “Successive Substitution”.

Solution: First we take equation (4) and solve for QF because it has one unknown only.

$$QF = 0.2 QF + 00$$

$$QF - 0.2 QF = 00$$

$$0.8 QF = 500$$

Next we take equation (2) and substitute the value of QF and solve the equation for QA.

$$QA = 0.1 QA + 0.3 QF + 120$$

$$= 0.1 QA + 150 + 120$$

$$= 0.1 QA + 270$$

$$QA - 0.1 QA = 270$$

$$0.9 QA = 270$$

$$QA = 300$$

Next comes equation (3) which has three unknowns but we can substitute the values for QF and QA and solve for QB.

$$QB = 0.1 QA + 0.3 QB + 0.1 QF + 60$$

$$= 30 + 0.3 QB + 50 + 60$$

$$= 0.3 QB + 140$$

Finally equation (1) contains all the four unknowns but we can substitute the values for QA, QB, and QF and solve for QS.

$$QS = 0.1 QS + 0.1 QA + 0.1 QB + 0.2 QF + 30$$

$$= 0.1 QS + 30 + 20 + 100 + 30$$

$$= 0.1 QS + 180$$

$$QS - 0.1 QS = 180$$

$$0.9 QS = 180$$

$$QS = 200$$

We have the values as follows:

$$QS = 200$$

$$QA = 300$$

$$QB = 200$$

$$QF = 500$$

By combining the production coefficients with the solutions obtained for total outputs we can obtain the complete set of intersectoral flows as shown in the Table below.

Intersectoral Flows

Producing Sector	Using Sector				Total Intermediate Use	Final Use	Total Use Quantity
	S	A	B	F			
S	20	30	20	100	170	30	200
A	--	30	--	150	180	120	300

B	--	30	60	50	140	60	200
F	--	--	--	100	100	400	500

We see from the Table, that although only 30 units of output are demanded by consumers, it is necessary for the service sector to produce 200 units of output. The balance 170 units is used by S (20), A (30), B (20) and F (100).

There are two types of relationships which indicate and determine the manner in which an economy behaves. They are:

- (1) Internal consistency of Balance equation; and
- (2) External stability of each sector or Inter-sectoral relationships.

Prof. Leontief calls them “Fundamental Relationship of Balance and Structure”. When expressed mathematically they are known as “Balance Equations” and “Structural Equations”.

If the total output X_i of the i th industry is to be divided into various industries 1, 2, 3... n, and the final demand D_i , then we have the balance equation:

$$X_i = x_{i1} + x_{i2} + x_{i3} + \dots + x_{in} + D_i \quad \dots (1)$$

When the amount say Y_j absorbed by the “Outside Sector” is taken into consideration, the balance equation of the i th industry becomes:

$$X_i = x_{i1} + x_{i2} + x_{i3} + \dots + x_{in} + D_i + Y_j \quad \dots (2)$$

$$\text{Or, } \sum_{j=1}^n x_{ij} + y_j = X_j \quad \dots (3)$$

It is to be noted that Y_j stands for the sum of the flows of the products of the j th industry to consumption, investment and exports, net of imports, etc. It is also called the “final bill of goods”. The balance equation shows the conditions of equilibrium between demand and supply. It shows the flow of outputs and inputs to and from one industry to other industries and vice versa.

The system of balance equations presents the conditions of internal consistency of the plan. The plan would not be feasible without them because if these equations are not satisfied, there might be excess of some goods and deficiency of others.

Since x_{ij} stands for the amount absorbed by industry 2 of the i th industry, it follows that x_{ij} stands for the amount absorbed by the j th industry of the i th industry output. The “technical coefficient” or “input coefficient” of the i th industry is denoted by:

$$a_{ij} = \frac{x_{ij}}{X_j} \quad \dots (4)$$

Where, x_{ij} is the flow from industry i to industry j ; X_j stands for the total output of industry j ; and a_{ij} is a constant called “technical coefficient” or “flow concept” in the i th industry.

The technical coefficient shows the number of units of one industry’s output that are required to produce one unit of another industry’s output. Equation (4) is called “Structural Equation”. The structural equation tells us that the output of one industry is absorbed by all industries so that the flow-structure of the entire economy is revealed. A number of structural equations give a summary description of the economy’s existing technological conditions.

Balance Equation: A simple Leontief system can be described in terms of a set of simultaneous equations as follows:

$$x_i = \sum_{j=1}^n x_{ij} + C_i \quad (i = 1, 2, 3, \dots, n) \quad \dots (1)$$

Where, i = i th industry, j = output, C_i = denotes the output of i th industry available for final demand, x_i = the gross output of the i th industry, x_{ij} = is the output of the i th industry used as input in the j th industry.

Equation (1) is known as the “Balance Equation” which says that the total gross output of a commodity is equal to inter-industrial requirements $[\Sigma_{ij}]$ + outside consumption which may comprise household consumption, government consumption, capital formation and net foreign trade (C_i).

If we postulate that every commodity produced by only one given process $x_{ij} = a_{ij}$ multiplied by x_j ($i,j = 1, 2, 3, \dots, n$). Where, a_{ij} stands for the amount of i th goods used to produce an unit of the j th product. We can rewrite the equation (1) as follows:

$$x_i = \sum_{j=1}^n a_{ij} \text{ multiplied by } x_j + C_i \quad (i = 1, 2, 3, \dots, n) \quad \dots(2)$$

This constitutes the fundamental relationship of a simple Leontief system.

Limitation of Input-Output Analysis: The input-output analysis has its shortcomings.

- (1) The input-output analysis rests on assumptions which are static in nature. The basic assumption of consistency of the input coefficient of production is based on (a) constant returns to scale; and (b) constant technique of production. The former holds good in a stationary economy; while the latter, under stationary technology.
- (2) Inter-industry analysis is not treated dynamically. The model does not tell us how technical coefficients would change with changed conditions.
- (3) Some industries may have identical capital structures, some may have heavy capital requirements while others may use no capital. Such variations in the use of techniques of production make the assumption of constant coefficient of production unrealistic.
- (4) Again, the assumption of fixed coefficients of production ignores the possibility of substitution. There is always the possibility of some substitution even in a short period, while substitution possibilities are likely to be relatively greater over a longer period.
- (5) The assumption of linear equations which relates the output of one industry to the inputs of others appears to be unrealistic. Since factors are mostly indivisible, increases in outputs do not always require proportionate increases in inputs.
- (6) The input-output model is severely simplified and restricted as it lays exclusive emphasis on the production side of the economy. It does not tell us why the inputs and outputs are of a particular pattern .

Use of Input-Output Technique in Planning: In spite of its limitations, the input-output model can be of great help in formulating development plans.

The input-output technique with its basic assumption of 'constant technical coefficient' is of much help to a planning authority in an underdeveloped country. A linear homogenous input-output model fits in an underdeveloped economy where reliable statistical data about technical coefficients are not easily available.

The input-output analysis is also used for national economic planning. The input-output model provides the necessary information about the structural coefficients of the various sectors of the economy during a period of time or at a point of time which can be utilized for the optimum allocation of the economy's resources towards a desired end.

A United Nations study lists the following uses of input-output models in development programming:

- (1) They provide for individual branches of the economy's estimates of production and import levels that are consistent with each other and with the estimates of final demand.
- (2) The solution to the model aids in the allocation of the investment required to achieve the production levels in the programme and it provides a more accurate test of the adequacy of available investment resources.
- (3) The requirements for skilled labour can be evaluated in the same way.
- (4) The analysis of import requirements and substitution possibilities is facilitated by the knowledge of the use of domestic and imported materials in different branches of the economy.
- (5) In addition to direct requirements of capital, labour and imports, the indirect requirements in other sectors of the economy can also be estimated.
- (6) Regional input-output models can also be constructed for planning purposes to explore the implications of development programmes for the particular region concerned, as well as for the economy as a whole.

4.6: ACCOUNTING (SHADOW) PRICES

The concept of shadow or accounting price has been developed by a host of economists like Jan Tinbergen, R. Frisch, H. B. Chenery, S. A. Marglin, etc.

Tinbergen defined shadow prices as: “Intrinsic values of productive factors that would prevail if the investment pattern under discussion were actually carried out and equilibrium existed on the markets, i.e., labour, capital and foreign exchange markets.” In other words, shadow prices are marginal value productivities of productive factors in an optimum solution when all other alternative uses have been taken into account.

To understand the concept properly, it is important to know the nature of accounting or shadow prices as distinct from market prices. In the first place, shadow prices are notional, hypothetical or imaginary prices, devised only for the purpose of accounting. Unlike market prices, they do not actually prevail in the market. They would prevail in the market only if all factor and product markets were perfectly competitive. In such a case, these prices would reflect the marginal value productivity or social opportunity cost of each factor of production.

Secondly, shadow prices deviate from market prices due to disequilibrium and imperfections in factor and product markets. In case of a surplus factor or product, its shadow price would be less than its market price while in the case of a scarce factor or product, the shadow price would be greater than its market price.

Need for Shadow or Accounting Prices

In underdeveloped countries, the price mechanism operates imperfectly. Market prices do not correctly reflect relative scarcities, benefits and costs. This is because perfect competition is entirely absent, structural changes do not respond to price changes; institutional factors distort the existence of equilibrium in the product, labour, capital and foreign exchange markets; and prices fail to reflect and transmit direct and indirect influences on the supply and demand sides. Markets are not in equilibrium due to structural rigidities. Labour cannot be usually employed because of the shortage of other co-operant factors. The rate of interest understates the value of capital to the economy. And disequilibrium persists in the balance of payments which cannot be reflected in the official rate of exchange. For example, in such economies wages are much lower in the unorganized agriculture sector, while they are even higher than the opportunity cost of labour in the organized industrial sector.

Thus, market prices, particularly those of the factors of production form a very imperfect guide to resource allocation in underdeveloped economies, because there exists fundamental disequilibria which are reflected in the existence of massive underemployment at present level of wages, deficiency of funds at prevailing interest rates and the shortage of foreign exchange at current rate of foreign exchange.

It shows that, there exists a strong case against the use of market prices of factors of production and goods in the calculation of costs and benefits of different projects. Hence, to overcome these problems, the use of accounting or shadow prices has been suggested by economists for the allocation of resources in development planning, for project evaluation and as a device in programming.

Determination of Accounting (Shadow) Prices: General Equilibrium Method

In the general equilibrium method, equilibrium is established for all factors by taking their final demand and supply. For this, data relating to the different sectors of the economy are collected and the accounting price of every factor is expressed in algebraic symbols and added up for the whole economy. A number of simultaneous equations are required to be solved for which correct and adequate data are not available. Since the shadow price is the price which would prevail if prices were equilibrium prices, the existence of full equilibrium is essential for the establishment of an equilibrium price for every factor of production. The evaluation of shadow prices can be done in two ways: one by 'Trial and Error' and two by 'Systematic' Method. If the method of trial and error is adopted, evaluation of accounting prices may be based on arbitrary values for products, factors and foreign exchange, calculating the priority figures for all investment projects and finding out whether equilibrium has been attained in the markets or not. If this method fails, a systematic method is required, which consists, in introducing algebraic symbols for each accounting price, trying to express supplementary demand for the factors and supply of the products concerned, and then equating total demand to total supply. But, the existence of full equilibrium situation for the entire economy is not realistic because in order to find out the equilibrium prices, knowledge of total demand and supply curves and the production and consumption functions is essential. These functions depend upon the varied social institutions.

Uses of Shadow Prices in Development Planning

The technique of shadow or accounting prices serves as a useful computational tool in devising a relatively efficient system of development planning. Following are the important uses of shadow prices:

1. In the underdeveloped countries, market mechanism operates imperfectly and the use of market mechanism for the determination of product and factor prices is not a perfect and correct method because it leads to wrong allocation of resources. Therefore, it is not possible to have project evaluation on this basis. Thus, shadow prices are used for evaluating the effects of a project on the national income which are also termed as external effects. This is often done on the basis of the profitability criterion or cost-benefit analysis where both costs and benefits are calculated at accounting prices. Sometimes even rough estimates of shadow prices also help.
2. As we know, market imperfection prevails in the underdeveloped countries and hence, the market prices may not be quite helpful in making optimal choice of technique. Therefore, to rectify the drawbacks of the market prices, shadow prices are used so that only those techniques are adopted which are in consonance with the resource endowment.
3. In the context of underdeveloped countries, programming implies the optimum use of investment whereby there is no difficulty in the production process. But in reality, the difficulties of supplies of factors rise in market prices and the scarcity of foreign exchange is apparent in such economies. All such difficulties are overcome with the help of shadow prices, and fiscal, monetary and other policies help in bringing the market prices of factors, products and foreign exchange in conformity with their shadow prices and thus make programming a success.
4. Development projects sometimes result in such costs and benefits which cannot be internalized. Their existence raises serious doubts about the suitability of market prices for cost-benefit analysis. The choice regarding adjusted prices however depends on the costs and value of additional information about the external effects of the project. Hence, shadow prices are used to internalize externalities.

Limitations of Shadow Prices

Although, the proponents of the concept of accounting or shadow prices are numerous now and the shadow prices are increasingly being used in actual planning, yet it is not free from criticisms. Following are some of the major limitations of shadow prices:

1. The calculation of shadow prices pre-supposes availability of data. But, adequate data are not easily available in the underdeveloped countries.
2. Further, finding the intrinsic value of a factor or product requires the existence of full equilibrium in all market. In an underdeveloped country, which is characterized by a number of fundamental disequilibria, knowledge of full equilibrium conditions for the entire economy is not possible. Thus, the notion of shadow prices corresponding to intrinsic values is arbitrary.
3. Another difficulty arises with regard to time-dimension. The concept of shadow prices is static and timeless. Shadow prices are used to overcome the difficulties involved in project evaluation and programming when factor prices change over time. All inputs and outputs are valued at fixed shadow prices in such cases. This is unrealistic. Hence, the concept of shadow prices remains essentially a static one.
4. One more practical difficulty that arises is that of using shadow prices in the economy where the private enterprises buy inputs and sell outputs at market price. The government, on the other hand, uses shadow prices for the evaluation of its projects but, buys all inputs at market prices and sells outputs at competitive market prices where it does not possess a monopoly.
5. The determination of shadow prices is also difficult in case of projects with high capital-intensity and which are substitutes and complementary to each other.

4.7: CAPITAL-OUTPUT RATIO

The term capital-output ratio (or capital coefficient) expresses the relationship between the value of capital investment and value of output. It refers to the amount of capital required in order to produce a unit of output. When the capital-output ratio in the economy is said to be 5:1, it implies that a capital investment of Rs. 5 crore is essential to secure an output (income) worth

Rs. 1 crore. It may thus be defined as “a given relationship between the investments that are to be made and the annual income resulting from these investments.”

Capital-output ratio is classified into two types: the average capital-output ratio and the marginal or the incremental capital-output ratio. The average capital-output ratio indicates the relationship between the existing stock of capital and the resultant flow of current output. The incremental capital-output ratio (ICOR) expresses the relationship between the amount of increase in output (income) ΔY , resulting from a given increase in stock of capital, ΔK . This can be indicated as: $\Delta K/\Delta Y$. In other words, “the average capital-output ratio refers to everything that has been invested in the past and to the whole income. The marginal ratio refers to all that has been added in a recent period to the capital or income.” The former is a static concept, while the latter is a dynamic one. The term capital-output ratio as used in economics relates to the incremental or marginal capital-output ratio. This ratio normally ranges between 3 to 4 and rotates to a period of time. Since it has a time dimension, it is expressed as “recoupment period” in the communist countries.

The concept of capital-output ratio is applicable not only to an economy but also to its different sectors. There are different capital-output ratios for different sectors of the economy depending on the techniques (i.e., capital-intensive or labour-intensive) used by them. In a sector using capital-intensive techniques the capital-output ratio would be low. Transport, communications, public utilities, housing and capital goods industries have very high sectoral capital-output ratios. While capital-output ratios in the agricultural sector, manufactured consumers' goods industries and service industries are generally low. The overall capital-output ratio for a country is the average of the sectoral ones.

Factors Determining Capital-Output Ratio: The size of the capital-output ratio in an economy depends not only on the amount of capital employed but also on the number of other factors such as the degree and nature of technological advance, efficiency in handling new types of capital equipment, quality of managerial and organizational skill, composition of investment, pattern of demand, relation of factor prices, extent of utilization of social and economic overheads and impact of industrialization, education and foreign trade on the economy.

Use of Capital-Output Ratio in Planning: The concept of incremental capital-output ratio has been widely used in planning exercises of underdeveloped countries. It has been used at different stages of planning as discussed below:

- (1) During the process of plan formulation, use of ICOR is sometimes made to answer some preliminary and macroeconomic questions. For instance, if the size of the plan is exogenously determined, what would be the rate of growth of output ? Or, alternatively, if the rate of growth of output is independently determined, what would have to be saving-income ratio to fulfil the growth target ? The capital-output ratio is thus used to determine the growth rate of an economy. The Harrod-Domar growth models are based on this concept.
- (2) In formulating a plan, an ICOR is required for the purpose of calculating the growth rate of the economy. We can also calculate the growth rate of national output (income) by dividing the saving ratio by the ICOR.
- (3) ICOR has been regarded as an investment criterion. It has been contended that the underdeveloped countries should minimize the ICOR to maximize the rate of capital turnover. Those projects should be included in the plans which have the lowest capital-intensity or ICOR. In other words, investment should be made where output per unit of investment is the maximum, or where the investment per unit of output is the lowest.
- (4) The trend in capital-output ratio pertaining to particular sectors and the economy as a whole over time provides some insight into the trends in factor combinations. This helps in the assessment of the extent to which particular resources or factors are to be increased to maintain a given rate of growth of the economy.
- (5) Moreover, the importance of capital-output ratio lies in making out the case for obtaining large foreign aid for investment by underdeveloped countries. Since the domestic saving-income ratio is low in underdeveloped countries, a higher rate of foreign aid is required for achieving a higher growth rate.

Limitations Of Capital-Output Ratio: Estimation of capital-output ratio is beset with a number of problems. The non-availability of technical data relating to projects in underdeveloped countries is one such constraint. Further, capital-output ratio does not remain constant. The use of capital-output ratio as a tool in economic planning is circumscribed by the presence of excess

capacity and idle resources. The capital-output ratio fails to tell us anything about investment in human capital. The concept of capital-output ratio assumes that when capital increases, other co-factors also increase simultaneously.

In spite of these limitations, it is a useful concept in economic planning. For it helps us to calculate the growth rate of the economy and also shows the importance of capital for economic development.

4.8: OPTIMISATION IN PLANNING (LINEAR PROGRAMMING)

Linear Programming (LP) is a mathematical tool which is now being increasingly used in economic analysis. Its use in the field of development planning is of much interest chiefly because it helps the planner to allocate resources optimally among alternative uses within the specific constraints. At the micro level, the technique could be used to find out optimal and efficient (least expensive) methods of production. Actually, LP can be regarded as a powerful and complementary tool which can be used to analyse the input-output tables in order to solve the problem of choice of techniques on the supply side as well as the problem of choice of final demand. It is important to emphasize that the LP technique helps us to tackle the major problems of investment planning: (i) consistency between sectors; (ii) feasibility of plans; and (iii) optimality in resource allocation. However, it should be pointed out that the important assumption that made in LP analysis is that variables are interrelated in a linear way. This assumption may not be very realistic in all cases. But if it is, then LP is indeed very useful for planning. On the other hand, if the relationships among the variables are non-linear, then non-linear programming can be used to solve the problems.

General Formulation of Linear Programming Problems

In an LP exercise, usually the objective is to maximize or minimize some linear function of the variables given, say, r variables. The programmer seeks to obtain non-negative values of these variables subject to the constraints and maximize (or minimize) the objective function. More formally,

$$\max V = c_1x_1 + \dots + c_rx_r$$

with m inequalities or equalities in r variables, i.e.,

$$a_{i1}x_1 + \dots + a_{ir}x_r \{ \geq, =, \leq \} b_i \quad (i=1, 2, \dots, m)$$

$$\text{and } x_j \geq 0, \quad (j=1, 2, \dots, r)$$

where a_{ij} , b_i and c_j are given constants.

The problem is sometimes written in a more compact way, e.g.,

$$\max Z = \sum_{j=1}^n c_{ij}x_j$$

$$\text{subject to, } \sum_{j=1}^n a_{ij}x_j \leq r_i \quad (i=1, 2, \dots, m)$$

$$\text{and } x_j \geq 0 \quad (j=1, 2, \dots, n)$$

where c_j and a_{ij} are the given coefficients and r_i are the constraints. Note that in matrix form a_{ij} helps us to find the exact location of each coefficient.

Let us assume a simple case of two variables to illustrate diagrammatically the LP solution. Let the objective function be

$$\max V = 5X_1 + 3X_2$$

$$\text{subject to } 3X_1 + 5X_2 \leq 15$$

$$5X_1 + 2X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

The graphical solution of this LP problem will be shown first and then the numerical solution will follow.

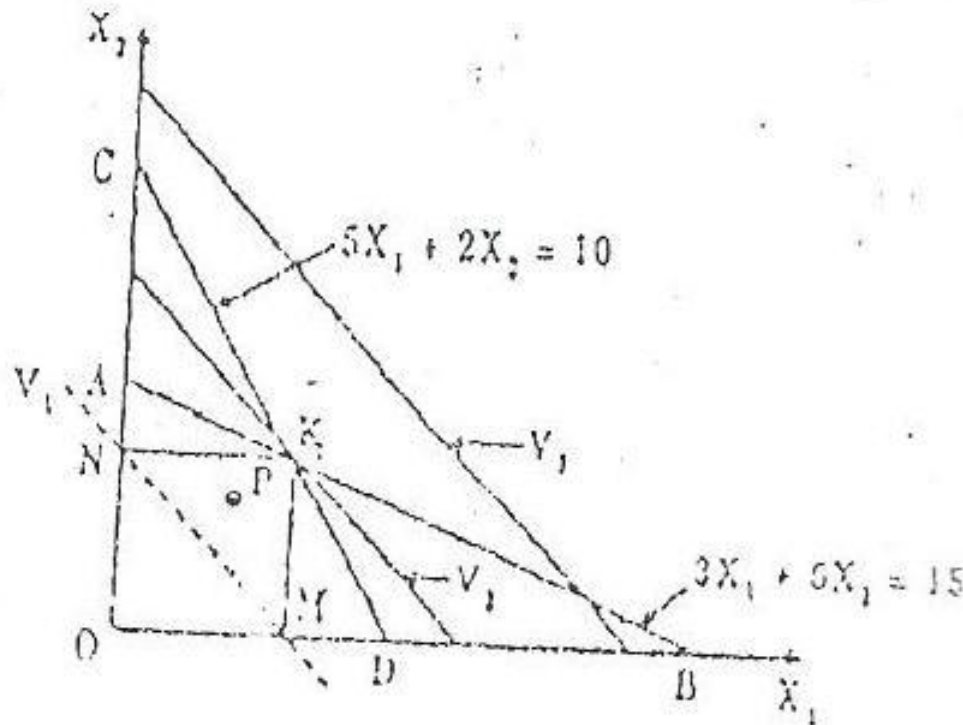
The Graphical Solution: Let us first convert the inequalities into equalities, i.e.,

$$3X_1 + 5X_2 = 15 \quad \dots(1)$$

$$5X_1 + 2X_2 = 10$$

...(2)

Accordingly we get lines AB for equation (1) and CD for equation (2) in the following figure.



Note that any point on or below AB satisfies the inequality $3X_1 + 5X_2 \leq 15$, just as any point on or below CD satisfies the inequality $5X_1 + 2X_2 \leq 10$. Also, there is no point above, say, AB (or CD) which satisfies the above inequalities. The points which will satisfy both the non-negativity restrictions are given by the area OAKD. This area is then regarded as a feasible region. Any point such as P is regarded as feasible because production of X_1 and X_2 at point P does not violate the constraints. Note that a feasible solution could lie at a point like O (at the origin). But such a feasible solution should imply that no production of X_1 and X_2 would take place. In order to obtain the optimum feasible solution it is necessary to find the point at which the iso-profit curve is tangent to any point lying on AKD. Any iso-profit line such as V_1 which lies inside the area OAKD does not yield the optimum profit because profit could always be increased by moving further away to a higher iso-profit line like V_2 which is just touches the area AKD at K. Similarly, the iso-profit line V_3 , although indicating higher profit, is not attainable. Thus, the optimum profit is given at the point K where OM of X_1 and ON of X_2 will be produced. Thus at

K the objective function $V = 5X_1 + 3X_2$ is at a maximum. It is necessary to point out here that, given the above profit equations, iso-profit lines are straight lines. Since constant returns to scale operate, the further we move away from the origin along the iso-profit line, the greater is the level of profit. The iso-profit lines, i.e., V_1, V_2 etc., are parallel to one another because the slope of V_1, V_2 etc., is $-5/3$ and is independent of V_1, V_2 etc. To obtain the optimal values of X_1 and X_2 , it is necessary to solve the two equations for lines AB and CD at K. Thus we have

$$3X_1 + 5X_2 = 15$$

$$5X_1 + 2X_2 = 10$$

Solving for X_1 , we have $X_1 = 1.053$; $X_2 = 2.368$.

The maximum profit now is $V = 12.37$.

The line V could lie along one edge of the polygon AKD. In such a case, no unique values of X_1 and X_2 would be maximize V . indeed, there will be more than one optimal solution which would imply that there exists more than a single way to juxtapose resources to obtain highest profit.

The above example of solving the LP problem is highly simplified. In reality, it is generally found that an optimum solution has to be found subject to some inequalities in the constraints. These inequalities are usually converted into equalities by adding extra 'slack' variables for solving the equations. Optimum solutions are then derived by using the 'simplex' method. In the simplex method, the optimum solution is reached via an iterative procedure. According to the rules of LP, any corner solution such as O, A, K, D in the figure is a basic solution. In the simplex method, starting from any basic solution (e.g., O), we move to the adjacent corner solution (e.g., either A or K) to improve upon the values of the objective function until the optimum is reached (i.e., any further move still worsen the situation). At each corner the simplex procedure states whether the corner point is optimal, and if not, what the next corner point will be.

To show the use of the slack variables, we first state the system of inequalities, i.e.,

$$\max V = 5X_1 + 3X_2$$

subject to $3X_1 + 5X_2 \leq 15$

$$5X_1 + 2X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

With the slack variables, we can now write

$$3X_1 + 5X_2 + X_3 = 15$$

$$5X_1 + 2X_2 + X_4 = 10$$

Where, X_3 and X_4 are the slack variables.

After the choice of a “pivot”, the optimum solution is found in successive steps.

Duality: LP problems are also solved by the application of the principle of “duality”. Previously we have observed how to maximize an objective function, e.g., profit. Corresponding to every maximization of profit problem, which is regarded as a ‘primal’, a ‘dual’ involves maximization, say, of cost. Note that if the constrained equations are given by \leq signs, the dual would imply \leq signs. The profit constants r_i will be replaced by the capacity constraints C_i and a different set of variables appears in the dual. More formally, we can write the primal as

$$\text{Max } V = r_1X_1 + r_2X_2 + \dots + r_nX_n$$

$$\text{Subject to, } b_{11}X_1 + b_{12}X_2 + \dots + b_{1n}X_n \leq L_1$$

$$b_{m1}X_1 + b_{m2}X_2 + \dots + b_{mn}X_n \leq L_m$$

$$X_1 \geq 0, \dots, X_n \geq 0$$

The dual can be written as

$$\text{min } y = L_1C_1 + L_2C_2 + \dots + L_mC_m$$

Subject to

$$a_{11}C_1 + a_{21}C_2 + \dots + a_{m1}C_m \geq r_1$$

$$a_{1n}C_n + a_{2n}C_n + \dots + a_{mn}C_m \geq r_n$$

$$C_1 \geq 0, C_2 \geq 0, \dots, C_n \geq 0$$

Note that, in the constrained inequalities, while the coefficients appear in the rows in the primal, they are observed in the columns in the dual. Also a new set of variables C_1, C_2, \dots, C_m appears in the dual.

If the slack variables are introduced, the system of equations can be written as follows:

$$\text{Primal: max } V = r_1X_1 + \dots + r_nX_n$$

$$\text{Subject to, } b_{11}X_1 + \dots + b_{1n}X_n + S_1 = L_1$$

$$B_{m1}X_1 + \dots + b_{mn}X_n + S_m = L_m$$

$$X_1 \geq 0, \dots, X_n \geq 0, S_1 \geq 0, \dots, S_m \geq 0$$

$$\text{Dual: min } y = L_1C_1 + \dots + L_mC_m$$

$$\text{Subject to, } a_{11}C_1 + \dots + a_{m1}C_m - K_1 = r_1$$

$$a_{1n}C_1 + \dots + a_{mn}C_m - K_n = r_n$$

$$C_1 \geq 0, \dots, C_m \geq 0, K_1 \geq 0, \dots, K_n \geq 0$$

The economic interpretation of the dual is not difficult. The structural variables C_1, C_2, \dots etc., of the dual are really the ‘shadow prices’ assigned to each input or resource. They represent the marginal product of each resource included in the optimal solution. The link between the shadow prices of an input as its marginal yield to profit can be seen through changes in profit resulting from the subtraction of a single unit of an input from its use. Also, in the dual, the objective function, i.e., minimization of cost, shows that total value of the inputs as it is the product of shadow prices of the inputs (C_1, C_2, \dots etc.) and their respective capacities. The constrained inequalities in the dual suggest that profits made from the production of goods must be wholly imputed to the resources used in their production. At the point of optimal solution, all inputs would be valued according to their marginal product and the total product will be exhausted.

Should the value of an input used in the production of an additional unit of any output be greater than the unit profit of that output, a loss will be indicated and the size of this loss is given by the slack variable in the constrained equations of the dual. It is now easy to see the main argument in one of the major theorems of the duality in relation to the primal solution.

First, at the optimal point of the feasible solution, the shadow price of each unit of resources should be such that there would not be any profit which could be made from anywhere and hence, at the optimal point, the highest profit V is equal to the minimum cost of resources, i.e., y in the dual.

The other duality theorem states that should the 'shadow' cost of inputs to produce a unit of output exceed the unit profit, that could be made from that output, then at the optimal point such a product should not be produced as its production means loss. At the optimal point, these goods should be produced whose loss is nil. It is now clear that wherever the values of the slack variable K_1, K_2, \dots, K_n are positive (which would mean loss), such activities should be excluded from the optimal solution. Thus, LP shows utility of the use of shadow prices for inputs for efficient allocation in the context of planning.

It should be mentioned, however, that in a LP solution prices are regarded as the indicators of the marginal worth to the society. But in underdeveloped countries, where the market is mostly imperfect, prices will usually be higher than marginal cost.

Second, the relationships in the LP analysis are assumed to be linear. On the other hand, many constraints in the underdeveloped countries are non-linear functions of the structural variables. However, the problem is not insuperable as non-linear programming methods could be used here.

Finally, if the society attaches considerable weight to the growth objective and if the market price of labour is overestimated (because wages are artificially high despite the abundance of labour) and/or that of capital is underestimated (since the interest rate is kept low despite capital scarcity), then some necessary corrections ought to be made by using some 'accounting' prices for a more efficient allocation of resources. In practice, such corrections are attempted using cost-benefit analysis.

4.9: SUMMARY

Planning is defined as the making of major economic decisions by a designated authority on the basis of a comprehensive survey of the system as a whole. Planning is needed to achieve an optimum utilization of available resources for maximization of social welfare. The intellectual support to planning is provided by the plan models. Different types of planning models may be constructed, depending upon the objectives and the availability of resources. In this chapter, we discussed two important planning models e.g., aggregate and sectoral models, and got some basic ideas about the planning model formulated by Prof. Mahalanobis.

Further, this chapter tells us about the interrelationship among different industries in the market. It also shows the way of determining output and price of the product for each industry, which is the most important thing for this kind of inter linkage among the industries.

We also discussed about the importance and uses of accounting or shadow prices and capital-output ratio in development planning.

Finally, this chapter presents the basic principles of linear programming used in solving different events of mathematical and economical importance. These important mathematical tools can be used for determining the proper course of action in making any suitable decision.

4.10: KEY WORDS

1. **Open and Closed Input-Output Models:** So long as one of the sectors at least stays outside the system of functionally inter-related productive activities, the system of input-output is open; otherwise it is regarded closed.
2. **Static and Dynamic Input-Output Models:** The dynamic input-output model extends the concept of inter-sectoral balancing at a given point of time to that of inter-sectoral balancing over time. In other words, the model becomes dynamic when it is closed by the linking of the investment part of the final bill of goods to output.
3. **Capital-Output ratio:** It means the relationship of investment in a given economy or industry for a given period to the output of that economy or industry for a similar time period

4. **Incremental Capital-Output Ratio (ICOR):** The incremental capital-output ratio (ICOR), is the ratio of investment to growth which is equal to 1 divided by the marginal product of capital. The higher the ICOR, the lower the productivity of capital. The ICOR can be thought of as a measure of the inefficiency with which capital is used.
5. **Linear Programming:** Linear programming is the analysis of problems in which linear function of a number of variables is to be maximized (or minimized) when those variables are subject to a number of restraints in the form of linear inequalities.
6. **Primal:** The original Linear programming problem. is called the primal problem.
7. **Shadow Prices:** Opportunity cost of an activity or project to a society, computed where the actual price is not known or, if known, does not reflect the real sacrifice made.

4.11: SELF-ASSESSMENT QUESTIONS

1. Explain the Aggregate and Sectoral models of development planning.
2. Write a note on Mahalanobis model.
3. Discuss the assumptions and nature of input-output technique as a tool of planning and bring out its limitations.
4. Analyse the shortcomings of the market prices in underdeveloped countries and build up a case for the use of shadow prices in planning.
5. Evaluate the usefulness of shadow (accounting) prices as a guide of actual decision making.
6. Distinguish between accounting prices and market prices and bring out the real nature of accounting prices.
7. What are the factors determining capital-output ratio. Discuss the use of capital-output ratio in planning.

4.12: FURTHER READINGS

1. Rudra, Ashok (1975),.. *Indian Plan Models*, Allied Publishers Pvt Ltd.
2. Todaro, M. P. (1971), *Development planning; models and methods*, Oxford University Press, London.
3. Baumol, William J. (1971), *Economic theory and operations analysis*, Prentice-Hall

CHAPTER-5: CAPITAL FORMATION AND ECONOMIC DEVELOPMENT

STRUCTURE:

- 5.1 Objectives
- 5.2 Introduction
- 5.3 Nurkse's Analysis Of Vicious Circle Of Poverty
- 5.4 Capital Formation And Economic Development
 - 5.4.1 Meaning Of Capital
 - 5.4.2 Meaning Of Capital Formation
 - 5.4.3 Importance Of Capital Formation
 - 5.4.4 Sources Of Capital Formation
 - 5.4.5 Factors Affecting Capital Formation
 - 5.4.6 Measurement Of Capital Formation
 - 5.4.7 Reasons For Low Rate Of Capital Formation
 - 5.4.8 Steps To Raise The Rate Of Capital Formation
 - 5.4.9 Capital Formation In India
- 5.5 Nurkse's Theory of Disguised Unemployment as a Saving Potential
- 5.6 Summary
- 5.7 Key Words
- 5.8 Self-Assessment Questions
- 5.9 Further Readings

5.1: OBJECTIVES

After going through this chapter, you will be able to know:

- The working of vicious circle of poverty and how it involves circular causation in an underdeveloped country;
- Meaning, importance, process and measurement of capital formation;
- Capital formation in India; and
- The meaning of disguised unemployment and its importance as a source of capital formation.

5.2: INTRODUCTION

In the later part of 1940s, a number of economists were attracted towards the problems of underdeveloped countries and tried to find out appropriate strategies for its solution. Though the characteristics of underdevelopment is not common to all the underdeveloped countries, yet an important question “why a country is poor” remains a fundamental issue. Perhaps, Nurkse was the first to answer this question through his path-breaking exposition of the vicious circles of poverty.

This chapter starts with the explanation of Nurkse’s analysis of vicious circles of poverty, which are a set of interlocking equilibrium circumstances that reinforce each other. Then it proceeds to explain capital formation as an important factor of economic development. And lastly, the chapter deals with disguised unemployment and its importance as a saving potential in the over-populated underdeveloped countries.

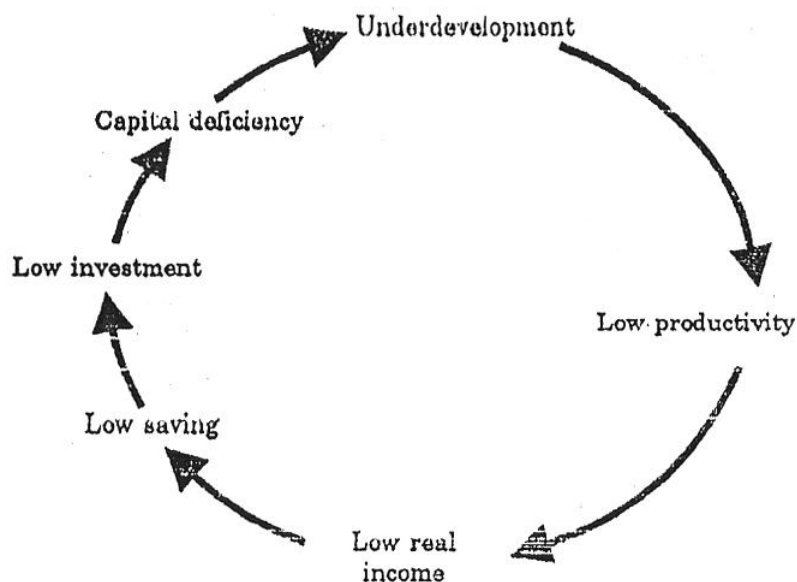
5.3: NURKSE’S ANALYSIS OF VICIOUS CIRCLE OF POVERTY

Underdeveloped countries are caught in the ‘vicious circles of poverty’. In the words of Prof. Ragnar Nurkse, “It implies a circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in the state of poverty.” For example, a poor man may not have enough to eat; being underfed, his health may be weak; being physically weak, his working capacity is low, which means that he is poor, which in turn means that he will not have

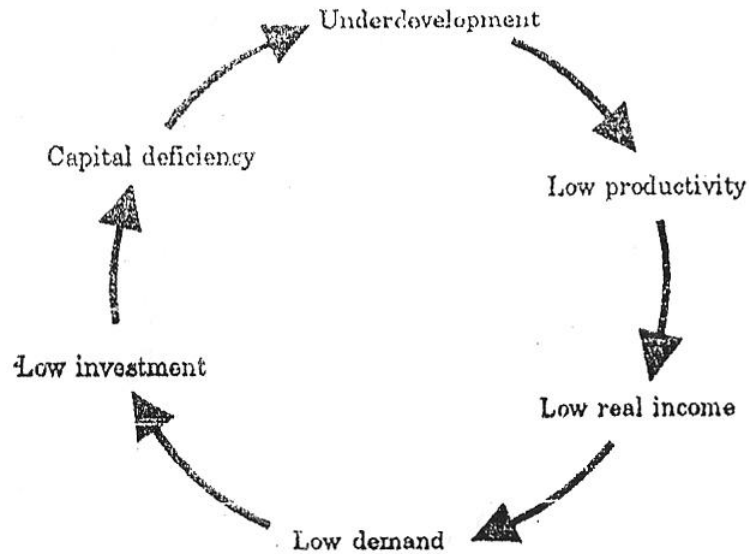
enough to eat; and so on. A situation of this sort relating to a country as a whole can be summed up in a trite proposition: “A country is poor because it is poor”

Three such circles can be identified:

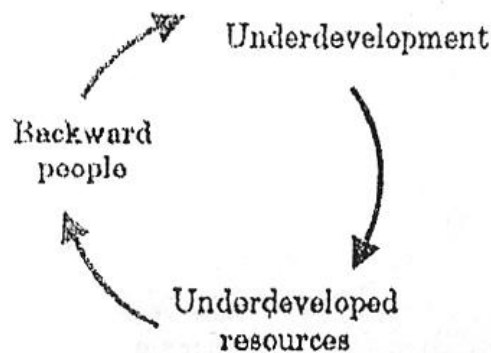
- (1) The first of these concerns the supply of capital. In underdeveloped countries, on account of economic backwardness, the total output is low and after consumption needs are fulfilled, little remains as a surplus for capital accumulation. Capital deficiency leads to less investment and a resultant low level income. Thus, underdevelopment is explained by capital deficiency, which acts both as a cause and consequence of a low level of real income. It is explained in the following diagram:



- (2) A low level of real income may act in another way to perpetuate a vicious circle. This time it acts on the demand side of capital unlike the previous one where it acted on the supply side. The low level of real income in the economy presents only limited market opportunities for entrepreneurs and generates only a limited demand for capital for investment purpose resulting in low investment, unemployment and underemployment and low income equilibrium. The Figure below explains this constellation of forces:



- (3) A third vicious circle encompasses underdeveloped resources and the backwardness of people. The development of natural resources depends on the character of human productive resources. The more economically backward the people are the less developed will be the natural resources. Illiteracy, lack of skill, deficient knowledge, and factor immobility lead to underutilization of resources, causing underdevelopment to perpetuate itself. The following Figure identifies it:



On the basis of the above discussion, it can be concluded that there are three major vicious circles, which are responsible, directly, individually or jointly, for keeping underdeveloped countries in the state of poverty.

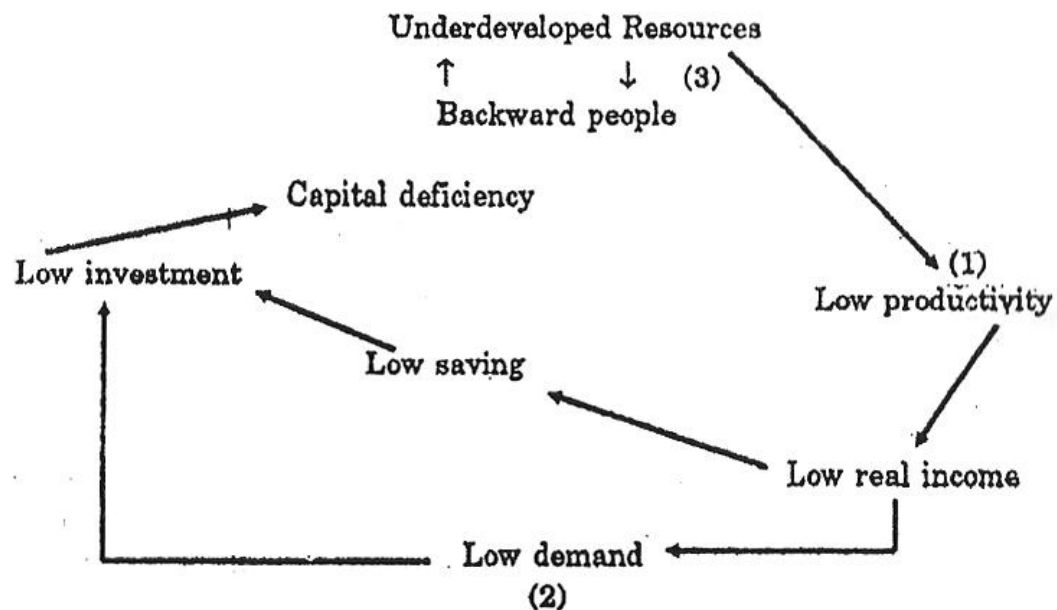
- (i) Low productivity → low real income → low saving → low investment → hence low productivity.

(ii) Capital Deficiency → low investment → low real income → low saving → low demand → low investment.

(iii) Backward population → this leads to unutilized, underutilized human and natural resources.

These three vicious circles can appear as follows:

These three vicious circles can appear as follows:



International Forces: Another most important factor which causes underdevelopment is the effect of international forces. During the last two centuries, international forces in the form of foreign trade and investment have produced “backwash effect” on the underdeveloped countries. These international forces have provided substantial positive gains to the developed countries, meaning thereby that these forces have made the rich countries richer and the poor countries poorer. Whereas in some countries foreign trade has worked as an “engine of growth”, it has worked to retard growth of the underdeveloped countries. The colonial pattern of trade and investment has been imposed on underdeveloped countries. As a result, the domestic resources of an underdeveloped economy have been used to serve the interests of the “masters”. Economists like Prebisch, Singer, Myint, Lewis and Myrdal have maintained that there have been “disqualifying forces” operating in the world economy. These forces made the gains from

trade go mainly to the more developed countries even though, foreign investors and foreign governments did not deliberately exploit the undeveloped countries.

These disqualifying forces took three forms:

- a) they promoted 'dual' economies in underdeveloped countries
- b) foreign investment developed natural resources for export
- c) a secular deterioration in the terms of trade for the underdeveloped countries.

Thus, underdevelopment is the result of market imperfections, vicious circles, and various institutional forces working in unison. A concerted effort on all these fronts is required to promote economic development. Meier and Baldwin have summed up the arguments so far in these words: "Fundamentally, market imperfections have obstructed the realisation of an optimum allocation of resources, vicious circles have prevented the introduction of structural changes, and the international forces have not been optimal from the poor country's viewpoint. Insofar as these obstacles overlap and intensify one another, it has been difficult to tighten and widen the poor country's economy and poverty"

5.4: CAPITAL FORMATION AND ECONOMIC DEVELOPMENT

The process of economic development of an economy is really a complex phenomenon and is greatly influenced by varied factors such as social, economic, cultural as well as political factors. In this connection, Prof. Ragnar Nurkse has rightly observed when he says that, "Economic development has much to do with human endowments, social attitudes, political conditions and historical accidents. Capital is a necessary but not a sufficient condition for progress." Therefore, natural resources, capital growth of scientific and technological knowledge and many others have a strong bearing on the process of economic growth.

The poor countries are caught in a vicious circle of poverty. Deficiency of capital in relation to their population and natural resources is their basic characteristic. It is not possible to raise the level of productivity in these countries unless more capital resources are made available. Thus, economic growth is mainly a function of the rate of capital formation.

Undoubtedly, capital is the core of economic development. In simple words, capital refers to that part of the wealth of an economy which is utilized for further production of wealth. It includes all forms of reproducible wealth utilized directly or indirectly in the production of a large volume of output. A huge amount of capital is invested on the construction of irrigation schemes, production of agricultural tools, building of big dams and bridges, land reclamation, machines, roads, railways, airports etc. It, thus, seems unquestionable to say that insufficiency of capital is the most serious limiting factor in underdeveloped economies. In other words, capital occupies a strategic position in the theory of economic development.

Almost all economists lay emphasis on capital formation as the major determinant of economic growth. Singer defines: "Capital formation consists of both tangible goods like plants, tools and machinery and intangible goods like high standards of education, health, scientific tradition and research". In the words of Kuznets, "Domestic capital formation would include not only additions to constructions, equipment and inventories within the country, but also other expenditure, except those necessary to sustain output at existing levels. It would include outlays on education, recreation and material luxuries that contribute to the greater health and productivity of individuals and all expenditures by society that serve to raise the morale of employed population". Thus, capital formation in an economy covers material as well as human capital.

Capital formation plays a vital role in promoting economic development in a country. According to Nurkes, the vicious circle of poverty in an underdeveloped country can be broken only through capital formation. Due to lack of adequate capital, income, production, investment, and employment are deficient and are at a very low level. It is capital formation that leads to the fuller utilization of resources, helps in creating socio-economic overheads. Thus capital formation leads to increase in size of national output, income and employment.

5.4.1: MEANING OF CAPITAL

Precisely, capital is defined as produced means of production. According to Colin Clark, "Capital goods are reproducible, wealth used for the purposes of production." A United Nations Study states, "As those goods resulting from economic activity which are used for future production of other goods." The basic characteristic of capital is that it is a man made and its

stock can be increased by human efforts. The aggregate stock of capital in an economy is made up of all construction and improvements attached to the land, machinery and equipment in the hands of producers, private and public inventories in the hands of businessman and net balance of claims against foreign countries at any point of time. In fact, capital must be confined to plant, equipment and inventories. It is an instrument of propelling economic development and increased productivity should also be included in investment in technical knowledge of the population and improvements in education and skills. Similarly, in the process of long term economic progress, the productivity raising function of capital is performed not only by plants and machinery but also by human capital. In a broad sense, Prof. Simon Kuznets has observed that capital will include much what is today classified as consumption expenditure. It should, therefore, include capital investment in human beings and as the whole, economic and social structure that conditions the use of plant and equipment.

Human capital has also emerged as significant part of the capital stock in an economy. It has been estimated that as much as 2/3rd to 3/4th of the total output of developed countries is attributable to investment in human capital. At the same time, the narrow view of capital in low income countries may result in distortion. These countries are poor not only because of their low rate of capital formation but also because more productivity raising outlay is very low relatively in such countries. Despite this narrow outlook about capital, there are certain scholars who constantly insist on the similar view perhaps due to practical difficulty of computing the contribution of immaterial capital towards the raising of productivity.

5.4.2: MEANING OF CAPITAL FORMATION

In simple words, capital formation means all that reproduced wealth by which more accumulation of wealth is possible directly or indirectly. The word 'capital formation' is used in a narrow sense as well as in a broader sense. In narrow sense, it means with physical capital stock which includes machines, machinery etc. In a broader sense, capitalized goods include non physical capital or human resources consisting of public health, efficiency, visible and invisible capital. In the words of Prof Colin Clark, capital goods "are reproducible wealth used for purpose of production. But capital formation refers to the net addition made to the existing stock of capital in a given period of time." Therefore, for a more clear understanding, it is said that capital formation involves a sacrifice of immediate consumption for obtaining more consumable goods

in future while 'capital' is that part of the current product which is used for further production instead of being immediately consumed.

Here, we must make a clear cut distinction between 'maintaining capital intact' and 'capital formation'. The process is known as maintaining capital intact when resources are used to replace the worn assets including wear and tear of machinery as it does not add to the productive capacity of the economy. On the contrary capital formation refers to increasing the stock of real capital which obviously helps in raising the level of production of goods and services. Therefore, the essence of the process of capital formation is the diversion of a part of society's currently available resources to the purposes of increasing the stock of capital goods so as to make possible an expansion of consumable output in future. In this way, the concept can also be extended to cover human capital formation. In fact, it is only real physical assets and not financial assets such like shares, bonds, currency notes and bank deposits, are included in capital formation as they increase the productive capacity of the economy.

According to F. H. Harbison, "human capital formation is the process of increasing knowledge, skill and the capacities of all people of the country." In other words, investment by the society in the field of education, imparting training and skill to the workers is also included in human capital formation.

In the words of Prof. Nurkse, "the meaning of capital formation is that society does not apply the whole of its productive activity to the needs and desires of immediate consumption but directs a part of it to the making of capital goods, tools and instrument, machines and transport facilities, plant and equipment, all the various forms of real capital that can so greatly increase the efficiency of productive effort." Dr. Singla has also put forth, "capital formation consists of both tangible goods like plants, tools and machinery and intangible goods such as high standards of education, health, scientific tradition and research."

According to Prof. Simon Kuznets, "Domestic capital formation would include not only additions to constructions, equipment and inventories within the country, but also other expenditure except those necessary to sustain output at existing lands. It would include outlays on education, recreation and material luxuries that contribute to the greater health and

productivity of individuals and all expenditures by society that serve to raise the morale of employed population."

In this regard, Prof. Kuznets has explained capital formation explicitly. In a narrow sense, he defined the concept of capital formation as, "In circumstances of restrained economic growth and industrialization, capital formation should be understood to be limited to machinery, instruments and inventories which are directly capable of being used in work."

5.4.3: IMPORTANCE OF CAPITAL FORMATION IN ECONOMIC DEVELOPMENT

The importance of capital formation in securing an accelerated rate of economic growth can hardly be over-emphasized. The secret of economic progress of the developed countries lies in having a high rate of capital formation. On the contrary, the basic reason for the low national and per capita income of the underdeveloped economies is the low rate of capital accumulation. The poor countries remain poor because increase in their national income is neutralized by the corresponding over-increase of their population. This being the case, they can attain higher standard of living only by raising the rate of capital formation and limiting the population growth.

The vicious circle of poverty, according to Prof. Nurkse, can easily be broken in underdeveloped countries through capital formation. It is capital formation that accelerates the pace of development with fuller utilization of available resources. As a matter of fact, it leads to increase in the size of national employment, income and output thereby creates the acute problems of inflation and balance of payment.

The importance of capital formation can be well described in the words of Prof. W. Arthur Lewis who has mentioned, "The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 per cent of its national income or less, converts itself to an economy where voluntary saving is running at about 12 to 15 per cent of national income or more. This is the central problem because the central fact of economic development is rapid capital accumulation including knowledge and skill with capital."

The importance of capital formation can easily be acknowledged from the following :

1. **Developing Infrastructure:** The foremost significance of capital accumulation especially in its initial stages is that it promotes the establishment of social overheads in the poor country as these countries need these infrastructures at a priority level. In fact, the possibility of economic development gets strength on the size and extent of the available conditions in the economy as of transportation, communication, banking, power and other social security steps. In this way, capital accumulation or formation goes a long way in the development of basic capital goods in underdeveloped countries.
2. **Use of Round-about Methods of Production:** In a backward country, process of capital formation makes possible the use of round-about or complex methods of production which make the division in different stages on the basis of modern techniques and production process leads to specialization. This further leads to rapid growth in production and on a large scale. Thus by capital formation modern machines and instruments are utilized on the basis of modern techniques with cyclic methods.
3. **Maximum Utilization of Natural Resources:** In underdeveloped countries, there is increase in the capacity of risk taking by capital formation by which fresh sources of natural resources are made available. It is made possible through proper and thoughtful exploitation of natural resources. Besides extra capital formation exploits the economy in normal resources on the basis of modern techniques and divisional imbalances are prevented by finding new fields of natural resources.
4. **Proper use of Human Capital Formation:** Capital formation plays an extra-ordinary role in the qualitative development of human resources. Human capital formation depends on the people's education, training, health, socio-economic security, freedom and welfare facilities for which sufficient capital is needed. Labour force needs up-to-date implements and instruments in sufficient quantity so that with the increase of population there will be optimum increase in production and increased labour is easily absorbed.
5. **Improvement in Technology:** In underdeveloped countries, capital formation creates overhead capital and necessary environment for economic development. This helps to instigate technical progress which makes the use of more capital in the field of production impossible and with increase of capital in production, the abstract form of capital changes. It is seen that present changes in the capital structure lead to changes in structure

and size of technique and public is thereby more influenced. In fact, technical progress has become a necessary condition for the present day economic progress and speed of economic progress depends on the rate of technical progress.

6. **High Rate of Economic Growth:** The higher rate of capital formation in a country means the higher rate of economic growth. Generally, the rate of capital formation or accumulation is very low in underdeveloped countries in comparison to advanced countries. In the case of poor and underdeveloped countries, the rate of capital formation varies between one per cent to five per cent while in the later's case, it even exceeds 20 per cent. In brief, higher rate of capital formation is the indicator of higher rate of economic growth in a country.
7. **Agricultural and Industrial Development:** Modern agricultural and industrial development needs adequate funds for adoption of latest mechanized techniques, inputs, setting up of different industries heavy or light. Deficiency of capital at their disposal, leads to lower rate of development, thus, capital formation. In fact, the development of both these sectors is not possible without capital accumulation.
8. **Increase in National Income:** Capital formation improves the conditions and methods for the production of a country. Hence, there is much increase in national income and per capita income. This leads to increase in quantity of production which further leads to rise in national income. The rate of growth and quantity of national income necessarily depends on the rate of capital formation. So increase in national income is possible only by the proper adoption of different means of production and productive use of the same.
9. **Expansion of Economic Activities:** As there is increase in the rate of capital formation, productivity increases quickly and available capital is utilized in more profitable and extensive way. In this way, complicated techniques and methods are utilized for the economy. This results in the expansion of economic activities. Capital formation increases investment effects in economic development in two ways. Firstly, it increases the per capita income and enhances the purchasing power which, in turn, creates more effective demand. Secondly, investment leads to increase in production. In this way, by capital formation, economic activities can be expanded in underdeveloped countries which, in fact, help to get rid of poverty and attain economic development in an economy.

10. **Lesser Dependence on Foreign Capital:** In under-developed countries, process of capital formation increases dependence on internal resources and domestic savings by which dependence on foreign capital is declined. Economic development leaves burden of foreign capital, hence to give interest on foreign capital and bear expenses of foreign scientists, country has to be burdened by improper taxation to the public. This gives set back to internal savings. Thus, by the way of capital formation, a country can attain self-sufficiency and can get rid of the dependence on foreign capital.
11. **Increase in Economic Welfare:** By the increase in rate of capital formation, public is getting more facilities. As a result, common man is more benefitted economically. Capital formation leads to unexpected increase in their productivity and income and this improves their standard of living. This leads to improvement and enhancement in the chances of work. This helps to raise the welfare of the people in general. Therefore, capital formation is the principal solution to the complex problems of poor countries.
12. **Crucial for Human Capital and Physical Capital:** The need of capital formulation in the development of human capital and physical capital is not under-estimated from the fact that despite the huge imports of material capital, they have not been able to increase their growth rate substantially in the case of underdeveloped human resources. There is no second opinion to say that increase in physical capital can boost the tempo of economic development but without making any investment in human capital, the rate of growth will certainly be very slow. In this connection, to quote Prof. G.M. Meier who has pointed out, "It has become evident that the effective use of physical capital itself is dependent upon human capital. If there is under-investment in human capital, the rate at which additional physical capital can be productively utilized will be limited since technical, professional and administrative people are needed to make effective use of material capital. In many newly developing countries, the absorptive capacity for physical capital has proved to be low because the extension of human capabilities has failed to keep pace with the accumulation of physical capital."

5.4.4: SOURCES OF CAPITAL FORMATION

The rate of capital formation differs from country to country. It is relatively much higher in developed countries than that in underdeveloped countries. It shows that formation of capital is governed by certain factors and its accumulation is not an automatic process.

The process of capital formation involves three main stages:

- a) Increase in the volume of real savings,
- b) Mobilization of savings through financial and credit institutions, and
- c) Investment of savings.

Let us explain the process of capital formation through these three stages.

- a) **Creation of Saving:** The creation of saving is the first stage of capital formation. It means that there must be an increase in the volume of real savings, so that the resources may be used for the production of consumption purposes and further may be released for other purposes. Therefore, for capital formation, some current consumption has to be sacrificed for obtaining a large part of flow of consumer goods in the near future. For instance, if a community saves nothing and consumes whatsoever it produces, no new capital will come into existence which will result in fall in the production of consumer goods in future with the wearing out of the existing capital assets. Therefore, it is essential that people should save from the present consumption. The creation of savings depends upon the power to save, will to save and facility to save.
- b) **Mobilization of Saving.** The next process of saving is that it must be mobilized converting into investible funds. Mere creation of savings is not enough. The savings must be mobilized so that they may be available to the investors. For this purpose, the existence of banking and other financial institutions is must. Banking facilities give considerable help to promote high rate of mobilization and channelization of saving. In brief, sound and efficient banking system enables investors to invest more and more.
- c) **Investment of Saving.** The final stage is the investment of saving into capital goods. It needs a class of efficient, dynamic, daring and skilled entrepreneurs. An able and efficient entrepreneur is always ready to make investments for the production of capital goods. In short, both saving and investment are crucial for capital accumulation.

Besides the process of capital formation, it must be remembered that real capital implies the creation of real assets which involves the urgent need for additional savings and production investment. Thus, the process of capital accumulation pre-supposes that national income (Y) in a given period of time should exceed the level of consumption (c). The income (Y) is divided between consumption and saving i.e. $Y = C + S$. We are also familiar that income is equal expenditure, $Y = E$. Similarly, expenditure can be divided into consumption expenditure (c) and investment expenditure (I). Since $Y=E$ and $C + S$ is equal to $C+I$. In other words, $S = I$. However, the excess of national income over consumption constitutes saving of the community which is investment. From this, the relationship between investment and capital formation can be easily understood. Investment (I) refers to investible surplus while capital formation is the net addition to the existing stock of capital. If any part of the investible surplus is used for the production of consumer goods, it fails to form capital formation. In this way, the value of capital formation may not be equal to the value of investible surplus in a given period. So, the pre-condition for capital formation is the positive value of investment. But at the same, it must be borne in mind that it does not guarantee for capital formation. Even then, it can be raised by transferring investible resources in the production of consumption goods to the production of capital goods.

Thus, the problem of capital formation in underdeveloped countries becomes two-fold: one, how to increase the propensity to save of the people in lower income groups, and two, how to utilise current savings for capital formation. This leads us to the sources of capital formation which are classified as domestic and external. The domestic sources from which savings can be mobilized for capital formation are: increase in national income, reduction in consumption, savings drives, establishment of financial institutions, mobilization of gold hoards, perpetuation of income inequalities, increasing profits, fiscal and monetary measures, by utilizing disguised unemployed, etc. The external sources are: foreign capital, restriction of consumption-imports and favourable terms of trade.

5.4.5: FACTORS AFFECTING CAPITAL FORMATION

Capital formation is the result of the supply and demand for capital which differ from country to country. Generally, it is relatively higher in well advanced countries in comparison to

underdeveloped countries. In poor countries, deficiency of capital is found either due to the deficiency of demand for capital or lack of its supply or both. In the opinion of A J. Tounghson, "Investment comes about because of the action of demand factors or supply factors or both." The demand for capital is governed by the incentive to invest while supply of capital is determined by the ability and willingness of the people to save. In case of poor and underdeveloped countries, the demand for capital is weak and its supply is inadequate, thus, both are responsible for low capital formation. Let us examine these both factors in detail.

(A) DEMAND SIDE

The demand for capital mostly depends upon the incentives for investment in an economy. It will be high if the incentive to invest is strong while it will be low if the incentive is weak. The incentive to invest almost depends on the rate of profitability of investment. In underdeveloped countries, lack of demand for capital is marked by an acute shortage of capital but here lack of demand only refers to the demand for capital of the private investors and not considered from the point of view of the economy as a whole. Therefore, lack of incentives for private investment arises primary from the small size of the domestic market. If the people are poor and size of the market is small, private investment will not be very profitable and incentives for investment will automatically be poor. According to Prof. Nurkse, "The inducement to invest is limited by the size of the market." Further he says, "The inducement to invest is low because of the small buying power of the people, which is due to their small real income, which again is due to low production. The low level of productivity, however, is the result of the small amount of the capital used in production, which in its turn, may be caused at least partly by the small inducement to save and invest. The circle is, thus, complete. "On the other hand, the larger the size of the market, the greater will be the incentive for the entrepreneurs to invest and produce more. If there is wider market, greater will be the scope for division of labour and specialization. But at the same time, small size of the market discourages profitable application of modern technology and productivity raising devices.

In underdeveloped countries, lack of demand for capital arises from low production and small purchasing power of common man. But in developed countries, the problem is of different nature. In such countries, the shortage of demand for capital comes from the deficiency of aggregate effective demand which is due to over saving. This type of shortage can be remedied

through money expansion. Here, it must be kept in mind that monetary expansion in underdeveloped countries will lead to inflation because there is always shortage of demand arising from a shortage of supply of goods and services in the market. In fact, small size of the market is responsible for lack of incentives for investment and entrepreneurs do not find it profitable to set up modern industries. Therefore, size of the market can be enlarged only through an all round increase in production through greater investment. Production creates its own demand and hence, size of the market depends upon the level of productivity and production in a country. In other words, the size, of the market is determined by the level of productivity. It is the purchasing capacity of the people that determines the size of market. Moreover, the size of the market can also be enhanced by the method of public expenditure, salesmanship, adjustment and formation of custom unions or free trade agreements etc. Thus, raising the productivity is a crucial determinant of the size of the market. Prof. Ragnar Nurkse also purposes simultaneous investment in a number of industries to expand the size of the market in underdeveloped economy. He observed, "A wave of capital investment in a number of different industries can economically succeed while any substantial application of capital by an individual entrepreneur in any particular industry may be blocked or discouraged by the limitations of pre-existing market."

In addition to the small size of the market, there are other factors which limit the demand for capital in underdeveloped countries. They are listed as under:

- (i) **Lack of Entrepreneurship:** Generally, in underdeveloped countries, there is acute shortage of efficient, dynamic and daring entrepreneurs who are capable of taking risks in business. In the absence of such qualities of entrepreneurs, the savings of the people cannot be properly utilized in speculative activities, thus, fails to create further capital accumulation. Even if there exist highly profitable opportunities for investment, there is always lack of demand for capital because of dearth of entrepreneurs and innovators who can exploit the opportunities of investment.
- (ii) **Lack of Availability of Skilled Labour:** Underdeveloped countries always suffer from the unavailability of skilled and trained labour. Due to their backwardness in technology, it inhibits the demand for capital.

- (iii) **Shortage of Basic Facilities:** Investment is hindered by the shortage of basic facilities like power, transportation, communication and research institutions etc. They limit the scope for higher investment.
- (iv) **Availability of Cheap Labour:** There is abundant labour supply in underdeveloped countries due to the higher population and mass unemployment. This leads to the adoption of labour intensive techniques rather than capital intensive techniques which, in turn, decrease the demand for capital.
- (v) **Primitive and Out-dated Agriculture:** In underdeveloped countries, the main occupation of the people is agriculture. About 70 per cent people directly or indirectly are dependent on agriculture for their livelihood. They use primitive and out-dated methods of cultivation. The holding is uneconomical, subdivided and fragmented. The land tenure system is defective which discourages investment in this sector. They do not apply scientific methods of cultivation.
- (vi) **High Interest Rates:** Another reason which limits the demand for capital is that there are comparatively high interest rates in poor and underdeveloped countries. High interest rates adversely affect the marginal efficiency of capital which, in turn, discourages investment in a country.
- (vii) **Taxation Policy:** In most of the underdeveloped countries, higher taxation policy has been adopted as a planned strategy for mobilization of additional resources to meet the needs of the development and to decrease the gulf between the poor and the rich. Extremely higher taxes on income and profit hamper the incentive to make investment in an economy.
- (viii) **Unstable Political Environment:** In underdeveloped countries, unstable political environment is witnessed which is greatly responsible for low demand for capital. These countries have backward and traditional systems which fail to develop suitable environment for making favourable investment in the country.
- (ix) **Lack of National Feelings.** Now-a-days, underdeveloped countries also lack a national feeling which discourages new investment. In fact, security of life and property are the basic needs for capital formation.

(B) SUPPLY SIDE

In an economy, supply of capital is always determined by the availability of investible funds which represent a surplus over the consumption requirements of the people. There are two sources of supply of money: (i) domestic supply of money; and (ii) imported capital (foreign capital). Therefore, the total supply of money is made up of domestic savings and net capital imports. Without saving, there is no accumulation of capital. There are three sources from where savings emerge. They are (a) saving by individuals and households; (b) saving by business enterprises and joint stock companies; and (c) saving by governments.

Capital imports do not make much influence. In other words, it may be helpful in accelerating the process of economic development but sustained growth is not possible without stepping up domestic sources. Hence, the domestic supply of capital plays dominant role in economic development of a country. However, the size of the domestic savings depends upon the ability and willingness of the people to save i.e. how much the individuals and the community, as a whole, are willing to forego current consumption and save. This depends upon the various factors like economic, social and political. In this regard, Prof. Buchanan and Ellis has observed, "Unless the habits of consumption and saving, the institutions and legal framework for accumulation, lending and investing can be adopted to the building and maintenance of capital, foreign aid can bring only transitory benefits. A permanent standard must be created within the society; indeed, this is the very meaning of economic development. Unless the chief nature of growth is indigenous, the society is constantly exposed to retrogression."

The inadequate supply of capital in underdeveloped countries is largely due to the under mentioned reasons :

- i. Low level of per capita income because majority of the people lives on subsistence level.
- ii. Common people lack saving habits.
- iii. Lack of banking and investment opportunities.
- iv. Lavish spending on conspicuous and ceremonial consumptions.
- v. People are more interested in purchase of gold, jewellery and land etc.
- vi. Unfavourable cultural and institutional set up.

- vii. Rapid increase in population.
- viii. Other reasons e.g., wasteful practices, lack of desire for progress, demonstration effects and lack of foresightedness, incongenial environment etc.

5.4.6: MEASUREMENT OF CAPITAL FORMATION

The measurement of capital formation is of great importance for developing economies in the initial stages of growth. Because, the growth of national income and hence of the economy depends, to a large extent upon the rate of capital formation. However, its measurement is not an easy affair. Generally, four methods are employed to measure capital formation.

1. The first method measures savings of the community in terms of the difference between production and consumption in a given period, (say, one year) and equates it to investment on the premise that savings are equal to investment. But this method suffers from various defects such as: it concerns itself only with the flow of funds and is not directly related to production. Besides, in underdeveloped countries the correct estimates of savings and spending are not available and the existence of a vast non-monetized sector makes calculations all the more difficult.
2. The second method takes into consideration expenditure incurred on capital equipment and other fixed assets such as machinery, buildings, construction works, etc., for the purpose of calculating capital formation. But, the defect of this method is that, it generally views capital expenditure from the point of view of an accountant and includes expenditures incurred on the transportation of equipment, installation, indirect taxes, etc. Moreover, the exact meaning and connotation of capital formation may vary from firm to firm, industry to industry and country to country.
3. The third method seeks to measure capital formation in terms of differences in the value of capital assets at the beginning and at the end of the year, after making due allowance for depreciation, obsolescence and changes in prices. However, the main shortcoming of this method is that while calculating capital formation, the market value of capital goods at different points of time is taken into consideration but in underdeveloped countries markets are not sufficiently developed and hence reliable market values are not available.

4. The fourth method is the commodity flow approach, which measures capital formation as the difference between domestic production plus imports of capital goods and those sold to households and exported. However, this approach can be a satisfactory measure of capital formation only if changes in the inventories of capital goods used by their producers are taken note of and the actual flow of capital goods to the ultimate users is fully known.

Apart from the defects associated with the various methods of computing capital formation, changes in prices, difference in quality, the degree and rate of depreciation and lack of a precise definition of capital formation make it impossible to measure exactly the extent of capital formation taking place in a country over a given period of time. Hence, the statistics relating to capital formation must be used with due care and caution as they serve only rough approximations of the changes in the rate of capital formation.

5.4.7: REASONS FOR LOW RATE OF CAPITAL FORMATION

The low standard of the rate of capital formation has been the result of the interaction of various reasons like economic, social and cultural those are operating in underdeveloped countries for centuries together. Some of the important causes put for low rate of capital formation can be summarized under the following heads:

1. **Low Level of National Income and Per Capita Income:** The root cause of capital deficiency in underdeveloped countries is low level of real national and per capita income which limits to the motives of savings and investments. Due to lack of desired investments, capital formation has no increase. Hence, due to low production, there is low national and per capita income and, in turn, this forces to low capital formation. These countries have rate of low standard of capital formation. This situation tends to perpetuate itself and the poor countries continue to be poor. The low rate of capital formation is a partial link in a vicious circle in such countries. Unless the vicious circle of poverty is broken, the rate of capital formation cannot be raised. The volume of savings depends on many factors besides the amount of income. According to Prof. Hirschman. "The decisions to save and invest in low income countries are inter-dependent and saving may be low because investments are low rather than vice-versa."

- 2. Lack in Demand of Capital:** Another cause of low rate of capital formation in underdeveloped countries is lack of demand of capital. In the words of Prof. Nurkse, "Low productivity in underdeveloped countries, people have low real income and, thus, purchasing power is low and so due to low demand, investment has bad effect which again reduces national income and productivity and rate of capital formation remains low."
- 3. Lack in Supply of Capital:** Like demand of capital, lack of supply of capital is responsible for low capital formation. However, due to lack of necessary supply of capital in underdeveloped countries, the process of capital formation is not instigated. As a result, capital formation remains at low level. Therefore, in the opinion of Prof. Nurkse, "Due to low rate of real income per capita in under developed countries, there is low saving capability, hence, there is less capital. Due to lack of capital, there cannot be established basic business and industries so the production falls down. In this way, want of capital in underdeveloped countries, essential economic structure is not created and there is low rate of capital formation."
- 4. Small size of Market:** Due to small size of domestic market, investment is not encouraged in poor countries. It does not expand the work of economic development and modern machines cannot be used as extra quantity produced has no market access. According to Nurkse, "Investment motive is limited by the size of market." Therefore, limited shape of market blocks the use of machines. This is clear that limited size of market prevents the increase in the rate of capital formation and productivity in underdeveloped countries.
- 5. Lack of Economic and Social Overheads:** Basic overheads like roads, buildings, communication, education, water, health etc. are generally lacking in underdeveloped countries which react as improper atmosphere for the capital formation and slow process of capital formation.
- 6. Lack of Skilled Enterprise:** Able and efficient entrepreneurs are not available in underdeveloped countries. It is an important reason for low rate of capital formation. Due to absence of risk-taking entrepreneurs, establishment of industries and expansion is quite limited and industrial diversification is not carried out and no balanced development of

economy is possible. It mars the process of capital formation resulting in low rate of capital formation in poor countries.

- 7. Immobility of Savings:** Immobility of saving also causes low rate of capital formation. Due to lack of banking and other credit institutes, poor countries have limited financial activities. Whatever these financial institutions exist, they are of small size and unable to collect the savings from distant places, thus, resulting in no enthusiasm to savings in a society. This creates problem of hoarding and saving which is used for nonproductive purposes. Surplus income is wasted in luxuries. They construct big mansions, make ornaments. Besides lack of credit institutes, influences the rate and quantity of investment. These reasons go along way to lower down the rate of capital formation in such countries.
- 8. Backwardness of Technology:** Underdeveloped countries also face the problem of technical knowledge. Production is carried on old and less productive techniques. As a result, these countries have low productivity and per capita production and income's low quantity lowers the standard of the rate of capital formation.
- 9. Lack of Co-operant Sources:** In underdeveloped countries, low rate of capital formation is also due to lack of co-operate sources. There is no lack of capital but with it, there is more dearth of efficient, able and thoughtful management and qualitatively efficient labour force which does not make possible the available capital in more capital formation. Thus, lack of co-operant sources does not allow their use properly in capitalistic goods which checks the capital movement and, in turn, low rate of capital formation.
- 10. Demonstration Effect:** Demonstration effect also stands in the path of capital formation. Prof. Nurkse has cited the reason of low rate of capital formation, "due to demonstration effect when people come into contact with best goods or superior patterns of consumption in which old demands are fulfilled by new goods and new plans, then, they feel unrest and discontent after sometime. In this way, their knowledge grows, their imagination is stimulated, and new desires are awakened. By this their propensity to consume becomes high." Besides, there is tendency among people of these countries to follow the higher consumption standard of developed countries. In fact, all these actions occur due to demonstration effect which increases the tendency of consumption based on

new ways and goods which limit the desire and capability to save in the society. Thus, international demonstration effect in consumption tendency is high in underdeveloped countries whereby capability to save diminishes and rate of capital formation fails to rise in these poor countries.

- 11. Lack of Effective Fiscal Policy:** Lack of effective fiscal policy or financial policy in underdeveloped countries also retards capital formation to some extent. Burden of taxation is too much which is out of people's capacity to bear as their income is quite low. Besides, inflationary circumstances accrue and prices soar extremely high. This leads to increase in cost price of capitalized goods and consumption goods by which exported goods in internal market do not hold in external market in competition to best and cheap goods. This creates the problems of unfavourable balance of trade and payment. Hence, if effective fiscal policy is not carried out then, economic power acts in such a way that the whole of development schemes tumble down. Thus, these countries have very low rate of economic development and capital formation.
- 12. Lack of Investment Incentives:** Still another cause of the low rate of capital formation is the lack of investment incentives in most of the underdeveloped countries. This leads to low rate of productivity which, in turn restricts capital formation.
- 13. Deficit Financing:** In modern times, deficit financing is considered a major resource of capital formation. But if it crosses its limit, then it tends to low rate of capital formation. Whenever, deficit financing is made in the country, it leads to rise in prices and as a result, all commodities become costly. Under this situation, it becomes hard to save as the entire amount is spent. This results in the low saving and low rate of capital formation.
- 14. Unequal distribution of Income and Wealth:** Since there is extreme unequal distribution of income and wealth in most of the underdeveloped and backward countries which keep the rate of capital formation relatively low. In fact, it restricts real investment in the economy which greatly affects the capital formation.
- 15. Demographic Reasons:** In underdeveloped countries, the growth rate of population is very high which keeps the rate of capital formation at a low level. It is because most part of their income is spent on bringing up the additional numbers. Thus, there is little scope of saving and as a result, it aggravates the growth of capital formation. Besides, in such countries, there is always shorter life expectancy. It means a small fraction of population

is available as an effective labour force. Since labourers are in the prime of their lives and very few adults to provide for large number of children, in a sense, they bring down the per capita income and thus, low rate of capital formation.

16. Not Suitable Financial Structure. In underdeveloped countries, the rate of capital formation is also low due to the fact that they do not possess suitable financial structure. Such institutions are most essential for the mobilization of saving and promoting capital formation. In the words of Prof. Nurkse, "However, poor an economy may be, there will be need for institutions which allow such savings as are currently forthcoming to be invested conveniently and safely, and which will ensure that they are channeled into the most useful purposes. The poorer a country is, in fact, the greater is the need for agencies to collect and invest the saving of the broad mass of persons and institutions within its borders. Such agencies will not only permit small amounts of savings to be handled and invested conveniently but will allow the owners of saving to retain liquidity individually but finance long term investment conveniently." But unfortunately, such institutions are absent and their financial structure is highly inadequate to meet the requirements of a high rate of capital formation in poor and underdeveloped countries. Moreover, the working of these financial institutions is also not efficient hardly development oriented.

5.4.8: STEPS TO RAISE THE RATE OF CAPITAL FORMATION

The most important problem facing an underdeveloped country is to raise the rate of capital formation. This problem is two-fold: first, as to how to increase the propensity to save of the common man in the lower income groups; and secondly, as to how to utilize current savings for capital formation. Therefore, the rate of capital formation can be raised by domestic as well as external resources. The mobilising of real capital has, thus, become one of the vital prerequisites of economic development. The domestic resources for capital formation include domestic saving drives, establishment of financial institutions, reduction of inequalities of income, saving through monetary and fiscal policies, reduction in consumption, taxation and by utilizing disguised unemployed sources etc. Similarly, external resources consist of foreign investment, loans and grants by foreign governments and favourable terms of trade. Let us make a detailed study of these both resources.

A. DOMESTIC SAVINGS

Domestic savings represent a community's surplus of production over its minimum consumption requirements. The larger the size of the surplus, the greater will be possibility of attaining a higher level of capital formation. In fact, domestic saving is the most reliable source of investment which helps to break the vicious circle of poverty and underdeveloped. In an economy, domestic saving can be increased either by increased production or reduced consumption or by both. Therefore, the essence of the process of increased savings is the creation of surplus over the consumption of the community, which, in turn, can be mobilised for capital formation. In other words, the volume of this investible surplus can be increased through (i) raising the productivity of the people; (ii) curtailing the consumption of the rich. The following measures can be adopted to increase the domestic savings:

- 1. Drive to Save:** Saving drives go a long way to solve the acute problem of augmenting savings. Efforts should be made through propaganda and social education. Common masses can be persuaded to save in their own interest or in the interest of their family. They should be educated and motivated to develop the habit of saving for their children, for building houses or as a safeguard against old age, sickness or any other emergency. In the same fashion, issuing of saving certificates, bonds are also helpful in mobilising savings. The profits of saving should be advertised so that general people may tend to change their attitude. This type of incentive, they will learn to save.
- 2. Establishment of Financial Institutions:** In poor and less developed countries, people hoard their unspent current income and invest in jewellery, gold, property etc. Therefore, such countries must have well organised financial institutions where countrymen may easily deposit their unspent money with confidence. In this regard, well developed capital and money market can give impetus. Moreover, money collection process should be simple so that even the laymen do not find any hardship in depositing and getting loans. Special attention should be made to make various institutions on sound footing like insurance, compulsory provident fund, provident-cum-pension schemes and opening of new banks especially in rural areas and cooperative societies. These institutions help to stimulate saving to a greater extent. Emphasizing the need of these institutions, Prof. Nevin has observed that "such agencies will not only permit small amount of saving to be

handled and invested conveniently but will allow the owners of savings to retain liquidity individually and finance long-term investment collectively.”

- 3. Reduction in Income Inequalities:** This method is also regarded as the measure adopted in order to achieve high rates of saving and investment. It is a common fact that the people in underdeveloped countries possessed lower marginal propensity to save. High income group spend more money on luxury goods, thus, savings are less. Therefore, riches should be equally distributed in these countries so that low income groups may have more income and this may lead to increase in the size and quantity of domestic savings. There is a great controversy over this opinion. Some scholars are of the view that income inequalities should be increased as high income class saves more and consequently makes investment. But others feel that this is not correct in the prevailing circumstances as it leads to improper competition, centralisation of wealth and power. Prof. W.A. Lewis is in favour of equal distribution of income in less developed countries. He says that voluntary saving and investment should increase in shape and quantity as it may increase in the ratio of national income.
- 4. Fiscal Measures:** As voluntary saving is not sufficient for capital formation in poor and backward countries, the Government can mobilise the resources through fiscal policy. These measures are in the form of a budgetary surplus, taxation, reduction in government expenditure, expansion of export sector, loans and deficit financing. Besides, growth oriented long-term saving policy should be evolved so that it may increase automatically as the process of development gets momentum.
- 5. Reduction in Consumption:** Prof. R. Nurkse and Prof. W.A. Lewis are of the opinion that saving can be raised through restricting consumption. It is argued that the level of consumption of the common people in underdeveloped countries is extremely below the subsistence line. Therefore, the rate of savings can be increased by curtailing the conspicuous consumption of the rich and by diverting an increasing percentage of the increments in national income to capital formation. According to Prof. Gunnar Myrdal, "There is no other road to economic development than a compulsory rise in the share of that national income which is withheld from consumption and devoted to investment.
- 6. Inflation:** When a country does not possess sufficient funds for capital formation, as is found in the case of most of the underdeveloped countries, inflation is the potent

measure. In fact, it is regarded hidden or invisible tax. Hence, through inflation, compulsory and voluntary savings can be raised. According to Prof. Nurkse, "We must accept that in broad sector, inflation can be an effective means of forced saving and in this sense, it is effective in underdeveloped countries."

- 7. Proper Utilization of Natural Resources:** The main drawback within the underdeveloped countries is the proper utilization of resources. There are profuse human and natural resources but they are not properly exploited. With the proper development of technical knowledge, education and training facilities, productivity of labour can be enhanced and modern techniques can be put to their best use. This is the lead to raise in the rate of saving and capital formation as they will increase the labour efficiency and new chances of business will be vast.
- 8. Utilization of Hoarded Resources:** In underdeveloped countries, people invest their extra saved income in hoarding ornaments, gold, jewellery and in productive religious institutes. Moreover, they are not ready to part with gold and jewellery and are reluctant to invest in gold bonds or certificates voluntarily. It is, therefore, necessary that government in such countries should take steps to prohibit law to possess above stipulated quantity. Private trading in gold should be regulated. Proper care should be taken to stop the smuggling of gold into the country. The use of pure gold for manufacturing ornaments should be banned. In this manner, hoarded resources like gold can be utilized for making investment in productive channel, which, in turn leads to capital formation.
- 9. Income from Public Enterprises:** Another method which the government can avail of to mobilise domestic saving for productive investment is by establishing public enterprises and corporations. Public enterprises and corporations are a substitute for private enterprises in underdeveloped countries. They get funds in the form of equity capital and bonded debt from open market (In India, they get funds directly from the government). They also receive foreign loans or collaborate with foreign enterprises. In most of the underdeveloped countries, socialistic welfare states have been set up and public enterprises are in the hands of government. These corporations collect domestic savings for productive investments and make possible dynamism in production sector in accordance with the demands of investors. Therefore, the profit earned by these concerns

can be well utilized for capital formation. This practice is common in the case of public enterprises set up by the state and central governments in our country. These corporations act as revolving fund in the economy. In this way, income from the public enterprises increases and surplus is actuated in productive channels and, thus, raises the rate of capital formation.

10. Rural Savings: Rural saving is still another measure to solve the problem of mobilization of domestic resources for capital formation. According to All India Rural Credit Survey Committee, "These rural debentures should as far as possible be for specific projects of development in which the villager is interested in different degrees, accordingly they are of direct benefit to him, or to those with whom he shares fellowship of interest because of their belonging to his district or region or state. Therefore, government should take measures to link rural savings with local development projects. This, in turn, leads to be more rapid development in the backward and poor countries.

11. Deficit Financing: As in underdeveloped countries, vast population lives below the poverty line, their low level of income puts a limit on tax revenue. Whenever, a curb is imposed on consumption through taxation, it badly affects the desire to work and save. In the same way, it also seems to be most undesirable and politically impracticable due to administrative deficiencies. Thus, under such adverse circumstances, deficit financing is justifiable to satisfy the increased demand for money. No doubt, deficit financing is inflationary, even then, it can be neutralised by adopting monetary and fiscal measures in the short run as well as in the long run period.

12. Utilization of Disguised Unemployment: It is a widely accepted view that there exists a saving potential in the disguised unemployment in over populated countries of the world. If this potential is effectively utilized, it can become a major source of capital formation and furthermore of economic development. According to Prof. Nuikse, "One of the important sources of capital formation is the concealed saving potential contained in rural underemployment in over populated underdeveloped countries. The disguised unemployed workers contribute practically little or nothing to output i.e. their marginal productivity is zero or negligible. Such unproductive workers can be removed from the land without a fall in agricultural output and can be employed in various capital projects such as irrigation, roads, house buildings etc. and they can be fruitful source of capital formation...." In other

words, the disguised unemployed or surplus agricultural labourers can be transferred from agricultural sector to non-agricultural sector without diminishing agricultural output. The objective is to mobilize these workers to employ on various capital creating projects. This will only be possible by taxing the productive workers in the rural sector and saving potential concealed in disguised unemployment can be tapped.

B. EXTERNAL SOURCES

Domestic sources for capital formation are generally scarce and they are required to be supplemented by external sources which are discussed below:

- 1. Private Foreign Investment:** The less developed and poor countries take the advantage of the foreign investment from private foreign investment which is in the shape of private business firms or persons. Foreign investors invest with the feelings of making more profits from modern techniques and efficient management. In modern times, this system is not much favoured as private foreign investors invest only in capital import industries in which they are interested and do not take care of public welfare.
- 2. Loans, Grants and Aid from Foreign Government:** These methods are used for foreign governments through heavy machines, instruments and other capitalised goods by imports. Furthermore, loans and grants are also given to the needed countries. These funds can be used by the country in any form. Prof. Nurkse has observed, "Previous experience shows that receipts of foreign credit by governments investing in the form of overhead capital are the best for the economic development.... The country is free to use according to its needs." Foreign loans and grants generally have deep burden on the domestic government and major portion of national income goes as interest to the concerned country. Therefore, proper care should be made to use these loans for productive purposes and follow the policy to encourage export and restrict imports. Besides, international agencies give credit to the process of capital formation. These institutions are International Monetary Fund, International Bank for Reconstruction and Development, International Finance Corporation, International Development Association, Asian Development Bank and many others.

- 3. Restriction of Imports:** Still another external measure to raise capital formation is the restriction of imports. It means that restriction should be imposed on all luxury imports if the domestic income saved on imported consumer goods is not invested on luxury and semi-luxury goods at home. But this saved amount should be diverted into productive channel on public utility services. This process will certainly lead to increase in capital formation.
- 4. Terms of Trade:** Another vital source for achieving means for capital formation in underdeveloped countries is the favourable terms of trade. It means if the terms of trade made in favour of such countries, then it is in a position to import large quantities of capital goods. The main benefit of this form of capital formation is that neither this lead to increase in the burden of international debt nor, one has to face struggles through the domestic loans and grants. Domestic economy is also saved from instability. But improvement in the terms of trade is not an automatic source of capital formation. Thus, Prof. Nurkse suggests that saving should be extracted through taxation to give the country a command over additional imports of investment goods.

For capital formation, the external source is an active determinant and in the initial stages, it has proved to be a boon to the less developed countries. But it must be borne in mind that external sources like foreign loans, aid grants and assistance is not a mean of permanent standing. This device must be used very carefully in a limited quantity and only for the construction of capital goods. So, the last alternative remains with domestic sources which is most reliable for the economic development of the country. To quote Prof. Nurkse, who has rightly observed, "Any country cannot be self sufficient in capital till the citizens do not save themselves and through their experience cannot understand the benefits of round-about process". Hence we can conclude that it is not good to rely on external sources of capital formation. Underdeveloped countries should adopt domestic saving for raising the capital formation and foreign capital should be used for short term in construction of social overhead capital in the initial stages only.

5.4.9: CAPITAL FORMATION IN INDIA

Capital formation in India is measured in terms of Savings and Investment as percentage of GNP. The rate of capital formation has been steadily rising since the First Plan with occasional

decline. For example, domestic savings as percentage of GNP was 5.3 per cent in 1951-52; 7.5 per cent in 1955-56; 8.8 per cent in 1968-69; 12.2 per cent in 1973-74 and 24.3 per cent in 1978-79. Similarly, investment as percentage of GNP was 5.6 per cent in 1951-52; 7.3 per cent in 1955-56; 11.2 per cent in 1968-69; 13.7 per cent in 1973-74 and 24.6 per cent in 1978-79. During the 6th Plan period (1980-85) rates of both domestic saving and domestic investment declined. In 1984-85, the rate of domestic saving was 18.2 per cent and that of investment was 19.6 per cent. This left a gap of 1.4 per cent to be filled by external sources. During the 7th Plan in 1990-91, both saving and investment rates increased and stood at 23.7 per cent and 27.1 per cent respectively. However, in the next three years, these rates declined and stood at 20.2 per cent and 20.4 per cent respectively in 1993-94. These facts show the dependence of our economy on foreign capital. The 8th Plan envisaged saving and investment rates to be of the order of 21.6 per cent and 23.2 per cent of GDP. The 9th Plan targets were 26.2 per cent and 28.3 per cent of GDP respectively. The 10th Plan targets in this regard were 26.8 per cent and 28.4 per cent respectively.

The increase in foreign investment in the post-reform period is not being reflected as higher rates of savings and investment in the economy. It is anomalous that while foreign investment has increased, savings and investment rates have either declined or, at best, remained stable. This means that increase in income through foreign inflow is not leading to any significant addition in the productive assets of the economy. The central question is where all the foreign investment is going. Since all foreign investment constitutes income, it should be reflected either in higher savings and investments, in consumption, or as capital flight. If there is a residual foreign investment not reflected either in consumption expenditure or savings, it means that money is being spent on unproductive, unaccounted for consumption or is being reversed as capital flight. The idea of capital flight, linked as it is to scams, is politically sensitive, but plausible.

Why is there so much emphasis on high saving rate ? Empirical evidence suggests that no country has been able to sustain high Gross Domestic Product (GDP) growth rate without an increase in the domestic savings rate. GDP is the total flow of goods and services produced in the country.

Foreign capital can supplement domestic savings, but only upto a point, since it has to be serviced. A sustained export growth is thus essential to absorb a high dose of foreign investment. If foreign capital comes in the form of commercial borrowings as a substitute for domestic savings, a balance of payments crisis and subsequent decline in the growth rate cannot be avoided. Going by the world average, India is not doing badly on the savings front. Yet, the level of savings remains substantially below that of the fast growing Asian economies such as Indonesia (38.7 per cent), Malaysia (35.6 per cent), Singapore (51.3 per cent), Thailand (37.2 percent) and China (40.5 per cent).

Domestic savings has two components: savings in the household sector, and in the corporate sector, known as private savings; the other is public sector savings. The heart of the savings problem of the economy lies in the behavior of public savings (including the savings of public enterprises). Public sector savings as a percentage of GDP was only 1.7 per cent in 1994-95, only marginally higher than it was five years ago. This dismal public savings performance is still continuing and has resulted in rising fiscal deficits (the gap between income and expenditure of the government which has to be bridged by borrowing). The deficits of the Centre and the States taken together now amount to 10.5 per cent of GDP, which is about the same as in 1990-91. Economists, both within the government and outside, say that no significant improvement on the savings front is possible without bringing down the fiscal deficit to half its present level.

The present saving and investment rate around 24 per cent of GNP can be considered as satisfactory. At one time, it was felt that a rate of saving and investment of about 20 per cent was sufficient to attain a growth rate of 5-6 per cent in GNP and about 3.5 per cent in per capita GNP. However, the paradox in the context of Indian economy is that the rate of growth of the economy has remained very low inspite of a high rate of saving.

Besides a high saving rate, economists lay down two other basic conditions for sustaining high GDP growth rates i.e., balance of payments viability and a high literacy ratio. In both these areas, India is far behind China and the high-growth South-East Asian countries.

There is no doubt that saving-income ratio of Indian economy has been raised substantially, but much of the gain on this account is being eroded in view of the high inventory accumulations resulting from sluggishness of demand and a sharp escalation in the investment costs which

absorbs to a large extent the increase in saving without any increase in investment in real terms. Moreover, the investment pattern of the economy is geared to the demand pattern of upper, middle and affluent classes and thus results in a higher capita intensity of investment. Coupled with inefficiencies of the productive system, the capital-output ratio of the economy is around 6. This explains the paradox of high saving and low growth rates.

An International Monetary Fund (IMF) survey has suggested that India needed higher rate of savings to sustain Gross Domestic Product (GDP) growth rates of at least seven per cent and catch up with the Tiger economies of East Asia. To achieve this goal of sustained seven per cent growth without relying heavily on foreign borrowing, domestic saving rates must rise. India's domestic saving rate should need to rise to around 30 per cent to achieve desired growth rate. Increased public saving, together with strong structural reforms, notably financial liberalization is necessary to boost India's domestic savings rate.

India's past experience seems to bear out the need for a strong savings rate bolstered by pertinent financial sector reforms. Inefficient investment, in part resulting from the dominance of the public sector in the economy, has hampered efforts to translate comparatively high savings rates into high growth. This pattern can be broken through determined fiscal consolidation and strong structural reforms that emphasise privatization and financial liberalization. If India is to sustain an increase in long-term saving, it must give market participants greater flexibility in portfolio allocation and rely on private sector involvement to boost competition and develop more innovative products. Then and then alone, we may be able to achieve 8 per cent annual growth target and 26.8 per cent domestic savings with investment rate pegged at 28.4 per cent of FDP in the 10th Plan.

5.5: NURKSE'S THEORY OF DISGUISED UNEMPLOYMENT AS A SAVING POTENTIAL

Meaning of Disguised Unemployment: The concept of disguised unemployment means that given the techniques and productive resources, the marginal productivity of labour in agriculture over a wide range is zero in overpopulated underdeveloped countries. It is, therefore, possible to withdraw some surplus labour from agriculture without reducing total farm output. Such unemployment is found where too many workers are

engaged in agricultural operations because of the lack of alternative or complementary employment opportunities. If, for example, seven persons are engaged in cultivating a farm that could be cultivated by five, it implies that all the seven workers are not fully employed. If two are withdrawn and given some alternative job, the total output of the farm will not be reduced when five workers are left to do the same work. It means that two workers are not contributing anything to farm output and their marginal productivity is zero.

Nurkse's Theory: Ragnar Nurkse developed the thesis that disguised unemployment in overpopulated underdeveloped countries can be a source of capital formation. According to Nurkse, the state of disguised unemployment in underdeveloped countries constitutes a disguised saving potential. Underdeveloped countries suffer from disguised unemployment on a mass scale. With existing techniques of production in agriculture, it is possible to remove from land a large proportion of the surplus labour force without reducing agricultural output. This surplus labour force can be put to work on capital projects, like irrigation, drainage, roads, railways, houses, factories, training schemes, community development, education and health, etc. In this way, rural underemployment can be a source of capital formation.

Nurkse has split up the problem of mobilizing the disguised unemployed as a saving potential in two parts: Firstly, how to feed the surplus population transferred to the various capital projects; and Secondly, how to provide tools to the new workers to work with.

Though the first problem can be solved to some extent by voluntary savings, by taxation and even by importing foreign capital, yet the magnitude of the problem requires that it should be self-financing. At present the unproductive surplus labourers are being supported by the productive labourers. The latter are doing virtual saving since they are producing more than they consume. But this saving is running waste because it is being utilized in feeding the unproductive labourers whose contribution to output is zero or negligible. If the productive peasants working on land continue to feed their unproductive dependents working on capital projects, then their virtual saving would become effective saving. But this capital formation, through the use of surplus labour is self-financing only if the mobilization of the concealed saving potential is 100 per cent successful. Nurkse further emphasizes, "It seems to be a question of all or nothing. Either the whole of the food surplus that becomes available on the land through the withdrawal of the surplus labourers is mopped up to feed the unproductive labourers in their new occupations or nothing can be done at all." But the snag is that, there may arise certain leakages in this food fund available for capital formation:

- a) The newly employed worker may start consuming more food than they were consuming at the farms;

- b) The peasants left behind on the farms may themselves start consuming more food than before; and
- c) The problem of bearing the cost of transporting food from the farms to the capital projects.

Though it is not possible to plug these leakages fully, Nurkse suggests that this can be done by complementary savings in other sectors of the economy, by state action in requisitioning the surplus food stocks from the peasantry, and even by meeting the deficit from imported food stocks. He also stresses the need for levying indirect taxes on commodities that enter into the peasants' budget: taxation in kind, a tax on land owners and on their rents may further help in mopping up the food surplus. Nurkse's firm conviction is that whatever the machinery employed may be, some form of collective saving enforced by the state may prove to be indispensable for the mobilization of the saving potential implicit in disguised unemployment.

The second problem relates to the financing of tools to be provided to new construction project workers. Even though capital goods can be imported, yet as usual an act of domestic saving is required in this case. In some of the densely populated agricultural economies, there is not only underemployment of labour but also of capital. Due to small scattered plots, large number of farm tools, implements and draught animals are used. But if these small and scattered holdings are consolidated, certain simple tools will be released which the investment workers can use in new capital projects. Moreover, simple tools and equipment that the newly employed workers require can be made by the workers themselves with their own hands. Such simple tools can also be imported from abroad in exchange for the country's exports. But it is essential that only that capital equipment should be imported which can be easily adapted to the prevailing factor endowments in the country. As Nurkse puts it, "Much simpler tools and equipment may be appropriate to the relative factor endowments of countries of this type in the early stages of development."

Thus a process of economic development is generated through the use of the disguised unemployed. Nurkse, therefore, rightly believes that there is concealed saving potential in rural underemployment in overpopulated underdeveloped countries that can be effectively utilized as a means of capital formation

Critical Appraisal: The concept of disguised unemployment as a concealed saving potential has led to considerable controversy. Economists have questioned the practicability of this concept in democratic underdeveloped economies. The various difficulties that stand in its working are examined below:

1. Nurkse assumes that propensity to consume of both the newly employed workers and those left on the farms remains constant. But this is an untenable assumption. Kurihara is of the view that as a result of transferring the disguised unemployed to the capital-goods sector, the propensity to consume

may rise in the case of the whole economy. In this event the pressure will increase for allocating to the consumer goods sector those resources which might otherwise be used to increase output of capital goods.

2. It is not easy to mobilize the disguised unemployed and send them to the new capital projects. They are so intensely attached to their family and land that they do not like to leave their kith and move to the new projects.
3. In Nurkse's analysis, the problem of payment of wages to the workers does not arise because the entire process of capital formation is assumed to be self-financing. This is unrealistic. Unless wages are paid, workers cannot be attracted to the new capital projects. As Lewis remarks, "Unpaid labour may be very important in countries which resort to compulsory labour but its scope in other countries is limited."
4. As a corollary to the above, this 'up by the bootstraps' approach can succeed only under strong totalitarian governments and has little relevance to democratic underdeveloped countries. As a matter of fact, this approach to capital formation has succeeded in China where the masses have been forced to work on capital projects by providing only minimum rations required for bare subsistence. Nurkse himself admitted this fact when he declared later on, "Some of the underdeveloped countries do have potential domestic resources available for capital construction. But it may be very hard to mobilize them without resorting to coercive methods."
5. Kurihara further maintains that the tacit assumption of technological neutrality involved in Nurkse's idea of disguised unemployment as a saving potential is untenable and unhelpful. During the process of industrialization, if the capital-goods sector adopts labour-saving devices, it will set a limit to the full mobilization of the disguised unemployed in the economy. In such a situation, capital equipment will have to grow at a much faster rate to equip labour with increasing productivity. Technological progress is thus inevitable.

Conclusion: The inference can be drawn from the entire discussion that the existence of disguised unemployment as a concealed saving potential and hence as a source of capital formation in the overpopulated underdeveloped countries is beset with a number of difficulties and has little practicability in the countries that have wedded themselves to a democratic way of living. We may thus conclude with Viner that "there is little or nothing in all the phenomena designated as 'disguised unemployment,' as 'hidden unemployment,' or as 'underemployment' which in so far as they constitute genuine social problems would not be adequately taken into account by competent, informed, and comprehensive analysis of the phenomenon of low productivity of employed labour, its causes, its true extent, and its possible remedies."

5.6: SUMMARY

In this chapter we discussed the vicious circles of poverty ,which presents a self-explaining fact that underdevelopment is both a cause and effect of itself. This chapter went on to discuss the meaning and importance of capital formation in economic development. This chapter then discussed the theory seeking to describe the importance of disguised unemployment as a saving potential, and various difficulties that stand in the way of working are also examined.

5.7: KEY WORDS

1. **Vicious Circle of Poverty:** A vicious circle of poverty implies a circular constellation of forces tending to act and react upon another in such a way as to keep a poor country in a state of poverty.
2. **Backwash Effect:** It basically means that, if one particular area in a country starts growing or developing, it causes people, human capital as well as physical capital (infrastructure, finance, machines etc.) from other parts of the country to gravitate towards this growing centre.
3. **Capital Formation:** Transfer of savings from individuals or households to the business sector; directly through investments or indirectly through bank deposits which are loaned out to firms.
4. **Disguised Unemployment:** It means that given the techniques and productive resources, the marginal productivity of labour is zero or negligible. And if some labour is withdrawn, the productivity will remain unchanged.

5.8: SELF-ASSESSMENT QUESTIONS

1. What do you mean by vicious circles of poverty? How does it operate in an underdeveloped country?
2. Explain the significance of capital formation in the development process of underdeveloped countries.
3. Explain the sources of capital formation. How is capital formation measured?
4. “Capital is a necessary but not a sufficient condition of economic development.” Discuss.
5. Explain the various stages of capital formation. Why capital formation is low in India ?

6. Write a note on capital formation in India and explain the paradox of high-saving and low-growth rates.
7. What is meant by disguised unemployment? Point out its main features.
8. Critically examine Nurkse's thesis of disguised unemployment as a saving potential.

5.9: FURTHER READINGS

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CHAPTER-6: PLANNING PROBLEMS AND POLICIES OF DEVELOPMENT PLANNING

STRUCTURE:

- 6.1 Objectives
- 6.2 Introduction
- 6.3 Investment Criteria
- 6.4 Choice Of Technique: A. K. Sen's Analysis
- 6.5 Technological Dualism
- 6.6 Appropriate Technology For Developing Economy
- 6.7 Schumacher's Intermediate Technology
- 6.8 International Transfer of Technology
- 6.9 Summary
- 6.10 Key Words
- 6.11 Self-Assessment Questions
- 6.12 Further Readings

6.1: OBJECTIVES

After having a through reading of this chapter, you will be able to know:

- Meaning and importance of investment criterion as an instrument of resource allocation in a developing economy;
- Different investment criteria and their respective limitations;
- Importance of the problem of choice of techniques and how it has been sought to be solved;
- Problem of technological dualism prevalent in underdeveloped countries;

- Importance of intermediate technology and its application; and
- Need, process and limitations of international transfer of technology.

6.2: INTRODUCTION

In underdeveloped countries, the planners face a number of problems to make the most efficient use of resources. This is why, in recent times, considerable attention has been given to this field and economists have propounded a number of planning tools which we will discuss in this chapter.

One of the most important problems in underdeveloped countries is the scarcity of capital for the investment in development projects. Thus, the allocation of resources needs to be guided by one or more investment criteria. The problem of investment criteria involves the principle underlying the allocation of scarce investment resources in a rational manner so as to maximize the national income. Further, the choice of an appropriate technique of production is important. For example, a country may choose labour-intensive or capital intensive techniques of production according to its local conditions. Another challenge faced by an underdeveloped country is the problem of technological dualism, and the dilemma of a choice between capital-intensive and labour-intensive technology has led some to search for an appropriate technology or intermediate technology.

6.3: INVESTMENT CRITERIA

In development planning, the problem of allocating investment resources involves several choices: (a) the choice of how much investment is to be made in various sectors of the economy; (b) the choice among various projects within a sector; (c) the choice of techniques for the projects chosen. For a developing country, these choices become increasingly complex for two basic reasons:

1. There is uncertainty regarding the determinants of development so that no “correct” criterion can be offered with respect of investment policies designed to maximize the rate of development.

2. Market imperfections, externalities, and disequilibrium prices make market criteria unreliable or irrelevant so that decisions about capital allocation must be made outside of the market mechanism.

Aside from these difficulties, the choice of sectors, projects, and techniques is complicated by the existence of any number of development objectives. There are no simple technical criteria for the ranking of investment priorities; instead, capital allocation is very much a matter of judgment since the optimal allocation depends upon what objective is being maximized and over what period of time. The objective may be maximum real national income, maximum real per capita income, maximum per capita consumption, or maximum employment. Each of these objectives may also be subject to a number of stated constraints; for example, the objective may be to maximize real per capita income subject to the constraints that the income distribution is not worsened in the process or that the balance of payments does not deteriorate.

The problem is complicated further by the treatment of time; over what time period is the objective to be maximized? Some discounting procedure will be necessary in order to maximize the present value of target variables through which one judges the objective. It is therefore, not surprising that different investment criteria are applicable depending upon different objectives to be achieved over different periods of time.

Investment Criteria

Investment planning has to be based on considerations of factor endowments, methods of production suitable to them and the choice of such techniques which ensure high rate of growth. Economists have put forward various investment criteria so as to attain the objective of acceleration of economic development. We can classify these criteria according to the emphasis they lay on the means of doing so. The different criteria fall into four different classes:

- a) Criteria which accept the present factor endowment position as it is and suggest allocation of investment accordingly;
- b) Criteria which aim at maximizing the rate of growth through methods which even go against the factor supply situation;

- c) Investment criteria which specially emphasize the time factor involved in planning development; and
- d) Investment criteria which are influenced by and which aim at controlling the special problems which are thrown up by the developing economy.

The Capital-Turnover-Criterion: The capital turnover criterion is also known as the “Rate of Turnover criterion”. It was given by Professors J.J. Polak and N.S. Buchannan in the context of discussion on the use of foreign loans in the reconstruction of war-devastated European economies. In applying this criterion to underdeveloped countries, the logic given is that since capital is a scarce factor here, such projects ought to be preferred which give a high rate of capital turnover (i.e., a low capital/output ratio). Such projects are generally labour-absorbing and have a high employment potential. The policy is according to the factor endowment situation of capital poor overpopulated economies.

This criterion has been criticized as unsuited to the requirements of economic development. It has been pointed out that the criterion is based on a static short-run view. Quickly-yielding projects having a low capital-output ratio in the short-run may have a high ratio over the long period. Economic development is a long-period phenomenon. Further, the criterion ignores that high capital-output ratio projects may confer certain supplementary benefits to the rest of the economy which far outweigh the extra capital cost on them. Moreover, certain industries may just outwardly show a low capital-output ratio but when we take into consideration the much higher rate of depreciation resulting from higher turnover of capital, the output ratio may indeed be very high. Therefore, we should consider the net rate turnover of different projects. Further, a project which is capital-intensive and labour-saving immediately may prove to be much more labour-absorbing over the long period. Then there is a limit to the thin spreading over of capital on labour because labour productivity may fall so rapidly as to be below the wage rate paid to labour. The capital turnover criterion, therefore, takes an extremely simplistic view. Economic development needs a foundation of heavy, capital-intensive industry with modern technology which even labor employment over a large scale will not be possible. We need to take an overall, social view of investment productivity.

The Social Marginal Productivity (SMP) Criterion: The social marginal productivity criterion was put forward by A. E. Kahn in 1951 and later elaborated by Hollis B. Chenery, the criterion states that investment on different projects should be spread on the basis of private marginal productivity (profitability), but according to the way the social marginal productivity of investment is maximized. According to Kahn, “The correct criterion for obtaining the maximum return from limited resources is social marginal productivity, taking into account the total net contribution (or its costs) which may accrue to the private investor”. The principle thus, requires the maximization of the total net increment to the national product whenever accruing directly or indirectly.

The social marginal productivity criterion differs from the capital turnover criterion in so far as it takes into consideration the ‘external effects’ of an investment on the economy as a whole; it is not the market costs which are taken into account; it is the social opportunity costs.

Hollis B. Chenery improved upon the SMP criterion of Kahn by giving a quantitative expression to it. He expressed the opinion that in an optimum investment programme, we can rank the various plan projects according to their social marginal productivity. Given the amount of funds available for investment, we can select as many projects from the ranking list as can be financed out of the given funds. In short, the SMP of a project is the direct and indirect contribution which it makes to the national economy. Chenery noted that less developed countries are particularly concerned about the effect of a project on their balance of payments. Therefore he would like to measure the SMP of a project by the following formula. If V is the social value added domestically and C is total cost of domestic factors and B_r is balance of payments effect or balance of payments premium per unit of investment, then

$$SMP = \frac{V}{K} - \frac{C}{K} + \frac{B_r}{K}$$

Chenery illustrated the applicability of this formula with reference to the starting of industrial production of certain commodities in Greece. For example, in the production of cement, he obtained the following data:

Investment (K) = \$ 6750 thousands;

Capital turnover = $V/K = 0.93$;

Cost ratio = $C/K = 0.37$;

Balance of Payments Effect = $B_f/K = 0.07$.

The SMP accordingly was = $0.97 - 0.37 + 0.07 = 0.63$. Similarly he found the SMP for other industries: fertilizers = 0.44, for sulphuric acid 0.41 and for glass manufacture, 0.39.

In this way, Chenery thought that ranking of projects according to their SMP helps planners to select projects with the highest SMPs which can be financed by investments in a plan. But the limitations of such a criterion should be well understood before applying it in practice. The SMP criterion has the merit of drawing attention to the overall effect of an investment programme but when it comes to the 'application' of this criterion in practice to policies for economic development, one comes across formidable difficulties.

First, market prices in less developed countries do not reflect social costs and benefits and as such quantitative assessment for costs and benefits arising out of a project is available only if we can arrive at the social cost and benefit. Chenery himself mentioned the need for making corrections of market prices for tax, subsidy and fiscal policies, correction for regulated cost-plus prices in transportations and public utilities, and also in respect of idle resources whose market price is not known. There are many services such as education and health which are difficult to evaluate directly. In such a state of affairs, we have to use 'shadow' or 'accounting' prices which reflect the intrinsic values of the factors and products. Professor Tinbergen and Frisch have advocated the use of shadow prices and costs in arriving at the SMP of different projects.

Secondly, the criterion becomes meaningless where the factors are valued at their social opportunity cost. For example, in an overpopulated, agricultural economy with the opportunity cost of labour very close to zero, the SMP criterion will approximate the capital-turn over criterion.

Thirdly, the criterion poses the existence of an optimal income distribution already and the possible making adjustments for the risks arising out of imperfect forecasting, ex-ante co-ordination of investment decisions and so on.

Fourthly, the Chenery formula is based on the assumption that the given project has only a marginal significance for the economy. It fails to take due account of structural interdependence and of the nature and value of external economies.

A major defect with the criteria is its static analysis. There is no proper consideration of the effect of investment on the composition, distribution, and flow of income over time. The SMP criterion is expressed in terms of a once-for-all effect on the national income and does not include the specific multiplier effects of investment on future income levels. Dynamic analysis must take account of what happens to the final products, for this determines the rate of investment in future which in turn determines the level of future incomes. The Chenery criterion is also inadequate so far as it does not take account of changes in the nature and quality of factors of production such as population and labour force that may, in part, be an indirect consequence of the current investment allocation.

The Galenson-Leibenstein Reinvestment Criterion: Harvey Leibenstein and W. Galenson criticized the SMP criterion for neglecting the forces which promote economic development and for using tools of economic statics in analyzing the problem of economic growth. In their view, the main objective of investment policy is to maximize the per capita output potential of the economy at some future time period, rather than the maximization of national income now. This, they claimed, is possible only if investment is so allocated among different projects that the Marginal Reinvestment Quotients (MRQ) of capital in various alternative investment projects is equated. The MRQ of a project is determined by the annual surplus it generates over and above wage and depreciation costs, taking into account at the same time the contribution of the project toward improving the quality of the labour force and bringing about a decline in the rate of growth. The proportion of this surplus to capital per worker gives the reinvestment quotient. Capital per worker at any future point in time 't' depends on the accumulation of capital from the present until 't' and the size of labour force at the point 't'.

Galenson and Leibenstein came to an empirical finding that the MRQ is likely to be higher in capital-intensive than in labour-intensive projects. Earlier E. Domar had shown that under conditions of economic growth, the ratio of replacement cost to gross investment would be considerably lower for long-lived than for short-lived capital goods, as such, other things being

equal, the reinvestment quotient will be higher. Hence, the correct policy is to “choose for each unit of investment that alternative that will give each worker greater productive power than any other alternative”. From this general conclusion, the authors went on to argue on the basis of assumption that while profits are largely saved for reinvestment and wages are largely spent, as far as possible, capital-intensive projects must be preferred even where capital is scarce.

The reinvestment-quotient criterion has been criticized by many writers. A.K. Sen has questioned the basic assumption that large profits would automatically go into reinvestment to produce a higher rate reinvestible surplus per unit of capital. In his opinion, the surplus may be large per unit of capital, but if the propensity to consume of the people engaged in that production goes up, investible surplus will go down correspondingly. O.H. Eckstein has, on the other hand, pointed out that there is not guarantee of capital deepening as ensuring the best use of available capital resources. It is rather possible that there is such an inefficient allocation of capital that the resulting increase in income is rather smaller. Further, Francis M. Bator has pointed to another slip in the argument. It is that the Leibenstein-Galenson argument holds only if the relative ratio of profits to wage in national income goes up and this raises the saving ratio to income. The second step cannot just be assumed away in a free, democratic society. Moreover, the criterion violates the basic welfare ideas. Adopting capital-intensive methods and raising the share of profits means displacement of a large number of workers by machines and concentration of income in fewer hands. This is surely a very indirect and unpopular way of increasing the future surplus. Otto Eckstein considers that it might be better to employ fiscal means to attain an income distribution which will yield sufficient savings, rather than to depend on planned investment based on the reinvestment criterion. In his opinion, “endless growth for its own sake does not make sense”, there may be a time when current consumption may become the immediate concern for the community. Lastly, the objective of maximizing the per capita output potential at some future point in time implies a one-commodity economy model. The criterion needs to be considerably modified in a multi-commodity economy.

The Eckstein Marginal Growth Contribution (MGC) Criterion: Eckstein tried to synthesize the Kahn-Chenery approach and the Galenson-Leibenstein approach. Accordingly, he postulated a social welfare function which is the sum of the discounted value of the stream of consumption resulting from a given current investment K and the future reinvestments occasioned by it. The

problem is to allocate current investment among competing projects which differ in their output stream and reinvestment potential. All reinvestments (at future points in time) are to be directed to a single project. According to Eckstein, social welfare function is maximized if the allocation of K satisfies his Marginal Growth Contribution (MGC) criterion. The optimal allocation of K requires that the amounts invested in each project are such that the MGCs of the different projects are equal. The MGC of a project is defined as the sum of two terms, (a) the present value of the project's direct contribution to the consumption stream and (b) the present value of the consumption stream resulting from reinvestments associated with the projects.

The Eckstein MGC criterion can be criticized mainly on two grounds. First, if we want the investment criterion to consider an infinite time horizon (as Eckstein has done), we cannot proceed on the basis of the assumption that capital will be the only scarce factor at all points of time. Second, there is no justification to direct all reinvestments on one project. It is wrong to assume that the same projects are available at all future periods of time as at the beginning.

The Dobb-Sen time-Series Criterion: The approach of Maurice Dobb and A. K. Sen is to emphasize the attempt of a community to maximize the returns available from the projects undertaken over a finite time horizon since a community cannot wait indefinitely for its consumption to improve. They stress time as an important factor in the choice of projects for investment. Once the time horizon before the planner is fixed, the choice becomes easier also. The investment criterion is: "choose projects which give the highest sum total of returns over the period of time for which the community is prepared to wait". The criterion can be nicely illustrated with a numerical example. Suppose the planners have before them two investment projects of the same cost but different in capital-intensity.

Table: Confirmation of the Return to Investment between Two Investment Projects

Period	Project II (Capital Incentive)		Project II (Labour - Incentive)	
	Return in millions of units of output			
	Annual	Total	Annual	Total
1 st year	4.0	4.0	6.0	6.0
2 nd year	5.0	9.0	7.0	13.0
3 rd year	6.0	15.0	8.0	21.0
4 th year	7.5	22.5	9.0	30.0

5 th year	9.0	31.5	10.0	40.0
6 th Year	10.5	42.0	11.0	51.0
7 th year	12.0	54.0	11.5	62.5
8 th Year	13.5	67.5	12.0	74.5
9 th year	15.0	82.5	12.5	87.0
10 th year	17.5	100.0	13.0	100.0
11 th year	20.0	120.0	13.5	113.5
12 th year	23.0	143.0	14.0	127.5

Project I capital-intensive and Project II labour-intensive. Suppose further that the time horizon given to the planners is ten years and the annual returns of two projects are as shown in the Table above. Project I absorbs a greater amount of capital but gives to the community a stream of output which is lower than that of Project II in the first six years. But after this period, the rate of growth of output from Project I is much greater than that of project II, so much so that the total return from Project I becomes equal (100 m. units) to the total returns from the Project II in the next four years. After the period of ten years the relative growth of output in Project I is far greater than the growth of output in Project II.

The choice problem now is simple. If the community has a time horizon of less than 10 years, it must choose Project II which would give the community a higher sum-total of returns. If the time horizon is 10 years or more, it will give higher total returns if we choose Project I. Ten years is the period of recoupment or recovery of loss of output by Project I for the lesser return it gives in the first six years.

This criterion has been criticized by Dr. K. N. Prasad as assuming too much. He asks: what is the criterion for the time horizon? The criterion simply becomes the 'net-rate of turnover criterion' if the period of recovery is very short and corresponds to the reinvestment criterion if the period of recovery is extremely long. Notwithstanding the importance of the choice of a time horizon in selection of techniques for projects, the Dobb-Sen criterion remains of academic interest only. In the face of widespread uncertainty in less developed economies, the criterion does not have much practical meaning. Technology, wage rates and prosperity to consume are factors which are all changing unpredictably. Therefore, forecasting of future outputs available from different projects may be almost impossible.

Conclusion: The brief review of the important investment criteria literature reveals that most of these authors analyse the problem of growth in a static framework. Even the analysis of Galenson and Leibenstein, claimed by them to be dynamic, is static because of their objective of maximizing per capita output potential at some chosen point of time in the future. They, therefore, have a finite time horizon and hence static tools could be used to analyze the problem. Sen and Dobb do introduce dynamic elements explicitly in their model, but they fail to consider restraints, such as the availability of labour, that may become operative at future points in time.

Special criteria: Employment-Absorption and Balance of Payments Criteria

It is often argued that in countries with massive unemployment and under-employment, the planners should select those investment projects that substitute abundant labour for scarce capital or, sparing otherwise; mobilize the maximum amount of labour per unit of investment. The maximization of employment may also be a social objective. This objective requires the adoption of projects with a low capital-labour ratio. This may not either maximize output immediately or maximize the surplus available for investment. It is on account of this basic conflict of employment absorption criterion with other factors in economic development that a practical meaning cannot be given to employment-generating development projects.

There are some less developed countries which face acute imbalance in their payments; leading to foreign exchange crisis with a threat of devaluation of their currencies. In such countries, the balance of payments effect of investment allocation assumes importance as a criterion for the allocation of investment. They like to give importance to those projects which minimize deficits, or in other words, increase the supply of foreign exchange or economize the use of it. The balance of payment effect of plan projects has two different aspects: (a) The effect of the project on the balance of payments during the construction phase, (b) the effect after it is commissioned into operation.

J. J. Polak classified investments into three types according to their positive, neutral or negative effects: (1) exports and import substitution, (2) replacements for goods presently consumed, (3) goods sold in the home market in excess of the demand resulting from increase in real incomes. Polak maintained that the investment of type (3) is a factor of the construction phase of all types of projects.

However, this approach is not very practicable because the outputs of many projects may place them under several or any two or all the three categories. Further, the approach does not tell what change should be made in the programme in case the criterion is not satisfied.

Application of investment criteria is a complicated job indeed. It is not that all the criteria are necessarily conflicting; there are some criteria of a complementary nature as well. The criteria relevant to the situation at the time of plan formulation may be specified by a detailed study of the broad strategy of planning and the prevailing economic situation in the economy. Since the projects included in a plan are often interdependent, there cannot be a partial selection approach to them. It is only within the framework of an optimizing plan model that the choice can be justifiably made.

6.4: CHOICE OF TECHNIQUES (A. K. SEN'S ANALYSIS)

An important problem in development planning is that of choosing between alternative techniques of production. The economic issue in the problem arises because to produce a given output a number of methods of production may be available, some using more labour and others more capital. Which is the best technological process to use in a given situation ? This is the problem of the choice of techniques.

In a static economy, the problem of the choice of techniques is simple enough. The rule of choice is, roughly to use that combination of techniques in the various sectors which over-all will employ productive factors in proportions as close as possible to the proportion in which resources are available. The criterion for optimal choice does not involve maximizing either the productivity of the employed labour force, the equipment used, or of any other particular resources input. Its objective is to maximize the total output that can be obtained from all the resources available to the country with the existing technological methods.

The criteria for optimal choice of technique in economic development ranges from the static criterion to various modifications to take care of many problems involving time in an essential way, statement of different goals, and imposition of additional constraints. In a dynamic context, for example, differences in the gestation period of production processes and in the durability must also be taken into account in choosing the technology which in turn determines the relative

intensity with which productive factors are used. If there are two processes with equal input requirements and equal outputs, the one with the quicker pay off (return) is to be preferred. However if getting faster return involves using more inputs or getting less output, again the problem of choice arises.

The choice of techniques in a developing economy will depend primarily on the goals we have in mind. If the goal is to increase the rate of growth, another set of influences related to technology not but purely technological must be taken into account. Different techniques of production will give rise to different distributions of income. Each income distribution generated by each technique will mean different amounts of reinvestible resources available. Thus, besides the immediate contribution to output we must take the reinvestment potential of each technique into account. As Harvey Leibenstein has observed, “different techniques often imply quite different strategies of economic development with very different effects on the economy”.

Prof. A. K Sen’s Analysis

Professor A. K Sen has admirably analysed the problem of choice of technique in a developing economy with a labour surplus. He had in his mind economies like India and Pakistan.

Assumptions: Sen considers an economy consisting of two sectors; an advanced Sector (A) and a backward Sector (B). The backward sector produces a single consumer good, corn, presumably using only labour. The advanced sector about to be initiated consists of two departments: Department I, which produces corn using labour and machines, and Department-II which produces machines, using only labour. The corn productivity of labour in Department-I depends on the capital-intensity of the process used. The capital-intensity of a process is measured by the number of man-years required in Department-II to produce enough capital (machines) to equip one labourer in Department-I. The wage rate to be paid to labourers in the advanced sector is assumed given. The total wage bill in the advanced sector is to be met from corn production within the sector except in the first period, when the advanced sector is being initiated. The wage bill of the first period is to be met by a corn surplus extracted from the backward Sector-B.

To simplify his analysis more, A. K. Sen takes the following assumptions further.

1. Capital goods do not depreciate and lasts forever;

2. There are only two factors in capital goods and labour. There is no working capital;
3. There are constant returns to scale;
4. All techniques have the same gestation period;
5. The real wage rate per labour-hour is the same for all the techniques and is constant through time;
6. The wage bill is entirely consumed and surplus entirely reinvested;
7. There is no progress of technological knowledge over time.

Choice between a labour- intensive and a capital-intensive technique: Having taken these assumptions, A. K. Sen proceeds to show the choice problem with respect to two alternative techniques of production, H and L, the former with a higher capital-intensity than the latter. He introduces the following notation for technique L. For technique H, the corresponding primed notations are used.

W = real wage rate per labourer per period

a = capital intensity

P_c = productivity per labourer per period in corn production in Department-II of Sector-A

L_i = number of labourers employed in Department-I

L_c = number of labourers employed in Department-II

C = total corn production in Sector-A

W_c = total wages bill in Department-II, Sector-A

and N = surplus of corn production over wage bill ($C - W_c$) in Department-II, Sector-A.

Since the wage rate for both the techniques is assumed to be the same, $W = W'$. Further, H has a higher capital intensity, i.e., $a < a'$. Since the purpose of increasing the amount of capital per unit of operating labour is to raise labour productivity, $P_c < P_c'$.

Analysis of the three possible objectives: Sen considers three possible objectives for his economy:

1. Maximizing the corn output of the second period in the advanced sector;
2. Maximizing the rate of growth of corn output; and
3. Maximizing the undiscounted sum of the stream of corn output over T periods of time.

Naturally the optimal capital intensities for attaining three objectives are different. With respect to the first two Sen derives the following two conditions: first, in which the corn output in the first period will be maximized; and, second, in which, given a time horizon, the rate of growth will be maximized. The two conditions are spelt out as follows:

Condition 1: Technique L gives a larger, equal or smaller volume of corn output than technique H in the first period depending in whether

$$\frac{P_c}{a} >, = \text{ or } < \frac{P'_c}{a'}$$

$$\text{i.e., } \frac{P_c}{P'_c} >, = \text{ or } < \frac{a}{a'}$$

It does not, however, follow that the technique which gives a larger output in the first period must of necessity give a larger output in the later periods. The production possibilities in the later periods depend upon the part of the product of the first period which is reinvested for expansion in Department-I. The reinvestible surplus available depends in turn on the surplus production left over after wages are paid to labourers in Department-II. Accordingly, the second condition is as follows:

Condition 2: Technique L gives a larger, equal or smaller rate of surplus then does technique H, depending upon whether

$$\frac{P_c - w}{a} >, = \text{ or } < \frac{P'_c - w}{a'}$$

$$\text{i.e., } \frac{P_c - w}{P'_c - w} >, = \text{ or } < \frac{a}{a'}$$

The maximization of surplus per unit of investment leads to the maximum rate of growth. Condition 2 in effect helps us choose between L and H if the rate of growth is to be maximized,

as against Condition 1, which helps decided the choice of technique if total corn output in the first period is to be maximized.

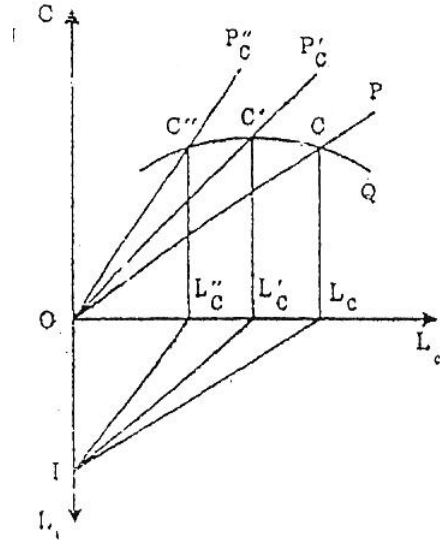


Fig. 1: Production through different techniques: the derivation of the output

In Figure 1, there are three axes: the south representing employment in Department-I (L_1), the east the consequent additional employment in Department-II (L_c), and the north the additional corn output (c) of the latter department. OI , the number of labourers that can be employed with the initial surplus of corn (S) i.e., it is equal to S/w . Employment created in Department-II by OI real investment in Department-I depends upon the capital intensity (a). Three degrees of capital intensity are used in the diagram represented in the increasing order by the tangents of the angles OL_cI , OL'_cI and OL''_cI respectively. As the capital-intensity of production is increased, the productivity of labour in Department-II rises, represented respectively by the tangents of the angles P_cOL_c , P'_cOL_c and P''_cOL_c . Thus, the corn output when the first technique is chosen is CL_c , when the second is preferred $C'L'_c$ and when the third is selected. $C''L''_c$. By taking infinitesimal changes in capital intensity we derive the curve Q representing the relationship between employment in Department-II and the output of corn governed by technological possibilities.

Given this capital-intensity-output curve Q and a given wage rate, we can determine the degrees of capital-intensity dictated by the rate of turnover or the SMP criteria and the rate of the surplus Criterion. This is done in Figure 2.

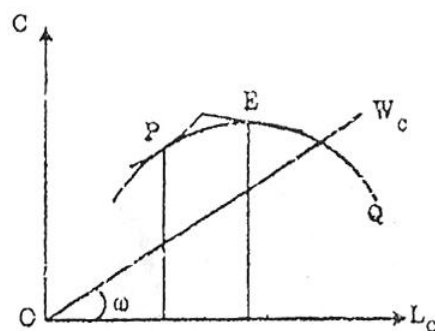


Fig. 2: The reinvestible surpluses available and the choice of techniques.

In Figure 3 given below, curve Q is that derived from the previous figure. The line W_c represents the wage bills corresponding to the levels of employment in Department-II. Since the wage rate is assumed given, W_c is a straight line. E shows the point of maximum output which corresponds to the first condition discussed by Sen. As against this, P is the point of maximum surplus of corn production over corn consumption because at this point the slope of curve Q equals the slope of W_c , i.e., equal to the wage rate. This point corresponds to the Sen Condition 2 or the Rate-of-Surplus criterion. It is clear from the diagram that the surplus at the point E is less than that at point P .

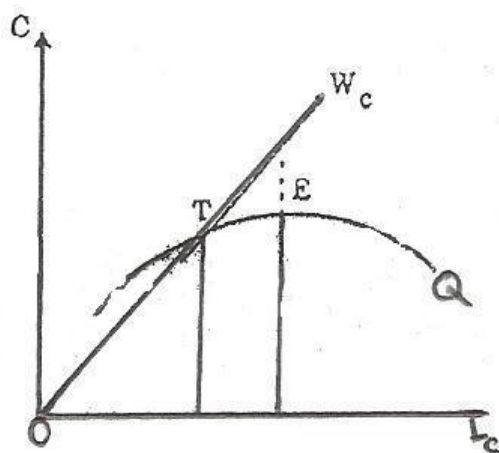


Fig. 3. Application of the SMP criterion means a negative reinvestible surplus

Sen dismisses the (Maximum) rate-of-turnover criterion as irrelevant to the requirements of economic development because maximization of total corn output need not necessarily result in maximum surplus (over wages) for reinvestment, unless the wage rate is zero. He constructs an interesting case diagram to show that in some situations, maximization of corn output of the second period yields a negative surplus. In Figure 3, the maximum output is obtained at the point E but, here the total wage bill is more than the output so that there is a negative surplus shown by the dotted line above E. thus the full application of the rate-of-turnover criterion will dictate contraction to the point T at which the output covers the wages bill.

Sen observes that the rate-of-turnover criterion is relevant if we are interested in the consumption of the first period only. An economy aspiring to grow fast must look into the future to maximize the rate of growth over a given time horizon because a technique with a higher rate of growth must give us a bigger sum of consumption even if it means a much smaller output of consumer goods at the moment. Given enough time, a capital-intensive technique will be able to make in more than the loss of output in the immediate future. Therefore, in choosing between two techniques we must compare the two streams of consumption given by them over a period of time. We can choose the technique which maximizes the level of aggregate consumption over the time period of the plan. The following Figure 4 shows the application of the Sen Time-Series Criterion very well.

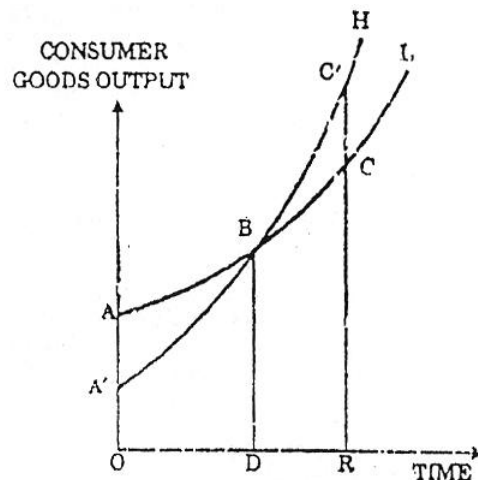


Fig. 4: Choice between two techniques and the time horizon

In Figure 4, curves A'H and AL show the flow of real consumption over time with the techniques H and L respectively. With the rates of growth in the two techniques as given, the consumption flow curves will rise exponentially over time. Technique H gives lower immediate output and a higher rate of growth than technique L. Until the point of time D is reached, technique L gives higher output than does technique H and the total gap which technique H has subsequently to make up is ABA". At the point of time R, technique H makes it up, area CBC' being equal to area ABA'. Sen calls the period OR as the 'period of recovery', for the time-period gives us the levels of aggregate consumption which are the same. For any pair of techniques we can find out a 'period of recovery'. To make a choice between two techniques, we compare this period of recovery with the period time horizon; we are ready to take into account for the choice of techniques. If the 'period of recovery' is longer than the planning horizon, we choose technique L. If the case is opposite, technique H may be chosen.

In this way through the introduction of the time horizon of planning into the choice decision, Sen could take into consideration what Professor Dobb has called the time dimension of investment. The logic boils down to the simple view that investment in light consumer goods industries with simple techniques may give us a higher consumable income in the near future; but that will not give us a higher rate of growth in future. On the other hand, choice of projects involving more capital-intensive techniques may yield a lower level of consumable income immediately but in future it will mean a much higher rate of growth of consumption. The choice of one technique or the other by the community depends upon how far distant into the future it is prepared to restrict its consumption to accomplish a higher rate of growth.

Criticism of Sen's Analysis: The Sen Rate-of-Surplus criterion has been criticized by Gerald M. Meier. The main points of criticism are:

1. First, the criterion is based on the assumption that any rate of growth can be sustained indefinitely by withdrawing labour from the backward sector without reducing its output. Once we introduce a limit to the withdrawal of labour from the backward sector the optimal intensity under the second objective may be different. The criterion completely ignores the time path of consumption by considering only the aggregate consumption over an interval of time.

2. Further more, such an approach precludes consideration of an infinite time horizon because undiscounted aggregate consumption over an infinite time horizon may well be infinite.
3. T. N. Srinivasan is another forceful critic of the Sen analysis. In his opinion the Sen analysis is too aggregative and simplified to be of much practical use. The analysis is based on single-commodity, two factor models where the same commodity serves as consumption as well as investment good. Labour with varying degrees of skill, managerial services and other such considerations are merged into a single factor, labour.
4. Technical change is ignored. Each available technique is characterized in such models by a single index such as capital-labour ratio. On account of these assumptions the analysis is hardly applicable to the practical choice problem. In practice, we find different categories of labour with widely differing scarcity values. The shortages of skilled labour, particularly the services of professional management, in the short run, have their own impact on lengthening gestation lags and reducing the rate of return on investment far below what the same investment can earn elsewhere. This very shortage can push the choice of technique in opposite directions.
5. Under the circumstances of widespread uncertainty prevailing in less developed countries observes Srinivasan, “it is difficult to judge whether there is in fact more than one technique to choose from in most cases”.

Conclusion: The analysis choice of techniques started with lot of hope. But the whole debate has proved to be inconclusive. One, therefore, comes to the sad conclusion that the discussion on choice of technique is nothing more than an intellectual game. The actual situation facing planners is much too complex for the academics to prescribe an undisputed criterion for the choice of technique.

6.5: TECHNOLOGICAL DUALISM

A prominent feature of all poor countries is the existence of “technological dualism”. We find in these countries an interesting contrast: use of capital-intensive production function in their advances (modernized) sector, and a relatively capital-saving, labour-intensive technology in their traditional sector’ the advanced sector. The advanced sector uses the Western labour-

saving, capital-intensive technique even when there is a general scarcity of capital and abundance of labour. This has been called “The Factor-Proportions Problem” by Professor R.S. Eckaus because, the factor proportions employed by modern technology imitated from the West are suited to the Western countries where capital is abundant and labour scarce but, not to the factor proportions prevailing in countries like India. This results in limited employment opportunities for workers and accentuates the unemployment problem. This seemingly contradictory use of techniques in the modernized sector is due to the real or imagined belief of the technicians that there is only a very limited degree of technical substitutability between factors, production is characterized by fixed technical coefficients and the production processes in this sector are relatively capital-intensive.

The situation can be shown diagrammatically as in Figure 1. In this figure units of capital are shown on the vertical axis and units of labour along the horizontal axis. The iso-quants IQ_1 , IQ_2 , IQ_3 are right-angled showing a fixed combination of factors (OK_1 of capital and OL_1 of labour) which remains the same whatever the level of out-put produced.

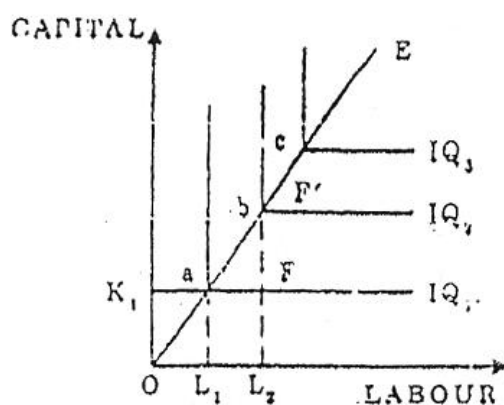


Fig. 1: Production function and Expansion Path in the Capital-Intensive Modern Sector

Therefore the Expansion-Path OE is a straight line passing through the points a , b and c of the iso-quants. The slope of this line OE is the factor-proportion of the relatively capital-intensive production process. It is this factor proportion which is employed whatever be the relative factor prices. But suppose the amount of labour available is OL_2 units while the available capital is OK_1 units, only OL_1 labour will be employed, and L_1L_2 units of labour will remain unemployed even when labour is relatively much cheaper than capital. It is only with the increase in the amount of

capital available to the extent of FF' that the given amount of labour OL_2 can be employed. Since such a big increase in the capital available is not possible, the excess labour supply will simply remain unemployed or compelled to seek employment in the traditional sector.

The position in the traditional sector is said to be a little flexible as far as factor combination ratios are concerned. While the techniques of production employed are of the labour-intensive type, the technical coefficients are said to be more variable in this sector. Since the capital available to the sector is limited, all the labour force available to this sector can not be employed. There is as a result a good deal of 'disguised unemployment' in the traditional sector.

It has been contended that as the situation of technological dualism is, it is not likely to ease over the long run on its own. This is because in the modern sector technological progress favours more capital-intensive techniques so that less and less labour would be needed as this sector expands. At the same time the seed-fertilizer revolution is encouraging farmers to use labour-saving machines in their farming operations. The unemployment situation is, therefore, likely to be worse as time passes.

It has been suggested that the nature of the gradual-type of technical progress is that it is more likely to cause a shift of points on the production function in the region of high rather than low capital-labour ratios, as has been shown by a shift of the iso-quant IQ to the position IQ' in figure 2; this is because the gradual type of technical progress is the result of machine redesign and general improvement. Such technical progress increases the effectiveness of given types of machines and tools. Since the traditional sector does not use much of machinery and tools it is the least benefited by technical progress. Further, there is poor incentive to take to gradual innovations because of the small scale of operations or the lack of the complementary inputs needed to adopt some types of new capital good. As a result, there is little tendency for the iso-quants to shift at points with low capital-intensity of production.

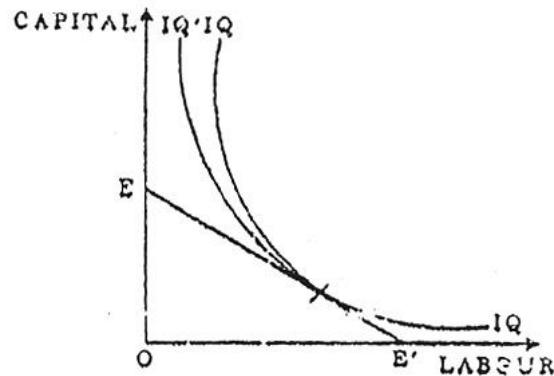


Fig 2: Nature of Technical Process itself favours the Capital-intensive technique

Figure 2, illustrates why the techniques do not change in the traditional sector even when possibilities for technical progress exist. Since the factor labor is much cheaper as compared to capital, the price line EE' is having such a gradual slope from left down to the right. It is touching the iso-quant IQ and IQ' at the same point; technical progress possibilities exist on the upper left-hand side of the iso-quant which are never exploited because it is not profitable to do so with the abundant and cheap labour supplies to the traditional sector.

6.6: APPROPRIATE TECHNOLOGY FOR A DEVELOPING ECONOMY

In view of the quality of the techniques of production prevailing in less developed countries and in the face of a general capital shortage, it has been suggested that the traditional sector should be gradually modernized with light machines which increase labour efficiencies but which do not replace labour. Further, the modernized sector is encouraged to adopt labour-intensive production progresses wherever possible. But it is not clear how on the whole the traditional and the modern sector are to be integrated. One thing is clear, however and all expert view converges on it. It is that each country has to work out its own salvation, and particularly to find out which production methods are feasible for it. This means evolution of a technology suited to the factor proportions and institutions an economy. This is, however an idea too good to be practicable immediately. Such a technology can be evolved only after trials for a long time. One can agree with Yale Brozen that the “appropriate technology for an area depends upon its resource patterns and its markets”, and his reasoning that “a relatively unskilled population cannot be propelled from low to high-level skills in one generation without the investment of prohibitive amount of

capital in training and in equipment”. But can the skill-starved countries find the appropriate technology here and now? Economic histories of the USSR and Japan tell us that they started with outright imitation of the Western technology and the development of indigenous technology was only gradual. Another, suggestion commonly given is that the poor overpopulated economies import the obsolete, discarded equipment from the developed economies since it is cheap and relatively labour-intensive; after all the Japanese textile industry was developed in its earlier phase on discarded British machines. And more recently Israel and Argentina have also been importing such machines. But in the present competitive international market, a developing economy can hardly aspire to produce competitive exportables with out-dated machines, apart from the fact that the spare parts imports of these machines are extremely costly.

In most developing economies there are some sectors where there is hardly any choice for technology as in the case of such heavy basic industries as steel, heavy chemicals and electricals. The real choice is open for the small-scale, light industry. These industries have the highest growth potential and are the most difficult to develop technically. The UN experts’ advice in their report quoted below was based on the assumption that a variety of techniques is available to the poor countries. They suggested “choosing the simplest of such alternative techniques, the sturdiest of available capital equipment, the small type of plant consistent with technical efficiency, the technology that makes the best use of most plentiful factors of production”. Such an assumption of choice is not much justified. There is in fact a conflict between the new techniques and the traditional techniques. How to minimize this conflict and modernize tradition-bound technology without causing social tensions, is the crux of the problem. It is a problem of the choice of strategy of economic development in dualistic economies like India. The choice is not purely economic; it involves considerations of social profitability. Further the changeover from traditional techniques to modern techniques makes some over-all demands of expansion of social overhead capital which can be met only from the mopped-up surplus from somewhere. Thus, as far as the modernization the traditional sector is concerned, there are no two opinions. But how is this process to be carried on, and within which period of time, are questions to be answered by the broad strategy of development chosen by the planners.

6.7: SCHUMACHER’S INTERMEDIATE TECHNOLOGY

In view of large scale disguised and open unemployment in the rural areas of the less developed countries, Professor E. S. Schumacher has advocated the conscious development of an intermediate technology and its application to the growth of rural industries. In his opinion, only this can check the twin evils of massive rural unemployment and mass migration to the urban areas. Since the Western technology of the capital-intensive, labour-saving type technology is unsuitable for the labour-abundant and capital poor economies and the traditional industries of these countries are neither economic nor viable. Research and development of an “intermediate technology” is the only solution to the problem of growing unemployment.

Intermediate technology, observes Schumacher “would be vastly superior in productivity to their (LDC’s) traditional technology (in its present state of decay), while at the same time being vastly cheaper and simpler than highly sophisticated and enormously capital intensive technology of the West. As a general guide it may be said that this “intermediate technology”, “would be on the level of £70 to £100 equipment cost per average work-place”. He concedes that there are certain sectors and localities in every developing country which are irrevocably committed to the Western technology, but for the rest of the economy he suggests a technology that should fulfill four requirements:

1. The workplaces have to be created in areas where the people are living now;
2. These workplaces must be, on the average, cheap enough so that they can be created in large numbers without making undue demands on savings and imports,
3. The production methods employed must be relatively simple so that the demands for high skills are minimized, not only in the production process itself but also in matters of organization, raw material supply, financing, marketing, and so forth; and
4. Production should be largely for local use. The industries which readily admit the use of such a technology are every type of consumers’ goods industries, including building and building materials, those producing agricultural implements and those producing equipment for “intermediate technology” industries.

There are a few economists who regard the “intermediate technology” to be a myth. In their view, the difficulties in the way of developing it are so many and the demand for such techniques so uncertain as to rule its development out of the question. The introduction of new techniques is

risky, and less developed countries cannot afford to take the risks. At least in the earlier stage of development, the user would not be assured of parts and servicing arrangements. Further, it is doubtful whether the actual performance of the machine would bear out the promise of pilot studies. The idea of the intermediate technology is theoretically attractive but practically it faces strong resistances. The case of the communist china undertaking to produce steel in thousands of small furnaces all over the country side and then abandoning it is often quoted as an instance of the failure of such appealing ideas in practice.

It is now admitted that Western technology is not that rigid as commonly been made out to be. In some industries there may be a variety of technologies available. For example steel can be produced through an integrated steel mill or through separate stages of smelting, refining and rolling. The less developed countries can start with the last stage of rerolling which can be undertaken efficiently on a small scale. From this stage it is an easy step to actual production of steel form scrap or pig form in small furnaces fired by gas, oil or electricity.

This can save a lot of capital in underdeveloped economies. Similarly, in some industries it may be possible to separate stages of production, making one capital-intensive, if so needed and the other labour-intensive, if so possible. Unfortunately, in less developed countries such possibilities are rarely explored and often overlooked. The Western technology is presumed to prescribe rigid factor proportions and the politicians in les developed countries wanting to install prestigious modern mills uncritically accept the advice of the culture-bound expert from the aid giving developed country.

6.8: INTERNATIONAL TRANSFER OF TECHNOLOGY

Technology transfer is the term used to describe the processes by which technological knowledge moves within or between organizations. International technology transfer refers to the way in which this occurs between countries. The technological knowledge that is transferred can assume various forms. It can be embodied in goods (including physical goods, plants and animal organisms), services and people, and organizational arrangements, or codified in blueprints, designs, technical documents, and the content of innumerable types of training. Alternatively it can be communicated through flows of tacit knowledge i.e. knowledge that has not been fully codified, and remains embodied in the skills of people.

All these forms of knowledge may vary in a further important ways. At one end of the spectrum, the transfer involved can be concerned with the knowledge for using and operating technology. At the other end, it can be concerned with the knowledge necessary for changing technology and innovating. In between, transferred knowledge may involve the many different kinds of design and engineering knowledge required to replicate and modify technologies.

Moreover, in international technology transfer there is a distinction between horizontal and vertical transfers. Horizontal technology transfer consists of the movement of an established technology from one operational environment to another (for instance from one company to another). Vertical technology transfer, in contrast, refers to the transmission of new technologies from their generation during research and development activities in science and technology organizations, for instance, to application in the industrial and agricultural sectors.

Need for Transfer of Technology

Technology transfer is an important means by which underdeveloped countries gain access to technologies that are new to them. The need for technology transfer to underdeveloped countries from the developed countries arises on the following grounds:

1. Technological backwardness in underdeveloped countries has led to their economic backwardness which is reflected in low productivity, industrial backwardness and misallocation of resources. The transfer of technology from developed countries brings advanced production techniques and machines, innovations in products and skilled personnel, organizational experience, marketing techniques, etc. thus, technology transfer is required to overcome the backwardness of the underdeveloped countries.
2. The transfer of technology from developed countries is required by underdeveloped countries to increase productivity of labour, capital and other factors of production in order to lower the per unit cost of production. This can be done by transferring capital intensive technologies from the developed countries.
3. The three pressing problems of the underdeveloped countries are poverty, inequality and unemployment which can be solved by raising the level of income of the people. By transferring labour-intensive technologies from the developed countries, the

underdeveloped countries can provide larger employment opportunities to the poorer people. This will tend to raise their incomes and help in reducing poverty and inequality.

4. Transfer of technology is also needed by the underdeveloped countries to accelerate their growth rates of their economies which will help them to develop rapidly. And for this, a long-term policy of technology is required.
5. Further, there exists a wide technological gap between the indigenous stock of technology and technology required for faster growth in the underdeveloped countries. This gap can be bridged by technology transfer from the developed countries. Modern technology supplements the available indigenous technology and also helps in modifying and adapting advanced technology in the underdeveloped countries.
6. Underdeveloped countries also lack in basic and key industries and infrastructure like, transport, communications, power, etc. Their natural resources lie dormant and remain unutilized or misutilized. This is because all these involve high risks, large capital investment, long gestation period and modern technology for their development. Thus, technology transfer is required by the underdeveloped countries to build their infrastructure, establish new industries, tap natural resources and open new avenues.
7. Again underdeveloped countries mostly export unprocessed products, raw materials and substandard articles. As a result, their products fetch low prices because their competitive power is weak in the world market. By technology transfer, they can protect their economic interests by making their goods competitive in the international market. This is possible by developing export-oriented and import-substitution industries through technology transfer.
8. Transfer of technology is also needed by the underdeveloped countries to ease their balance of payments situation. When the transfer of technology brings capital, machinery, knowledge, experts, etc., there is a greater inflow of resources without little remittances abroad in the early stages of development. Repatriation of profits, royalties, etc., begins after the recipient firms become fully operational and break-even. Further, by helping in the establishment of export-oriented and import-substitution industries, the transfer of technology tends to increase exports and reduce imports, thereby improving the balance of payment position of the underdeveloped countries.

Channels of Technology Transfer

There are primarily four channels or modes of international transfer of technology from one country to another and across enterprises. They are as follows:

1. The transfer of technology takes place when knowledge about modern technologies is passed on through scientific exchange in the form of research journals, books and other published material. Also, the use of internet these days to explore new technologies and knowledge are a form of this channel.
2. Technology is also transferred across borders through commercial channels on a bilateral basis from private firms, mostly multi-national corporations to state-owned enterprises, and branches of multi-national corporations operating in the underdeveloped countries. This is also known as intra-firm technology transfer.
3. Further, the transfer of technology takes place through government channels in the form of technical assistance which is not related to the direct promotion of commercial goals. This is usually in the form of providing educational and training facilities to students and personnel of the underdeveloped countries in colleges and institutions in developed countries. Also, experts and advisors come to the underdeveloped countries to advise and train people in various fields of economic activity such as establishing steel plants, hydroelectric projects, oil exploration, nuclear plants and building other infrastructure.
4. Many international organizations like, the United Nations, World Bank, International Monetary Fund, etc., also promote the transfer of technology to the underdeveloped countries through training of their personnel, providing vocational training, conducting seminars and short-term courses, helping in research by providing necessary equipment, sending specialists and consultants to impart training in various fields, to evaluate natural and economic resources, etc.

Problems in International Transfer of Technology

In the process of international transfer of technology from developed countries to underdeveloped countries, the problem arises from both the supplier as well as the recipients of technology. Problem arises from the supply side because the technological markets are mostly imperfect and occupied by the multi-national corporations. On the demand side, the purchasers of technologies have weak bargaining power due to backwardness, urgency of importing

technologies and lack of information about the availability of appropriate technologies. Consequently, the suppliers exploit the purchasers of technologies. Apart from these two basic factors, following are some other problems relating to the international transfer of technology.

1. When the multi-national corporations or private firms enter into agreement with firms in the underdeveloped countries for transfer of technologies, they restrict their right to use or change or transfer the technologies according to their discretion or requirements. This leads to technological dependence.
2. The sellers prefer to sell technologies in project-packages, which are tied to specific projects or products. The buyers are compelled to buy such technologies which require the purchase of raw materials, machines, spare parts and services of parent companies at costs much higher than those prevailing in the competitive world market. It is estimated that they are normally higher by 30 to 40 per cent.
3. Often, the multi-national corporations transfer new technologies to their own branches in the underdeveloped countries. But, these branches do not share the new technologies with local firms and use them for their own benefits. As a result, new technologies do not enter other spheres of national economies and thus reduce the opportunities for the development of local entrepreneurship.
4. Developed countries mostly transfer capital-intensive technologies to the underdeveloped countries, which have limited labour absorption capacity. Such a technology fails to solve the acute problem of unemployment in underdeveloped countries.
5. It has been observed that, the multi-national corporations export outmoded and discarded technologies to the underdeveloped countries. Such technologies is somewhat cheaper and of a lower capital intensity, but it entails high costs in terms of repeated breakdown and constant repairs. In the absence of spare parts in the supplier country, such technologies become useless and bring huge losses to the purchasers in the underdeveloped countries.
6. There are large wage differentials between workers trained in new technologies and workers engaged in local firms in the underdeveloped countries. Such wage differentials increase income inequalities. An elite class of workers is created which leads to a dual society and thus causes social tensions within the economy, thereby retarding growth.

Conclusion

In spite the above stated problems, the underdeveloped countries need technology transfer for their rapid and all round economic development. It is essential for increasing the productivity of men and machines for building infrastructure, developing agriculture and industry so as to make them internationally competitive, for exploiting and making an optimal use of their natural resources, and for developing labour, organizational, administrative and entrepreneurial skills, etc. Hence, technology transfer is an engine of growth for the underdeveloped countries.

6.9: SUMMARY

In underdeveloped countries, the existence of various market imperfections does not allow laissez faire to prevail. And hence investment decisions cannot be left to the market forces and scarce resources have to be channelized for their optimum utilization. Thus, we need suitable investment criteria, intelligent choice of production techniques, efficient use of both advanced and traditional technologies, and import international best practices.

6.10: KEY WORDS

1. **Investment Criteria:** It refers to the principles underlying the allocation of scarce investment resources in a rational manner so as to maximize the national income.
2. **Choice of Technique:** It refers to the type of factor combinations (i.e., between labour and capital) for any particular project or enterprise.
3. **Intermediate Technology:** Technology which combines sophisticated ideas with cheap and readily available materials, especially for use in developing countries.
4. **Technological dualism:** Technological dualism has to do with the way modern technology can exist in a society

6.11: SELF-ASSESSMENT QUESTIONS

1. Discuss the problems of choice of technique for a developing country like India.
2. Critically examine Sen's analysis of choice between a labour-intensive and a capital-intensive technique. Which one, in your opinion is suited for India?

3. Explain with diagram, the nature of technological dualism prevalent in developing countries. Suggest appropriate technology for a developing economy like India.
4. Discuss the concept of intermediate technology and examine its practical utility.
5. Do you think, international transfer of technology is inevitable for underdeveloped countries for their economic development?
6. What are the modes of international transfer of technology? Bring out the limitations of international transfer of technology.

6.12: FURTHER READINGS

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CHAPTER-7: REGIONAL PLANNING

STRUCTURE:

- 7.1 Objectives
- 7.2 Introduction
- 7.3 Strategy For Regional Planning
- 7.4 Regional Imbalance In India
- 7.5 Causes Of Regional Imbalance
- 7.6 Measures To Remove Regional Imbalances
- 7.7 Policy For Balanced Regional Development
- 7.8 Summary
- 7.9 Key Words
- 7.10 Self-Assessment Questions
- 7.11 Further Readings

7.1: OBJECTIVES

The goal of this chapter is to understand the concept of balanced regional development and various issues related to regional imbalances. After going through this chapter you will be able to know:

- Regional planning strategy and its importance;
- Magnitude of regional imbalances in India;
- Causes of regional imbalances;
- Steps taken by the Government through Five Year Plans to reduce regional imbalances and its limitations; and
- Some policy suggestions for balanced regional development.

7.2: INTRODUCTION

Most of the countries of the world are faced with the problem of regional imbalances and regional inequalities. But it assumes a more acute and explosive form in the developing countries. The problem has assumed such a magnitude that the very political and economic stability in the countries is threatened. Rivalry and the search for maximal profits (including political advantage) endanger peace and harmony. The primary causes of regional imbalance can be located in the region making process itself. i.e. geographic and physiographic characteristics, history and cultural experience. The problem becomes further complicated when economic disparities among regions overlap with differences in race, religion, language or culture of the people living in different regions. Regional inequalities exist not only in the form of income or output levels among regions, but also in other forms such as unequal access of the people of different regions to economic and social services, employment opportunities and political power.

The concept of regional development is based on the development of specific regions. It is generally undertaken where regional differences exist and where a particular region is to be developed. Regional development is carried through the regional planning which is a technique to evaluate the potential of sub-natural areas and to develop them to the best advantages of the nation as a whole. Balanced development of the different parts or regions of the country, extension of the benefits of economic progress to the less developed regions and widespread diffusion of industry have been among the major aims of planned development.

7.3: STRATEGY FOR REGIONAL PLANNING

Like national planning, regional planning also has the objective of accelerating the process of social advancement of the community through the technique of economic and social planning, though it is restricted to the given region or area of the country. The major objective of the regional planning is to remove regional disparities in respect of economic and social development and bring out the region at par with other regions of the country. It is a significant means to remove regional backwardness, meet regional aspirations and demands, make optimum and judicious use of regional resources, solve regional problems and involve local people in plan formulation and implementation. It may also help in conserving the environment and cultural

heritage of a particular region. Planning for regional development involves identifying the regionalism present, demarcating the region, determining needs of the region, formulating the plan, implementing the plan within the framework of government set up and reviewing implementation of the plan.

In a developing country like India, which has widespread poverty and vast population with below-subsistence level of existence in many backward regions, the task is two-fold: reduction of regional disparities and ensuring at least a minimum level of subsistence to the majority of people inhabiting the backward areas and living below the subsistence level. The strategy of deliberate promotion of growth centres can go a long way in accomplishing the former. Once the different levels in the hierarchy of human settlements are integrated, with the different levels of growth foci (service centers, growth points, growth centers, etc.) located in them according to the functional or linkage approach, regional disparities should reduce appreciably. However, solution of the second problem requires redistribution of national income and wealth in favour of the poorer section of the population and initiation of a well conceived employment strategy.

Such planning should also take into account the problems to be tackled, objectives of the planning, availability of the resources, policy alternatives and their impacts, type of investment needed, cost of planning, planning priorities, design and layout, policy decision and the implementing authority.

7.4: REGIONAL IMBALANCES IN INDIA

It is a misnomer to use the term “Regional Imbalance” in our country. It is advisable to use the term “Inter-State Imbalances” (states are analogous to regions but they are not regions in the strict academic sense) because information required to understand the spatial imbalances is available or collected either at the state level or district level.

Economic backwardness of a region is indicated by symptoms like high population pressure on land, excessive dependence on agriculture, absence of large-scale urbanization, low productivity in agriculture and cottage industries, etc. Differences in industrial growth, disparities in agricultural growth, level of literacy in different states, percentage of workers in manufacturing

industries to total workers, total road length, infant mortality rate etc., can all be considered as indicators for the purpose of studying imbalances and inequalities in regional development.

There are wide income differentials between more developed and relatively poorer states which the planning process has not succeeded in overcoming. In terms of per capita income, the states of Punjab, Maharashtra and Haryana have continuously maintained a considerable lead over other states. Over the 25 year period from 1970-71 to 1995-96, the poorer states have performed very poorly as the annual rate of growth in these states were in the range of 1.4 and 1.9 per cent. In the richer states, viz., Punjab, Haryana, Maharashtra and Gujarat, annual growth rates were much higher than the growth rates in poorer states. To study this, Montek S. Ahluwalia estimated Gini Coefficient measuring inter-state inequality and found that, the inter-state inequality was 0.233 for 1998-99 as against 0.171 for 1990-91 and 0.152 for 1980-81. Thus, over the time, disparities between the richer and the poorer states have increased.

According to Planning Commission's estimates of incidence of poverty, around 27.5 per cent of the population of India was below the poverty line in 2004-05. However, the trend is not uniform in all the states. For example, population below poverty line was 8.4 per cent in Punjab, 15.8 per cent in Andhra Pradesh, 14.0 per cent in Haryana, 10.0 per cent in Himachal Pradesh and 15.0 percent in Kerala. As against this, incidence of poverty was as high as 41.4 per cent in Bihar, 46.4 per cent in Orissa, 38.3 per cent in Madhya Pradesh and 32.8 per cent in Uttar Pradesh. This implies that, there is extreme concentration of poverty in economically backward states.

The first ever National Human Development Report (NHDR), 2001, brought out by the Planning Commission, estimated the value of Human Development Index (HDI) for the States and Union Territories. It becomes apparent that the economically less developed states like Bihar, Uttar Pradesh and Madhya Pradesh lag behind in HDI, while the economically advanced states like Kerala, Punjab Maharashtra and Tamil Nadu have a higher HDI. However, in the middle income states, HDI and income do not necessarily show correspondence. If Kerala in this group has a good HDI, Andhra Pradesh has a low HDI. In terms of other indicators like Human Poverty Index (HPI) and Gender Equality Index (GEI), the variations can be easily noticed. States like, Maharashtra, Kerala, Gujarat have shown better development where as states like Bihar, Orissa, Uttar Pradesh and Rajasthan are showing only marginal changes.

As for industrial disparities, till 1950, the western region and West Bengal dominated in the regional distribution of industries. After six decades of planning, even though West Bengal lost its dominance, Maharashtra, Gujarat and Tamil Nadu accounted for (in 2004-05) nearly 46 percent of gross output, 41 percent of value added, 45 percent of total invested capital and 38 percent of employment in factory sector. This indicates lopsided industrial development.

Regional disparities have also increased in the agricultural sector with Punjab, Haryana and Uttar Pradesh way ahead of other states in output. The high yielding varieties of seeds programme under Green Revolution helped Punjab and Haryana, especially as these states enjoyed irrigation facilities and used fertilizers on large scale.

If urbanization is considered a part of the development process, once again inter-state disparity is evident. Here also, Bihar, Orissa, Uttar Pradesh and the North-Eastern states are low on the scale where as, urbanization is high in Maharashtra, Tamil Nadu, Gujarat and Karnataka.

More recently, during the period 2004-05 to 2011-12, the historically poor states like Bihar and Orissa have grown as fast as or even faster than all-India average of 8.5 per cent. However, fast growth in poor states could not trickle down to the poor people and the development of these states have shown only marginal rise.

Disparities exist not only between the different states; these can also be traced as between different regions and areas of a state. For example, Orissa has three regions viz., relatively more developed Coastal Orissa in comparison to underdeveloped Western Orissa and tribal dominated Southern Orissa. Similarly, Andhra Pradesh has three distinct regions which are at different stages of socio-economic development, viz., Coastal Andhra, Telangana and Rayalaseema. Other states like, Gujarat, Uttar Pradesh, Madhya Pradesh, Karnataka, Rajasthan and West Bengal also have regions with distinct characteristics of backwardness.

Inter-regional disparities have been brought more clearly in a recent study prepared by the Centre for Monitoring Indian Economy. It has used the concept of “District Domestic Product”(DDP), which is defined as the monetary value of the goods and services produced in a district during a year. The study reaches the following conclusions:

- (i) The more developed the state, the more inequitable is the pattern of development in the state.
- (ii) Districts classified as backward districts by the state appear to have much higher per capita DDP than the so called non-backward districts.
- (iii) Relatively developed or underdeveloped districts tend to be spatially concentrated ignoring the intervening state boundaries.

In fact, Indian economy is an archipelago economy, made of high-tech islands surrounded by an underequipped hinterland.

7.5: CAUSES OF REGIONAL IMBALANCES

Regional imbalance may be, natural due to unequal natural endowments or man made in the sense of neglect of some regions and preference of others for investment and development effort; inter-state or intra-state; total or sectorial. The important factors can be summarized as follows:

1. According to the 'economic sector thesis' of Colin Clark, the levels of income are higher in those regions where a larger proportion of working population is engaged in manufacturing and tertiary sectors. Per capita income has tended to be higher in those states where a larger proportion of population is engaged in tertiary occupations.
2. Location pattern of industrial growth in the past has been influenced by the early pattern of railway construction. These centres of industrial location, therefore, in conformity with Gunnar Myrdal's thesis, have attracted a considerable portion of industrialization towards themselves because of conglomeration economics.
3. Also, a related historical factor has been the development of infrastructure. The developed regions owe it to their inbuilt infrastructure dating back to the time when they were still princely states. Whereas, in other regions the states did not pay much attention to development. The same trend continued even after independence and mostly the tribal dominated and hill areas have been neglected till today.
4. Similarly, there exist glaring regional imbalance and disparity among different states in the country in the provision of educational and training facilities, especially technical education. As a result, there is uneven development of skilled manpower in different regions.

5. Operations of the system of Public Finance in the country have also contributed to the creation and aggravation of inter-state disparities. Subsidized lending and differential allotment of grants to the states from the Central government out of political considerations have led to regressive inter-governmental transfers.
6. In low income states, the level of public investment, infrastructural growth and standard of public services are lower as compared to the high income states, thus perpetuating disparities.
7. With increasing globalization, India has chosen a skill-intensive path to growth; and wages for skilled labour are already being bid up. In this situation, it is necessary for firms to have scale to ensure the proper use of scarce skilled labour. But, it is only in the fast growing state that the environment and infrastructure exist for scale. This further promotes disparities.
8. In the pre-reform period, the public sector had played a crucial role in maintaining regional equality by directing resources to backward areas. But, with a change in the focus of the public sector following the reforms, this process has become weaker. As a result, growth of manufacturing units has been grossly uneven across states. Some states have reaped the benefits of the boom period and others have a long way to catch up.
9. The economic reforms contributed largely to the private sector and export-oriented production. These sectors, which were attempting to reduce costs and become competitive found suitable infrastructure, skilled manpower etc. in relatively more developed regions. As a result, investment and development activity shifted to the developed areas, strengthening the forces of divergence.

7.6: MEASURES TO REDUCE REGIONAL IMBALANCES

It is not that, regional disparities have not caught the attention of planners. Balanced regional development have been given due importance ever since the initiation of the planning process in India. Thus, the Second Five Year Plan stated , “In any comprehensive plan of development, it is axiomatic that the special needs of the less developed areas should receive due attention. The pattern of investment must be devised so as to lead to balanced regional development.” The Third Five Year Plan had a separate chapter on Balanced Regional Development. Over the plans, several initiatives were taken. Area planning and sub-plan approach were adopted in the Sixth

Plan. Though not strictly regional development programmes, National Rural Employment Programme (NREP) and Integrated Rural Development Programme (IRDP) certainly had regional dimensions. The Seventh Plan recognized that a region's economic status was determined by agricultural productivity and human resource potential and a reduction of disparity in these two areas would lead to reduction in regional disparity on the whole. Plans to raise production, and for dry-land and rain-fed agriculture were initiated. Area development programmes for drought prone, desert, hill and tribal areas were envisaged. To reduce human development disparities, the Plan envisaged universalisation of elementary education, and the provision of minimum needs like water supply, and rural infrastructure. In the Eighth Plan, economic planning became more indicative than ever before, and a regional perspective was not specially discussed. But, there were programmes for special areas, such as the Hill Area Development Programme, Border Area Development, Desert Area Development, etc. The Ninth Plan recognized that public investment in infrastructure needed to be biased in favour of less well off states, but did not spell out resource allocation from this point of view.

In the Tenth Plan, it was decided to have a new approach to target areas of high poverty, low growth and poor governance that were slowing down the growth and development of the country through a specific programme for Backward Areas, and the Rashtriya Sam Vikas Yojana (RSVY) was introduced in 2003-04. Also, the Backward Regions Grant Fund (BRGF) was initiated with two major changes, namely, the involvement of Panchayat Raj Institutions (PRIs) not only in the choice of schemes but also in their implementation and supervision, and the preparation of district plans which would ensure convergence and prevent duplication.

Further the Eleventh Plan intends to strengthen the Backward Regions Grant Fund (BRGF). Now BRGF is to be anchored in a well-conceived, participatory district plan by implementation of programmes selected through people's participation for which PRIs from the village up to the district level will be the authorities for planning and implementation. The scheme has two components, namely, (i) District Component covering 250 districts and (ii) Special Plans for Bihar and the undivided Kalahandi-Bolangir-Koraput (KBK) districts of Orissa. In addition to this, the Eleventh Plan is to continue with the Hill Area Development Programme (HADP) and the Western Ghats Development Programme (WGDP). The main objectives of the programme have been eco-preservation and eco-restoration with emphasis on preservation of bio-diversity

and rejuvenation of the hill ecology. The plan also proposed a number of initiatives for the development of the North-Eastern Region, which has already got some programme going on from earlier plan periods. The Eleventh Plan, for the first time proposed to provide Banking and Financial facilities to all the regions of the country under the theme “Financial Inclusion”. And hence, the banking industry was encouraged to set up more and more branches in unbanked rural areas in order to provide easy access of banking and financial facility for the people.

Programmes such as the Bharat Nirman, Indira Awaas Yojana, Sarva Sikhya Abhiyan, National Rural Health Mission, and Prime Minister’s Gram Sadak Yojana address backwardness in terms of the particular sectors. Most of the schemes for the rural development and poverty alleviation use poverty as a criterion for distribution of funds and therefore people and areas with low income benefit automatically.

Critical Appraisal: Government has initiated a number of measures to develop backward regions in order to reduce regional disparities. However, proper regional planning has not been attempted; rather an ad hoc approach has been adopted. For instance:

- (i) Public sector enterprises were made to come up in backward regions but, they failed to generate the expected growth process. This was because no in-depth study was undertaken to ascertain the effect of such investment on the rural hinterland, whether enough ancillary units could emerge and whether these would spread the effects of development.
- (ii) The concept of growth centres has not been given sufficient attention. No attempt was made to create a linked pattern of different settlements with central villages, service towns, growth points, growth centres, etc. This has led to a lopsided pattern of urban development.
- (iii) One of the most important drawbacks of all schemes is that, there is hardly any feedback about the actual physical progress of these schemes on the field. Many critics point out that, most of the plans are merely paper-work without any significant action on the ground. Also, there are complaints about leakages of vast funds through corruption in bureaucracy and local oligarchy.

- (iv) Although some amount of funds have been earmarked for backward region development schemes; yet it appears that, the total development out-lays per capita available to less developed areas remain small in comparison to the developed regions.
- (v) Further, the effects of subsidies in the sectors like, industrial, agricultural, electrical, transport, etc., have resulted unproductive and have only inducement effect due to the lack of basic infrastructure.

Thus, until and unless these shortcomings are not corrected, regional disparities may well grow further and bring socio-political struggle in the country. This is evident in the recent demand for separate state-hood for these backward regions like, Kosal (Orissa), Telengana (Andhra Pradesh), Vidarbha (Maharashtra), Gorkhaland (West Bengal), etc. Also, the backwardness of some regions have resulted in a civil-war like situation and gave birth to Naxalism in states like Orissa, Chhattisgarh, Jharkhand and Andhra Pradesh.

7.7: POLICY FOR BALANCED REGIONAL DEVELOPMENT

In recent times, Balanced Regional Development as a subject of study has attracted many economists and policy makers. With the past experience, it is evident that, the theory of “trickle down” is a failure at least in Indian context. So, the need of the hour is to formulate some better strategy for balanced regional development and inclusive growth. Following are some policy suggestions, per se, for balanced regional development:

1. Since agriculture is the most important sector in the backward region, investment in agriculture needs to be stepped up. The backward and forward linkages of agriculture in poorer regions need to be emphasised more. Investment in water harvesting, soil conservation, rural roads, warehouses, food processing activities, promotion of high yielding crops and agricultural finance facilities should be prioritized. Since, agricultural productivity is found to be different in different regions; intensive programmes should be carried out according to the need of the local conditions.
2. In the post-reform period, service sector has emerged as the new driver of the growth process. Especially, the banking and insurance sector and infrastructure have contributed

to acceleration of growth in many states. There is an urgent need to promote these sectors on a priority basis in the backward regions.

3. Improvement in basic infrastructure facilities like power, transport, telecommunication and irrigation in backward regions is a precondition to improve the quality of life of people and to usher in sustainable development in them. Also, improved infrastructural facilities are the important factors to attract private and even foreign investments in these regions.
4. Further, there is an urgent need for the review of the criteria used for devolution of financial resources from Central government to the states through Finance Commission and Planning Commission. Over the years almost all the criteria are same with little variations. Thus the formulae according to which Centre allocates resources to states, should be more progressive. And, strict provisions should be made to avoid political considerations.
5. Also, it has been pointed out that, backward regions within the states are not considered when Centre-State transfers of resources are met. Thus, it is necessary that, the unit of resource allocation should be the districts rather than the states. And highest priority should be given to the most backward districts, and it would be more beneficial to concentrate on intensive resource deployment by identifying the priority investment areas on the basis of backwardness.
6. In the age of Globalization, foreign investments are considered essential to accelerate industrialization and growth process. So, serious efforts should be made to attract foreign investment to the backward regions.
7. An important factor that influences the economic progress of a state is the quality of governance. A better administered state is more efficient in raising revenues and putting them to better use. They will also attract more investments from domestic as well as foreign sources viz., Gujarat. Hence, governance needs to be given immediate attention, especially in the backward regions.

Ultimately, the key to balanced regional development lies not merely in increasing resource flows to backward , but in creating an enabling environment to attract more resources, using them properly and assuring a fair deal to investors. The overall investment climate and governance needs to be upgraded.

7.8: SUMMARY

Regional planning is carried out within the framework of a national plan in order to better meet the special needs of a region. Regional planning is a useful component of national planning. It serves best the purpose of meeting regional aspirations, exploiting regional resources and capabilities, and facilitating the implementation of national plans, if they correctly fit into them.

Therefore, in this chapter we started our discussion with the strategy for regional planning which is very essential for the developing economies like India. Then, we proceeded to assess the magnitude of regional imbalances in India with the help of some indicators like, human development, industrial growth, agricultural development, level of urbanization etc. Further, we tried to understand the causes of regional imbalances and measures taken by Government to reduce imbalances. And finally, we ended the chapter with some policy suggestions for balanced regional development.

7.9: KEY WORDS

1. **Regional disparities:** The differences between regions with respect to specified variables such as income, employment etc.
2. **Planning:** A basic management function involving formulation of one or more detailed plans to achieve optimum balance of needs or demands with the available resources.
3. **Gini-coefficient:** The Gini coefficient (also known as the Gini index or Gini ratio) is a measure of statistical dispersion intended to represent the income distribution of a nation's residents.
4. **Human Development Index (HDI):** The Human Development Index is a statistical tool used to measure a country's overall achievement in its social and economic dimensions. Calculation of the index combines four major indicators: life expectancy for health, expected years of schooling, mean of years of schooling for education and Gross National Income per capita for standard of living.
5. **District Domestic Product:** The monetary value of the goods and services produced in a district during a year.

6. **Balanced Regional Development:** Balanced development of different parts of the country and extension of the benefits of economic progress to the less developed regions.

7.10: SELF-ASSESSMENT QUESTIONS

1. What should be the planning strategy in a developing country like India?
2. What is regional planning? How far is it useful and feasible in a developing country like India?
3. Give an assessment of the magnitude of regional imbalances in India.
4. Enumerate the causes of regional imbalances.
5. Critically examine the measures taken by the Government of India to reduce regional imbalances.
6. Suggest some policy measures for balanced regional development in a developing country like India.

7.11: FURTHER READINGS

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CHAPTER-8: HUMAN CAPITAL PLANNING

STRUCTURE:

- 8.1 Objectives
- 8.2 Introduction
- 8.3 Evolution Of The Concept
- 8.4 Sources Of Human Capital Formation
- 8.5 Human Capital and Human Development
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8.1: OBJECTIVES

The objective of this chapter is to understand the concept of human capital formation and its various dimensions. After reading this chapter, you will be about to know:

- The meaning and evolution of human capital;
- The various sources of human capital formation;
- The difference between human capital and human development;
- The role and importance of human capital in economic development;
- The process of demographic transition and human capital formation;
- The problems of human capital formation in underdeveloped countries; and
- The human capital planning and demographic dividend in India.

8.2: INTRODUCTION

Human resources have a two-pronged relationship with economic development. As a resource, people are available as factors of production to work in combination with other physical factors. And, as consumers, human beings make demand on the national product of the economy. Human resource, therefore, is a crucial determinant of economic development.

The modern economists are of the view that natural resources i.e., forest, minerals, climate, water power, etc., play an important role in the economic development of a country. A country which has abundant natural resources is in position to development more rapidly than a country which is deficient in such resources. They here however emphasize that the presence of abundant resources is not a sufficient condition for economic growth. Physical features, they say, are passive factors for economic growth. They are to be combined with human resources which are active for economic development.

Human resources of a country are the size of population, rate of growth of population, urban rural distribution of population, and quality of population. The quality of population as measured by health standards, educational levels, etc. A country which has developed the skills and knowledge of its people can exploit natural resources, build social, economic and political organizations and can carry forward national development.

The less developed countries of the world are now making investment in human resources for increasing their skills, abilities, health standards, etc. These productive investments have a strong bearing upon increasing human capabilities which is called human capital.

8.3: EVOLUTION OF THE CONCEPT OF HUMAN CAPITAL

Earlier economists like Adam Smith, Veblen and Marshall stressed the importance of human capital in production. According to Adam Smith, "a country's stock of fixed capital should include "the acquired and useful abilities of all the individuals". Marshall regarded education, "as a national investment and the most valuable of a capital is that invested in human beings."

A. W. Lewis is said to have begun the field of Economic Development and consequently the idea of human capital when he wrote in 1954 the "Economic Development with Unlimited Supplies of Labour." However, the term "human capital" was not used due to its negative undertones until it was first discussed by A. C. Pigou: "There is such a thing as investment in human capital as well as investment in material capital".

The use of the term in the modern neo-classical economic literature dates back to Jacob Viner's article "Investment in Human Capital and Personal Income Distribution" in 1958. T.W. Schultz has also contributed to the development of the subject matter. The best-known application of the idea of "human capital" in economics is that of Mincer and Gary Becker of the Chicago School of Economics. Becker's book entitled "Human Capital", published in 1964, became a standard reference for many years. In this view, human capital is similar to "physical means of production", e.g., factories and machines: one can invest in human capital (via education, training, medical treatment) and one's outputs depend partly on the rate of return on the human capital one owns. Thus, human capital is a means of production, into which additional

investment yields additional output. Human capital is substitutable, but not transferable like land, labor, or fixed capital.

8.4: SOURCES OF HUMAN CAPITAL FORMATION

Human capital formation refers to the process of acquiring and increasing the number of persons who have the skills, education and expenditure which are critical for the economic and political development of a country. Thus, it is associated with investment in man and his development as a creative productive resource. According to Schultz, there are five ways of developing human resources: by providing basic health facilities and services; organizing on-the-job training, apprenticeships; through the provision of education at the elementary, secondary and higher levels; conducting study programmes for adults; by migration of individuals and families to adjust to changing job opportunities; etc.

Thus, investment in human capital means expenditures on health, education and social services, training etc. And this is why the United Nations has given priority to improve human capital through its 'Millennium Development Goals'.

Spending on education by individuals is similar to that of spending on capital goods by companies with the objective of increasing future profits over a period of time. Likewise, individuals invest in education with the objective of increasing their future income. Education makes a person more skilled which improves his productivity. And literacy is a major factor to take the economy to the higher level (i.e., take-off stage). Thus, spending on education at the elementary, secondary and higher levels has been considered the most important source of human capital formation.

The investments made in education helps to accelerate the process of economic growth of a country. Edward F. Donason estimated that investment in education contributed 23% of the growth of total real income and 42% of the growth of real national income per person employed in U.S.A. The effective utility of manpower depends on education, training and industrial experience of the people. Prof. Singer observes that, "Investment in education is not only highly productive but also yields increasing returns in so far as co-operating teams of skilled and educated people are worth more than the sums of the individuals of which they are composed.

Whenever we look in this area of human investment we find increasing returns at play.” The investment made in education enhances the productivity of the work force. The greater progress will occur in those countries where education is widespread and where it encourages experimental outlook.

In addition to this it has been observed that LDC import physical capital for its development but due to the lack of critical skills they fail to utilize it properly. Thus the technological change is the basic determinant of economic growth. Prof. Solow estimated that technical change accounted for about 2/3rd of the growth of the U.S.A. economy, after allowing for growth in the labour force and capital stock. Thus educational development is a pre-condition of technological change. But education has brought will change in UDC which is largely responsible for economic backwardness. Due to inadequate investment in educational development majority of people in UDC are illiterate while the population in developed countries is literate. To overcome this, the UDC must use modern techniques as used in advance countries. In fact, without an improvement in the quality of human factor no progress is possible in UDC. Schultz observed that, "It is as if we had a map of resources which did not include a mighty river and its tributaries. The particular river is fed by schooling, learning on-the-job, advances in health and the growing stock of information of the economy."

Investment in human capital is also required to raise the general living standards of the people in UDC and which can be done through education and training which make fuller and rational utilization of surplus manpower by providing larger and better job opportunities in both rural and urban areas which in turn raise incomes and living standards of the people.

The expansion of education in UDC must take place at primary, secondary and higher levels. The expansion in secondary education can contribute much to the economic development in UDC. Higher education is also important as it results in creating highly trained and technical manpower, scientists and research oriented persons. It accelerates the process of economic development. This type of education must be development oriented. The persons should be sent abroad to achieve higher education which does not exist in the country.

Adult education and training is another integral part of human resource development programme. There should be provision of in-service-training. Special incentives should be given for the

development of scarce skills. Various professional training courses should be widely arranged. Organizing on the job training to workers can be very productive for firms. This may take different forms: one, the workers may be trained in the firm under the supervision of a skilled worker; two, the workers may be sent for off-campus training. In both these cases firms incur some expenses. Firms will, thus, insist that the workers should work for a specific period of time, after their on-the-job training, during which it can recover the benefits of the enhanced productivity owing to the training. Expenditure regarding on-the-job training is a source of human capital formation as the return of such expenditure in the form of enhanced labour productivity is more than the cost of it.

Like education, health is also considered as an important input for the development of a nation as much as it is important for the development of an individual. A sick labourer without access to medical facilities is compelled to abstain from work and there is loss of productivity. Hence, expenditure on health is an important source of human capital formation. Preventive medicine (vaccination), curative medicine (medical intervention during illness), social medicine (spread of health literacy) and provision of clean drinking water and good sanitation are the various forms of health expenditures. Health expenditure directly increases the supply of healthy labour force and is, thus, a source of human capital formation.

A healthy manpower is a great aspect for a developing economy as it leads to greater output per man. But the health and under-nourishment adversely affect the quality of manpower. But in UDC people are underfed and undernourished which results in poor quality of manpower. There is also deficiency of proteins and vitamins, in the diet of the people and due to the lack of medical facilities, diseases are very common in the people. The best way to improve the quality of manpower in UDC is to provide adequate food and better nourishment to people, better sanitary facilities and the extension of medical facilities which in turn will raise the efficiency and the productivity of the people. Human capital, is therefore, "needed to staff new and expanding government services to introduce new system of land use and new methods of agriculture, to develop new means of communication, to carry forward industrialization, and to build the educational system. In other words innovation or the process of change from static or traditional society, requires very large doses of strategic human capital."

People migrate in search of jobs that fetch them higher salaries than what they may get in their native places. Unemployment is the reason for the rural-urban migration in developing countries like India. Technically qualified persons, like engineers and doctors, migrate to other countries because of higher salaries that they may get in such countries. Migration in both these cases involves cost of transport, higher cost of living in the migrated places and psychic costs of living in a strange socio-cultural set-up. The enhanced earnings in the new place outweigh the costs of migration; hence, expenditure on migration is also a source of human capital formation.

Also it can be seen that, people spend to acquire information relating to the labour market and other markets like education and health. For example, people want to know the level of salaries associated with various types of jobs, whether the educational institutions provide the right type of employable skills and at what cost. This information is necessary to make decisions regarding investments in human capital as well as for efficient utilization of the acquired human capital stock. Expenditure incurred for acquiring information relating to the labour market and other markets is also a source of human capital formation.

The last component of human investment is the development of housing facilities for the people as housing development is an important determinant of human resource development as the comfortable living makes a man better agent of production. But, in UDC it must be given more priority that workers must be provided with healthy living conditions. Special incentive for private house construction must be provided. Subsidized housing schemes play an important role in these countries.

8.5: HUMAN CAPITAL AND HUMAN DEVELOPMENT

Though human capital and human development sound similar but there is a clear distinction between them. Human capital considers education and health as a means to increase labour productivity. On the other hand, human development is based on the idea that education and health are integral to human well-being because only when people have the ability to read and write and the ability to lead a long and healthy life, they will be able to make other choices which they value. Human capital treats human beings as a means to an end; the end being the increase in productivity. In this view, any investment in education and health is unproductive if it does not enhance output of goods and services. However, in the human development perspective, human

beings are ends in themselves. Human welfare should be increased through investments in education and health even if such investments do not result in higher labour productivity. Therefore, basic education and basic health are important in themselves, irrespective of their contribution to labour productivity. In such a view, every individual has a right to get basic education and basic health care, that is, every individual has a right to be literate and lead a healthy life.

8.6: ROLE OF HUMAN CAPITAL IN ECONOMIC DEVELOPMENT

Human capital is the fundamental source of economic growth. It is a source of both increased productivity and technological advance. In fact the major difference between the developed and developing countries is the rate of progress in human capital. Prof. Galbraith is right in saying that: "We now get larger part of economic growth from investment in men and improvements brought about by improved men".

The concept of human capital has relatively more importance in labour-surplus, underdeveloped countries. These countries are naturally endowed with more of labour due to high birth rate under the given climatic conditions. The surplus labour in these countries is the human resource available in more abundance than the tangible capital resource. This human resource can be transformed into Human capital with effective inputs of education, health and moral values. The transformation of raw human resource into highly productive human resource with these inputs is the process of human capital formation.

Underdeveloped countries are faced with two diverse manpower problems: first, they lack the critical skills needed of the industrial sector; and second, they have a surplus labour force. The existence of surplus labour is due to shortage of critical skills. Thus, human capital formation aims at solving these problems by creating the necessary skills in man as a productive resource and providing him gainful employment.

The need for investment in human capital in underdeveloped countries is obvious from the fact that despite the massive imports of physical capital, they have not been able to accelerate their growth rates, because of the existence of undeveloped human resources.

Physical capital can be utilized more productively and efficiently only if a country possesses sufficient human capital.

Most of the underdeveloped countries import physical capital for development but they are unable to utilize it fully due to lack of “critical skills” required for its operation. Thus the failure of human capital to grow at the rate of physical capital has been responsible for the low absorptive capacity of the latter in underdeveloped countries.

Underdeveloped countries are characterized by economic backwardness which manifests itself in “low labor efficiency, factor immobility, limited specialization in occupations and in trade and lack of entrepreneurial ability that minimize the incentives for economic change”. To remove economic backwardness and instill the capacities and motivations to progress, it is necessary to increase the knowledge and skills of the people. Therefore, without an improvement in the quality of human factor no progress is possible in an underdeveloped country.

Investment in human capital is also required to raise the general living standards of the people in underdeveloped countries.

Thus investment in man and his development is necessary to actualize physical development and rapid economic growth.

8.7: DEMOGRAPHIC TRANSITION AND HUMAN CAPITAL FORMATION

Recently, economists and demographers have found that the age structure of the population (distribution of population across different age groups) can have a significant impact on the economic performance of the countries. This new finding has changed the way the issue was looked upon until recently. Countries with a relatively higher proportion of young or old dependents have to spend more of their resources on these groups without any immediate returns. In contrast, countries with a relatively higher share of working age population (labour force) can save and invest more due to the reduced spending on dependents.

8.7.1: THEORY OF DEMOGRAPHIC TRANSITION

Theory of Demographic transition as formulated by Frank Notestein and based upon the actual experience of the developing countries explains the growth of population through three different stages of economic development.

Stage One: The first stage relates to the most backward stage of a country. It is primarily applicable to an agrarian economy with no sign of industrial development. Birth rate and death rate are high in this stage. High birth and death rates keep the growth of population either stagnant or very slow.

In this stage, death rates and birth rates are both high and fluctuated rapidly according to natural events, such as drought and disease, to produce a relatively constant and young population. Family planning and contraception are virtually nonexistent; therefore, birth rates are essentially only limited by the ability of women to bear children. Emigration depressed death rates in some special cases but, overall, death rates tended to match birth rates, often exceeding 40 per 1000 per year. Children contributed to the economy of the household from an early age by carrying water, firewood, and messages, caring for younger siblings, sweeping, washing dishes, preparing food, and working in the fields. Raising a child cost little more than feeding him or her; there were no education or entertainment expenses. Thus, the total cost of raising children barely exceeded their contribution to the household. In addition, as they became adults they become a major input to the family business, mainly farming, and were the primary form of insurance for adults in old age. In India, an adult son was all that prevented a widow from falling into destitution. While death rates remained high there was no question as to the need for children, even if the means to prevent them had existed.

During this stage, the society evolves in accordance with Malthusian paradigm, with population essentially determined by the food supply. Any fluctuations in food supply (either positive, for example, due to technology improvements, or negative, due to droughts and pest invasions) tend to translate directly into population fluctuations. Famines resulting in significant mortality are frequent. Overall, the population dynamics during stage one is highly reminiscent of that commonly observed in animals.

Stage Two: The second stage relates to a developing country when resources are utilized and industrial development also sets in. The birth rate continues to be high. On the other hand, the death rate falls considerably on account of spread of health technology. A high birth rate matched with a sharp decline in the death rate causes a rapid increase in population. This stage is better known as the stage of ‘population explosion’. The consequences of this stage are very dangerous.

The decline in the death rate is due initially to two factors:

- a. First, improvements in the food supply brought about by higher yields in agricultural practices and better transportation prevent death due to starvation and lack of water. Agricultural improvements included crop rotation, selective breeding, and seed drill technology.
- b. Second, significant improvements in public health reduce mortality, particularly in childhood. These are not so much medical breakthroughs as they are improvements in water supply, sewerage, food handling, and general personal hygiene following from growing scientific knowledge of the causes of disease and the improved education and social status of mothers.

A consequence of the decline in mortality in second stage is an increasingly rapid rise in population growth (a ‘population explosion’) as the gap between deaths and births grows wider. Note that this growth is not due to an increase in fertility (or birth rates) but to a decline in deaths. In this stage of demographic transition, countries are vulnerable to become failed states in the absence of progressive governments.

Another characteristic of second stage of the demographic transition is a change in the age structure of the population. In first stage, the majority of deaths are concentrated in the first 5–10 years of life. Therefore, more than anything else, the decline in death rates in second stage entails the increasing survival of children and a growing population. Hence, the age structure of the population becomes increasingly youthful and more of these children enter the reproductive cycle of their lives while maintaining the high fertility rates of their parents. The bottom of the ‘age pyramid’ widens first, accelerating population growth.

Stage Three: The third stage relates to a developed country. The character of the country changes from the agrarian to the industrial status. The birth rate falls sharply. The death rate also falls, sometimes to unusually low levels because of the superfluity of young people in the population. Eventually death rates rise somewhat as the age distribution becomes more normal. The population of a country grows at a slow rate, if at all it rises.

The third stage moves the population towards stability through a decline in the birth rate. Several factors contribute to this eventual decline:

- 1) In rural areas continued decline in childhood death means that at some point parents realize they need not require so many children to be born to ensure a comfortable old age. As childhood death continues to fall and incomes increase parents can become increasingly confident that fewer children will suffice to help in family business and care for them in old age.
- 2) Increasing urbanization changes the traditional values placed upon fertility and the value of children in rural society. Urban living also raises the cost of dependent children to a family. A recent theory suggests that urbanization also contributes to reducing the birth rate because it disrupts optimal mating patterns
- 3) In both rural and urban areas, the cost of children to parents is exacerbated by the introduction of compulsory education acts and the increased need to educate children so they can take up a respected position in society. Children are increasingly prohibited under law from working outside the household and make an increasingly limited contribution to the household, as school children are increasingly exempted from the expectation of making a significant contribution to domestic work. Even in equatorial Africa, children now need to be clothed, and may even require school uniforms. Parents begin to consider it a duty to buy children books and toys. Partly due to education and access to family planning, people begin to re-assess their need for children and their ability to raise them.
- 4) Increasing female literacy and employment lowers the uncritical acceptance of childbearing and motherhood as measures of the status of women. Working women have

less time to raise children; this is particularly an issue where fathers traditionally make little or no contribution to child-raising. Valuation of women beyond childbearing and motherhood becomes important.

- 5) Improvements in contraceptive technology are now a major factor. Fertility decline is caused as much by changes in values about children and sex as by the availability of contraceptives and knowledge of how to use them.

In short, the theory of demographic transition views economic growth as a sufficient condition for a decline in fertility. This is an idealized picture of population change. The model is a generalization that applies to most of the countries and may not accurately describe all individual cases. The extent to which it applies to less-developed societies today remains to be seen. Many countries such as China, Brazil and Thailand have passed through the demographic transition very quickly due to fast social and economic change. Some countries, particularly African countries, appear to be stalled in the second stage due to stagnant development.

8.7.2: DEMOGRAPHIC TRAP

The term ‘Demographic Trap’ is used by demographers to describe “the combination of high fertility (birth rates) and declining mortality (death rates) in developing countries, resulting in a period of high population growth rate”. High fertility combined with declining mortality happens when a developing country moves through the demographic transition of becoming developed.

During second stage of the demographic transition, quality of health care improves and death rates fall, but birth rates still remain high, resulting in a period of high population growth. The term ‘Demographic Trap’ is used by some demographers to describe a situation where second stage persists because "falling living standards reinforce the prevailing high fertility, which in turn reinforces the decline in living standards". This results in more poverty, where people rely on more children to provide them with economic security. Social scientist John Avery explains that this results because the high birth rates and low death rates "lead to population growth so rapid that the development that could have slowed population is impossible."

One of the significant outcomes of the demographic trap is explosive population growth. This is currently seen throughout Asia, Africa and Latin America, where death rates have dropped

during the last half of the 20th century due to advanced health care. However, in subsequent decades most of those countries were unable to keep improving economic development to match their population growth: by filling the education needs for more school age children; creating more jobs for the expanding workforce; and providing basic infrastructure and services, such as sewage, roads, bridges, water supplies, electricity, and stable food supplies.

A possible result of a country remaining trapped in the second stage is its government may reach a state of 'Demographic Fatigue'. In this condition, the government will lack financial resources to stabilize its population growth and becomes unable to deal effectively with threats from natural disasters, such as hurricanes, floods, landslides, drought, and disease. According to Kaufman, many countries suffering from 'Demographic Fatigue' will slip back into the first stage, resulting in both high fertility and high mortality rates. "If they do," he states, "these countries may soon reach zero population growth, but at a terrible price."

Environmentalism Lester Brown notes that, 16 of the 20 countries designated as "failed states" in 2010 were caught in this 'Demographic Trap' and would most likely be unable to break out of it on their own. Brown describes Sudan as a classic case of a country caught in the demographic trap.

It has been recently suggested that the emergence of major socio-political upheavals at the escape from the Malthusian trap (a similar idea to the demographic trap) is not an abnormal, but a regular phenomenon.

However, some demographers see it as only a temporary problem, which can be eliminated with better education and better family planning. While others consider the "trap" more of a longer-term symptom of the failure to educate children and provide safety nets against poverty, resulting in more families seeing children as a form of "securing incomes" for the future. Nonetheless, many social scientists agree that family planning should be an important part of public health and economic development.

Others argue that, while the combination of increasing fertility and decreasing mortality is a very real phenomenon, there is no reason to assume that this is harmful to developing countries. According to some economists, human ingenuity is a resource more important to economic

growth than natural resources. Because, population growth is accompanied by improvements in resource efficiency, new discoveries of natural resources, the development of substitutes, and changing consumer desires, a growing population will frequently support economic growth rather than hamper it.

8.7.3: DEMOGRAPHIC DIVIDEND

An interesting and rapid shift in dependency burden occurs during demographic transition from high to low mortality and fertility. In the first stage of the transition process, people are very young and the size of the under-15 population (young dependents) is very large compared to the working population (15-59). In the second stage, the share of the old dependents in the population gradually rises. What is of interest is the transition from the second stage to the third stage. The large generation of infants in the second stage is fairly large compared to the initial generation of infants in the third stage. When the former grows up it results in a population structure in which the share of working age population is relatively high in comparison to both the young and old dependents. Many underdeveloped countries which have experienced rapid fertility declines in recent years, are currently passing through this phase of demographic transition in which the labour force or productive population grows more rapidly than the total population.

Countries passing through this phase of demographic transition therefore, have a “Demographic Dividend” or a “Window of Demographic Opportunity”. It can create an atmosphere conducive to economic growth mainly due to following reasons, among others:

- a. First and foremost is the increased saving expected during the age structure transition. The increase in saving rate happens primarily due to the low dependency rate and partly also due to increased life expectancy.
- b. Secondly, with the decline in fertility, women are more likely to enter into the labour market during this stage. This will result in increased economic activity and would lead to a spurt in economic growth.
- c. Thirdly, it is also pointed out that people invest more on their own health when children are fewer in number, leading to better productivity and economic benefits to the household.

- d. Finally, the government also will be in a position to spend and invest in more productive activities with the decline in the number of children as public spending on education and health can be diverted to more productive activities.

During the course of the demographic dividend, there are mainly four mechanisms through which the benefits are delivered:

- 1) The first is the increased labor supply. However, the magnitude of this benefit appears to be dependent on the ability of the economy to absorb and productively employ the extra workers rather than be a pure demographic gift.
- 2) The second mechanism is the increase in savings. As the number of dependents decreases individuals can save more. This increase in national savings rates increases the stock of capital in developing countries already facing shortages of capital and leads to higher productivity as the accumulated capital is invested.
- 3) The third mechanism is human capital. Decreases in fertility rates result in healthier women and fewer economic pressures at home. This also allows parents to invest more resources per child, leading to better health and educational outcomes.
- 4) The fourth mechanism for growth is the increasing domestic demand brought about by the increasing GDP per capita and the decreasing dependency ratio.

However, the demographic dividend cannot guarantee economic growth automatically. To capitalize on the demographic dividend, countries must implement favourable policies and invest in key areas such as education, health, gender equality and employment generation. This should be coupled with good government institutions and functioning markets. If governments fail to implement such programmes, countries may struggle with social unrest of unemployed youths and end up in a position that is weaker than ever. And, demographic dividend will turn into a demographic disaster.

The demographic dividend does not last forever because the window of opportunity opens only once and closes within a generation. Over time, the age distribution changes again, as large working population moves into old dependent age groups and is followed by smaller working populations born during fertility decline. When this occurs, the dependency ratio rises again. This time the elderly out-number children, while the middle generation has to look after both.

8.8: PROBLEMS OF HUMAN CAPITAL FORMATION

The main problems of human capital formation in less developed countries (LDC's) in brief are as under:

1. The population of almost all developing countries of world is increasing faster than rate of accumulation of human capital. As a result, these countries are not making the satisfactory expenditure on education.
2. In the developing countries of the world, the governments are giving priority to primary education for increasing literacy rate. However, secondary education which provides critical skills needed for economic developed, remains neglected. Another problem related to investment in education is that in the public and private sectors there is a mushroom growth of universities without trying to improve their standard of education. There are also mass failures at primary, secondary & higher levels of education resulting in wastage of the scarce resources of the countries.
3. Another major problem of investment in human capital in developing countries of the world is the politicians and administrators lay more stress on the construction of buildings and provision of equipments than on the provision of qualified staff. It has been observed that foreign qualified teachers and doctors are appointed in rural areas where there is little usefulness of them.
4. In the less developed countries of the world there is shortage of trained nurses qualified doctors medical equipment, medicines etc. The less availability of health facilities pose threat to the millions of the people living there. The people are faced with unsatisfactory sanitary conditions, polluted water, high fertility and death rates urban slums, illiteracy etc. All these deficiencies affect the health of the people reduce their life expectancy.
5. On the job training or in service training is very rare or insufficient in underdeveloped countries to raise the standard of the workers. The result is that the efficiency and knowledge of the workers remains static and hence, low human capital formation.

6. Study programme for adults can also be introduced for improving literacy rate. Programme for adults has been introduced in many underdeveloped countries for providing basic education, increasing skills of farmers and small industrialists. But, the scheme has miserably failed as no interest was shown by the adults in getting such training.
7. In most of the world the ratio of unemployed or underemployed persons is very large. For increasing employment and reducing under employment proper investment in human capital is required which is visibly lacking in underdeveloped countries.
8. Due to non-availability of reliable data there is little manpower planning in less developed countries. As a result thereof, there is no matching of demand and supply of different types of skills. The result is that large number of skilled and highly qualified persons remains underemployed. The frustration and discontentment among the unemployed or underemployed graduate and post graduates result in brain drain from the country. It is a huge loss to resources of developing countries.
9. In underdeveloped countries where agriculture is the major sector of the economy, very little attention is paid for educating the farmers to the use of modern agricultural practices. Unless the farmers are provided agricultural education and training on the fields, they will not be able to raise the agricultural the outlook of the farmers.

Whatever the difficulties associated with the problem of investment in human capital, it is now fully recognized that the growth of underdeveloped countries is held back not by the shortage of physical capital as by the shortage of critical skills and knowledge which in turn limit the capacity of the economy to absorb the available physical capital stock. Thus, human capital formation is regarded even more important than material capital formation.

8.9: HUMAN CAPITAL PLANNING AND DEMOGRAPHIC TRANSITION IN INDIA

India is the second largest populated country in the world with the total population enumerated in the 2011 census at about 121 crore. This forms about 17.5 per cent of the total population of the

world. In other words, every sixth person on the earth is an Indian. India, on the other hand, has got only 2.4 per cent of the total land area in the world. China with about 20 per cent of the world's population has about 7 per cent of the land area; the USA maintains only 6 per cent of the total world population on about 7 per cent of the total area; Russia has 5 per cent of the population and 12 per cent of the land area. A 2012 United Nations report has estimated that "India is among the top 10 countries with the highest in-migration in the world. It would thus be seen that India has been seriously handicapped in that, a large proportion of the world population is found jam-packed in a small area". The US Census Bureau has also predicted that, India will surpass China as the world's largest country by 2025, with a large proportion of those in the working age category.

Half a century ago, India's growing population was considered a liability by many and providing basic needs for all seemed to be a near-impossible task. Somewhere along the line, however, economists discovered a silver lining: "The world was aging, but India was growing younger". There was a "demographic dividend" that the country could hope for, and ultimately exploit. An April 2012 International Monetary Fund (IMF) paper titled, "Asia and the Pacific: Managing Spillovers and Advancing Economic Rebalancing," noted that "in many Asian countries, aging populations are now causing, or are about to cause, a decline in the working-age ratio. The Japanese workforce has been shrinking since 1995, and the Korean workforce will start to decline beginning 2015. China's working-age ratio will peak in 2013 and then decline by a substantial amount in the next few decades.... The second most populous country in the region (and the world) affords grounds for cautious optimism. India's demographic transition is presently well underway, and the age structure of the population there is likely to evolve favorably over the next two to three decades." The demographic dividend could add 2 percentage points to per capita GDP growth per annum, according to the IMF.

The pace of India's population has slowed in the past few decades; and in the coming years, India will have a large proportion of people in the working ages. Optimists have argued that the resulting demographic dividend (or bonus) will create a smaller dependency load and will generate opportunities for economic growth. On the other hand, the pessimists have stated that India is indeed heading towards a demographic dividend, but challenges exist for economic

prosperity if India's policies are not geared towards productive employment for this large working age cohort.

8.9.1: INDIA'S DEMOGRAPHIC TRANSITION

The growth rate of population is a function of migration, birth rate and death rate in a country. The birth rate and death rates in India have followed the general trends indicated in the theory of demographic transition.

Census data suggests that population growth is on the decline since 1991. The average number of children a woman expected was 3.8 in 1990, and this has fallen to 2.7 children per woman today. Even though the fertility and population growth rates are declining, India's population is projected to increase from 1.2 billion today to an estimated 1.6 billion by 2050 due to the population momentum and this figure is based on UN's medium-fertility scenario. Population momentum refers to a situation where the large cohort of women of reproductive age will fuel population growth over the next generation, even if each woman has fewer children than previous generations did. Additionally, the drop in crude death rate (CDR) and crude birth rates (CBR) for the past four decades indicates that India is progressing towards a post-transitional phase. From 1950 to 1990, the drop in CBR was less steep than the drop in the CDR. However, during 1990s the decline in CBR has been steeper than the decline in CDR, which has resulted in an reduced annual population growth rate of 1.4% today.

India's demographic transition is also visible through population pyramids which provide data on a nation's age structure. The pyramid helps portray the share of population in each age group, and in 1950, India had a very young population with many children between the ages of 0-15, while there were very few elderly people. This gave India a typical pyramidal shape where the large base of young children indicated an overall young population. Moving forward in time to years 2030 and 2050, United Nations' projections show that with the declining CBR and population growth, the base of the population pyramid will shrink as the number of working-age individuals will increase relative to the children and the elderly. As of 2010, there are still a sizeable number of children in the age-group of 0-15 years, which is a result of the population momentum.

During the demographic transition, the changing age structure of a population has a large effect on economic growth, especially when the shift is due to baby booms and busts and their echo effects. Like other nations, India also experienced a delay between the occurrence of a sustained fall in the death rate and the start of a major decline in the birth rate. Due to this delay, India experienced a transitional period of rapid population growth and it is this period which is often the focus of economists and demographers.

With population growth, age structure of the nation is also transformed as a consequence of transition. At the beginning of a transition, there is baby boom that occurs which is not caused by an increase in births, but due to the sharply reduced rates of infant and child mortality. This baby boom has a higher survival rate because of an increased access to vaccinations, antibiotics, safe water and sanitation. Due to babies surviving, fertility subsequently decline when couples start to recognize that fewer babies are needed to reach their targets for ideal family size. Baby booms or growing number of children can have economical consequences because the presence of more children requires that there be adequate resources for food, medical care, housing, and schooling. Those resources must be diverted from other economically generating uses such as building factories, establishing infrastructure, and investing in research and development. Babies and children between the ages of 0-14 are referred to as the 'dependency load' because, they consume more resources than they generate, in comparison to the working age individuals who have an input in the economy and little consumption. The diversion of resources to current consumption for the baby boom can temporality slow the process of economic growth. Babies born in such a boom will eventually reach working ages within a period of 15-25 years and when this happens, the productive capacity of the economy expands on a per capita basis and a demographic dividend may be within reach.

Three major forces have been at work in the age structure during the demographic transition and are visible in India's population model:

- a. The first was the growing size of young cohorts as a result of improvements in child survival at the start of the demographic transition.
- b. The second force involves the subsequent decline in the relative size of young cohorts as a result of fertility decline.

- c. The third phase is the movement of the large-sized youth cohorts into adulthood with the passage of time.

United Nation's analysis stated that during the 1970s, children and young people were dominant in India's age structure. By 2010, the shape of the population structure had changed, as the influx of babies diminished as a share of the total population. By 2050, the projected change will be dramatic, as people of working age (between the ages of 15 to 64) will constitute a much larger share of the population than India does now. In contrast, the developed countries already have a reproductive age group population that is relatively small. Their fertility is low and the longevity of a child at birth is high. Population pyramids of these nations resemble cylinder and not a pyramid, where the population remains stable over the years.

8.9.2: DEMOGRAPHIC DIVIDEND FOR INDIA

Demographic Dividend is a phenomenon where the falling birth rate and the consequent shift in the age structure of the population towards the adult working ages and is also referred to as the demographic gift/bonus or the demographic window. The beneficial aspect of this population growth is that rise in the rate of economic growth due to a rising share of working age people in a population. There has been optimism surrounding the demographic dividend where researchers have pointed to East Asian countries where the rapid decline in fertility evolved the age structure in such a way that has been beneficial for economic growth.

The concept of demographic dividend has been applicable to India, where the three phases of the demographic transition have created three unique age structures. In the first phase, the fertility is very high and mortality begins to drop, which we know was the case in India during the 1960s and 70s (with growth rate at 2.3%). In the second phase, the fertility starts to decline at a fast pace leading to a reduction in the child population and one can see this trend occurring in India for the last four decades. However, due to the higher fertility of the past, India's population would continue to grow and will reach 1.6 billion by 2050 (population momentum). This period will include a large working age population and a lower dependency load. During the third phase, the dependency ratio will begin to rise as a result of higher old age population (60 & above), which also consumes resources in the form of health care, pension etc. The dividend is a term used to understand better the second phase of the age structure where the working age

population will be higher than the growth of infant and child population growth, resulting in a reduced dependency ratio. By the year 2020, the large cohorts of earlier years will reach prime years of working and saving.

The age structure transition of dividend can result in economic growth in the following ways:

- 1) Firstly, India can increase savings during this age structure transition. When majority of the population will be working, savings rate will increase. Human beings save the most during their working years and this accumulation of assets is critical for achieving the demographic 'gift'. The medium variant of India's population growth implies that by 2030, India could reach East Asia's working age ratio and will be able to match its per capita income growth. According to the World Bank (2010), India's annual rate of growth in real income per capita averaged around 4 % during the last three decades and is quickly rising to East Asia's levels. This is a significant increase because when East Asia was undergoing such rapid growth in average incomes, its rate was around 6.4% and current trends show that India's per capita income growth is also compounding year after year.
- 2) Secondly, since there will be a decline in fertility, women will enter the labor force at increasing rates, which will help increase the economic activity in India. A major impediment to women's labor force participation has been high fertility and the time spent on raising and caring for children. When there is a decline in fertility, women are more inclined to enter the paid workforce resulting in higher economic growth during this period.
- 3) Thirdly, when there are fewer children to care for, people invest more on their own health and on their few children, leading to better productivity and economic benefits for the household. Health can drive economic growth because healthier workforce is a more productive workforce and have higher savings rate due to anticipation of longer lives post-retirement. On the other hand, government will also be in a position to spend and invest in more productive activities because public spending resources can be allocated away from children's education, infant health etc.

8.9.3: ESTIMATION OF INDIA'S DEMOGRAPHIC DIVIDEND

Individual states in India vary in terms of their demographic achievements and this can implicate the demographic dividend. According to various census reports, age distribution of India's population can be observed for major states. These reports conclude that there has been drastic change in the age structure of the population in the age groups of 0-14 and 15-59 over the last four decades. Some Indian states such as Kerala, Karnataka, Gujarat and Tamil Nadu have showed a decline of more than 10 percentages in the age group of 0-14 between 1961 and 2001. On the other hand, some states such as Madhya Pradesh, Bihar and Rajasthan have showed little or no decline in this age group which can pose a setback to India's demographic dividend. In the working age group of 15-59, those same states of Kerala, Karnataka and Gujarat have shown significant rises in the last 4 decades. On the other hand, states such as Uttar Pradesh have shown a decline in this working age population, while other states have shown only marginal increase in this age group between years 1961 and 2001.

After analyzing the census reports, economists have found that "the annual growth rate of population by total age groups shows that while there is a substantial reduction in the growth rate of the child population (0-14) particularly since the 1971-81, an increase has not observed in the case of the adult age group (15-59)". The growth rate in the adult ages of India has been higher in the past, specifically during the 1980s, and this shows that the advantage of demographic dividend is not derived simply from the enhanced growth of the working age population, but from its relatively larger share than the child population. As mentioned earlier, the fertility rates of India are declining since the 1960s and the annual population rate today is at 1.4%. Moreover, the growth rate in the working age group has not changed dramatically over the last four decades and has remained relatively high. The argument has been made that for India to reach its dividend, it does not just require absolute growth of the working age population, but its relative growth to the dependent child population. As discussed earlier, children are part of the dependency load because they require extra care in terms of health, food, and education. This means that resources must be diverted from infrastructure, research and development and physical capital accumulation which would have served in bettering the quality of the large working age group.

8.9.4: CHALLENGES AND ISSUES FOR INDIA

Thomas Malthus had argued that a growing population would have extremely detrimental effects on a nation. He pointed that such unprecedented population growth will impede economic growth because it will put pressure on resources, resulting in a reduced per-capita income and declining quality of life. On this note of economic advancement, some pessimists have stated that there can be several institutional constraints, such as not providing productive employment to the working age, which can constrain the benefits of demographic dividend. The nation undergoing a dividend must appropriate policies for employment, otherwise the unemployment or underemployment of large working age individuals will result in a “demographic disaster”.

It must be realized that demographic dividend does not automatically result in economic growth. If India does not employ tactics to utilize its age shift in demographics, it could lead to disastrous results, because a large number of prime-age individuals will be unemployed, or underemployed in the coming years. This will not only impede the social and political stability, but will also lead to dwindling living standards and stunted economic growth. Economists have identified that India’s dividend could be jeopardized due to five policy failures:

- (i) India may fail at adopting programs that support further reductions in fertility and family size. India’s approach to limiting fertility has been through family planning programs that encourage the population at large to voluntarily reduce the family size rather than through coercive policies, such as forced sterilization or China’s one-child policy.
- (ii) Secondly, India could fail at equipping its workers with the skills, training and capital they need to be productive.
- (iii) Thirdly, potential workers will not be absorbed into productive employment if various policies constrict labor markets. For instance, widespread enforcement of minimum wages or union-negotiated earnings in excess of competitive wages could reduce the availability of jobs.
- (iv) India could also constrain capital markets if its macro-economic policies lead to higher inflation which can further implicate the savings. When savings are low, people are less likely to invest, and an economy stagnates. On the other hand, policies

- should rather be dedicated to government spending on health, education and infrastructure for long term economic growth.
- (v) Lastly, India may be unsuccessful at ensuring that the benefits of growth are shared widely by everyone, especially those in rural areas.

As these points suggest, there is a risk that growing working-age population could put a demographic drag on India's economy, if India fails at preventing these potential threats to its economy. It should be emphasized that policy makers of India must play a decisive role in capturing the beneficial potential for economic advancement in their country's population trajectory of demographic dividend or window.

8.10: SUMMARY

Development does not happen automatically, it requires systematic efforts. Development theories help us to show the way, how to organize our efforts to achieve the ultimate goal of development. And, one of the important factors that help us to achieve the goal of development is the human capital. Capital in the form of material stock has been discussed in various growth theories, but the role of human capital has been highlighted in the new growth theory. In this chapter, we discussed the role of human capital and various sources through which it can be developed. Also, we tried to examine the problems associated with the development of human capital in underdeveloped countries.

8.11: KEY WORDS

1. **Physical Capital:** refers to a factor of production (or input into the process of production), such as machinery, buildings, or computers.
2. **Human Capital:** Human capital is the attributes of a person that are productive in some economic context. Often refers to formal educational attainment, with the implication that education is investment whose returns are in the form of wage, salary, or other compensation.
3. **Human Capital Formation:** It refers to the process of acquiring and increasing the number of persons who have the skills, education and experience which are critical for the economic and political development of a country.

4. **Demographic Transition:** A change from stable population with high fertility and mortality to a new stability in population due to low fertility and mortality patterns is referred to as a demographic transition.
5. **Demographic Trap:** The term is used by demographers to describe the combination of high fertility (birth rates) and declining mortality (death rates) in developing countries, resulting in a period of high population growth rate.
6. **Demographic dividend** refers to a period usually 20 to 30 years when fertility rates fall due to significant reductions in child and infant mortality rates. This fall is often accompanied by an extension in average life expectancy that increases the portion of the population that is in the working age-group. This cuts spending on dependents and spurs economic growth. As women and families realize that fewer children will die during infancy or childhood, they will begin to have fewer children to reach their desired number of offspring, further reducing the proportion of non-productive dependents.

8.12: SELF-ASSESSMENT QUESTIONS

1. What do you mean by human capital? Discuss the role of human capital in the growth of an economy.
2. Bring out the differences between human capital and human development.
3. What are the major sources of human capital in a country?
4. What are the main problems of human capital formation in India?
5. Examine the role of education in the economic development of a nation. Explain how investment in education stimulates economic growth.
6. What are the stages of demographic transition ? Explain the features of each stage.
7. What do you mean by demographic dividend ? How is India expected to benefit from it ?
8. Bring out the differences between demographic dividend and demographic trap.
9. What are the challenges before India to achieve demographic dividend ?
10. Explain the process of demographic transition in India.

8.13: FURTHER READINGS

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