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M.A. [Economics]

I - Semester

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DEVELOPMENT ECONOMICS

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INTRODUCTION

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In simple words, economic development is the development of economic wealth of countries or regions for the well-being of their inhabitants. Usually, the terms growth and development are used interchangeably. However, economic growth and economic development are two different terms used in economics. In common parlance, economic development refers to the problems of underdeveloped countries, while economic growth to those of developed countries. When we use the term economic growth, we simply mean increase in per capita income or increase in gross national product (GNP). In recent literature, however, the term economic growth is used to refer to sustained increase in a country's output of goods and services, or more precisely product per capita. Output is usually measured in terms of GNP.

The term economic development is far more comprehensive, implying progressive changes in the socio-economic structure of a country. If we see development in this perspective, economic development involves a steady decline in agricultural shares in GNP and continuous increase in shares of industries, trade banking construction and services. Further, while economic growth simply refers to rise in output, development means change in technological and institutional organization of production and in distributive pattern of income. The process of development is far more wide-ranging. Besides a rise in output, it involves changes in composition of output, shift in the allocation of productive resources, and elimination or reduction of poverty, inequalities and unemployment. In the words of Amartya Sen: 'Development requires the removal of major sources of unfreedom poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation neglect of public facilities as well as intolerance or over activity of repressive states.'

This book, *Development Economics*, is divided into fourteen units that follow the self-instruction mode with each unit beginning with an Introduction to the unit, followed by an outline of the Objectives. The detailed content is then presented in a simple but structured manner interspersed with Check Your Progress Questions to test the student's understanding of the topic. A Summary along with a list of Key Words and a set of Self-Assessment Questions and Exercises is also provided at the end of each unit for recapitulation.

BLOCK - I

ECONOMIC GROWTH AND DEVELOPMENT

UNIT 1 ECONOMIC GROWTH AND DEVELOPMENT: AN OVERVIEW

Structure

1.0 INTRODUCTION

A country's economic growth is usually indicated by an increase in that country's gross domestic product, or GDP. Generally speaking, gross domestic product is an economic model that reflects the value of a country's output.

Economic growth is the positive change in the real output of the country in a particular span of time economy. Economic Development involves a rise in the level of production in an economy along with the advancement of technology, improvement in living standards and so on.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the concept of economic growth and development
- Discuss the factors affecting economic growth
- Analyse the prevalence of underdevelopment in different countries
- Explain the various obstacles to development

1.2 CONCEPT OF ECONOMIC GROWTH AND DEVELOPMENT

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Economic development is usually concerned not only with quantitative expansions, but also with changes in non-quantitative factors such as institutions, organizations and culture under which economies operate. If we follow this usage, economic growth is considered to be a quantitative aspect of economic development.

1. In broad terms, one would say that economic development involves a steady and ongoing activity that leads to a better standard of living and improvement in the financial health of a particular sector or area of a country's economy. Economic development also signifies the quantitative and qualitative changes that take place in the economy. Such actions can include the development of human capital, critical infrastructure, regional competitiveness, environmental sustainability, social inclusion, health, safety, literacy, and other initiatives.
2. The concept of economic growth is much narrower than the concept of economic development. As we have already studied, it implies an increase in a nation's real level of national output which could have been brought about by an expansion in the resource quality or quantity, technological improvements, etc. The principle of economic development is normative. This means that it finds application in the context of people's sense of morality (right or wrong, good or bad). Michael Todaro, an American economist and a pioneer in the field of development economics, equates economic development with increasing standards of living, better self-esteem, and other privileges such as freedom from any and all kinds of exploitation, etc.
3. Economic growth will take place upon a gradual increase in any or all elements that make up the GDP such as consumption, investment, government expenditures and net exports. Economic development, on the other hand, involves an increase in the Human Capital Index; a notable decline in social and economic inequality; and structural changes that contribute to a basic improvement in the overall quality of a nation's population. One must note that one of the most precise ways of determining economic development is by using the Human Development Index. This Index includes the literacy rates and the growth of more employment opportunities in various sectors such as education, healthcare, employment and the protection of the environment. This denotes that all citizens of the nation experience a growth in their per capita income. Other measures of economic development include gender related index, human poverty index, infant mortality rate and literacy rate.
4. Economic growth pertains to an increase in the output of an economy, whereas economic development pertains to structural changes that take place in an economy.

5. Economic growth is a quantitative measurement relating to an increase in Gross Domestic Product and shown Production-possibility Frontier. Economic development is measured in qualitative terms. In other words, whereas economic growth is associated with bringing about quantitative changes in an economy, economic development is associated with bringing about qualitative changes in an economy.
6. In order to measure progress in developed nations, economic growth is a much preferred indicator. Most nations make use of it for measuring fiscal growth since growth is a pre-condition for development. Developing countries make use of economic development in order to measure progress and quality of life.
7. There are several unrecorded economic activities that characterize an economy. These activities go unaccounted for in the measurement of economic growth. These activities are related to an informal or a black economy. Economic development helps in alleviating people from low standards of living with the provision of proper employment and suitable shelter.
8. A major problem with economic growth is not taking into account the exhaustion of natural resources that may cause pollution, congestion and the occurrence of various diseases. The concept of development, on the other hand, is synonymous with sustainability referring to meeting present needs without having to compromise the future needs.
9. Economic growth is an important, but not an adequate condition of economic development.

   We can say that development economics is that branch of economics that deals with the economic aspects of development process in nations with low incomes. Development economics focusses not only on methods that encourage economic growth and structural changes, but also on the improvement of the potential for the mass of the population.

   Generally, economic development is concerned with growth in such metrics as literacy rates, life expectancy and poverty rates. GDP disregards other important components such as leisure time, environmental quality, freedom or social justice. There are other ways of measuring the economic well-being of a nation. In a fundamental sense, the economic development of a nation appertains to its human development, which includes, among other things, health and education. These determinants are, nevertheless, closely linked to economic growth in such a way that economic development and economic growth are complementary concepts.

Factors Affecting Economic Growth

Broadly speaking, there are chiefly three important areas encompassed by the policies of economic development:

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- Governmental measures undertaken to fulfil broad economic objectives like price stability, high employment and a sustained rate of growth. These efforts allow for changes in economic and fiscal policies, the governance and administration of financial institutions, trade and tax policies, etc.
- Procedures that offer infrastructure and services such as highways, parks, affordable housing, crime prevention and school education.
- Job creation and retention through specific efforts in business finance, marketing, neighbourhood development, workforce development, small business development, business retention and expansion, technology transfer and real estate development.

1.3 OBSTACLES TO DEVELOPMENT AND CHARACTERISTICS OF LESS DEVELOPED COUNTRIES

Underdevelopment means having a low level of economic productivity and technological sophistication within the contemporary range of possibility. The term 'development' is generally used to mean industrialization, economic growth and the living standards associated with prosperity, such as increased life expectancy, health-care and free education. The countries that have not yet achieved these objectives are said to be 'undeveloped' countries.

Disparity between the rich and the poor and an unhealthy balance of trade are the characteristics of an underdeveloped country. The trade and commerce balance is often skewed as the products these countries yield for export, such as bananas, coffee, sugar, cocoa, tea, are not in great demand in the developed countries. The products that demand a smaller quantity of raw materials, such as jute, cotton, etc., are being substituted by synthetic materials. Prices of organic and natural raw materials cannot be increased as this leads to an industrial clamouring for the synthetic products. On the other hand, production can also not be increased as this again brings down the prices. Thus, the developing countries face this elusive development as the primary commodities used by them are subject to short-term price inflation.

Different criteria of underdevelopment

Countries are categorized as underdeveloped on the basis of the following criteria:

- **Low ratio of industrial output to total output:** Countries with a low ratio of industrial output to total output are considered underdeveloped.
- **Low ratio of capital to per head of population:** According to Ragnar Nurkse, 'Underdeveloped countries are those, which compared with the advanced countries, are under-equipped with capital in relation to their population and natural resources.'

- **Poverty:** Poverty is one of the main criteria of underdevelopment. Poverty is nothing but lack of basic standards of living. The people of underdeveloped countries are characterized by less money or salary, less education, improper health care, sanitation, etc.
- **Low per capita income:** Most acceptable criterion of underdevelopment is low per capital real income.

1.3.1 Characteristics of Less Developed Countries

The characteristics of underdevelopment may be summarized as follows:

- **General poverty:** Most of the people in underdeveloped countries are poor, leading a wretched life without any norms of standard of living. Poverty results in low labour productivity, lack of entrepreneurship and poor specialization.
- **Agriculture, the main occupation:** An underdeveloped depends largely on the production of agricultural materials and minerals. Industries in such countries are mainly agro-based. The share of the primary sector, which includes the agriculture and allied activities, is larger in the national income of the underdeveloped country.
- **A dualistic economy:** An underdeveloped economy is characterized by the presence of dualistic economy— the existence of both market economy and subsistence economy at the same time. There is market economy on one side, where marketing system has developed exceedingly well, catering to the needs of rich and wealthy class of people. On the other hand, there is subsistence economy characterized by backward agriculture-oriented activities in rural areas.
- **Underdevelopment of national resources:** The natural resources of the underdeveloped economy are either unutilized or underutilized. For example, India is a country of vast natural resources, which have not been fully utilized.
- **Demographic features:** Another feature of underdeveloped countries is that they are invariable overpopulated. The size of the population in these countries is increasing at a faster rate than in developed countries.
- **Unemployment and disguised unemployment:** Excessive pressures on land and poor industrial development create unemployment problems in underdeveloped countries. The problem of unemployment has resulted in underemployment. Owing to population pressure, more persons work on land than what is actually required. This is referred to as disguised unemployment.
- **Economic backwardness:** The people of underdeveloped countries are economically backward. The economic backwardness is characterized by lower efficiency, illiteracy, poverty, factor-immobility, lack of entrepreneurship and ignorance in economic matters.

- **Lack of enterprise and initiative:** An important characteristic of underdeveloped countries is the lack of entrepreneurship and initiative. The governments of underdeveloped countries are not very encouraging towards entrepreneurship. The people of such countries are largely risk averse. They generally prefer a long-term employment, such as government jobs.
- **Insufficient capital equipment:** Capital has a strategic role in production and economic development of a nation. The insufficient amount of physical capital in existence is also a characteristic feature of underdeveloped economies. Hence, they are often called simply 'capital poor' economies. One indication of the capital deficiency is the low amount of capital per head of population.
- **Technological backwardness:** In underdeveloped countries, the methods of production are primitive. As a result, the productivity either in agriculture or in industries is very low. The lack of technical know-how and poor scientific advancement and obsolete technique result in poor quality products.
- **Foreign trade orientation:** Underdeveloped countries are usually foreign trade-oriented. They export raw materials instead of utilizing them at home and import manufactures instead of making them at home. Excessive dependence on export makes these countries precarious and unbalanced, affecting their terms of trade adversely.

Prevalence of underdevelopment

(i) **Africa:** Africa consists of one-seventh of the world's population. It is the second largest continent with fifty-four countries and 800 million people. It accounts for 20 per cent of the planet. This is the most underdeveloped continent. The continent had faced 400 years of slavery which has ultimately resulted in ethnic and political fragmentation. Political and social unrest has caused economic instability that has left communities unfit for pursuing economic development.

(ii) **Afghanistan:** Afghanistan's underdevelopment has resulted from ineffective trade policies with little economic growth. 35 per cent of the population is unemployed. Pervasive military and political corruption has left the economy of the country shattered and the culture and religion broken. Disruption of trade and commerce has resulted in the falling of GDP every year. Internal conflicts have left the country incapable of reviving with domestic and international aids.

(iii) **Latin America:** Latin America consists the South American nations where people primarily speak Spanish, Portuguese and French. The infant mortality rate here is very high and the life expectancies of people are twenty years lesser than those of the people in developed countries. Unemployment, homelessness and malnourishment have become rampant in this part of the world with many communities being poverty-stricken. The region has

suffered due to over population, military dictatorships and wars. It is replete with cases where larger countries have oppressed its smaller neighbours. The free trade policies adopted in the nineteenth century prevented the development of national industries in the region.

(iv) **South Africa:** South Africa is a segregated land of the rich and the poor. The rich are integrating the country with global economy and adopting industrialization, agricultural and financial services. The second economy is the economy of the underprivileged. South African countries nurture institutionalized apartheid that influences politics, society and economics. Reforms have further increased the chasm between the rich and the poor through uneven distribution of wealth. As Hoogeveen and Ozler (2005: 15) conclude in their paper 'Not Separate, Not Equal: Poverty and Inequality in Post-Apartheid South Africa' that 'growth has not been pro-poor in South Africa as a whole, and in the instances when poverty declined for certain subgroups, the distributional shifts were still not pro-poor' . The economy is dictated by those who are incorporated in the mainstream and not by those living under unfavourable circumstances.

Check Your Progress

1. What are the characteristics of underdeveloped countries?
2. What is the major problem with economic growth?
3. When does economic growth take place?

1.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Disparity between the rich and the poor and an unhealthy balance of trade are the characteristics of an underdeveloped country.
2. A major problem with economic growth is not taking into account the exhaustion of natural resources that may cause pollution, congestion and the occurrence of various diseases.
3. Economic growth will take place upon a gradual increase in any or all elements that make up the GDP such as consumption, investment, government expenditures and net exports.

1.5 SUMMARY

- Economic development is usually concerned not only with quantitative expansions, but also with changes in non-quantitative factors such as institutions, organizations and culture under which economies operate.

- In order to measure progress in developed nations, economic growth is a much preferred indicator. Most nations make use of it for measuring fiscal growth since growth is a pre-condition for development. Developing countries make use of economic development in order to measure progress and quality of life.
- A major problem with economic growth is not taking into account the exhaustion of natural resources that may cause pollution, congestion and the occurrence of various diseases. The concept of development, on the other hand, is synonymous with sustainability referring to meeting present needs without having to compromise the future needs.
- Most of the people in underdeveloped countries are poor, leading a wretched life without any norms of standard of living. Poverty results in low labour productivity, lack of entrepreneurship and poor specialization.
- Excessive pressures on land and poor industrial development create unemployment problems in underdeveloped countries. The problem of unemployment has resulted in underemployment. Owing to population pressure, more persons work on land than what is actually required.
- Economic growth is a quantitative measurement relating to an increase in Gross Domestic Product and shown Production-possibility Frontier. Economic development is measured in qualitative terms.
- In other words, whereas economic growth is associated with bringing about quantitative changes in an economy, economic development is associated with bringing about qualitative changes in an economy.

1.6 KEY WORDS

- **Development economics**: Development economics is a branch of economics that focuses on improving fiscal, economic and social conditions in developing countries.
- **Demography**: It is the study of statistics such as births, deaths, income, or the incidence of disease, which illustrate the changing structure of human populations.
- **Human Capital Index**: It measures how well an organization makes use of the ability of an individual to perform and create shareholder value through his/her competencies, knowledge and expertise.

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1.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. How is economic growth considered a quantitative measurement?
2. How are countries categorised as underdeveloped?
3. State the factors affecting economic growth.

Long Answer Questions

1. Analyse the characteristics of underdevelopment.
2. Describe the prevalence of underdevelopment in different countries.
3. What are the different obstacles to development? Discuss.

1.8 FURTHER READINGS

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UNIT 2 GROWTH, POVERTY AND INCOME DISTRIBUTION

Structure

2.0 INTRODUCTION

The aim of all modern economies today is to achieve a certain level of economic growth. This is because economic growth reflects the situation that the resources are being used efficiently by the economy to progress. This is seen in terms of growing employment opportunities, increased investments, and higher living standards for people. But the rising income of the country does not always denote that more people are coming out of poverty, it could even take the form of growing divide between the rich and poor. This is referred to as the inequality of income. This is evident in most countries including India, where even though the country is praised for being one of the top fastest growing economies, other studies like Oxfam report that the 1% of the population takes 73% of the total income generated! For wholesome economic development, it is important that there is a balance maintained, in that the economic growth and its distribution is efficient. In this unit, you will learn about the measurement of economic growth and income distribution.

2.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the meaning of economic growth and development
- Discuss the concept of poverty and income distribution
- Explain the different methods of measuring income inequality

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2.2 MEANING OF GROWTH

Although in common parlance, there is no difference between economic growth and economic development, and these terms are used interchangeably. But in economics, we differentiate between these two concepts. Economic growth is a narrower concept between the two, and denotes an increase in a country's Gross Domestic Product.

There are two common measures of the rate of economic growth. The first is the rate of growth of a nation's real Gross Domestic Product, which tells how rapidly the economy's total real output of goods and services is increasing. The second is the rate of growth of per capita real Gross Domestic Product, which is a better measure of the rate of increase of a country's standard of living.

To represent the process of economic growth, it is convenient to use the production possibilities curve which shows all efficient combinations of output that an economy can produce. For example, let us suppose that a given society produces only two goods: food and tractors. If this society has at its disposal a fixed amount of resources and if technology is fixed, the production possibilities curve shows the maximum quantity of food that can be produced, given each amount of tractors produced. This is shown in Figure 2.1.

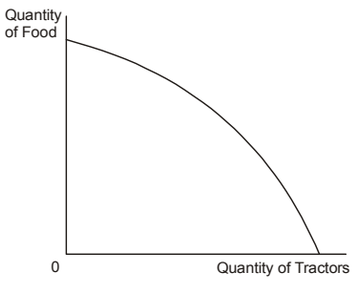

Fig. 2.1 *Production Possibilities Curve*

The production possibilities curve shows all efficient combinations of output that an economy can produce.

Shifts of the Production Possibilities Curve

A country's potential output increases when its production possibilities curve shifts outward, as from position A to position B in Figure 2.2. This happens because the society can produce (and consume) more of one good without having to produce (and consume) less of the other good. Thus, its productive capacity must be greater. If the production possibilities curve shifts outward, if the economy is efficient, and if population remains constant, the per capita GDP increases, thus facilitating economic growth. Moreover, the faster the production possibilities curve shifts outward, the greater the rate of economic growth.

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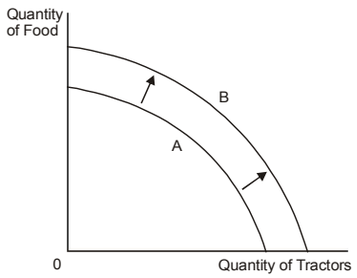

Fig. 2.2 *Outward Shift of Production Possibilities Curve*

No Shift of the Production Possibilities Curve

A general decline in the unemployment or inefficiency levels will cause economic growth even if the country's production possibilities curve does not shift outward. If a country allows some of its resources to be unemployed or underutilized because of an insufficiency of intended spending, this will cause the economy to operate at a point *inside* the production possibilities curve rather than *on* the curve.

Now it is clear that economic growth has a connotation of quantitative expansions in economic variables, specially aggregate and per capita. National income is measured by GNP and NNP. Therefore, the analysis of economic growth is concerned mainly with measuring of growth in economic variables, and identifying their interrelationships such as between the national income growth rate and the speed of capital formation.

2.3 POVERTY AND INCOME DISTRIBUTION

Poverty is a multifaceted occurrence which is caused by various factors. There are different ways of defining poverty. The most common of these are objective and subjective poverty. Poverty can also be defined as absolute and relative on the basis of scale of threshold. Another popular way of defining poverty is static and dynamic. The dynamic studies focus on the length of duration of poverty.

Absolute poverty is a state in which the basic needs of an individual are not covered. These basic needs include the needs which are related to food, housing and clothes. This is a widely accepted method of defining poverty across the world. But the problem with this method is, sometimes it is difficult to measure absolute poverty. Relative poverty is defined in a different context. It means that the individual is at a disadvantageous position (financially or socially) in comparison to other individuals in the same environment. The relative measure of poverty is used to describe the inequality in distribution of income. The criteria of measuring relative poverty cannot be same for all the countries. A person who is relatively poor in America may not be poor in India. Moreover there cannot be a static way of defining poverty over a period of time. It is a dynamic subject and it keeps on changing with passage of time.

Different poverty lines are drawn to measure the absolute and relative poverty. The absolute poverty lines are based on some absolute standard. It is a monetary threshold used to meet the basic needs. The relative poverty lines are based on overall distribution of income and overall consumption in a country. The absolute measure of poverty is considered as a better approach. Further there are different approaches to measure absolute poverty. Generally it is measured on the basis of either food-energy intake method or cost of basic needs method.

Inequality of Income and Wealth

The inequality of income means unequal distribution of income among individual household of a country. It measures the disparity of income between individual making most of the money and least of the money. The inequality of income is a relative measure to study the gap between household incomes of a region or country etc.

Increasing income inequality is a universal phenomenon. The inequality of income and wealth has increased as a result of increasing globalization. The examples of income inequality can be seen in the form of, rising corporate profits but decline in income of employees, higher income of males than females, higher income of urban people in comparison of rural people, and higher income of developed economies in comparison to developing and underdeveloped economies, etc.

Majority of the countries of the world are facing the situation of income inequality. Whether we take the example of US, India or China or other countries, the recent trends of income inequality have shown that the gap between rich and poor has increased.

The two measures used to compute the income inequality are Lorenz curve and Gini Index.

The Lorenz curve explains the percentage of income earned by a percentage of population. A perfect income distribution will have a Lorenz curve a straight line showing same percentage change in income caused by same percentage change in population.

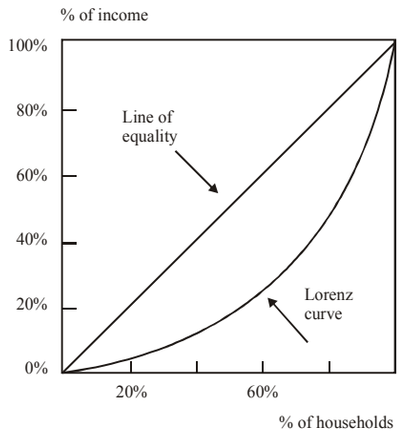

Fig. 2.3 *A Lorenz Curve Illustrates Inequality*

The Gini coefficient is also used to measure the inequality of income. The Gini coefficient calculates the deviation of income distribution in a country from a perfect equity income state in that country. If Gini coefficient is zero then it indicates the perfect equality and if it is one then it shows perfect inequality of income indicating that a single person is holding the whole income. The inequality in income is an indicator of social welfare of the country. The increasing income inequality increases the social unrest.

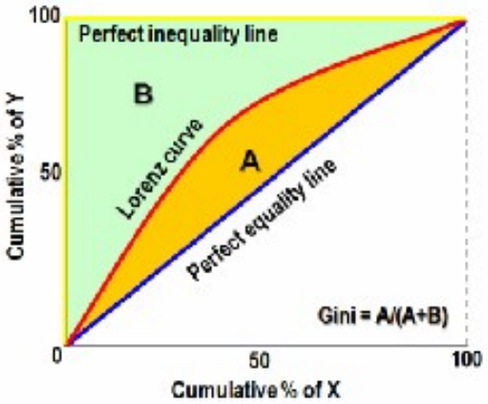

Fig 2.4 *Gini Coefficient Graph*

Gini coefficient

Gini coefficient is a statistical measure of the degree of variation represented in a set of values, used especially in analysing income inequality. Gini coefficient of countries with highly unequal income distribution lies between 0.50 and 0.70 while the countries with some extent to equal distribution of income lies 0.20 to 0.35. We can draw four possible Lorenz curve with the help of international data. The diagram is shown in fig 2.5. In the Lorenz criterion of income distribution, one Lorenz curve adjacent to other Lorenz curve, the economy corresponding to the upper curve is equal to the lower curve (Lorenz curve). So in the figure, economy A may unambiguously be said to be more equal than economy D, as one is lower and other is upper curve. Whenever two Lorenz curve cross, such curve like B and C, the Lorenz criterion states that we 'need more information'. Economy of B represents more equal economy while we argue on the grounds of the priority of addressing problems of poverty, since the poorest are richer and riches are richer (middle class is 'squared').

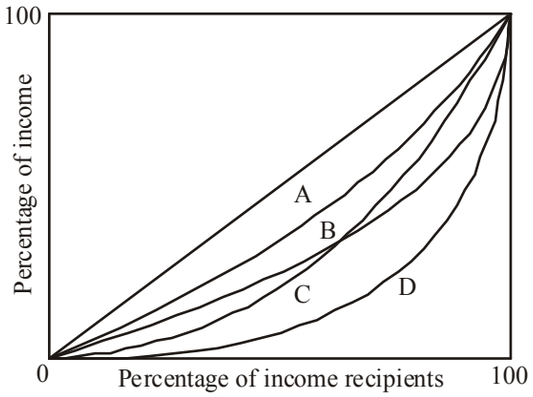

Fig. 2.5 *Lorenz Curve and Income Distribution*

An economy with a strong middle class is more equal and after observing the Lorenz curve aggregate might select economy C. One could also measure aggregate like Gini coefficient to finalize the matter. As it turns out, Gini coefficient is among a measure that satisfies highly desirable properties. The anonymity principle simply means that our measure of inequality should not depend on who has the higher income.

Inequality in India for the period 2000-2011, when measured in terms of income Gini-coefficient was 36.8 and is more favourable as compared to other countries like South Africa (57.8) Brazil (53.9), Thailand (53.6) and even the U.S.A (40.8), Israel (39.2) and Bulgaria (45.3) which are otherwise, ranked very high in human development. The second indicator increasing the inequality is the quintile income ratio, which is a measure of average income of the richest 20 per cent of the population to that of poorest 20 per cent. The quintile income ratio for India was 5.6 in 2010-11. When compared with other countries, Australia (7-0), USA (8.5), New Zealand (6.8), Singapore (9.8), The U.K (7.8), Mexico (14.4), Malaysia (11.8), Argentina (12.3) and Vietnam (6.2) had a higher ratio. This implies that in terms of inequality between top and bottom, quintiles in India was lower than a large number of countries.

For the inverse in inequality recorded the past two decades in developed countries, government makes policies to tax more from the higher income group and spend more to affect the trends towards more inequality on social issues. They need to spend more because of the increasing age of the population of such countries and have to spend more on health care, and pension's expenditure. The redistributive effect of government expenditures dampened the rise in poverty in the decade from the mid 1980 to 1990s. But in these time period, benefits became less targeted on the poor population. If the government stops trying to manage the inequalities by spending less on social benefits, or taking taxes from the poor, then growth of inequalities will be more rapid.

Some points have been made on the number of objections that people make in response like:

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- Public services are very helpful to reduce inequalities like education and health.
- Some people who have assets but are in low income group cannot be considered as poor.
- People have low incomes for long period of time is considered as poor but for short period is not considered.
- A better way of looking at inequality is seeing if people are deprived of key goods and services, such as having enough food to eat, or being able to afford a television or any other luxury items.
- People who work harder or are more talented earn more income as compared to other. What matters really is the equality of opportunity and not the equality of outcome.

Some nations have more unequal income distribution than others in which inequality has little effect on the country rankings. Countries having wider distribution of income also have higher relative income poverty. This holds true regardless of relative poverty, which is defined as having income below 40.50 or 60 per cent of the median income. Income inequality has risen significantly since 2000 in the countries like, Germany, Norway, the United States, Finland, Italy and declined in countries like United Kingdom, Mexico, Australia and Greece. Reasons for the rise in inequality are that rich households have done particularly well in comparison with middle class income group and those at the bottom like lower income group.

There are four broad areas which correspond to the four major elements that determine the distribution of income of developing countries.

1. Altering the functional distribution

In functional distribution, the return to land, labour and capital is determined by factor prices and on the level of utilization of national income that accrue to the owners of each factor.

2. Mitigating the size distribution

The functional distribution translated into a size distribution by knowledge of how to control productive assets and also on labour skills are concentrated and distributed throughout the population in an economy.

3. Moderating (reducing) the size distribution at the upper levels

With the help of progressive taxation of personal income, government revenues increases and decreases the share of disposable income of the rich income groups. Revenue can be increased with good policies of government to be invested in human capital and rural infrastructure, thereby promoting inclusive growth.

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4. Moderating (increasing) the size distribution at the lower levels

With the help of public expenditures of tax revenues to raise the income of poor individuals either directly (providing cash transfer) or indirectly (by giving then opportunity to work and earn income). Such types of public policies help to raise the real income level of low income group above what their personal income levels would be.

Kuznets inverted 'u' Hypothesis

Simon Kuznets analysed the historical growth patterns of contemporary developed countries. He suggested that in the early stage of economic growth, the distribution of income will tend to worsen, whereas at later stages it will improve. This observation came to be characterized by the 'inverted U' Kuznets curve because a longitudinal (time-series) plot of changes in the distribution of income is measured by Gini Coefficient. (the curve shown in fig. 2.6).

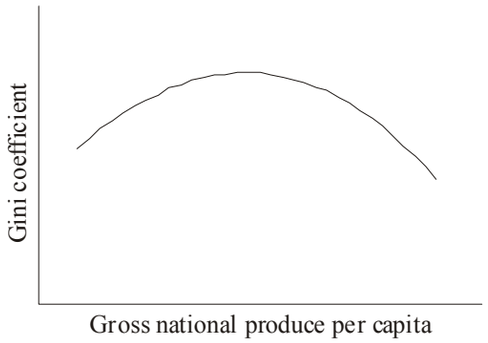

Fig. 2.6 *The Inverted U Kuznets Curve*

In the explanation of 'inverted U' shape, inequality seemed first to worsen during the early stages of economic growth before eventually improving. Early growth may, in accordance with the Lewis model is concentrated in 'industrial sector where employment is limited but wages and productivity are high. The income gap between the modern and traditional sectors may widen quickly at first before beginning to converge. Inequality in the expanding modern sector may be much greater than inequality in the stagnant traditional sector. Income transfers from the rich to the poor and poverty – reducing public expenditure are more difficult to undertake by governments in very low income countries. Although in the long run, data for western nations do seem to support their proposition, studies of the phenomenon in Third World nations have produced conflicting results. The problem is methodological because of the absence of time-series data for LDLs and researchers use longitudinal phenomenon with cross-sectional data.

Disregarding the merits of methodological debate, few development economists would argue that Kuznets sequence of increasing and then declining inequality is inevitable. Enough studies have been done on countries like Taiwan, South Korea, China, Costa Rica and Sri Lanka to demonstrate that higher level of

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income can be accompanied by falling not rising inequality. Theorists argue the inevitability of the Kuznets process, especially political leaders in countries with large and growing inequalities.

Check Your Progress

1. What is the analysis of economic growth concerned with?
2. Name the types of poverty lines which are based on overall distribution of income and overall consumption in a country.
3. Mention the two measures used to computer the income inequality.

2.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The analysis of economic growth is concerned mainly with measuring of growth in economic variables, and identifying their interrelationships such as between the national income growth rate and the speed of capital formation.
2. The relative poverty lines are the poverty lines which are based on overall distribution of income and overall consumption in a country.
3. The two measures used to compute the income inequality are Lorenz curve and Gini Index.

2.5 SUMMARY

- Although in common parlance, there is no difference between economic growth and economic development, and these terms are used interchangeably. But in economics, we differentiate between these two concepts. Economic growth is a narrower concept between the two, and denotes an increase in a country's Gross Domestic Product.
- There are two common measures of the rate of economic growth. The first is the rate of growth of a nation's real Gross Domestic Product, which tells how rapidly the economy's total real output of goods and services is increasing. The second is the rate of growth of per capita real Gross Domestic Product, which is a better measure of the rate of increase of a country's standard of living.
- To represent the process of economic growth, it is convenient to use the production possibilities curve which shows all efficient combinations of output that an economy can produce.
- The analysis of economic growth is concerned mainly with measuring of growth in economic variables, and identifying their interrelationships such

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as between the national income growth rate and the speed of capital formation.

- Poverty is a multifaceted occurrence which is caused by various factors. There are different ways of defining poverty. The most common of these are objective and subjective poverty. Poverty can also be defined as absolute and relative on the basis of scale of threshold. Another popular way of defining poverty is static and dynamic. The dynamic studies focus on the length of duration of poverty.
- Absolute poverty is a state in which the basic needs of an individual are not covered. These basic needs include the needs which are related to food, housing and clothes.
- Relative poverty is defined in a different context. It means that the individual is at a disadvantageous position (financially or socially) in comparison to other individuals in the same environment.
- The inequality of income means unequal distribution of income among individual household of a country. It measures the disparity of income between individual making most of the money and least of the money.
- The Lorenz curve explains the percentage of income earned by a percentage of population. A perfect income distribution will have a Lorenz curve a straight line showing same percentage change in income caused by same percentage change in population.
- The Gini coefficient is also used to measure the inequality of income. The Gini coefficient calculates the deviation of income distribution in a country from a perfect equity income state in that country.
- Simon Kuznets analysed the historical growth patterns of contemporary developed countries. He suggested that in the early stage of economic growth, the distribution of income will tend to worsen, whereas at later stages it will improve. This observation came to be characterized by the 'inverted U' Kuznets curve because a longitudinal (time-series) plot of changes in the distribution of income is measured by Gini Coefficient.

2.6 KEY WORDS

- **Production possibilities curve:** It shows all efficient combinations of output that an economy can produce.
- **Lorenz curve:** It explains the percentage of income earned by a percentage of population
- **Gini coefficient**: It is a statistical measure of the degree of variation represented in a set of values, used especially in analysing income inequality

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2.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What are the two common measures of the rate of economic growth?
2. Which among the two have a narrower concept: economic growth or economic development?
3. State some of the ways of defining of poverty.
4. Differentiate between absolute and relative poverty lines.
5. What are the forms in which the examples of income inequality can be seen?

Long Answer Questions

1. Explain how production possibilities curve reflect economic growth.
2. Discuss the broad areas which correspond to the four major elements that determine the distribution of income of developing countries.
3. Describe the Kuznets inverted 'u' hypothesis.

2.8 FURTHER READINGS

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UNIT 3 OVERVIEW OF DIFFERENT DEVELOPMENT INDICES

Structure

3.0 INTRODUCTION

Measurement of development is important from the point of view of understanding whether the economic activities within the economy is bringing any real change in the lives of the people involved. Besides, these measurement indices allow economists to compare not only where the company standards in the development path and which pattern they are on, but also compare the relative development of different countries. The most basic measure of development is generally the GDP followed by the per-capita income. But since these are very restricted to only measuring the economic standards, other indices have been developed to also bring in other factors which affect human life like life expectancy and literacy as well as health indicators. In this unit, we will learn about three development indices and their development: PQLI, HDI and Human Poverty Index.

3.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the development of the PQLI
- Describe the elements of HDI
- Discuss human poverty index and the newer development indices

3.2 HDI, PHYSICAL QUALITY OF LIFE INDEX AND HUMAN POVERTY INDEX

The dislike of per capita GDP as an indicator gave rise to a broad based definition of economic development and indicators of development. Various indicators started developing. One such indicator was the Physical Quality of Life Index (PQLI).

The index was developed by Morris D. Morris in 1979. According to him, income is only an input in the process of economic development and not the output in itself. Moreover, it also does not explain how the income is distributed in the society. He takes into consideration three broad indicators that help in explaining the quality of life of the people. These are literacy rate, life expectancy and the infant mortality rate. These three parameters help in understanding the changes in the basic life of the people during the process of economic development. Equal weight is assigned to each variable. The maximum and minimum values are measured on a scale of 0 to 10. The countries are then ranked as per the actual achievements in these three components. For instance, the minimum value of literacy rate is 0 and the maximum 100. Similarly, the lowest life expectancy was 39 years in Somalia and 76 in Canada. Similarly, the infant mortality rate was the highest in Bangladesh at 139 per thousand and the lowest in Denmark at 8 per thousand. Infant mortality rate is a negative index and hence the country with the lowest IMR will be ranked higher compared the country with higher IMR. The averages of the three give PQLI, the Physical Quality of Life Index.

Steps to calculate physical quality of life

The calculation of physical quality of life index involves the following steps:

Step 1: Find percentage of the population that is literate (literacy rate).

Steps 2: Find the infant mortality rate (out of 1000 births). [Indexed infant mortality rate = (166 – infant mortality) × 0.625]

Step 3: Find the life expectancy. [Indexed life expectancy = (Life expectancy – 42) × 2.7]

Step 4: Now calculate the physical quality of life using the following formula: Physical quality of life =

HDI

According to the Tenth Plan Report of the Government of India,

> Economic growth cannot be the only objective for national planning and indeed over the years, development objectives are being defined not just in terms of increases in GDP or per capita income but more broader in terms of enhancement of human well being. This includes not only an adequate level of consumption of food and other types of consumer goods but also access to basic social services especially education, health, availability of drinking water and basic sanitation. It also includes the expansion of economic and social opportunities for all individuals and groups, reduction in disparities, and greater participation in decision making.

Amartya Sen, the Nobel Laureate and one of the pioneers of the concept of human development, mentions:

> The basic purpose of development is to enlarge people's choices. In principle, these choices can be infinite and can change over time. People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more

secure livelihoods, security against crime and physical violence, satisfying leisure hours, political and cultural freedoms and a sense of participation in community activities. The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives.

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Development should be all encompassing, all nourishing and all pervading. Development objectives need to be defined not just in terms of increases in GDP or per capita income but in broader terms of the enhancement of human well-being.

UNDP also mentions that human development is a process of expanding people's choices in life. These choices can be infinite and can change over time. However, the three basic capabilities that are universally applicable are the capability to live a long and healthy life, capability to be knowledgeable and capability to acquire a decent standard of living. If these essential choices are not available, many other opportunities will remain inaccessible. HDI, therefore, incorporates only these three variables (UNDP 1994).

In view of the new dimension of the concept of human development, UNDP formulated the Human Development Index (HDI). HDI is a summary measure of human development that measures the average achievement in a country in three basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth (LEB).
- Knowledge, as measured by the adult literacy rate (with two-thirds weight) and combined primary, secondary, and tertiary gross enrolment rate.
- A decent standard of living as measured by GDP per capita (PPP US$).

For each of these three dimensions, an EDEP (equally distributed equivalent percentage) is calculated and HDI is calculated as a simple average of the three indexed EDEPs as shown in the Table 3.1.

Table 3.1 *Calculation of HDI*

Index	Measure	Minimum Value	Maximum Value	Formula
Longevity (L)	LEB	25 years	85 years	$LEB/LEI = \frac{Actual - Min}{Max - Minn}$
Education (E)	Literacy Rate (LR)	0 %	100 %	
	Combined Gross Enrollment Ratio (CGER)	0 %	100 %	
GDP	GDP per capita (PPP)	100 US$	40000 US$	$GDPI = \frac{logactual - logmin}{Logmax - logmin}$

In case of literacy rate 2/3 weight is assigned to Adult Literacy Rate and 1/3 weight is assigned to combined Gross enrolment ratio. Equal weight is given to all three variables viz., life expectancy, literacy rate and PPP PC GDP. HDI is then calculated as follows:

HDI= 1/3LEI+1/3 CGER +1/3 GDPI.

The value of HDI would lie between 0 and 1. Higher the value of HDI will indicate the achievement level of a country.

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Criticism

The Human Development Index has been criticized on a number of grounds, including failure to include any ecological considerations, focusing exclusively on national performance and ranking, not paying much attention to development from a global perspective and based on grounds of measurement error of the underlying statistics and formula changes by the UNDP which can lead to severe misclassifications of countries in the categories of being a 'low', 'medium', 'high' or 'very high' human development country. Other authors claimed that the Human Development Reports 'have lost touch with their original vision and the index fails to capture the essence of the world it seeks to portray'. The index has also been criticized as 'redundant' and a 'reinvention of the wheel', measuring aspects of development that have already been exhaustively studied. The index has further been criticized for having an inappropriate treatment of income, lacking year-to-year comparability, and assessing development differently in different groups of countries.

Economist Bryan Caplan, has criticized the inclusion of schooling in HDI with argument that: '[...] a country of immortals with infinite per-capita GDP would get a score of .666 (lower than South Africa and Tajikistan) if its population were illiterate and never went to school.'

Some economists discuss the HDI from the perspective of data error in the underlying health, education and income statistics used to construct the HDI. They identify three sources of data error which are due to (i) data updating, (ii) formula revisions and (iii) thresholds to classify a country's development status and find that 11 per cent, 21 per cent and 34 per cent of all countries can be interpreted as currently misclassified in the development bins due to the three sources of data error, respectively. The authors suggest that the United Nations should discontinue the practice of classifying countries into development bins because the cut-off values seem arbitrary, can provide incentives for strategic behaviour in reporting official statistics, and have the potential to misguide politicians, investors, charity donators and the public at large which use the HDI.

In 2010 the UNDP reacted to the criticism and updated the thresholds to classify nations as low, medium and high human development countries. In a comment to *The Economist* in early January 2011, the Human Development Report Office responded that they undertook a systematic revision of the methods used for the calculation of the HDI and that the new methodology directly addresses the critique in that it generates a system for continuous updating of the human development categories whenever formula or data revisions take place.

However, each year, UN member states have been ranked according to the computed HDI. If high, the rank in the list can be easily used as a means of national aggrandizement; alternatively, if low, it can be used to highlight national insufficiencies. Using the HDI as an absolute index of social welfare, some authors have used panel HDI data to measure the impact of economic policies on quality of life.

Ratan Lal Basu criticizes the HDI concept from a completely different angle. According to him, the Amartya Sen-Mahbub ul Haq concept of HDI considers that provision of material amenities alone would bring about human development, but Basu opines that human development in the true sense should embrace both material and moral development. According to him, human development based on HDI alone, is similar to dairy farm economics to improve dairy farm output. To quote: 'So human development effort should not end up in amelioration of material deprivations alone: it must undertake to bring about spiritual and moral development to assist the biped to become truly human.' For example, a high suicide note would bring the index down.

A few authors have proposed alternative indices to address some of the index's shortcomings. However, of those proposed alternatives to the HDI, few have produced alternatives covering so many countries, and that no development index (other than, perhaps, Gross Domestic Product per capita) has been used so extensively—or effectively, in discussions and developmental planning as the HDI.

Human Poverty Index (HPI)

The Human Poverty Index (HPI) measures the extent of deprivation in HDI's three dimensions. For industrialized countries, it uses as variables the probability of dying before age 60, functional illiteracy, and the incidence of poverty and long-lasting unemployment. For developing countries, its variables are the probability of death before age 40, adult illiteracy, child malnutrition, and the percentage of population with no access to drinking water.

Gender Development Index (GDI) and Gender Empowerment Measure (GEM)

Two global gender indices, namely the Gender Related Development Index (GDI) and Gender Empowerment Measure (GEM), were introduced in the Human Development Report 1995. GDI was also measured with the help of life expectancy, education and income, but it was measured after adjusting the HDI for gender inequality. The greater the gender disparity in basic human development, the lower would be a country's GDI compared to HDI.

GEM shows whether women are actively involved in political and economic field or not. It focuses on political participation, economic participation and power over economic resources.

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Three drawbacks of GDI and GEM, as pointed out by some critics, are as follows:

1. The measures combine absolute and relative achievements. Thus, a country with low absolute income scores poorly, even with perfect gender equity. The GDI adjusts the HDI for gender inequalities, thereby measuring both total achievements and disparities. However, it is often misinterpreted as reflecting only disparities.
2. Nearly all indicators in the GEM reflect a strong urban elite bias and use of some indicators which are more relevant to developed countries.
3. Extensive imputations were needed to fill in missing data. For the relative income share in both indices, more than three-fourths of a country's estimates were partly imputed. With income as the most important driver of the wedge between the HDI and the GDI, this imputation was particularly problematic.

Gender Inequality Index (GII)

HDR 2010 introduced a new measure named Gender Inequality Index (GII) in order to address the above criticisms. GII does not rely on imputations. It includes three critical dimensions for women: reproductive health, empowerment and economic activities or participation in labour market.

Check Your Progress

1. Who developed the Physical Quality of Life Index?
2. What is the range in which the value of HDI lies?
3. What does GEM show?

3.3 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Physical Quality of Life Index (PQLI) was developed by Morris D. Morris in 1979.
2. The value of HDI lies between 0 and 1.
3. GEM shows whether women are actively involved in political and economic field or not. It focuses on political participation, economic participation and power over economic resources.

3.4 SUMMARY

- The dislike of per capita GDP as an indicator gave rise to a broad based definition of economic development and indicators of development. It was

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found that per capita GDP can not be a measure to improve the life of the people at large. Various indicators started developing. One such indicator was the Physical Quality of Life Index (PQLI). The index was developed by Morris D. Morris in 1979.

- Morris took into consideration three broad indicators that help in explaining the quality of life of the people. These are literacy rate, life expectancy and the infant mortality rate. These three parameters help in understanding the changes in the basic life of the people during the process of economic development.
- HDI is a summary measure of human development that measures the average achievement in a country in three basic dimensions of human development:
  - o A long and healthy life, as measured by life expectancy at birth (LEB).
  - o Knowledge, as measured by the adult literacy rate (with two-thirds weight) and combined primary, secondary, and tertiary gross enrolment rate.
  - o A decent standard of living as measured by GDP per capita (PPP US$).
- For each of these three dimensions, an EDEP (equally distributed equivalent percentage) is calculated and HDI is calculated as a simple average of the three indexed EDEPs.
- The value of HDI would lie between 0 and 1. Higher the value of HDI will indicate the achievement level of a country.
- The Human Development Index has been criticized on a number of grounds, including failure to include any ecological considerations, focusing exclusively on national performance and ranking, not paying much attention to development from a global perspective and based on grounds of measurement error of the underlying statistics and formula changes by the UNDP which can lead to severe misclassifications of countries in the categories of being a 'low', 'medium', 'high' or 'very high' human development country.
- The Human Poverty Index (HPI) measures the extent of deprivation in HDI's three dimensions. For industrialized countries, it uses as variables the probability of dying before age 60, functional illiteracy, and the incidence of poverty and long-lasting unemployment. For developing countries, its variables are the probability of death before age 40, adult illiteracy, child malnutrition, and the percentage of population with no access to drinking water.
- GDI was also measured with the help of life expectancy, education and income, but it was measured after adjusting the HDI for gender inequality. The greater the gender disparity in basic human development, the lower would be a country's GDI compared to HDI.

- GEM shows whether women are actively involved in political and economic field or not. It focuses on political participation, economic participation and power over economic resources.
- GII does not rely on imputations. It includes three critical dimensions for women: reproductive health, empowerment and economic activities or participation in labour market.

3.5 KEY WORDS

- **PQLI:** It includes the three measures literacy rate, life expectancy and the infant mortality rate which help in understanding the changes in the basic life of the people during the process of economic development.
- **HDI:** It is a summary measure of human development that measures the average achievement in a country in three basic dimensions of human development: capability to live a long and healthy life, capability to be knowledgeable and capability to acquire a decent standard of living.
- **Human Poverty Index (HPI):** It measures the extent of deprivation in HDI's three dimensions.

3.6 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What were the dimensions that were not explained by income which led to the development of PQLI?
2. List the dimensions which constitute as the summary measure for HDI.
3. What are the variables used by Human Poverty Index for industrialized and developing countries?
4. Differentiate between the GDI and GEM.
5. What is Gender Inequality index?

Long Answer Questions

1. Explain the development and steps in calculating the PQLI.
2. What is HDI? Discuss the criticism against it.

3.7 FURTHER READINGS

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UNIT 4 THEORIES OF GROWTH - I

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Structure

4.0 INTRODUCTION

This unit will introduce you to the theories of development. There are many theories on how desirable change in society can be achieved, such as the Classical Theory, the development theory of Karl Marx, the Creative Destruction Theory of Joseph Alois Schumpeter, and others.

Classical economics is widely regarded as the first modern school of economic thought. Major developers of classical theory of development include Adam Smith, Jean-Baptiste Say, David Ricardo, Thomas Malthus and John Stuart Mill. These economists were largely concerned with the dynamics of economic growth of a capitalist economy. According to them, population growth and capital accumulation are the prerequisites for growth. The forces of diminishing returns and technological advancements determine the pace of economic growth.

According to the Marxian theory of development, human civilization has manifested itself in a series of organizational structures, each determined by its primary mode of production, especially the division of labour that dominates in each of the four stages of development: tribal stage, primitive communism stage, feudal stage and capitalist stage. During the tribal stage, a slave culture was established. As the population increased, there occurred the growth of wants and the growth of relations with outside civilizations (through war or barter). During the primitive communism, the concept of private property began to develop. Like tribal and communal ownership, feudalism was based again on a community; but

the directly producing class standing over against it was not the slaves, but the enserfed small peasantry. In the city, the feudal structure manifested itself in trade guilds. As a result of the eventual growth of commerce (and of human populations), feudal society began to accumulate capital, which, along with the increased debt incurred by the aristocracy, eventually led to the English Revolution of 1640 and the French Revolution of 1789. These Revolutions opened the way for the establishment of a society structured around commodities and profit (i.e., capitalism).

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Schumpeter, an Austrian-Hungarian-American economist and political scientist, popularized the term 'Creative Destruction' in economics. While he agreed with the Marxian theory that capitalism will collapse and will be replaced by socialism, he was of the opinion that this will not come about in the way Marx predicted. To describe it he borrowed the phrase 'creative destruction'. According to the theory of creative destruction, the success of capitalism will give rise to a type of corporatism and encourage values unsympathetic to capitalism, particularly among intellectuals. The intellectual and social climate, which is the key to allow entrepreneurship to prosper, will cease to exist in advanced capitalism. Capitalism will be replaced by socialism in some form. Schumpeter does not predict a revolution; but he merely oversees the emergence of a trend in parliaments to elect social democratic parties of one line or another.

4.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the classical theory of development
- Examine Karl Marx's theory of creative destruction
- Discuss Schumpeter's theory of economic development

4.2 CLASSICAL THEORY OF DEVELOPMENT

The classical school of thought in economic development includes economists such as Adam Smith, David Ricardo, Thomas Robert Malthus, J.B. Say and J.S. Mill. The classical economists explain the process and causes of long run growth in national income.

The basic approach and the broad framework in which the classical theories have been propounded is similar in most of the writings. Hence, a general framework of the classical theory is undertaken here. An important assumption in the classical theory is that of laissez-faire, i.e., no government interference. Smith argued that economy should be left free and be guided by the invisible hand, i.e., the market forces.

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According to the classical economists, accumulation of capital is an important factor determining growth. Capital that includes tools, equipment and machines helps in boosting production. Capital formation facilitates specialization and division of labour.

In the classical theory, there are three factors of production, viz., land, labour and capital and hence, the production function would be:

$$Q = f(k, l, n) \quad ...(4.1)$$

where, Q is the amount of output,

k is the stock of capital,

l is the amount of labour, and

n is the amount of land

The classical economists assumed a linear and homogeneous production function which meant that any change in the amount of factors of production is followed by an equal amount of production. Adam Smith anticipated increasing returns in scale owing to division of labour. He argued that the cost of production tends to decrease with increase in production. With increase in production, the size of market extends and economies of scale occur. The division of labour is limited by the extent of market.

Adam Smith recognizes the importance of technology in the process of growth as it leads to rise in productivity. Hence, in the overall production function technology is an important factor. The new production function would then be,

$$Q = f(k, l, n, S) \quad (4.2)$$

where S is the level of technology

In his *Wealth of Nations*, he explains,

> The owner of the stock which employs a great number of labourers, necessarily endeavours, for his own advantage, to make such a proper division and distribution of employment that they may be enabled to produce the greatest quantity of work possible. For the same reason, he endeavours to supply them with the best machinery which either he or they can think of. What takes place among the labourers in a particular workhouse takes place, for the same reason, among those of a great society.

Hence, technology plays a very important role in the process of growth and as the stock of capital increases in an economy technological know-how will continue to increase. This will also help in preventing output per labour or labour productivity to decline. The classical theory also considered profit as an important source of saving as capital accumulation profits are sort of residual received after making payments to land, labour and capital (i.e., paying rent, wages and interest). These are received by those who are willing and able to save. So long as profits are rising, savings too will rise which will be used for further capital accumulation or investment.

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The classical economists further argued that the competition among the producers or the capitalist class will result in the decline in profits. Further, the national resources being limited in supply will also narrow down the profitability. In the long run, the market will be in a stationary state or situation of no growth.

To summarize the classical approach to growth, in a less developed economy, the capital accumulation takes place. This enhances the stock of capital in the following period through increased investment. Hence, growth will take place with increase in investment. This results in the division of labour and expansion of market thus leading to increase in output and national income. But this is not an endless process. Scarcity of natural resources and exhaustion of profits due to competition drives the economy into a stationary state, characterized by stable income and output, subsistence wages, elimination of profits, no further investment. Figure 4.1 explains this process.

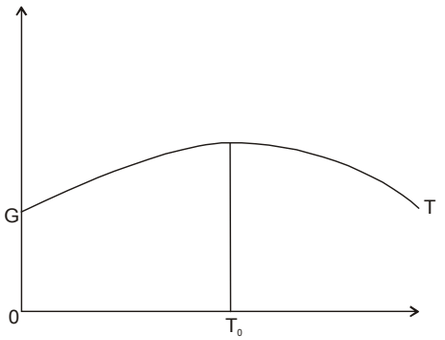

Fig. 4.1 *Classical Approach in a Less Developed Economy*

In the figure, X-axis represents the time line and the Y-axis shows the rate of capital accumulation. The curve GT shows the path of economic progress. Economy reaches a situation of stationary state at which the rate of capital accumulation and income are constant.

Critical Evaluation

The classical theory of growth has contributed towards an understanding of the factors determining the growth of an economy. The classicists argue that basically, it is the rate of investment that will lead to the division of labour, specialization and expansion of market. The classical theory further argued that profit is an important source of savings and investment. However, the later economists argue that it is not necessary that profit can be the only source of savings and investment. There can be other sources as well. These may be the savings out of the income of the middle class or the government savings too. Hence, according to these economists, the concept of profit adopted in the classical theory is severely limited. Moreover, the classical theory assumes that savings are always equal to investment but this is not necessarily true. At times, investment may be less than the savings whenever there are leakages. At other times, investment may be more than the savings. According to Schumpeter this is due to the credit creation by the banking system.

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Another criticism of the classical theory relates to the assumption of laissez-faire or non-governmental interference which seemed quite unrealistic; particularly in the present times, there are certain sectors where the government interference is imminent. The growth of these sectors such as education, health, water and sanitation or even building up of infrastructure or even removal of income inequalities and poverty are important for the growth of economy and society. However, market will not enter into this sector either because of long gestation period or due to low or no profitability. Therefore, the government has to intervene. Even during the early stage of growth, the government has to incur investment to give boost to the economic activities.

Check Your Progress

1. Who are some of the noted economists associated with classical school of economic development?
2. What is the significance of a linear and homogenous production function?
3. Why is the classical theory's support for laissez-faire government criticized?

4.3 KARL MARX'S THEORY OF CAPITALIST DEVELOPMENT

Marxian theory of development is based on the premise of the nature of production function, technological progress and the way the process of capital accumulation takes place. All these together influence the wage rate determination and accumulation of profit in the economy thereby consequent upon the dynamic behaviour of the economy.

In his *Das Kapital*, Marx maintains that the production of goods takes place under the control of a capitalist and on his behalf, does not alter the general character of that production. According to him, labour is a process in which both man and nature participate. He argues that the labour power gives value to a commodity produced. However, the unearned income of the labour is retained by the capitalist as profit. Karl Marx terms this as the exploitation of labour. This injustice caused to the labour class can be eliminated only when the factors of production are transferred from the capitalist to the working class.

According to Marx, technology inevitably replaces labour and machines help the capitalist to earn greater profits. Thus, technological advancement results in increase in unemployment and furthering accumulation of capital. But this will also result in the reduction of investment opportunities and rate of profit. Therefore, the ruling capitalist class becomes an imperialist class. Under capitalism, income inequalities will grow. Growth would be unbalanced and business cycles would be more violent due to increase in unemployment, poverty and under consumption among the masses. The working class will revolt against the capitalist class thereby resulting into an end of capitalism and rise of communism.

The theory of development is based on certain assumptions such as the capital accumulation, technological progress and the production function.

4.3.1 Materialistic Interpretation of History

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According to Karl Marx, the foundation and evolutionary cause of all social life is materialism. Historical development is determined and influenced by the economic condition and non-economic forces have very little influence on these events. The mode of production determines the general character of social and political process of life and the class structure is related to the relations of production which is characterized by the following:

- Division of labour in a society, skills possessed by the labour in the social content with respect to degree of freedom
- Knowledge about the availability of resources in the economy
- Technological progress

According to Marx the entire history of human kind is divided into four different social systems.

- Primitive communism
- Slave age
- Feudalism
- Capitalism

During the age of primitive communism, the factors of production belong to the community which also enjoys control over the resources. Individuals utilize the resources as per their needs. But in the other stages, the control of resources is restricted to a smaller class. This class also controls the society. The society gets divided into two classes, viz., the **dominant class** and the **depressed class**. Such a kind of division of society also creates tensions and conflicts. Hence, the control of resources results into a change in the structure of the society. But the basic structure relates to production, exchange and distribution. This also influences the shape of life. Friedrich Engels mentions that the ultimate cause of social change and political revolution is sought in the mode of production and exchange.

4.3.2 Surplus Value

According to Karl Marx, labour is the only source of value of a community. The factors of demand and supply determine the value of a commodity only in the short run but in the long run the amount of labour used in the production of a commodity determines this value.

Karl Marx divides the society in two classes, viz., the working class and the capitalist class. The capitalist class owns the resources and purchases labour services from the working class and the working class sells its labour to the capitalists. The commodity produced by the labour is sold at a price in the commodity market

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and the labour is paid some wages for producing the commodity. The difference between the price by the commodity and the wages paid to the labour is the surplus value which is retained by the capitalist. According to Marx, capitalists are interested in producing those goods and services that generate more surplus value for them rather than socially useful commodities. Thus capitalism believes in the exploitation of labour which is nothing but the surplus value generated by the workers. The surplus value generated by the labour during the process of production is used by the capitalist class for reinvestment which furthers the process of production under capitalism.

The capitalist tries to increase the surplus value which leads to the capitalist development. Hence, it is the surplus values generated by the labour class which has a great role to play in the development of a society.

4.3.3 Process of Production

According to Karl Marx, it is the process of production in an economy that determines the evolution of society. Under capitalism, the value of a commodity consists of three elements. These are the **constant capital**, **variable capital** and **surplus value**. The constant capital represents machinery and material and remains constant during the process of production. Labour power represents the variable capital and changes with production. Finally, the surplus value is the value added to the production which according to Marx is equal to the profit. This occurs because the worker is not paid wages equal to the amount of value added during the process of production, but only subsistence wages.

If we suppose that the following is the production function:

$$Q = f(K, N, L, T, Z) \quad (4.3)$$

where Q is the amount of output

K is the capital stock

N is the amount of land

L is the amount of labour

T is the technical knowledge and technical interaction representing relations of production Z is the entire socio-cultural and institutional set-up of the society Accordingly,

$$Q = (\alpha + \beta)\, L + yK + nN \quad (4.4)$$

where, a L is the variable capital (v)

b L is the surplus value (Sv)

and (yK + nN) is constant capital (c).

Since, yK and nN are not separate amount

Thus,

$$Q = (\alpha + \beta)\, L + yK \quad (4.5)$$

where yK is K + N

The coefficients of production (α, β and y) are responsive to the changes in the relations of production and thus are not fixed over a period of time. In the Marxian theory, changes in the techniques of production is not autonomous. As Marx puts it, the additional capital termed in the course of accumulation serve mainly as vehicles for the accumulation of new inventions and discoveries, or of industrial improvements in general. An increase in the amount of gross investment is shown by the rate of change of the relations of production. Any change in technology displaces labour, that is c/v rises over a period of time due to increase in gross investment. This is known as the organic composition of labour change in the stock of variable capital determines the demand for labour. Gross investment also determines the labour capital ratio.

The supply of labour is exogenous and increases with an increase in population. Because technology displaces labour, with change in technology, unemployment will increase and create a 'reserve army of labour'. This reserved army of labour facilitates movement of capital between the new and traditional production activities. It also influences the bargaining power of labour and thereby the amount of money wages. This results in exploitation of labour. Hence, with growth of capitalism, there is a progressive deterioration in the conditions of the labour class. According to Marx, 'with the progress of industry, the modern labour sinks deeper and deeper below the conditions of existence of his own class, becomes a pauper and pauperism develops more rapidly than population and wealth.'

Capital Accumulation

The rate of capital accumulation is an important determining factor of economic growth in the Marxian theory. Marx argues that the quantity of accumulated capital is determined by the surplus value generated during the process of production. This is due to the fact that the wages received by the workers are spent for consumption. There is reinvestment in the society so as to maintain the stock of capital. Thus, 'all the circumstances that determine the mass of surplus value operate to determine the magnitude of accumulation.'

Another factor contributing to the accumulation of capital is the productivity of labour. As productivity of labour rises, the surplus value generated by labour increases and therefore results into accumulation of capital. The capitalist forms the elite class in the society as he is the owner of the capital. Higher the amount of capital owned by a capital, higher is the position power and prestige in the society. As Marx puts it, 'to accumulate is to conquer the world of social wealth, to increase the mass of human being exploited by him, and thus to extent both the direct and indirect sway of the capitalist.' The capitalist who has more advanced and efficient technology is also the one who is able to generate larger amounts of surplus and therefore is able to accumulate larger amount of capital.

After accumulating large amounts of capital, the capitalist spends on luxury and conspicuous consumption, may be due to necessities of business show off

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that may add to prestige. This kind of expenditure grows with the growth of accumulated capital. The motive behind this kind of lavish and wasteful expenditure is also to accumulate more capital.

The tendency to accumulate capital is normal and important features of the working of capitalism. This results in the emergence and expansion of huge enterprises that gain importance in the economy. This stimulates the concentration of capital in a capitalist society and gradually results into the emergence of monopoly power. Gradually, this results into monopoly capitalism and imperialism. But at the same time, the process of socialization of production is promoted, i.e., a large group of workers begin to work together. This provides material condition for transition to socialism.

One important aspect of capital accumulation under capitalism that Marx mentions is the **cyclical nature of accumulation**. There are cyclical crises from one period to another resulting into another kind of crisis. At times, there is a situation of overproduction or underconsumption or there may be an underutilization of the capacity resulting in underproduction. There are phases of depression, recession, recovery and boom through which the economy passes. When capitalism exhausts its progress there is a collapse of the system and is replaced by a superior form, i.e., socialism as a result of high level of unemployment, poverty and growing inequalities.

Critical Evaluation

The Marxian theory of economic development has been criticized on several grounds. Some of these have been discussed as under:

- Marx argues that there is a tendency for the profit to fall as the organic composition of capital rises. But Paul Sweezy argues that as organic composition of capital rises, labour productivity increases. But this should have the effect of creating an industrial reserve army of labour which results into lowering of wages which in turn raises the rate of surplus value. Since both the composition of capital and the rate of surplus value are variable, the rate of profit would be indeterminate, though falling rate of profit is a basic feature of capitalism.
- The Marxian theory has also been criticized on the ground that at best it can be a synthesis of the historical evolution of the society during the process of economic growth but cannot be a theory of economic growth.
- Marxian theory has been criticized in respect to the wages and poverty among the working class. He argues that under industrial capitalism wages tend towards subsistence level. However, the evidences are that in the industrial societies, wages have had the tendency of upward movement.
- Another important criticism of the Marxian theory pertains to his assumption about the collapse of the capitalist system being replaced by socialism.

Though revolutions have taken place in some countries such as Russia and China it is not simple to carry through a socialist transformation in the industrially advanced countries as the employment and wage levels are high. Ernest Mandel has also argued that there has been a straight line progressive evolution in the world starting from the first stages of fruit gathering and ending with the most advanced capitalist or socialist industry.

- The recent experiences with former USSR, China and the East European countries have shown that the social ownership of the factors of production and production decisions have resulted into growing inefficiencies in the economy and the collapse of the system. There have been government failures resulting into collapse of economies.

  Despite these criticisms the Marxian theory is relevant from the point of view of the historical evolution of a capitalist society.

Check Your Progress

4. Which are the three aspects of the value of a commodity for capitalists?
5. Which are the two classes society can be divided into, as per Marx?

4.4 SCHUMPETER THEORY

Joseph A. Schumpeter in his *Theory of Economic Development* provides an analysis of the origin, operation and evolution of a capitalist economy. But his approach is more of an explanation of the phases of business cycles rather than a theory of economic development. With his concepts of 'innovation' and 'entrepreneur', Schumpeter provides a penetrating analysis of the dynamics of capitalism. However, his analysis is important in understanding the earlier phase of a capitalist society during the process of economic development.

4.4.1 Entrepreneur and Innovations

The entrepreneur in Schumpeter's theory plays an important role. It is the entrepreneur who introduces innovations, causing shift in the production function. Schumpeter begins his analysis with a stationary state. A stationary state is a situation in which there is no population growth, no investment and no profit. With this assumption, production takes on a circular form, i.e., it repeats itself. The value of the products determines the rewards to the various factors of production. The entrepreneur brings a change in such an equilibrium position. Here, the bank credit plays an important role. This entrepreneur who is willing to take risk introduces some innovations.

New products are introduced in the market. Innovation adds value to the product which exceeds the value of the factors of production. Thus, there is a surplus profit generated by the entrepreneur who has pioneered the product in the

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market. Inspired by the profit of the entrepreneur other firms enter into the market and output increases.

According to Schumpeter, innovations can take any of the five forms, viz., adopting a new method of production, introduction of a new commodity or a new quality of a commodity, locating new sources of supply, locating new market or even reorganization of an industry such as monopoly.

Schumpeter's entrepreneur has the risk bearing capacity and also has the qualities of leadership. His concept of an entrepreneur was quite different from the Marshallian concept of an entrepreneur who played the role of only an organizer. But Schumpeter asserts that the entrepreneur is not necessarily a manager of a firm or the organizer of the various factors of production but the most distinguishing function of an entrepreneur is to carry out innovation or discontinuous technological changes resulting in development. He explains,

> Because being an entrepreneur is not a profession and as a rule not a lasting condition, entrepreneurs do not form a social class in the technical sense, as for instance, land owners or capitalists or workmen do. Of course, the entrepreneurial function will lead to certain class position for the successful entrepreneur and his family.

An entrepreneur is not necessarily motivated by profit but is rational in his approach, which is important in carrying out new plans for breaking up old traditions and creating new ones. He identifies three motivating factors for an entrepreneur to undertake a business. These are: (i) the firm desire to set up a private business kingdom, (ii) will to conquer, the impulse to fight, to prove oneself superior to others, to success for the sake, not of the fruits of success, but of success itself and (iii) the pleasure of creating or doing something or simply of exercising one's energy and ingenuity.

Further, he mentions that the social climate in an economy has an influence on the entrepreneurial activities. There has to be a social climate where widespread entrepreneurial activities can flourish. There should be complete freedom to the entrepreneur to grow. During the initial phase of industrialization, it is the self interest that motivates a person. However, capitalism develops rationality and adds new edge to it in two ways. As Schumpeter puts it:

> First it turns the monetary unit into a tool of rational cost profit calculations which, in turn, react upon that rationality. By crystallizing and defining numerically, cost profit calculations forcefully propel the logic of enterprise. Secondly, apart from developing the modern scientific attitudes, the emerging capitalism also produces the men eager to innovate.

4.4.2 Bank Credit

Another important element in Schumpeter's analysis is the bank credit. Bank credit is important in giving freedom to the entrepreneur to take risks involved in undertaking innovations. With personal savings, the entrepreneur will not undertake any risk. It is the bank that promotes and shows the risk in addition to the ready

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availability of the credit. This kind of investment financing results into inflationary situations as the income starts increasing before the actual production of consumer goods takes place. Hence, people are forced to save and these amounts are available to the investors for investment purposes. According to Schumpeter, this is an inflationary process. The situation is self-correcting. Once production takes place, the supply of consumer goods increases due to cumulative expansion of output in the initial and secondary phases.

The credit in an economy ensures the smooth flow of money which is mandatory to the smooth functioning of business and individual households. Moreover, the role of credit becomes more significant in case of huge requirement of funds by both industry and individuals. But it should also be taken care of that the expansion of credit must be coupled by increase in revenue. More credit means more flow of 'future' money which is unearned.

The demand created by individuals is out of their disposable income. With more flow of money through credit, it may create artificial increase in demand and it cannot be sustained for long periods because the disposable income of individuals is not real. On the other hand, there will be spikes in supply side with more availability of funds. This unreal demand and supply will result in economic disequilibrium whenever there is constraint on the credit flow. Other aspect of credit flow is that when repayment of credit flow takes place then there is loss of revenue to economy. Therefore, even if the companies do extend credit to their customers for three months then it may increase demand at once but when the repayment will be done by the customers then it will surely compress the demand by customers. Such tendencies in an economy are not considered good because more demand at one point of time and lesser demand at another point of time will not cause growth in the economy. Moreover, the assumption on which process of credit supply is based, which is that the revenue generated from more demand by increasing credit will be reinvested, may not work all the time.

Therefore, the credit supply is an important parameter which can cause disequilibrium or equilibrium in economic activities of an economy and so it must be dealt with utmost care.

4.4.3 Cumulative Process and Creative Destruction

The process of production initiated by an entrepreneur is cumulative. Initially, there is primary increase in the production of goods in the industry in which innovation has taken place. Inspired by the supernormal profit, other entrepreneurs also enter into the industry which results into further increase in output. However, the innovations in one industry do not remain confined to that industry alone. Other industries imitate the pioneers and the production rises there too. Thus, according to Schumpeter, innovations come in clusters and spread to many industries. This primary expansion in output gives rise to increase in production in the already existing industries with existing modes of production. Rising prices and increasing

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income of the people emanates impulses and the demand for consumer goods increase. It is this expanding nature of production that makes growth cumulative. However, the process of growth is not continuous. It reaches its limits and then starts again. It reaches a limit when the environment for further innovational investment is not favourable. There are two reasons for this. Firstly, the credit expansion which is responsible for much of the investment reaches a ceiling. There are repayment obligations on the part of the entrepreneur which restrict further expansion. Secondly, with the primary and secondary expansion of production, there is a glut in the market which results in lowering of prices and money income. Thus, there is a higher risk involved in innovations which affect further entrepreneurial activities and therefore has an impact on secondary production activities.

Thus, the economy experiences a slump in the economic activities leading to a recessionary situation. The economy gradually starts moving out of the recessionary situation as the weak entrepreneurs leave the market during the adjustments and a new stage is set for further innovative activities and the economy is again on a growth path. This leads to upward and downward movements in the economy which are cyclical in nature as shown in Figure 4.2.

The secondary wave is superimposed on the primary wage, with favourable climate for innovation, development proceeds in the prosperity phase, when the recession begin, the cycle moves downward below the equilibrium path and ultimately a new phase of growth begins with new innovations.

4.4.4 End of Capitalism

Schumpeter's theory predicts that capitalism is destined to destroy itself. The reason is its success. The expansion of output under capitalism can continue endlessly. But the system is eliminated as the economic success of the development front undermines the social institutions that constitute a capitalist society. During the process conditions that are hostile for the continuance of the capitalist system are created. The very motivation of the entrepreneur who is the agent of growth gets eroded. Thus, capitalism is replaced by socialism.

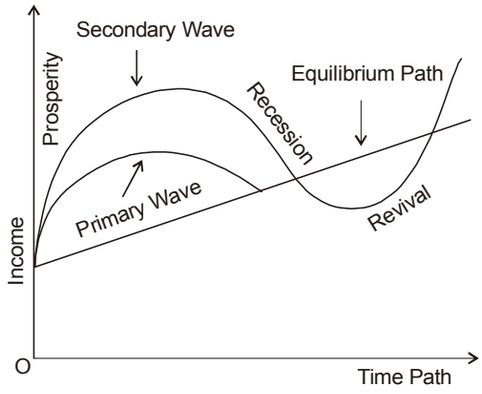

Fig. 4.2 *Cyclical Patterns in the Schumpeter's Theory*

Critical Evaluation

Though Schumpeter's theory is quite relevant in the real world and regarded as a major analytical approach to economic growth, the theory has been criticized on the following grounds.

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- The theory overlooks the problem of economic development as that of capital accumulation and deals with the growth in general.
- The theory is in appropriate in the present day context because of the changes that have taken place in the present times. There is no single individual who can be identified as being responsible for undertaking innovations. They are normally being undertaken by the firms where a group of individuals are involved.
- Research and development in the present times is no more considered risky. Rather, it is considered as a part of investment.
- The creative destruction as mentioned by Schumpeter is no more valid in the present day context as the large size firms are easily able to absorb the shocks of readjustments.
- Schumpeter's idea about the collapse of capitalism and its replacement by socialism is also subject to criticism. The decline of entrepreneurial activities alone cannot do much harm to capitalism. There may at times be some changes in the system but not the collapse of the system as a whole.

Check Your Progress

6. What is stationary state, as per Schumpeter?
7. What makes growth cumulative in an economy?
8. State any one limitation of Schumpeter's theory.

4.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The classical school of thought in economic development includes economists such as Adam Smith, David Ricardo, Thomas Robert Malthus, J.B. Say and J.S. Mill.
2. The classical economists assumed a linear and homogeneous production function which meant that any change in the amount of factors of production is followed by an equal amount of production.
3. The criticism of the classical theory for the assumption of laissez-faire or non-governmental interference seemed quite unrealistic to critics; particularly in the present times, where there are certain sectors where the government interference is imminent. The growth of these sectors such as education,

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health, water and sanitation or even building up of infrastructure or even removal of income inequalities and poverty are important for the growth of economy and society. However, market will not enter into this sector either because of long gestation period or due to low or no profitability. Therefore, the government has to intervene.

4. Under capitalism, the value of a commodity consists of three elements. These are the constant capital, variable capital and surplus value. The constant capital represents machinery and material and remains constant during the process of production. Labour power represents the variable capital and changes with production. Finally, the surplus value is the value added to the production which according to Marx is equal to the profit.
5. Karl Marx divides the society in two classes, viz., the working class and the capitalist class. The capitalist class owns the resources and purchases labour services from the working class and the working class sells its labour to the capitalists.
6. A stationary state is a situation in which there is no population growth, no investment and no profit. With this assumption, production takes on a circular form, i.e., it repeats itself. The value of the products determines the rewards to the various factors of production.
7. The process of production initiated by the entrepreneur is cumulative. Initially, there is primary increase in the production of goods in the industry in which innovation has taken place. Inspired by the supernormal profit, other entrepreneurs also enter into the industry which results into further increase in output. However, the innovations in one industry do not remain confined to that industry alone. Other industries imitate the pioneers and the production rises there too. This leads to cumulative growth.
8. One of the limitations of Schumpeter's theory is that it overlooks the problem of economic development as that of capital accumulation and deals with growth in general.

4.6 SUMMARY

- The classical school of thought in economic development includes economists such as Adam Smith, David Ricardo, Thomas Robert Malthus, J.B. Say and J.S. Mill.
- An important assumption in the classical theory is that of laissez-faire, i.e., no government interference. Smith argued that economy should be left free and be guided by the invisible hand, i.e., the market forces.
- Marxian theory of development is based on the premise of the nature of production function, technological progress and the way the process of capital accumulation takes place. All these together influence the wage rate

determination and accumulation of profit in the economy thereby consequent upon the dynamic behaviour of the economy.

- According to Marx, technology inevitably replaces labour and machines help the capitalist to earn greater profits. Thus, technological advancement results in increase in unemployment and furthering accumulation of capital.
- Karl Marx divides the society in two classes, viz., the working class and the capitalist class. The capitalist class owns the resources and purchases labour services from the working class and the working class sells its labour to the capitalists.
- With his concepts of 'innovation' and 'entrepreneur', Schumpeter provides a penetrating analysis of the dynamics of capitalism. The entrepreneur in Schumpeter's theory plays an important role. It is the entrepreneur who introduces innovations, causing shift in the production function.
- An entrepreneur is not necessarily motivated by profit but is rational in his approach, which is important in carrying out new plans for breaking up old traditions and creating new ones.
- Schumpeter's theory predicts that capitalism is destined to destroy itself. The reason is its success. The expansion of output under capitalism can continue endlessly. But the system is eliminated as the economic success of the development front undermines the social institutions that constitute a capitalist society.

4.7 KEY WORDS

- **Capitalist Class:** Who owns resources and purchases labour services from the working.
- **Stationary State:** A situation in which there is no population growth, no investment and no profit.

4.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Which are the three factors of production in classical theory?
2. Which are the two main criticisms garnered by the classical theory?
3. What is the materialistic interpretation of history?
4. Write a short note on the concept of creative destruction as described by Schumpeter.

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Long Answer Questions

1. Summarize classical approach to growth in a less developed economy.
2. Explain the process of production as described by Karl Marx.
3. Examine the concept of capital accumulation as described by Karl Marx.
4. Discuss the role of an entrepreneur in Schumpeter's theory.

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UNIT 5 THEORIES OF GROWTH - II

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Structure

5.0 INTRODUCTION

There have been many prominent economists who have contributed to developing economic theories that have resulted in a sustained and constant economic growth. The main purpose of these theories is to affect a growth in the economic productivity. We have already seen the classical model, Marxian perspective and Schumpeter's theory in the previous unit. In this unit, we take the discussion forwards and, you will learn about three models of economic growth: Robinson's model, Kaldor's model and Harrod-Domar's model.

The Joan Robinson assumes that there is a laissez-faire closed economy. Capital and labour are the two factors of production. National income is distributed between the two classes of an economy, namely workers and entrepreneurs. The model of Nicholas Kaldor follows the Harrodian dynamic approach and the Keynesian techniques of analysis. It attempts 'to provide a framework for relating the genesis of technical progress to capital accumulation'. Other neoclassical models, on the other hand, treat the causation of technical progress as completely exogenous. According to Kaldor, 'The purpose of a theory of economic growth is to show the nature of non-economic variables which ultimately determine the rate at which the general level of production of economy is growing, and thereby contribute to an understanding of the question of why some societies grow so much faster than others.'

The Harrod-Domar Growth model, developed in the late 1930s, explains how growth has occurred and how it may occur again in the future. It states that the rate of growth of GDP is determined by the savings ratio (the marginal propensity to save) in the economy and the capital output ratio (the amount that has to be spent on capital to produce a given worth of national output. Thus, the rate of growth in an economy can be increased in one of two ways, namely increasing the level of savings in the economy or reducing capital-output ratio.

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The neo-classical growth model is an extension to the Harrod–Domar model (discussed in the previous unit) that included a new term: productivity growth. However, this model has been criticized on the ground that increasing the savings ratio, especially in developing countries, may not always be easy. This is due to the fact that the majority of developing countries have low marginal propensities to save. Whatever extra income such countries gain is usually spent on procuring new assets. When the developing economies deviate even slightly from the natural growth rate, the consequences would be either growing unemployment or prolonged inflation. The reason for this is that such economies have no built-in equilibrating force. Further, the Harrod-Domar model assumes fixed proportions in the combination of capital and output, which does not always hold good. As a result, an alternative model—the Neo-Classical Growth Model —has been developed in which factor proportions are flexible and all rigidities are assumed away.

Neo-classical growth theory is an economic theory that summarizes the method in which a steady economic growth rate can be achieved with suitable proportions of the three dynamic forces: labour, capital and technology. The hypothesis affirms that by altering the quantity of labour and capital in the production function, a balanced condition can be achieved. When a new technology is available, labour and capital should be synchronized to sustain the economic growth equilibrium.

The neo-classical growth model, also referred to as the Solow's model, is an alternative workhorse of macroeconomics. This model gives clarity on the future scenario of economic growth. It covers areas like:

- The reasons for high incomes
- The reasons for extreme variances in incomes in different nations

Thus, the neo-classical growth model is a macro model in which the long-term rate of progress of output per employee is established by the rate of technological progress that is external.

In the steady-state equilibrium, there can be consistent economic development only if there is technical development. An economy will evolve as a state of increased consistency if there is a rise in its degree of accumulation or a reduction in its rate of population expansion.

The neo-classical growth theory broadly revolves around the equilibrium of an aggressive economy through time. It emphasizes on capital accumulation, population expansion and technological development. It differentiates between transitory equilibrium (when the capital stock, the operational people and the technological expertise are fixed) and long-term equilibrium (when any of these elements are not specified). Long-term equilibrium is not a series of momentary equilibria, since it exemplifies the logical anticipation of economic instruments. The philosophy does not have much data about the exuberance that may ascertain an economy's prospective development rate, but it offers a sound foundation for venturing into the learning of specific economies.

5.1 OBJECTIVES

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After going through this unit, you will be able to:

- Discuss the Robinson model of growth
- Examine the Kaldor model of growth
- Evaluate the Harrod-Domar model and instability of equilibrium
- State the essentials of the theories of economic growth
- Explain the neo-classical growth theory
- Prepare a general overview of the neo-classical growth model
- Discuss Solow's model

5.2 ROBINSON'S MODEL OF GROWTH

In her book entitled *The Accumulation of Capital*, published in 1956, Joan Robinson expressed her views on the economic growth.

Assumptions of Robinson's growth model

The following are the assumptions that Robinson's model of growth is based on:

(i) A closed economy prevails.

(ii) There is no government interference.

(iii) There are two factors of production viz., labour and capital.

(iv) There are no savings by the labour class. It is the business class that saves and invests.

(v) The labour capital ratio is given and there are constant returns to scale.

Working of Robinson's Model of Economic Growth

Since the economy is divided into two sectors i.e., the labour and the business class and

$$Q = F(L, K) \quad ...(5.1)$$

so the income of the economy is also distributed between these two classes. This can be mathematically expressed by the following equation:

$$pQ = wL + \Pi pK \quad ...(5.2)$$

where Q is the total output of the economy, L is the amount of labour and K is the amount of capital. This means that production is dependent on the amount of labour and capital used. 'p' here denotes the average price. Accordingly, pQ is the average price of output and pK is the average price of capital whereas W is the wage rate and P is the gross profit.

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Dividing both sides of the equation by p, in real terms:

$Q = W/P\ L + \Pi K$ ...(5.3)

Therefore, the profit would be:

$\Pi = Q - W/P\ L / K$ ...(5.4)

$= Q/N - W/P / K/L$ ...(5.5)

If Q/N is denoted by a and K/L as b then

$\Pi = Q/N - W/P / K/L = a\text{-}W/P/b$ ...(5.6)

The equation shows that the rate of profit depends on labour productivity (denoted by a), wage rate (W/P) and capital labour ratio (denoted by b). This means that the profit is directly related to the net rate of return to capital and is inversely related to the coefficient of capital intensity.

The capital class will maximize its profit when:

$d(a\text{-}W/P/P) = 0$ ...(5.7)

and where d is subject to the production function.

On the expenditure side,

$Y = C + \Delta,\ S = I$ ...(5.8)

Since consumption takes place only in the labour class and savings by the business class, we arrive at the following equation:

$C = Ct = W/P\ .\ L$ ...(5.9)

and $S = Sk = WK$ ...(5.10)

where, CL is the consumption from the income of the labour class and SK is the savings from the profits of the business class.

Thus, net investment would be an increase in real capital

i.e., $I = \Delta K$ ...(5.11)

Substituting the values of S and I

$\Delta K = \Pi K$ ...(5.12)

Dividing both the sides by Q:

$\Delta K/K = \Pi K/K = \Pi$

Substituting the value of Π in the equation:

$\Delta K/K = \Pi = (a - W/P / b)$ ...(5.13)

Where $\Delta K/K$ is the rate of growth of capital and $(a - W/P)$ is the net return to capital and b is the capital labour ratio. This shows that the rate of growth of capital tends to rise if the net return to capital increases at a proportion more than capital labour ratio.

NOTES

An important concept that Joan Robinson describes in her theory is the golden age in which both the resources labour and capital are fully utilized. According to her, 'when technical progress is neutral and proceeding steadily, without any change in the time pattern of production, the competitive mechanism working freely, population growing (if at all) at a steady rate and accumulation going on fast enough to supply productive capacity for all available labour, the rate of profit tends to be constant and the level of real wages rise with output per man. Then there are no internal contradictions in the system. Total annual output and the stock of capital (valued in terms of commodities) then grow together at a constant proportionate rate compounded of the rate of increase of the labour force and the rate of increase of output per man. We may describe these conditions as a golden age (thus indicating that it presents a mythical state of affairs not likely to obtain in any actual economy.)'

In addition to the situation of full employment called as golden age, there can be other possibilities as well.

(a) **Limping golden age:** When the steady rate of accumulation of capital is below full employment.

(b) **Leaden golden age:** When the rate of capital accumulation is low and unemployment is rising.

(c) **Restrained golden age:** When the stock of capital is sufficient and full employment exists but desired rate of growth cannot be realized.

(d) **Galloping platinum age:** When the business sector is expanding, more employment is generated and the ratio of gross investment to the output increases. The rate of profit is also increasing but the real wage rate is falling.

(e) **Creeping platinum age:** When there is a deceleration in the rate of growth of capital accumulation; profits are falling accompanied by declining marginal efficiency of investment and rising real wage rate.

(f) **Bastard golden age:** When the rate of accumulation is being held in check by the threat of rising money wages due to a rise in prices. The age is characterized by unemployment, inflation and rising money wages.

(g) **Bastard platinum age:** When there is an acceleration of capital accumulation with constant real wages.

Check Your Progress

1. In which book did Joan Robinson express her views on the economic growth?
2. Which is the important concept that Joan Robinson describes in her theory?

5.3 KALDOR'S MODEL OF GROWTH

NOTES

The ideas put forward by Nicholas Kaldor in fact do not present a theory of growth but a model of distribution. According to him, 'the purpose of a theory of economic growth is to show the nature of the non-economic variables which ultimately determine the rate at which the general level of production of an economy is growing and thereby contribute to an understanding of the question of why some societies grow so much faster than others'.

Assumptions of Kaldor's model

Kaldor's model of economic growth is based on the following assumptions:

(i) The available resources determine the level of output in the economy.

(ii) There is one single relationship between the growth of capital and growth of productivity that influences both the factors of production.

(iii) The price of real stock of capital is constant.

(iv) The investment in the current period depends on output and profit in the previous period.

(v) Role of monetary policy is only passive in the sense that the interest rate influences the investment only in the long run.

(vi) The choice of technique is a matter of the relative prices of various types of capital goods, which can alter accumulation of capital and the progress of techniques in the capital goods making industries.

Working of Kaldor's model

Kaldor presents his model under two hypotheses – one assuming a constant working population and the other allowing for population growth.

(i) **Constant Working Population:** In this case, Kaldor mentions that the proportionate rate of growth in total real income (Y_t) will be same as the proportionate rate of growth in output per head (O_t). To begin with the model, he considers three functions – savings function, investment function, and technical progress function. Y_t, K_t, P_t, S_t stand for real income, capital, profits, savings and investment respectively at a given time t.

Hence, $S_t = I_t = K_t + 1 - K_t$ ...(5.14)

As for savings, Kaldor divides income into wages and profit. It is assumed that the savings propensities for profit earners and wage earners are given. The savings function is, therefore, expressed as:

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

Where, $1 > \alpha > \beta > o$ ...(5.15)

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The equation shows the savings comprising of a proportion a of aggregate profits (P_t) and a proportion b of wages ($Y_t - P_t$).

Investment function is based on the assumption that the investment decisions during any given time period is governed by the propensity to maintain the capital stock in a given relationship to turnover, modified by any change in the rate of profit on capital. The stock of capital in the period t, denoted by K_t here is then given by:

$$K_t = \alpha' Y_{t-1} + \beta(P_{t-1} / K_{t-1}) Y_{t-1} \quad ...(5.16)$$

This shows that the stock of capital at the time t (and which is assumed to be equal to the desired stock of capital at the time $t - 1$) is a coefficient α' of the output of the period ($Y_t - 1$) and a coefficient β' of the rate of profit on capital of the previous period, multiplied by the output of the previous period.

With the help of equation (16), one can express $K_t + 1$ as follows:

$$K_t+1 = \alpha' Y_t + \beta' (P_t / K_t) Y_t \quad ...(5.17)$$

Where again $\alpha' > o$, $\beta' > o$

Kaldor assumes that investment in the period t (denoted by 1t) is equal to the difference between desired and actual capital at t, as indicated by the following equation:

$$I_t = K_t+1 - K_t$$

Substitution from (16) and (17) gives:

$$I_t = \alpha' (Y_t - Y_t-1) + \beta' [(P_t / K_t) Y_t - (P_t-1)/K_t-1) Y_t-1]$$

Adding and subtracting $\beta' (P_t-1 / K_t-1) Y_t$ to the right hand side, we arrive at the following equation:

$$I_t = (Y_t - Y_t-1) (\alpha' + \beta' P_t-1 / K_t-1) + \beta' (P_t / K_t - P_t-1 / K_t-1) Y_t \quad ...(5.18)$$

On readjustment, equation (18) shows that the investment in period t(I_t) is equal to the increment in output over the previous period ($Y_t - Y_t$-1) multiplied by the relationship between desired capital and output in the previous period (K_t / Y_t-1). Equation (16) then can be expressed as:

$$K) = \{\alpha' + \beta' (P)-1 / K)-1)\} Y)-1$$

That gives $\alpha' + \beta' (P)=1 / K_t-1) = K_t / Y_t-1$

plus a coefficient β' of the change in the rate of profit over that period, multiplied by the output of the current period. Therefore, equation (18) according to Kaldor implies that, 'expressed as a proportion of the existing stock of capital, K_t, the investment of period t is equal to the expected rate of growth of turnover (which in turn is assumed to be equal to the actual rate of growth in turnover for the previous period) if the rate of profit on capital is constant; and it is greater (or smaller) than this if the rate of profit on capital is rising (or falling).'

NOTES

The technical progress function is expressed in the following way:

$$Y_t+1 - Y_t / Y_t = \alpha'' + \beta'' I_t/K_t \quad ...(5.19)$$

Where $\alpha'' > o$, and $I > \beta'' > o$.

Equation (19) shows the rate of growth of labour productivity (and income) as an increasing function of the rate of net investment expressed as a proportion of the stock of capital, i.e., of the (proportionate) rate of growth of capital stock.

Suppose t = 1, where the existing capital stock K_1, is regarded as a datum. Now we have:

$$K_1 = \{\alpha' + \beta' (Po / Ko)\} Yo$$

$$\text{or } K_1 / Yo = \alpha' + \beta' Po / Ko$$

Equation (18) now gives

$$I1 = (Y_1 = Yo) (\alpha' + \beta' Po / Ko) + \beta' (P_1 / K_1 - Po / Ko) Y_1$$

$$\text{or } I_1/Y_1 = Y_1 - Yo/Y_1 (\alpha' + \beta' Po/Ko) + \beta' (P_1/Ko - Po / Ko) \quad ...(5.20)$$

$$= Y_1 - Yo / Y_1 . K_1/Yo + \beta' (P_1/K_1 - Po/Ko)$$

(Substituting from equation (7), we get:

$$I_1/Y_1 = Y_1 - Yo/Yg . K_1/Y_1 + \beta' (P_1/K_1 - Po/Ko) \quad ...(5.21)$$

This equation shows that the rate of investment in period 1, as a proportion of the income of the period, equals the rate of growth of income over the previous period (i.e., $Y_1 - Yo / Yo$) multiplied by the capital output ratio of the current period (K_1 / Y_1), plus a term depending on the change of the rate of profit over the previous period. Equation (21) can be written as:

$$I_t / Y_t = \{Y_1 - Yo / Yo . K_1/Yo - \beta' Po/Ko\} + \beta' Y_1/K_1 . P_1/Y_1 \quad ...(5.21a)$$

While equation (15) can be written as

$$S_1/Y_1 = \alpha P_1/Y_1 + \beta Y_1 - P_1 / Y_1$$

$$= \beta + (\alpha - \beta), P_1/Y_1 \quad ...(5.21b)$$

These two equations, determine both the distribution of income between profits and wages, and the proportions of income saved and invested at t = 1. This can be shown with the help of the following diagram:

In the diagram, profits as a ratio of income (P/Y) are measured on the horizontal axis while savings and investment as a ratio of income (S/Y and I/Y) are measured on the vertical axis. Curve SS' represents the savings equation (21b) while the curve II' represents the investment equation (21a). The slopes of these two curves are given as $(\alpha - \beta)$ and $\beta' . Y_1 / K_1$ respectively.

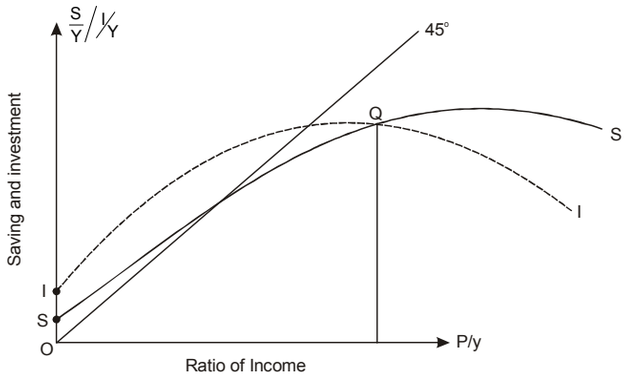

Fig. 5.1*Distribution of income and Proportions of Income Saved and Invested*

The point of intersection of the two curves, Q, indicates the short period equilibrium level of profits and of investment as a proportion of income. If profits are a lower proportion of income, the investment plans (although lower than the equilibrium level) will tend to exceed the available savings. In this situation, prices will rise in relation to costs until the difference is eliminated through the significant rise in prices. The stability of the equilibrium will require that the slope of SS' curve exceeds the slope of the II curve, as expressed by the following equation:

$$\alpha - \beta > \beta_t . Y_t / K_t$$

Kaldor assumes this restriction to hold. In addition, he assumes two other restrictions in his model given as follows:

$$P_t \leq Y_t - W_{min}$$

and $P_t / Y_t \geq m$

The first of these restrictions will mean that the profits determined by equations (15) and (18) should not be higher than the surplus available after the labour force is paid the subsistence wage bill. The second restriction means that the profits resulting from equations (15) and (18) are greater than the minimum required to secure a margin of profit over turnover below which entrepreneurs would not reduce prices, irrespective of the state of demand.

Assuming that these conditions are satisfied, the technical progress equation (19) indicates the growth of income and capital from t = 1 onwards, and the gradual movement of the economy from a short period equilibrium of steady growth. This is shown in the following diagram where the proportionate growth of capital is measured on the horizontal axis and the proportionate growth of income on the vertical axis.

At t = 1 where $I_t / K_t = I_1 / K_1$ to the left of I/K, the rate of growth in income is shown by the points G_1, G_2, G_3, etc. as g_1, g_2, g_3, etc respectively. To begin with, the initial position at t = 1(I_1 / K_1 being to the left of I/K) would mean that the

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growth of output, g, in successive units of time will be greater than the growth of capital, I_1 / K_1 and in accordance with equation (21), the rate of investment will grow in the subsequent period so as to make I_2 / K_2 equal to g_1, which in turn will increase the growth in the second period to g_2, and so on, until the point G is reached at which the rates of growth of income and capital are equal.

Long-run equilibrium rate of growth of income and capital is independent of the value of the coefficients of equations (15) and (21) (the savings and investment functions), and depends only on the coefficients in equation (19), i.e., the technical progress function. This is given by:

$$G = \alpha'' / 1 - \beta'' \qquad ...(5.22)$$

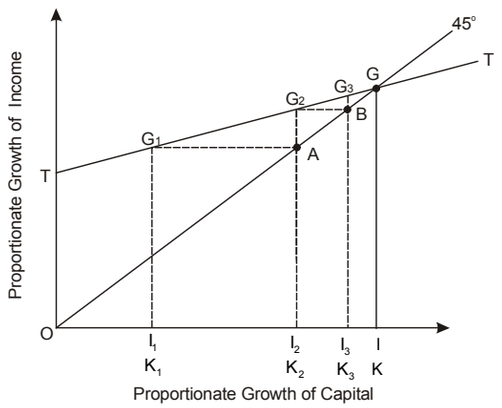

Fig. 5.2 *Proportionate Growth of Income and Capital*

This is the equilibrium rate of growth in productivity since it makes the rate of growth of capital and income equal, and is equal to both (under the assumption of a constant population).

$$\text{Putting } \alpha'' / 1 - \beta'' = Y'' \qquad ...(5.23)$$

The equilibrium ratio of investment to income, the equilibrium share of profits in income and the equilibrium rate of profit on capital can be derived with the help of equations (15) and (21) as follows:

$$I / K = Y'' K/Y \qquad ...(5.24)$$

From equation (21b)

$$S/Y = \alpha P/Y + \beta (1 - P/Y) \qquad ...(5.25)$$

$$= (\alpha - \beta). P/Y + \beta$$

Substituting from equation (24)

$$Y'' K/Y = (\alpha - \beta). P/Y + \beta$$

which gives

$$P/Y = Y'' K/Y - \beta / \alpha - \beta \qquad ...(5.26)$$

Multiplying both sides by Y/K, we get:

$$P/K = Y'' - \beta\ Y/K\ /\ \alpha - \beta \qquad ...(5.27)$$

Equation (24) along with equation (21b) is an alternative of Harrod's 'warranted rate of growth' while equation (22) is an alternative of Harrod's 'natural rate of growth'. Harrod's, argues, 'the system tends towards an equilibrium rate of growth at which the "natural" and the "warranted" rates are equal, since any divergence between the two will set up forces tending to eliminate the difference; and these forces act partly through an adjustment of the "warranted rate"'.

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(ii) Increase in population and Kaldor's model: Assuming an increase in population, Kaldor assumes that (i) for any given fertility rate in a society, the rate of growth of population cannot exceed a certain maximum, however fast the real income is rising; and (ii) the rate of population growth will rise only moderately as a function of the rate of growth in income over some interval of the latter before the maximum is reached. The dependence of population growth on the growth of income can be shown with the help of a diagram.

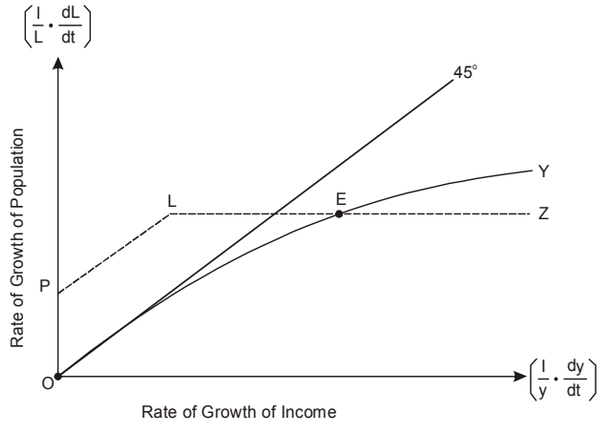

Fig. 5.3 *Dependence of Population Growth on the Growth of Income*

In the diagram, proportionate growth of income (I/Y. dy/dt) is shown on the X axis and proportionate growth of population (I/L. dL/dt) is shown on the Y axis. The dotted curve represents the population growth curve. When the rate of growth of income exceeds a certain critical value, the population growth curve becomes virtually horizontal.

In terms of a linear equation, the relationship can be expressed as follows:

$$I_t = g_t\ (g_t < \lambda)$$

$$I_t = \lambda\ (g_t > \lambda) \qquad ...(5.28)$$

Where, I_t, is the percentage rate of growth of population and g_t is the income respectively, and λ is the maximum rate of growth of population .

NOTES

If the rate of growth of population is λ (i.e., $g_t > \lambda$) then, I_t / K_t in equation (19) will be replaced by $I_t / K_t - \lambda$.

And $Y_{t+1} - Y_t / Y_t$ by $(Y_{t+1} - Y_t / Y_t - \lambda)$

Hence, the long run equilibrium rate of growth of both capital and income will now be:

$$G = Y''_t + \lambda \qquad ...(5.29)$$

The long run equilibrium values of other ratios are obtained by substituting $(Y'' + \lambda)$ for Y'' in the equations (24), (26) and (27).

Initially if $g_t < \lambda$ (and therefore $I_t < \lambda$), the rates of growth of income and population will continuously rise till the latter approaches λ. In the long run, hence, population should grow at the maximum rate. This is shown by the horizontal part of the dotted curve.

Here it is assumed that the technical progress function – coefficients α'' and β'' in equations (19), and thus, λ'' – remain unchanged due to changes in population. This would mean constant returns to scale. In other words, an increase in number, given the amount of per capita capital availability, will leave production per head unaffected. However, while this assumption may be true in the case of a young and relatively under populated country, Kaldor argues that it will not hold true in case of an overpopulated country where there will be a situation of diminishing returns due to the scarcity of land. This means that, with given techniques and capital per head, an increase in population will result into a fall in productivity. Thus, the curve showing the technical change function will be lowered by an extent depending on the rate of increase in population. Under these conditions, the technical progress function curve will have a different shape as shown in the second diagram (with the curve TT' intersecting the X axis). This means that it will require a certain percentage growth in capital per head (C_t) even to maintain output per head (O_t) at a constant level.

The curve TT' intersects the 45^0 line at two points: P and P'. P shows a stable equilibrium while P' shows an unstable equilibrium. If the economy is towards the left of P', the rate of growth of income and capital will steadily decline and the growth of capital and income will come to a standstill. Naturally, no long run equilibrium is attainable in this case. The only possibility is complete stagnation.

Therefore, whether a rising population will be consistent with an equilibrium of growth or not, will depend on the relative magnitude of two factors : (i) the maximum rate of population rise λ and (ii) the rate of technical change that brings a rise in productivity, α'' in equation (19), when both population and capital per head are constant. According to Kaldor, 'Since diminishing returns cannot cause the output of a larger working population to be smaller than that of a smaller population, the growth of population will not result into lowering of the position of the curve TT' by greater than the rate of population growth itself, so that if $\alpha'' > \lambda$,

then the technical progress function should continue to intersect income axis positively, and the possibility of a stable equilibrium of growth will be certain.'

Check Your Progress

3. What is the purpose of economic growth, according to Nicholas Kaldor?
4. Which assumption is the basis of the investment function?

NOTES

5.4 HARROD-DOMAR MODEL AND INSTABILITY OF EQUILIBRIUM

Though this model is known as Harrod-Domar model, yet it was independently developed by R.F. Harrod and E.D. Domar. But because there are certain common features in both the models, they are identified together.

According to this model, the rate of economic growth in an economy depends on firstly the rate of savings and secondly the capital output ratio or the productivity of investment. For instance, if an investment in capital worth '100 can produce output of '10, then the capital output ratio would be 10:1. Hence, the model suggests that every economy must save a part of the income to replace depreciated capital. However, in order to grow new investment in capital, stock is imperative.

Assumptions

The following are the assumptions that underlie Harrod-Domar model:

(i) There is an equilibrium level of income and employment.

(ii) There is a closed economy and no foreign trade.

(iii) The average propensity to save is equal to marginal propensity to save and the coefficient of capital is constant.

(iv) Laissez-faire economy prevails and there is no government interference.

(v) There are no lags in the adjustment in savings investment, expenditure and income.

(vi) The rate of interest is constant.

(vii) Labour and capital are used in a given proportion.

Domar's Model

According to Domar, 'an economy will be said to be in equilibrium when its productive capacity P equals its national income Y'. To understand this model, let us first understand the supply side of the model.

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Supply side of Domar's model

Suppose the investment in the economy is to be made at rate of I per annum and the productive capacity of the newly created capital is equal to S. According to Domar, due to the investment which is equal to S, the productive capacity of the economy will increase by Is per year. However, the economy has a potential social average productivity of investment that will actually determine the productivity of the investment. Suppose this is denoted by s. A high s will show that the economy is capable of increasing its output relatively fast. Thus, the supply side is I which shows the increase in output which the economy can produce.

Demand side of Domar's model

Suppose the investment increases by ΔI and the corresponding rise in income by Δy. Then:

$$\Delta y = \Delta I \, i/\alpha$$

Where, i/α is the value of multiplier.

To determine equilibrium condition,

$$\Delta I / I/\alpha = I \, \sigma$$

Assuming that the economy can achieve fall employment equilibrium, this would mean that the national income is equal to the productive capacity of the economy. This will be maintained if income increases at a rate equal to the productive capacity.

Thus, the fundamental equation in the model is:

$$\Delta \, I \, I/ \, \alpha = I\sigma$$

Multiplying both side of α and dividing it by I, the equation will become:

$$\Delta I / I = \alpha\sigma$$

The left hand side of the equation is the relative increase in investment. Hence, to maintain a level of full employment, investment should grow at a rate of $\alpha \, \sigma$. Since income is a constant multiple of investment, income should also grow at the same rate $\alpha \, \sigma$.

As Domar suggests, the maintenance of a continuous state of full employment requires that investment and income grow at a constant annual relative (or compound interest) rate, equal to the product by the propensity to save and the average productivity of investment. The equation also indicates the conditions to be satisfied for maintaining a level of full employment over a period of time.

Harrod's Model

Before describing Harrod's theory of economic growth, it is worthwhile to make a few remarks concerning the ideas and goals which Harrod had in mind.

1. Harrod has discussed the following three different concepts of the rate of economic growth.

(a) The actual rate of growth which gives the increase in output attained during any given time period;

(b) The natural rate of growth which is determined by the growth in the economy's labour force and technological improvements and which may be called the full employment rate of growth; and

(c) The warranted rate of growth which is that rate of growth which the entrepreneurs counted on and which, if realized, will be repeated by them.

2. Harrod attempts to show how the steady–equilibrium–growth may take place in the system.
3. He also attempts to show that once this steady rate of growth is interrupted, cumulative factors tend to perpetuate the divergence. As a consequence, the economy will experience either a secular stagnation or a secular exhilaration.
4. Harrod's theory is based on the naive acceleration principle as an explanation of the level of investment and the additional investment needed to produce additional output (the capital-output ratio makes it so).
5. Included in Harrod's warranted rate of growth is the equilibrium rate of growth between (*i*) saving and investment, and (*ii*) total supply and total demand. Both these equilibrium rates are crucial to his theory. When the realised investment exceeds or is less than the planned investment, the warranted rate of growth is interrupted.
6. Under the warranted rate of growth, the net investment equals the amount necessary to produce the increased output of the period.
7. Under the warranted rate of growth, the production decisions are made first and thereafter investment is undertaken to satisfy these production decisions; in a sense, production is assumed to create its own demand.

There are three different concepts used in the Harrod model. The first concept is the actual rate of growth which is indicated as G. This is determined by savings ratio S and incremental capital output ratio C.

Another concept is that of the warranted rate of growth indicated by GW. It is the required rate of growth for the full utilization of rising stock of capital.

The third concept used by Harrod is the natural rate of growth indicated as Gm. This is the rate of growth by the current growth of labour and the current potential for technical progress in the economy.

Explanation of the model

Ex-post savings and investment are equal to each other. i.e.,

$GL = S$

Where G is the actual rate of growth and is equal to $\Delta y / y$.

NOTES

C is the ratio of investment to an increase in income and is equal to I/Δy.

S is the savings as proportion of income and is equal to S/Y.

Substituting these into the equation, we get the following:

Δy/y, I/Δy = S/Y

Or

I/Y = S/Y

Or

S = I

According to Harrod, investment would not take place in a natural course; it has to be induced, so that this income should grow. Thus, for a steady growth:

Gw Cr = S

Where Gw is the warranted rate of growth and Cr is the required amount of capital for maintaining the growth rate Gw and S is the savings rate.

Why is the Harrod Model called a 'razor-edge' model?

Due to instability of equilibrium, the Harrod model is termed by many economists as a 'razor-edge' model. Harrod mentions that in the long run, it is likely that the actual rate of growth may deviate from the warranted growth rate. If G is greater than Gw, it would mean that ex-ante savings are lower than ex-ante investment. This would mean that production will decline and inflationary situation will occur.

However, any departure from Gw to G would be unstable. If ex-ante investment is more than ex-ante savings, then further expansion will take place. This situation will be recessionary in nature and increase in output will be below Gw. This will retard the economic growth.

According to Harrod, the system cannot advance more quickly than the natural rate allows. If the proper warranted rate is above this, there will be a chronic tendency to depression; the depressions drag down the warranted rate below its proper level and so keep its average value over a term of years down to the natural rate. But this reduction of the warranted rate is only achieved by having chronic unemployment.

In short, in Harrod's dynamic system there are two points of crucial importance. *Firstly*, to avoid too much or too little fluctuation in production, income must rise at an ever increasing rate. All the burden is placed on investment because, according to Harrod, saving intentions are always realised. *Secondly*, in Harrod's model even a slight deviation from the warranted growth rate path tends to be "self-sustaining and possibly self-aggravating." In other words, Harrod's warranted rate of growth is a path which, if once lost, is difficult to regain. It is on account of its precarious balance and volatile behaviour—when there is even a slight deviation from the path of warranted rate of growth—that this model has been labelled as a "razor-edge" model.

Check Your Progress

5. Who developed the Harrod-Domar model independently?
6. What is the basis of Harrod's theory?

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5.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. In her book entitled *The Accumulation of Capital*, published in 1956, Joan Robinson expressed her views on the economic growth.
2. An important concept that Joan Robinson describes in her theory is the golden age in which both the resources labour and capital are fully utilized.
3. According to Nicholas Kaldor, 'the purpose of a theory of economic growth is to show the nature of the non-economic variables which ultimately determine the rate at which the general level of production of an economy is growing and thereby contribute to an understanding of the question of why some societies grow so much faster than others'.
4. Investment function is based on the assumption that the investment decisions during any given time period is governed by the propensity to maintain the capital stock in a given relationship to turnover, modified by any change in the rate of profit on capital.
5. The Harrod-Domar model was independently developed by R.F. Harrod and E.D. Domar.
6. Harrod's theory is based on the naive acceleration principle as an explanation of the level of investment and the additional investment needed to produce additional output (the capital-output ratio makes it so).

5.6 SUMMARY

- In her book entitled *The Accumulation of Capital*, published in 1956, Joan Robinson expressed her views on the economic growth.
- The assumptions that Robinson's model of growth is based on are a closed economy; no government interference; two factors of production: labour and capital; no savings by the labour class and constant returns to scale.
- Robinson's model shows that the rate of growth of capital tends to rise if the net return to capital increases at a proportion more than capital labour ratio.
- An important concept that Joan Robinson describes in her theory is the golden age in which both the resources labour and capital are fully utilized.

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- According to Kaldor, 'the purpose of a theory of economic growth is to show the nature of the non-economic variables which ultimately determine the rate at which the general level of production of an economy is growing and thereby contribute to an understanding of the question of why some societies grow so much faster than others'.
- Kaldor presents his model under two hypotheses – one assuming a constant working population and the other allowing for population growth.
- Kaldor's model of economic growth is based on the following assumptions:
  - The available resources determine the level of output in the economy.
  - There is one single relationship between the growth of capital and growth of productivity that influences both the factors of production.
  - The price of real stock of capital is constant.
  - The investment in the current period depends on output and profit in the previous period.
  - Role of monetary policy is only passive in the sense that the interest rate influences the investment only in the long run.
  - The choice of technique is a matter of the relative prices of various types of capital goods, which can alter accumulation of capital and the progress of techniques in the capital goods making industries.
- Assuming the population to remain constant, Kaldor's model suggests that the proportionate rate of growth in total real income (Y_t) will be same as the proportionate rate of growth in output per head.
- Harrod's, argues, 'the system tends towards an equilibrium rate of growth at which the "natural" and the "warranted" rates are equal, since any divergence between the two will set up forces tending to eliminate the difference; and these forces act partly through an adjustment of the "warranted rate"'.
- According to Kaldor, 'Since diminishing returns cannot cause the output of a larger working population to be smaller than that of a smaller population, the growth of population will not result into lowering of the position of the curve TT' by greater than the rate of population growth itself, so that if ~~a~~" > ~~1~~, then the technical progress function should continue to intersect income axis positively, and the possibility of a stable equilibrium of growth will be certain.'
- Harrod-Domar model was independently developed by R.F. Harrod and E.D. Domar.
- According to Harrod-Domar model, the rate of economic growth in an economy depends on firstly the rate of savings and secondly the capital output ratio or the productivity of investment.

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- The following are the assumptions that underlie Harrod-Domar model:
  - o There is an equilibrium level of income and employment.
  - o There is a closed economy and no foreign trade.
  - o The average propensity to save is equal to marginal propensity to save and the coefficient of capital is constant.
  - o Laissez-faire economy prevails and there is no government interference.
  - o There are no lags in the adjustment in savings investment, expenditure and income.
  - o The rate of interest is constant.
  - o Labour and capital are used in a given proportion.
- According to Domar, 'an economy will be said to be in equilibrium when its productive capacity P equals its national income Y'.
- Domar suggests that the maintenance of a continuous state of full employment requires that investment and income grow at a constant annual relative rate, equal to the product by the propensity to save and the average productivity of investment.
- According to Harrod, investment would not take place in a natural course; it has to be induced, so that this income should grow. Thus, for a steady growth: Gw Cr = S, where Gw is the warranted rate of growth and Cr is the required amount of capital for maintaining the growth rate Gw and S is the savings rate.
- Harrod mentions that in the long run, it is likely that the actual rate of growth may deviate from the warranted growth rate. If G is greater than Gw, it would mean that ex-ante savings are lower than ex-ante investment. This would mean that production will decline and inflationary situation will occur.

5.7 KEY WORDS

- **Labour Force:** The sum of those who are employed and those who are actively looking for work.
- **Capital Stock:** The economy's total accumulated stock of buildings, roads, other infrastructure, machines, and inventories.
- **Capital Intensity:** The ratio of the capital stock to total potential output — K/Y – which describes the extent to which capital, as opposed to labor, is used to produce goods and services.
- **Capital Output Ratio:** The ratio of capital used to produce on output over a period of time.
- **Laissez-faire economy:** An economy that relies chiefly on market forces to allocate goods and resources and to determine prices.There is no government intervention in it.

5.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

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Short Answer Questions

1. How does an increase in population affect economic growth according to Kaldor's model?
2. Comment on Harrod's concept of unstable equilibrium.
3. What are the assumptions of Robinson's model of growth?

Long Answer Questions

1. Explain the working of Robinson's model of economic growth.
2. Describe Robinson's concept of the golden age in brief.
3. Discuss the assumptions and working of Kaldor's model of economic growth.
4. Discuss Harrod- Domar's model of economic growth in detail.

5.9 FURTHER READINGS

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UNIT 6 THEORIES OF ECONOMIC DEVELOPMENT

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Structure

6.0 INTRODUCTION

Theories of development are a collection of theories about how desirable change in society is best achieved. Such theories draw on a variety of social science disciplines and approaches. In this unit multiple theories are discussed.

Rostow's stages of economic growth model is one of the major historical models of economic development. It was published by American economist W.W. Rostow in 1960. The model postulates that economic growth occurs in five basic stages of varying length: (1) Traditional society, (2) Transitional society, (3) Take off, (4) Drive to technological maturity, (5) High mass consumption.

According to Prof. Rostow, an economy in traditional societies stage has an unlimited production function which barely attains the minimum level of potential output. Trade is predominantly regional and local, largely done through barter, and the monetary system at this stage is not well developed. Investments share never exceeds 5% of total economic production and the social structure is generally feudalistic in nature.

In the second stage of economic growth, the economic development undergoes a process of change for building up of conditions for growth and take off. Rostow said that these changes in the society and the economy had to be of fundamental nature in the socio-political structure and production techniques. The only change required were in economic and technical improving methods.

The third stage take off is a decisive breakthrough in the economic history when the vicious circle of poverty is finally broken and growth becomes its normal condition. The impediments to steady growth are overcome and a process of

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cumulative economic development starts. Rostow defines take off as the interval when the old blocks and resistances are finally overcome. The forces making for economic progress, expand and come to dominate the society.

After the take-off and before the attainment of maturity by an economy, there follows a long period of sustained by fluctuating progress as the growing economy tries to extend modern technology over the whole field of economic activity. The economy regularly invest 10% to 20% of its national income, and its output continuously outstrip the increase in population.

In the fifth stage, the leading sectors of the economy shift towards the production of durable consumer goods and services, it is characterized by migration to suburban areas and extensive use of automobiles and household gadgets.

Rosenstein Roden builds up a case for giving a 'big push' to the economies of underdeveloped countries in order to put them on a path of self-sustained growth. According to him, planning for development is about jerking the entire social system out of its low level equilibrium and setting of a cumulative process upwards. Smaller efforts means waste. It is only a 'big push' that can release these economics from the inertia of underdevelopment.

The balanced growth theory is an economic theory pioneered by the economist Ragnar Nurkse (1907-1959). Nurkse was in favour of attaining balanced growth in both the industrial and agricultural sectors of the economy. He recognized that the expansion and inter-sectoral balance between agriculture and manufacturing is necessary so that each of these sectors provide a market for the products of the other and in term supply the necessary raw materials for the development and growth of other sectors. And in the last part of this unit, you will learn about Hirschman and Sen's capability approach.

6.1 OBJECTIVES

After going through this unit, you will be able to:

- Define the Rostow's Stage Theory
- Explain Rosenstein Rodam's Big Push approach
- Describe Nurske and Hirschman economic development theory
- Explain Sen's capability approach

6.2 ROSTOW'S STAGES OF ECONOMIC GROWTH

Professor W.W. Rostow has sought an historical approach to the process of economic development. As seen before, he distinguishes five stages of economic growth, (1) the traditional society (2) the pre-conditions for take-off (3) the take-off: (4) the drive maturity; (5) the age of high mass-consumption. Let us have a detailed look at each of these stages.

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1. The Traditional Society

A traditional society has been defined 'as one whose structure is developed within limited production functions based on pre-Newtonian science and technology and as pre-Newtonian attitudes towards the physical world'. This does not mean that there was little economic cultivation, the scale and pattern of trade could be expanded manufactures could be developed and agricultural productivity could be raised along with increase in population and real income. But the undeniable fact remains that for want of a regular and systematic use of modern science and technology a ceiling existed on the level of attainable output per head. It did not lack inventiveness and innovations but lacked the tools and the outlook toward the physical world of the post-Newtonian era.

The social structure of such societies was hierarchical in which family and clan connections played a dominant role. Political power was concentrated in the regions, in the hands of the landed aristocracy supported by a large retinue of soldiers and civil servants. More than 75 per cent of the working population was engaged in agriculture. Naturally, agriculture happened to be the main source of income of the state and the nobles, which was dissipated on the construction of temples and other monuments, on expensive funerals and weddings and on the prosecution of wars.

2. The Pre-conditions for Take-off

The second stage is a transitional era in which the pre-conditions for sustained growth were created slowly in Britain and Western Europe, from the end of the 15th and the beginning of the 16th centuries, when the medieval age ended, and the modern age began. The pre-conditions for take-off were encouraged or initiated four forces: the New Learning or Renaissance. These forces led to reasoning and skepticism in place of faith and authority brought an end to feudalism and led to the rise of national states; inculcated the spirit of adventure which led to new discoveries and inventions and consequently the rise of the bourgeoisie-the elite-in the new mercantile cities. Thus, these forces were instrumental in bringing about changes in social attitudes, expectations, structure and values. Generally speaking, the pre-conditions arise not endogenously but from some external invasion. For example, the pre-conditions ended in Europe (excluding Britain) with the domination of Napoleon Bonaparte whose victorious armies set in structure of traditional societies and paved the way for the unification of Germany and Italy.

In any case, the process of creating pre-conditions for take-off from traditional society follows along these lines:

> 'The idea spreads that economic progress is possible' and is a necessary condition for some other purpose, judged to be good: be it national dignity, private profit, the general welfare, or both, willing to mobilize savings and other institutions for mobilizing capital appear. Investments increase, notably may have an economic interest. The scope of commerce, internal and external, widens, and here and there, modern manufacturing enterprise appears, using the new methods.

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The pre-conditions for sustained industrialization, according to Roots, have usually required radical changes in three non-industrial sectors:

- First, a build-up of social overhead capital, especially in transport. In order to enlarge the extent of the market, to exploit natural resources productively and to allow the state to rule effectively.
- Second, a technological revolution in agriculture so that agricultural productivity increases to meet the requirements of a rising general and urban population.
- Third, an expansion imports, including capital imports, financed by the continuous development and expansion of modern industry was mainly possible by the ploughing back of profits into fruitful investment channels

As Rostow says: 'The essence of the transition can be described legitimately as a rise in the rate of investment to a level which regularly, substantially and perceptibly outstrips population growth.' The role of social and political factors in creating the pre-conditions has already been explained in the beginning of this stage. But the political forces deserve further explanations with reference to under developed countries and colonial territories. It was reactive nationalism's reaction against the fear of foreign domination which acted as a potent force in bringing about the transition.

In the colonies, the policy followed by the colonial power to build up social overhead capital, ostensibly to meet its own requirements, helped in moving the traditional society along the transitional path. The spread of modern education brought about a gradual transformation in thought, knowledge and attitude of the people, and a growing spirit of nationalism started resenting the colonial rule. Lastly, under the influence of a powerful international demonstration effect, people wanted the products of modern industry and modern technology itself.

3. The Take-off

The take-off is the 'great watershed' in the life of a society 'when growth becomes its normal condition.... Forces of modernization contend against the habits and institutions. The value and interests of the traditional society make a decisive breakthrough: and compound interest gets built into the society's structure.' By the phrase 'compound interest' Rostow implies 'that growth normally proceeds by geometric progression such as a saving account if interest is left to compound with principal.' At another place, Rostow defines the take-off, 'as an industrial revolution, tied directly to radical changes in the methods of production, having their decisive consequence over a relatively short period of time.'

The take-off period is supposed to be lasting for about two decades. Rostow gave the following tentative take-off dates for */those countries which are considered to be airborne.

Country	Take off	Country	Take off
Great Britain	1783-1802	Japan	1878-1900
France	1830-1860	Russia	1890-1914
Prelgium	1833-1860	Canada	1890-1914
USA	1843-1860	Agrentina	1935
Germany	1850-1873	Turkey	1937
Sweden	1868-1890	India China	1952

The conditions for take-off stage:

(i) A rise in the rate of productive investment from: say, 5 per cent or less to over 10 percent of national income or net national product

(ii) The development of one or more substantial manufacturing sectors with a high rate of growth

(iii) The existence of quick emergence of a political, social and institutional framework which exploits the impulses to expansion in the modern sector and gives to growth an outgoing character.

Let us examine these conditions in detail.

(i) Rate of net Investment over 10 per cent of national Income: One of the essential conditions for take-off is that the increase in per capita output should outstrip the growth of population to maintain a higher level of per capita income in the economy. As Rostow explains: If we take the marginal capital output ratio for economy in its early stages of economic development at 3.5:1 and if we assume, as is not abnormal, a population rise 1-1.5 per cent annum it is clear that something between 3.5 and 5.25 per cent of NNP must be regularly invested if NNP per capita is to be sustained. An increase of 2 per cent per annum in NNP per capita requires, under these assumptions that something between 10.5 and 12.5 per cent of NNP be regularly invested Ny definition and assumption, then, a transition from relatively stagnant to substantial regular rise in NNP per capita under typical population conditions, requires that the proportion of national product productively invested should move from somewhere in the vicinity of 5 per cent to something in the vicinity of 10 per cent.

The typical case explained by Rostow is based on the supposition that the incremental capital output ratio and the rate of population growth remain constant. It thus precludes effects of increased labour force and improved technology on national income. However, during the take-off, capital output ratio tends to decline with the change in investment pattern and a rise in the proportion of net investment to national income takes place from 5-10 per cent, thus definitely outstripping the growth of population.

(ii) Development of Leading Sectors: Another condition for take-off is the development of one or more leading sectors in the economy. Rostow regards

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the development of leading sectors as the analytical bone structure of the stages of economic growth. There are generally three sectors of an economy:

(a) Primary Growth Sectors, where possibilities of innovation or of exploiting new or unexplored resources lead to a higher growth rate than in the rest of the economy.

(b) Supplementary growth sectors, like the cotton textiles of Britain and New England in the early stages of growth takes place as a consequence of development in the primary growth sectors. For example, the development of railways is a primary growth sector and the expansion of iron, coal and steel industries may be regarded as a supplementary growth sector.

(c) Derived Growth Sectors, where growth takes place 'in some fairly steady relation to the growth of total income, population, industrial production of some overall modestly increasing variable.' For example, the production of food and the construction of houses in relation to population.

Historically, these sectors have ranged from textiles in Britain and New England to railways in the United States, the USSR, Germany and France: to modern timber cutting in Sweden. In addition, modern agriculture also forms part of the leading sectors, For example, the rapid growth of Denmark and New Zealand has been due to the scientific production of bacon, eggs, and butter, and mutton and butter respectively. Thus, 'there is clearly, no one sectoral sequence to take-off, no single sector which constitutes the magic key.'

According to Rostow, the rapid growth of the leading sectors depends upon the presence of four basic factors:

(a) First, there must be an increase in the effective demand of their products generally brought about by dishoarding, reducing consumption, importing capital or by a sharp increase in real incomes.

(b) Second, a new production function along with an expansion of capacity must be introduced into these sectors.

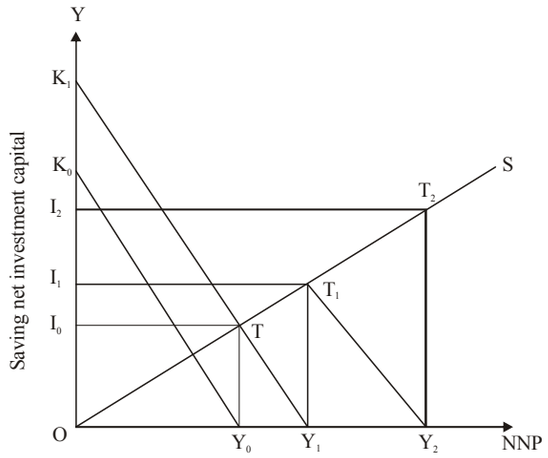
(c) Third, there must be sufficient initial capital and investment profits for the take-off in these leading sectors.

(d) Lastly, these leading sectors must introduce expansion of output in other sectors through technical transformations.

(iii) Cultural Framework that Exploits Expansion: The last requirement for take-off is the existence of emergence of cultural framework that exploits the impulses to expansion in the modern sector. A necessary condition for this is the ability of the economy to mobilize larger savings out of an expanding income to raise effective demand for the manufactured products, and to create external economies through the expansion of leading sectors. As

Rostow says, take-off requires the massive set of pre-conditions going to the heart of a society's economic organization, its polities and its effective scale of values– It usually witnesses a definitive social, political and cultural victory of those who would modernize the economy over those who would either cling to the traditional society or seek other goals–By and large, it persuades the society to persist and to concentrate its efforts on extending the tricks of modern technology beyond the sectors modernized during the take off. The take off stage is explained in Fig. 6.1 The horizontal axis represents NNP and the vertical axis the amount of saving, net investment and capital, S is; the saving schedule. KOYO and K1Y1 are the curves of capital output ration drawn as downward sloping to simplify the curves of capital output ratio drawn as downward sloping to simplify the figure. They are drawn parallel to each other to indicate a constant capital-output ratio,

$\frac{OK_0}{OY_0} = \frac{OK_1}{OY_1} \cdot \frac{TY_0}{Y_0Y_1}$ is the marginal capital output ratio.



To start with the society has a very flat saving curve and a very steep capital output ratio curve in the pretake-off stage. It implies that people save little out of their income and the capital output ratio is very high. In the time period 0 as OI_1 net investment is made it tends to increase the capital stock which becomes productive in time period 1 and raise NNP to OY. Then in the take of stage when OI_1 (= T1Y1) investment takes place, some major stimulus leads to growth of the productive capital more quickly leading to a fall in the capital output ratio to T1Y1/Y1Y2. As a result, the investment pattern changes and the capital output ratio curve becomes flatter. It is T1Y2 NNP increases to OY2 which further raises net investment to OI2 (T2Y2). The economy has taken off and if this pattern of growth is continued it will become self-sustained.

Thus, the take off is initiated by a sharp stimulus, such as the development of a leading sector of a political revolution which brings and outgoing change

in the production processes, a rise in proportion of net investment to over 10 per cent of national income outstripping the

4. The Drive to Maturity

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Rostow defines it 'as the period when a society has effectively applied the range of (then) modern technology to the bulk of its resources.' It is a period of long sustained economic growth extending well over four decades. New production techniques take the place of the old ones. New leading sectors are created. Rate of net investment is will high over 10 per cent of national income. And the economy is able to withstand unexpected shocks.

Rostow gives the symbolic dates for technological maturity of the following countries:

Grate Britain	1850	Japan	1940
USA	1900	Russia	1950
Germany	1910	Canada	1950
France	1910		
Sweden	1930		

When a country is in the stage of technological maturity, three significant changes take place:

- First, the character of working force changes. It primarily becomes skilled. People prefer to live in urban areas rather than in rural. Real wages start rising and the workers organize themselves in order to have greater economic and social security.
- Second, the character of entrepreneurship changes. Rugged and hardworking masters give way to polished and polite efficient managers.
- Third, the society feels bored of the miracles of industrialization and wants something new leading to a further change.

Importance and Limitations of take-off for Underdeveloped Countries

The concept of take-off is ideally suited for the industrialization of underdeveloped countries. As Dasgupta has written, '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.

Of the three necessary conditions for take-off, the first two, namely, capital formation over 10 per cent of national income and the development of one or more leading sectors are helpful in the process of industrialization of underdeveloped countries. So far as the first condition is concerned, there can be little doubt about achieving that percentage. But the second condition can be molded to suit a country's environments. For instance. The leading sectors can be in agriculture or production of primary products for exports. The last condition is more important in the context

of underdeveloped countries where monetary and political institutions, and skills and technology are at a low level whereby the retired the expansion of the modern sector.

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Limitations

From the standpoint of underdeveloped countries the take-off has the following limitations.

- **Capital-Output Ratio not Constant:** In calculating the aggregate capital requirements of underdeveloped countries, Rostow takes a constant capital-output ratio. This implies constant returns to scale. This assumption is valid in the case of advanced economies, but underdeveloped economies are characterized by the predominance of agriculture and primary production. Given unchanged techniques and increasing population, their natural resources result in conditions of diminishing returns to scale for the expansion of the economy as a whole.
- **Silent over the Removal of Unemployment:** Dasgupta regards the elimination of an accumulated backlog of unemployment as 'the minimum that the take-off must accomplish in an underdeveloped economy. According to him, 'once full employment is secured the economy is raised to a level where growth is self-sustained and spontaneous.' Taking India's case, he says, 'Judged by the employment criterion, despite all the investment that has taken place over the period, our economy seems to be receding.' Therefore, it is imperative for an over-populated country to have the elimination of unemployment as one of the conditions for take-off.
- **Element of Ambiguity:** Besides, there is an element of ambiguity in this concept of take-off when applied to an underdeveloped country. During the take-off investment increases with a rise in the national income without reducing the average propensity to consume. Technically speaking, there is an 'excess of the marginal rate of saving over the average rate of saving, so that the average rate keeps on rising.... (and) the final level is characterized by a constant, thought high average rate of savings.' To Dasgupta, 'This does not seem to be a sensible interpretation. For even in a highly developed economy the average rate of saving may not remain constant.'
- **Economic Development not Spontaneous:** The concept of take-off suggests an element of spontaneity which is of little significance in the context of an underdeveloped economy. But 'a take-off is not an instantaneous process. It is an exercise that requires time and from which, after a certain speed has been attained and a portion of the runaway used up, there is no turning back of even safe throttling down.'
- **Aeronautical Concept not Correct:** Professor Bicanic, however, does not agree with the symbolical presentation of the take-off because it appears to him like a light flying animal just got cut off from the earth and floating in

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the air. It is like creeping over a very difficult threshold of economic development. One has to creep over it, one can't fly over it. It is not a take-off but a very painful process which every underdeveloped country has to go through.

The Take-off and India

According to Rostow, one of the important conditions for take-off is the raising of saving and investing ration from 5 per cent or less to over 10 per cent of national income and maintaining it for two or more decades. It is a critical transitional stage of self-sustained growth. In India at 1960-61 prices, the ratio of investment of national income increased from 5.5 per cent in 1950-51 to 10.4 per cent in 1964-65 and the ratio to of domestic savings to national income from 5.5 per cent of 10.5 per cent.

Thus, India which entered the take-off stage in 1950-51 (1952 according to Rostow), can be definitely said to have taken-off in the year 1964-65 when both the saving and investment ratios were above 10 per cent. The second condition for take-off is the development of one or more leading sectors in the economy. By 1964-65 the agricultural, industrial, and tertiary sectors had developed considerably 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 India also seems to fulfill this condition of take-off.

India also fulfils the third condition for take-off. Planned development has generated the cultural framework that leads to the expansion of the modern sector. The skills and attitudes of the 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 one jump to the conclusion that India had definitely taken-off during the Third Plan on the basis of the existence of the three Rostowian conditions. It appears that India has tried a premature take-off. Professor Myint warns that a premature attempt at take-off 'can result not only in wastages 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 actually happened in the case of the Indian economy. Between 1950-51, India's net national income (at 1960-61) increased at a compound rate of 3.8 per cent per annum from Rs 9850 crores to Rs 16,630 crores 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 her year. Coupled with their trends is the existence of inflationary pressures in the economy which trends is the existence of inflationary pressures in the economy which cast serious doubts about India having attained the take-off stage. In the last year (1965-66) of the Third Plan, national income declined by 5.6 per cent, per capita real income

in 1965-66 was almost the same as in 1960-61, recession in the economy during 1966-68 made matters still worse. As revealed by the Estimates Committee of the Lok Sabha in its ninth hand report 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. Further the rate of domestic savings declined from a 10.5 per cent. In 1965-66 (at 1960-61 prices) to 8.2 per cent in 1966-67 and to 8 per cent in 1967-68 in real terms, it would be even below the pre-Plan period.

The Third Plan was conceived as 'the first stage of a decade or more of intensive development leading to a self-reliant and self-generating of intensive development leading to a self-reliant and self- generating economy.' It aimed at raising net investment from 11 per cent in 1960-61 to 14-15 per cent of national income and that of domestic savings from 8 per cent in 1960-61 to 11.5 per cent of national in by the end of the Third Plan. But the Third Plan failed to bring about the required rates of growth in savings and investment. Savings rose from 8 to 10.5 per cent and investment from 11 to 13 per cent. Three consecutive crop failures plunged the economy into a morass. An era of Annual Plans ensued. The Draft Forth Plan was scrapped and postponed. However, it can be concluded in terms of Rostow's main conditions of a rise in the proportion of net investment of over 10 per cent, that the Indian economy had taken-off during the Third Plan.

5. The Age of Mass Consumption

According to one critic, 'the period of mass-consumption is nothing else but communism minus its ideological overtone.'

Rostow has explained the stage of mass consumption in the technical sense. According to him, 'The balance of attention of the society, as it approached and went beyond maturity, shifted from supply to demand, from the problems of production to the problems of consumption and of the welfare in the widest sense,' Rostow believed that resources employed in the following three directions could promote and enhance social welfare.

- First, larger resources be allocated to military and foreign policies for achieving international and external power and influence
- Secondly, the resources of mature economy are directed to promote welfare of the society
- Thirdly, the state should direct its resources to the expansion of consumption levels beyond the basic necessities of the life like food, shelter and clothing.

Check Your Progress

1. State the political factor which led to transition in Rostow's opinion.
2. Name the period of economic development in which 'a society has effectively applied the range of (then) modern technology to the bulk of its resources.'

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6.3 ROSENSTEIN-RODAN THEORY

The theory of the 'big push' is associated with the name of Professor Paul N. Rosenstein-Rodan. The thesis is that a 'big push' or a large comprehensive programmed is needed in the form of a high minimum amount of investment to overcome the obstacles to development in an underdeveloped economy and to launch it on the path to progress. To stress big argument, he quotes an analogy from an MIT Study. 'There is a minimum level of resources that must be devoted to .... a development program if it is to have any chance of success Launching a country into self-sustaining growth is a little like an airplane off the ground. There is a critical ground speed which must be passed before the craft can become airborne. The theory states that proceeding 'bit by bit' will not launch the economy successfully on the development path: rather a minimum amount of investment is a necessary condition for this. It necessitates the obtaining of external economies that arise for the simultaneous establishment of technically interdependent industries.

Rosenstein-Rodan distinguishes between three different kinds of indivisibilities and external economies. One, indivisibilities in the production function, especially the indivisibility of the supply of social overhead capital; two, indivisibility of demand; and three, indivisibility in the supply of saving. Let us analyse the role of the three indivisibilities in bringing economic development.

Rosenstein Rodan Theory: The Big Push Theory

Indivisibilities in the Production Function

The production function in underdeveloped countries may several indivisibilities but the indivisibility of the social overhead capital is the most important. Because of its indivisibility this sort of investment can be a great source of external economies and increasing returns. The creation of social overhead like power, transport, communications, housing etc., requires huge initial investment but its most important advantage is the creation of investment opportunities in other industries. According to Rosenstein-Rodan, investment in social and economic overheads is irreversible in time and hence it must precede other types of investment. Since its services cannot be imported so it must be created within the economy. It has a long gestation period and an irreducible minimum size and, therefore, this sort of investment tends to be lumpy. The indivisibility of social overhead capital is great obstacle in the development of underdeveloped countries. A high initial investment in infrastructure or a 'big push' is a precondition for creating proper climate for productive investments in the economy.

Indivisibility of Demand

Another important argument in favour of big push theory is the indivisibility of demand or the complementarity of demand. The indivisibility of demand requires simultaneous setting up of inter-dependent industries. Individual investment

decisions have a high element of risk because of the uncertainty of finding the market for their products. This risk is considerably reduced if decision for the simultaneous development of interdependent industries is taken. In other words, investment decisions are inter-dependent or indivisible unless there is assurance that complimentary investments will be forthcoming, individual investment decisions will be highly risky and they may not be undertaken. Thus, a large scale investment programme is necessary to ensure complimentary investment and to make possible individual investments.

Indivisibility in the Supply of Savings

The indivisibility in the supply of savings is also put forward as an argument in favour of 'big push' in underdeveloped countries. This indivisibility arises because of the fact that it is only after a certain level of income has been achieved that there can be a significant increase in savings. Thus, a high level of income is a pre-condition for high level of savings and investment. For this it is necessary that when income increases as a result of investment marginal rate of savings must be kept higher than average rate of saving. Prof. Rosenstein Rodan states this problem as a high minimum quantum of investment requires a high volume of savings which is difficult to achieve in low income underdeveloped countries. The way out of this vicious circle is to have first an increase in income and to provide mechanisms which assure that at the second stage the marginal rate of savings be very much higher than the average rate of savings. This argument is also sometimes used to justify large minimum foreign aid for poor countries.

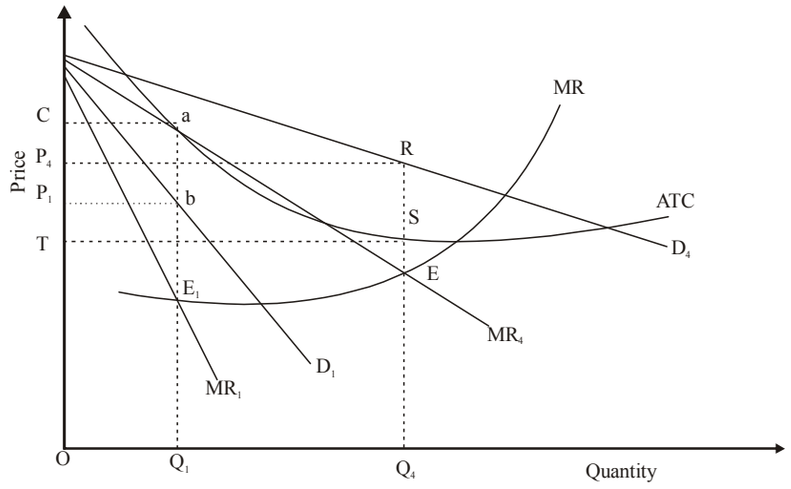

Fig. 6.2

The curves ATC and MC represent the costs of a plant which is a little smaller than the optimum-size plant. D_1 and MR_1 are the demand and marginal revenue curves of the shoe factory when investment is made only in it. It produces OQ_1 (10,000) shoes and sells at OP_1, price which does not cover the ATC. So

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the factory is incurring CabP, losses. But when simultaneous investment is made in a number of different industries, the market for shoes expands. The demand for shoes rises to D4 (four times) so that the quantity of shoes expands. The demand for shoes rises to D4 (four times) so that the quantity of shoes become OQ_4 (40000). Now the shoe factory earns profits equal to P4RST. Similarly, other industries earn profits.

A Critical Appraisal

Professor Rosensten Rodan regards his theory of development superior to the traditional static equilibrium theory because it appears to contradict the tatter's motto that nature does make jumps. His theory is based on more realistic assumptions of indivisibilities and 'non-appropriabilities' in the 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. The 'big push' theory is, however, not free from certain defects.

1. **Negligible economies from investment in export and import substitutes:** The main justification for a 'big push' in investment on social overhead capital is the realization of extensive external economies. But as pointed out by Viner, underdeveloped economies realize greater economies from world trade independently of home investment. Rodan has recognized this fact but keeps silent over another reality that in the newly developing countries investment for export and for marginal import substitutes occupies a large chunk of total investment. The external economies argument for a 'big push' losses its justification because external economies are negligible in the above types of investments.
2. **Negligible economies even from cost-reducing investments:** Even in the production of local consumer goods and most public utilities, potential external economies can be realized in a limited way. Investments in the case of fairly inelastic demand are cost-reducing rather than output-expanding. Since external economies accrue from the output-expansion in the initial industry, they are negligible in the case of cost-reducing investment.
3. **Neglects investment in the agricultural sector:** One of the principal defects of the 'big push' theory is that it emphasizes the importance of a high level of investment in all types of industries capital foods, consumer goods and social overhead capital except the agricultural and other primary industries. In agriculture-oriented underdeveloped countries, a 'big push' of large investments in irrigation, transportation facilities, land reform and in improving agricultural practices through better tools, implements, fertilizers, etc., are as important as investment in other industries. The neglect of the agricultural sector in such economies will retard rather than accelerate their development.

4. **Generates inflationary pressures:** Even the launching of a high minimum amount of investment on social overheads in highly expensive. Moreover, overhead capital-output ratio and a very long gestation period. This makes the task of developing LDCs more difficult and longer. This is because such countries do not possess enough financial resources to provide social overhead capital required for the 'big push'. The period during which social overhead capital is being formed will also be one of inflationary pressures because of the shortage of consumer goods. These inflationary pressures, in turn, would prolong the process of building social overhead capital, thus making it highly difficult for an LDC to achieve rapid economic development.
5. **Low investment leads to large increase in output**: Professor John Adler's statistical analysis of the economic development of the world reveals that 'a relatively low level of investment pays off well in the form of additional output.' This conclusion is based on his study of low capital-output ratios in India, Pakistan and in many other Asian and Latin American countries. Thus, there appears to be little conclusive proof that a 'big push' of investment is a prerequisite of the economic development of underdeveloped countries.
6. **Administrative and institutional difficulties:** Further, the 'big push' theory is based upon a burst of state-engineered investment. Rosenstein himself points out that in the presence of imperfectly developed markets in underdeveloped countries, state investment itself poses a number of problems. The administrative and institutional machinery in such economies is weak and inefficient. Difficulties are bound to arise not only in drawing up the pans for various projects but also in their execution. Lack of statistical information, technical know-how, trained personnel and coordination between the various department are some of the complex problems which are not easy of solution. Moreover, the majority of underdeveloped countries have a mixed economy, where the private and public sectors are mostly competitive rather than complementary. This leads to mutual rivalry and suspicion which are inimical to a balanced growth of the economy.
7. **Not an historical fact:** Last but not the least, Professor Rodan's thesis is a sort of prescription for launching underdeveloped countries on the part of progress rapidly in the present. It is not an historical explanation of how development takes place. Historically, the presence of absence of a 'big push' has not been a distinguishing feature of growth anywhere, according to Professor Hagen.

6.4 HIRSCHMAN THEORY

In this section, we will first look at the concept of unbalanced growth as presented by Hirschman and then compare it to the theory of balanced growth.

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The concept of unbalanced gorwth

Introduction

The theory of unbalanced growth is the opposite of the doctrine of balanced growth. According to this concept, investment should be made in selected sectors rather than simultaneously in all sectors of the economy. No underdeveloped country possesses capital and other resources in such quantities as to invest simultaneously in all sectors. Therefore, investment should be made in a few selected sectors of industries for their rapid development, and the economies accruing from them can be utilized for the development of other sectors. Thus, the economy gradually moves from the path of unbalanced growth to that of balanced growth. Economists Pike Singer, Kindleberger, Straiten, etc. have expressed their views in favor of the unbalanced growth doctrine which are in fact the criticisms of the theory of balanced growth. It is, however, Hirschman who has propounded the doctrine of unbalanced growth in a systematic manner.

Hirschman's Strategy

The concept of unbalanced growth has been popularized by Hirschman. It is his contention that deliberate unbalancing the economy, according to a predesigned strategy, is the best way to achieve economic growth in an underdeveloped country. According to Hirschman, investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way to further economic development. He maintains that 'development has of course proceeded in this way, with growth being communicated from the leading sectors of the economy to the follower, from one industry to another, from one firm to another.' He regards development as a 'chain of disequilibria' that must keep alive rather than eliminate the disequilibria, of which profits and losses are symptoms in a completive economy. If the economy is to be kept moving ahead, the task of development policy is to maintain tension, disproportions and disequilibria,' this seesaw advance is induced by one disequilibrium that in turn leads to a new disequilibrium and so on ad infinitum. According to Hirschman, when new projects are started they appropriate external economies created by previous projects and create new external economies that can be exploited by subsequent ones. There are some projects that appropriate more external economies that they create which he calls convergent series of investments. Hirschman also calls them induced investments for they are net beneficiaries of external economies. There are other projects too that they appropriate which he characterizes as divergent series of investments.

From the point of view of the economy, the latter may have a greater social desirability than private profitability, whereas induced investments may be less desirable from the social viewpoint. In practice, development policy should aim at (i) the prevention of convergent series of investments which appropriate more external economies than they create; and (ii) the promotion of divergent series in

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which more economies are created than are appropriated. Development can only take place by unbalancing the economy. This is possible by investing either in social overhead capital (SOC) or in directly productive activities (DPA). The former creates external economies while the latter appropriates external economies.

Unbalancing the Economy with SOC

Social Overhead Capital has been defined as 'comprising those basic services without which primary, secondary, and tertiary productive activities cannot function.' SOC includes investments on education, public health, communications, transportation and conventional public utilities like light, water, power, irrigation and drainage schemes, etc.

A large investment in SOC will encourage private investment later in Directly Productive Activities (DPA). For example, cheaper supply of electric power may encourage the establishment of small industries. SOC investments indirectly subsidies agriculture, industry or commerce by cheapening various inputs which they use by reducing their costs. Unless SOC investments provide cheap or improved services, private investments in DPA will not be encouraged. Thus the SOC approach to economic developments in DPA will not be encouraged. The SOC approach to economic development is to 'unbalance' the economy so that subsequently investments in DPA are stimulated. As Hirschman puts it, 'Investment in SOC is advocated not because of its direct effect on final output, but because it permits and in fact invites DPA to come in–Some SOC investment is required as a prerequisite of DPA investment.'

Unbalancing the Economy with DPA

An imbalance can also be created via DPA. A government might directly or indirectly invest in DPA instead of investing in SOC. If DPA investment is undertaken first, the shortage of SOC facilities is likely to raise production costs substantially. Political pressures might stimulate investment in SOC also. Investment sequences are generated by profit expectations and political pressures. Profit expectations generate the sequence from SOC to DPA and political pressures from DPA to SOC.

The path to Development, Hirschman calls the first sequence (from SOC to DPA) 'development via excess capacity of SOC' and the second sequence (from DPA to SOC) 'development via shortage of SOC.' As to which sequence should be followed first for economic development, Hirschman prefers that sequence which is 'vigorously self-propelling.'

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This can be explained with the help of Hirschman's slightly modified diagram.

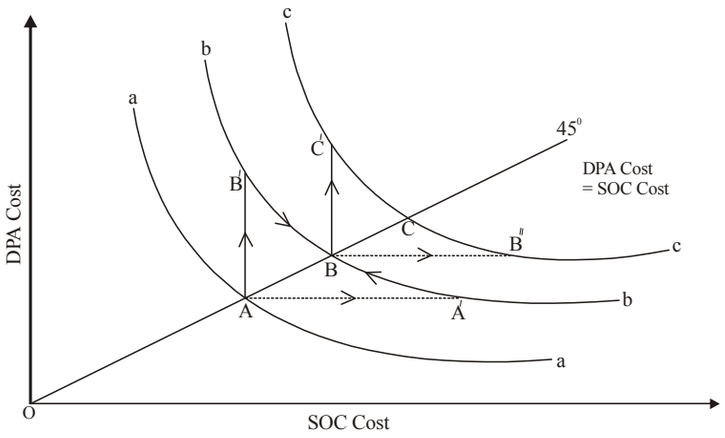

Fig. 6.3

DPA investments are measured along the vertical axis. The curves a b c are isoquants' showing various quantities of DPA and SOC which will give the same gross national product at any point. As we move to a higher curve, it represents a higher gross national product. The curves are go drawn that the 45° line through the origin connect the optimal points on the different curves. This line shows the balanced growth of DPA to SOC.

Hirschman makes two assumptions: firstly, that SOC and DPA cannot be expanded simultaneously and secondly, that sequence of expansion should be adopted which maximizes 'induced' decision-making.

If the path to development is followed via excess capacity of SOC the economy will follow the dotted line AA'BB"C. When the economy increases SOC from A to A' the induced DPA increase to B' until balance is restored at B where the whole economy is on a higher level of output. The higher gross notational product thus achieved induces government to increase SOC further to B". DPA also follows suit to point C Via C,'

If the other path to development via shortage of SOC is followed, the economy moves along the thick line AB,BC'C. When DPA is increased to B',. SOC has to move to A' and then to B. And when DPA is increased further to C,' balance requires SOC to increase to C Via B".

It is to be noted that development path via excess SOC capacity is more continuous and smooth than the second path. It is in a way what Hirschman calls 'self-propelling'. The other path via SOC shortage capacity is not so, because if there is a belated adjustment of SOC, as it is likely to be due to the absence of political pressures in the beginning. The DPA cost of producing a given output rises. Accruing to Hirschman, 'Development via SOC shortage is an instance of the disorderly, compulsive' sequence while via 'excess SOC capacity is essentially permissive' linkages. Having studied the virtues of specific imbalance, the problem

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is one of finding the kind of imbalance that is likely to be most effective. Any investment may have both 'forward linkage, and backward linkage' effects.

Forward linkage effects encourage investment in subsequent stages of production, and backward linkage effects in earlier stages of production. Development should aim at discovering projects with the largest total linkage. Such projects very from time to time and country to country, and can be found only by empirical studies of their input-output tables. Hirschman says, 'The industry with the highest combined linkage score in iron and steel. Perhaps the under developed countries are not so foolish and so exclusively prestige motivated in abutting prime importance to this industry.' But he says, 'everywhere with an iron and steel industry just because the industry maximizes linkage,' the reason being the lack of interdependence and linkage in underdeveloped countries. For example, agriculture, including primary production, and mining are weak in both backward and forward linkage effects. The primary production activates mostly of the 'enclave' type leading to exports have little development effects on the economy in adding either to employment or to gross national product in an underdeveloped country.

Last Industries First

Hirschman, therefore, advocates the setting up of 'last stage industries first.' In making industrial products, a developing country need not undertake all the stages of production simultaneously. It can begin with the manufacture of durable consumer goods at the final stages of production. It can import many converting, assembling and mixing plants for final touches to almost finished assembling and mixing for final touches to almost finished products. In this way, the country can turn out finished consumer goods that it was previously importing, and then move on to the higher stages of production to intermediate goods and machines through backward linkage effects.

'Backward linkage effects' are important not only from secondary back to primary production, but also from tertiary back to both secondary and primary production, but also from tertiary back to both secondary and primary production. 'Backward linkage effects' are the combined result of several last stage industries in a country. A backward linkage effect is produced by increases in demand. Therefore, when the demand for import-replacing commodities increases, it justifies domestic last stage production. In other words, in the makings of some products, when demand reaches a certain 'threshold', it is advantageous to manufacture the product at home. So long as the threshold is being reached, it pays to import the product. When the threshold is reached, Hirschman suggests subsidies or protection to import-replacing industries. But it is not desirable to give infant industry protection till the industry has been fully established.

Hirschman calls last stage industries as import enclave industries. They are different from export enclave industries. The latter produce only for exports and are primarily related to staple products and minerals in LDC. According to Hirschman, LDCs do not give due importance to the part played by exports in

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their economic development. They often treat exports like a step child. Their exports do not expand and fail to produce forward linkage effects within the economy. Hirschman, therefore, suggests export promotion which is the only practical way of achieving industrialization via import substitution. Hirschman sums up his 'Strategy of Economic Development' in these words:

> Economic development typically follows a path of uneven growth; that balance is restored as a result of pressures, incentives, and compulsions; that the efficient path towards economic development is apt to be somewhat disorderly and that it will be strewn with bottlenecks and shortages of skills, facilities, services, and products; that industrial development will proceed largely through backward linkage, i.e. will works its way from the 'last touches' to intermediate and basic industry.

Limitations

The doctrine of unbalanced growth is not free form certain limitations:

1. **Neglects Resistances**: Streeten points out that 'the theory concentrates on stimuli to expansion and tends to neglect or minimize resistances caused by unbalanced growth.' For instance, Hirschman neglects resistances in attitudes created by an imbalance. When development is the outcome of deliberate unbalancing the economy, the business attitudes change due to shortages and tensions, and there is lot of opposition and hostility Hirschman neglects this type of reaction on the part of the existing institutions in underdeveloped countries.
2. **Inadequate Attention to the Composition, Direction and Timing of Unbalanced Growth**: Paul Streeten criticizing Hirschman's theory of unbalanced growth asks, 'The crucial question is not whether to create imbalance, but what is the optimum degree of imbalance, where to imbalance and how much in order to accelerate growth; which are the growing points, where should the spearhead thrust, on which slope snowballs grow into avalanches.' He thus points out that inadequate attention has been paid to the composition, direction and timing of unbalanced growth.
3. **Beyond the Capabilities of Underdeveloped Countries**: Hirschman's criticism of Nurkse's doctrine of balanced growth that it 'combines a defeatist attitude toward the capabilities of underdeveloped economics with completely unrealistic expectation about their creative abilities' applies equally to his own theory. Investment creates mobilities applies equally to his own theory. Investment creates imbalances thereby creating pressures and tensions in the growth process which are overcome by the inducement mechanism. But pressures and tensions are bound to be serious in underdeveloped countries thereby hampering the process of development.
4. **Lack of basic Facilities**: There may be lots of difficulties in procuring technical personnel, raw materials, and basic facilities like power and transport and even in finding out an adequate domestic or foreign market for the products.

5. **Lack of Factor Mobility:** Inducement mechanism is practicable where there is internal flexibility of resources. But in underdeveloped countries it is difficult, and also impossible, to shift resources form one sector to another.
6. **Emergence of Inflationary Pressures:** One of the serious limitations of the unbalanced growth doctrine is the development of inflationary pressure within the economy. When large doses of investment are being injected into the economy at certain strategic points, income will rise which may tend to increase the demand for consumer goods relative to their supply. Shortages arise due to strains, pressures and tensions. Such a situation leads to inflationary rise in the price level becomes difficult to control prices in underdeveloped countries, as the governments are incapable of wielding monetary and fiscal measures effectively.
7. **Linkage Effects not Based on Data:** Hirschman's analysis of the 'linkage effects' suffers from the fact that it is not based on data pertaining to an underdeveloped country where social overhead facilities are not fully developed for a generation or so.
8. **Too much Emphasis on Investment Decisions**: Hirschman's development strategy is largely related to maximizing investment decisions. No doubt decision making is a crucial factor in economic development. Yet underdeveloped countries need not only investment decisions but also administrative, managerial and policy decisions. Thus, Hirschman lays too much emphasis on investment decisions essential for development. Compared to other important decision essential for development

Conclusion

Despite these weaknesses, the technique of unbalanced growth has come to be recognized as a novel technique for the development of underdeveloped countries. Russia was the first country to adopt it and has been successful in acceleration its rate of economic growth within a short-period of time. India has also followed suit by adopting this technique with the Second Five-Year Plan. Whereas Russia could succeed by creating large surpluses in the heavy industries sector by keeping down the consumption levels, in India such an extreme policy is impracticable. Here, investments in heavy industries are being kept up at a high level in the five-year plans and at the same time every effort is being made to step up production of consumer goods. But nothing is done to keep the consumption levels low in order to generate large economic surplus, the continuous rise in the price level however tends to keep the real consumption standards low. Unless the government controls the inflationary pressure, planning with unbalanced growth will fail to achieve the goal of self-sustaining growth.

Balanced Growth and Unbalanced Growth

Having examined critically the doctrines of balanced and unbalanced growth, we attempt an overview of these strategies of economic development.

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The case for balanced growth rests on the fact that vicious circles of poverty are at work in underdeveloped countries which are responsible for the small size of the local market for their goods. The solution lies in a balanced pattern of investment in a number of mutually supporting different industries so that the size of the market is enlarged.

Its critics argue that an underdeveloped country does not possess sufficient resources in men, materials and money for simultaneous investments in a number of complementary industries. Another serious weakness of this doctrine is that it emphasizes the complementarity of markets of final goods. Primarily consumer goods, as an inducement to invest and leaves out intermediate goods markets.

Proponents of unbalanced growth strategy favour investments in selected sectors rather than simultaneously in all sectors of the economy. Investments in selected sectors lead to new investment opportunities. This is possible by deliberately unbalancing the economy. The aim is to keep alive rather than eliminate the disequilibria by maintaining tensions.

Disproportions and disequilibria

The strategy of unbalanced growth aims at removing scarcities in underdeveloped countries by induced investment decision-making. Critics point out that in such countries decision-making itself is scarce along with other resources. Moreover, creating imbalances within the economy by making investments in strategic sectors in the face of acute shortage of resources leads to inflationary pressures and balance of shortage of resources leads to inflationary pressures and balance of payments difficulties in underdeveloped countries.

Despite these differences in approaches the doctrines of balanced and unbalanced growth have two common problems; one, relating to the role of the state, and two, the role of supply limitations and supply in-elasticities.

Nurkse believes that balanced growth is relevant primarily to a private enterprise system. 'It is private investment that is attracted by markets and that needs the inducements of growing markets. It's her that the element of mutual support is so useful and for rapid growth, indispensable.' But critics point out that private enterprise alone is incapable of taking investment decisions in underdeveloped countries. Therefore, balanced growth presupposes planning.

On the other hand, in Hirschman's unbalanced growth strategy, the state plays an important role in encouraging SOC investments thereby creating disequilibria. If development starts via investment in DPA. Political pressures force the state to undertake investments in SOC. Thus unbalanced growth also requires state planning. Since both balanced growth and unbalanced growth involve lobby investments in complementary activities they require state planning. In order to get investment decisions implemented and to benefit from complementarities, coordination between the private and public sectors is essential in an

underdeveloped country whether it adopts the strategy of balanced growth or unbalanced growth.

The other problem concerning the two strategies is the role of supply limitations and supply inelasticity. Nurkse's theory of balanced growth, is mainly related to the lack of demand, and neglects the role of supply limitations. This is not a correct view because underdeveloped countries woefully lack in the supply of capital, skills economic infrastructure and other resources which are inelastic in supply, While the demand for final goods can be created by import restriction and export promotion without recourse to the strategy of balanced growth.

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The unbalanced growth doctrine also neglects the role of supply limitation and supply inelasticity. Though it emphasizes the scarcity of decision-making, yet it ingnores scarcity of physical, human and financial resources in an underdeveloped country.

Thus both strategies are in neglecting supply limitations and base their arguments on ceiling less economies, of the developed countries which have high elasticity of supply of resources.

This distinction between balanced and unbalanced growth techniques leads to certain points of similarities between the two. First, both believe in the existence of a private enterprise system based on market mechanism under which they operate at the same time, they imply the operation of state planning. Second, both ignore the role of supply limitations and supply inelasticity. Last but not the least, both the doctrines assume interdependence, but of different degrees. In balanced growth the development of one sector is dependent on the development of other sectors. On the other hand. Under unbalanced growth the economy gradually moves on the path of economic development via balanced growth. Thus both the strategies involve interdependence among different. Sectors of the economy. But the interdependence is of different degree.

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, SOC should be developed first which will encourage subsequent investments in DPA when the economy will ultimately move on the path to balanced growth. The experience of many developing manpower, transport etc. are developed first, the development of agriculture. Industry and commerce is retarded. The rapid development of Russia has of course proceeded in this way with growth being communicated from the leading to the following. But developing countries wedded to democracy should try to control the twin evils of inflation and adverse balances of payments while pursuing this strategy of development.

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Check Your Progress

3. Which type of investment must precede all other types of investments as per Rosenstein-Rodan?
4. Name the factor which creates external economies, and which appropriates external economies.
5. What generates investment sequences?

6.5 SEN'S CAPABILITIES APPROACH

The capability approach is a theoretical of framework that contains two core normative claims: first that the freedom of achieving wellbeing is of primary moral importance and second that freedom to achieve well-being is to be understood in terms of people's capabilities.

Sen's approach is both comprehensive and flexible. It provides dignity to human race because the economic model of development has reduced people to the status of producers and consumers. If the GDP growth model dis-empowers then, the capability approach makes their empowerment a central issue. Rather than taking of some theoretical equality of people or seeking them in terms of numbers, the capability approach explicitly recognizes the differences among individuals. It also accepts that people's abilities are affected by external factors coming from interaction with other people, social arrangements, access to infrastructure and public services, discriminations, opportunities to participate in social and political activities, freedom to speak and influence state policies.

The capability approach focuses directly on the quality of life that individuals are actually able to achieve. This quality of life is analysed in terms of the core concepts of functioning and capability.

Functioning are states of being and doing, such as being well nourished, having shelter. They should be distinguished from the commodities employed to achieve them.

Capability refers to the set of valuable functionings that a person has effective access to. Thus, a person's capability represents the effective freedom of an individual to choose between different functioning combinations between different kinds of life that he has reason to value. (In later work, Sen refers to capabilities in the plural (or even freedoms) instead of a single capability set, and this is also common in the wider capability literature. This allows analysis to focus on sets of functionings related to particular aspects of life. For example, the capabilities of literacy, health or political freedom.

Thus, Amartya Sen's capability approach revolves around people as human being. It sees development as expansion of people's capabilities, it is an enabling

(empowering) preposition. It aims to enhance people's well-being by expanding their capabilities which is connected to freedom of choices. It explicitly recognizes presence of diversities and the multidimensional nature of human well-being. The emphasis is not only on how people actually function but also on their having capabilities, which are practical choices.

It provides a relatively universal grammar for understanding the elements of human well-being. The capabilities approach offers a systematic way of thinking and analysing issues in the light of people's capabilities.

In the capabilities paradigm poverty is understood as deprivation of basic capabilities. People may get deprived of such capabilities in several ways for example, ignorance, oppressive state policies, lack of financial resources, lack of proper education, sudden accidents and so on.

The scope of this approach is quite vast, all factors that can potentially affect people's capabilities are relevant for consideration. Included in the domain capability theory are all possible factors, social and political process, gender, inequality, discrimination of all types, social exclusion disability, environmental conditions personal and psychological factors that can possibly influence human capabilities, which is the prime measure of human wellbeing. In this sense, it is a complete human development model.

What is Functioning and Capabilities

Sen searched for measure to adequately represent people's wellbeing and deprivation and found that neither income and command over commodities, nor happiness and fulfillment of desires constituted good enough indicator of human wellbeing or lack of it. Sen argued that people's wellbeing depends upon what they are actually capable of doing and being. Thus, he focused on something more direct such as human functioning and capabilities in terms of which the quality of life is analysed. In other words, a person's capabilities offer a perspective in terms of which his advantages and disadvantages can be reasonably assessed that makes it highly appropriate for analysing poverty.

Functioning: Functionings are what people really 'do and are'. They are achievements of people, their doings or being. Taken together, these doings and beings achieved functionings give value to life. The functionings may include being well nourished, having shelter, able to work, rest or being literate or healthy, being part of a community or group. Being respected, and so on achieving a function (for example, being adequately nourish) with a given bundle of commodities (say, bread or rice) depends on a range of personal and social factors (e.g. age, gender, activity levels, health access to medical services, nutritional knowledge and education, climatic conditions and so on). A functioning therefore refers to the use a person makes of what over is at his/her command.

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Capabilities: Capabilities are different combinations of functions that a person can achieve; it also reflects his freedom to choose. So, capabilities refers to the set of valuable functionings that a person has affective access to. They are best thought to be the equivalent of a person's opportunity set. In nutshell, capabilities are made up of two things; functionings and the freedom to choose from them.

Difference between functionings and capabilities: The distinction between functionings and capabilities is that between the realized and the effectively possible, in other words, between achievements, on the one and freedoms or opportunities on the other. Capabilities are a person's real freedoms or opportunities to achieve functionings. For example, while travelling is a functioning, the real opportunity to travel is the corresponding capability.

Functionings refers to what people really 'do and are'. Capabilities all note what people potentially can do and can be. The achieved functionings, the realized achievements and the capabilities are potentially possible. Functionings are in a sense, more directly related to living conditions. Since they are different aspects of living conditions, capabilities are notions of freedom, in the positive sense including what real opportunities a person has regarding the life he can potentially lead. Take away the freedom to choose, the two things become sense.

The difference between functioning and capability can be best clarified with an example. Consider two persons who are not eating. One is a victim of a famine in Ethiopia and the other decided to sit on a 'fast' in the front of the US embassy in London to protest against its troops in Afghanistan. What distinguishes the two is the freedom, or availability of option. The first person is badly constrained in freedom and lacks the capability to achieve the functioning to be well, the second person has this capability though he decides not to use it.

Sen proposes that people lose capabilities when they lack freedom, having freedom provides the space to develop capabilities. Therefore, all development, according to Sen, is development of human capabilities in the enabling environment of freedom.

Sen proposes that expansion of individual freedom is the goal of development, freedom is also the principal means of development. Therefore, development also means remaining the major sources of constraint (lack of freedom) such as all forms of discrimination- social, religious, gender or community based, unreliable public facilities and poor in free structure, lack of economic opportunities, social exclusion and political marginalization, and policies limiting human rights and so on. In many societies where there is ethnic tension, we can also include the fear of violence or attacks as freedom restricting factor. Freedom provides the necessary space to make choices to make one's life better the way one wanted. It is particularly relevant for the poor for its enabling and empowering impact.

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Sen's capability approach and poverty

In the capability perspective, poverty is seen in terms of a short all of 'basic capabilities'- a kind of basic capability failure'. Such failure involves the inability to achieve certain minimally adequate levels of crucially important functionings, such as being nourished and being sheltered.

Poverty experts can point out that this definition of poverty is based on the ancient Aristotelian notion that a poor person is not free to carry out the important activities that he wants to. In the other words, poverty is to be seen as living in a state or restricted freedom. In his book *Development as freedom*, Sen has talked about various types of freedoms necessary to increase peoples capabilities (or reducing poverty) and development is increasing these freedoms. The freedom of a person is understand as the ability (or opportunity) to choose what one values.

Let's compare Sen's capability approach with resources based approaches. Sen argues that the resource centric approaches don't distinguish between means and ends. How the available resources are converted to and used depends upon personal factors as well as on the environment in which people live including social and political. For example, a disabled person needs more resources to do a task, say moving, than a normal person. Another example is presence of social bias in the society or extreme bureaucracy in the system; these things affect different people differently. It is non material factor that hardly ever shows up in the GDP model of development or poverty.

What is Income poverty and capability

Poverty: The traditional income poverty and Sen's capability poverty are not entirely distinct from each other. In general, increasing income improves the capabilities of people and vice-versa. Basic essentials like education and health directly improve the quality of life and capabilities. They also improve the ability to earn more.

The issue of unemployment offers an insightful comparison between income and capability poverty approaches. If unemployment only meant loss income it could be compensated by some form of income support (say unemployment allowance), but in reality, look or loss of job has much helper impact on a people's life than more economic loss. It might include psychological damage, loss of motivation and self-confidence, stress, depression, increase in ailments and morbidity etc. The income poverty approach is blind towards such (human suffering) which are clearly picked up by the capability approach through their adverse impact on the capabilities.

Conversion of income into capabilities is an important issue, particularly for the poor. For example, alcoholism is widespread in some poor communities and if the income earner habitually spends it on drinking he is doing nothing to improve his or family's capabilities, on the contrary he might by degrading his capabilities.

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A better use would be to raise the nutrition level of family members (but that needs awareness and information, which the poor often lack). Similarly, there are other situations where good income does not automatically ensure better capabilities. For example, in the disadvantaged sections of society, say for instance, the lowest caste community in India even good enough income does not automatically ensures social or political equality. In such case, belonging to a discriminated community becomes a disability (and a cause for reduced freedom).

Gender inequality is another hurdle when the income distribution within families is considered. In patriarchal societies, male members always have the first right leaving the females members rather deprived in everything. This deprivation ultimately shows up in the later for mortality rates, morbidity, literacy, undernourishment, medical neglect etc.

Poverty reduction involves more than economic development

The fact that higher capital GDP does not automatically translate into lowered poverty, is clearly observed in the development status of different states of India. Kerala is a unique state in India, it has only a moderately developed economy but has achieved significant poverty reduction. It does so through the expansion of basic education, healthcare facilities and equitable land distribution to counter poverty. In comparison, Punjab with much higher per capita GDP also has higher poverty. Therefore, people's wellbeing is not directly related with economic growth.

Likewise, through the economic reforms in India have opened up the economy throwing new opportunities, but majority of the population failed to reap the benefits because the enabling condition of high literacy level, quality basic education, good healthcare facilities etc., proved simply for too inadequate.

The presence of poverty even in rich countries

A country has higher per capita GDP and yet has large percentage of people with poor quality of human life. How to account for low wellbeing of people (poor people) in rich countries?

Human wellbeing depends upon several things other than wealth or income. A country obsessed with GDP growth alone may not provide basic infrastructure of education, healthcare, housing, transport, clean drinking water, sanitation and so on. Today is a proven fact that economic growth inherently favors the rich and hence wealth gets increasingly concentrated in few hands. It means rising inequalities, which leads to social exclusion of the poor class. Social exclusion is not only a present concern but also has future consequences. It works to sustain and promote poverty. A rich country can only eliminate poverty if it frames political that focus on increasing peoples capabilities in place of the fetish for GDP growth.

Implementation of the Capability Approach

Many attempts have been made to implement the capability approach. For instance, it has been used to investigate poverty, inequality wellbeing social justice, gender,

social exclusion, health disability child poverty and identity as well as for designing policies. It has been related to human needs, human rights and human security as well as development in general. It has also been seen as a theory of social justice seeking to reduce social exclusion and inequalities. There have been numerous attempts to apply the capability approach to the measurement of poverty and wellbeing. The capability approach is perhaps best known for having inspired the creation of the human development India (HDI) in 1990 by the United Nations development programme (UNDP) to gauge countries level of human development or people's wellbeing. The HDI offered an alternative measure of human progress in terms other than GDP growth and has played a key role in advancing alternative ideas about development and welfare. The HDI covers dimensions of material wellbeing, health and education, the Multi-Dimensional Poverty Index (MPI) is another comprehensive led for evaluating poverty.

Now conclusion is that the wellbeing of people depends upon many things other than increased income or resources. All such thing get simplified when the GDP alone is used as proxy for development. The basic objective of development should bet to create an enabling environment for people to live long health. In reality, they are only means to expand people's capabilities and freedom of choices, not ends in themselves.

The capability approach is more fundamental and comprehensive in nature as it shifts the focus from the means (resources) to the ends (human wellbeing) by putting the people in the center. Anti-poverty programmes must not focus on reduction of income poverty alone. Enhancement of human capabilities must also go hand in hand with the economic growth for it to be sustainable.

6.6 NURKSE'S THEORY

The explanation of Nurkse theory is based on disguised unemployment. The term disguised unemployment is generally defined in terms of margined productivity of labour being zero. This is loose interpretation of the concept. To understand the meaning of this term, we must address to the questions which arise in explaining the phenomenon of disguised unemployment. How workers can survive on the land if their marginal product is zero or even positive but below subsistence? Who would employ such labour? Could the output in the subsistence sector really remain unaffected if substantial quantities of labour is withdrawn or migrated? In short, what is precisely meant by the term disguised unemployment? Can it be quantified? What are we to make of the argument that industrial development in surplus labour economies is a relatively painless process?

Measurement: Formally, there are three possible interpretations of the concept of disguised unemployment that are commonly found in the literature. Look at at the diagram 6.4.

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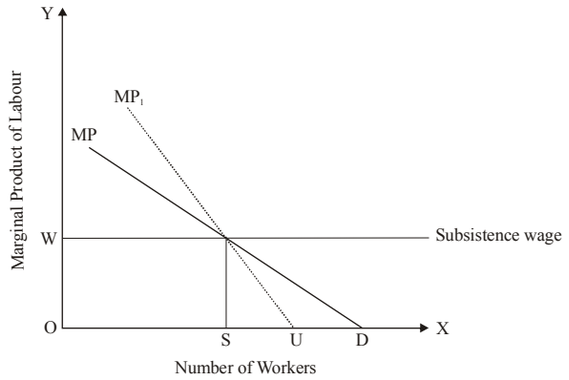

Fig. 6.4

The number of workers is shown on horizontal axis and marginal productivity of labour on vertical axis. The marginal productivity line and dotted MP, shows the marginal productivity of labour with improved techniques. Point A on x-axis indicates the equal numbers of workers available for employment. One possible measure of disguised unemployment is the difference between A and S or the gap between the number of workers available for work and the amount of employment that equates the marginal product of labour and the subsistence wage. This interpretation of disguised unemployment conforms to the definition of unlimited supply of labour in Lewis's model.

The second possible measure of disguised unemployment is the difference between A and D or the gap between the actual number of workers available for employment and the level of employment at which the marginal productivity of labour is zero. It sometimes is referred to as the state surplus. This surplus is obviously less if disguised unemployment is defined as labour with marginal product below the subsistence wage.

A third measure of disguised unemployment is the difference between the actual number of workers available and the level of employment at which marginal product of labour would be zero if some change take place that enable the same level of output to be produced with fewer workers. This is presented by the dotted marginal product curve MP_1 Disguised unemployment is now measured by the difference between A and U and it is sometimes referred to the dynamic surplus. The dynamic surplus clearly embraces many types of disguised unemployment because there are many reasons, particularly in developing countries where labour may not be working at its potential and where small changes in techniques organization of production may release substantial quantity of labour.

Estimate

There are three main ways of ascertaining whether surplus labour exists in the sense that labour's marginal product is zero. The first is to examine instances where substantial numbers of the agricultural labour force have been withdrawn from the land either to work in industrial projects or as a result of illness.

This method was followed by Schultz (1964) who examine the effect of influences epidemic in India in 1918-19, which killed approximately 8% of the agricultural labour force. He found there output during the following year declined and concluded that surplus labour in Indian agriculture did not exist. Schultz observations were criticized on the ground that he failed to distinguished between the summer and winter season of the year following epidemic. S. Mehra (1966) has shown that summer production, which just followed the epidemic, was not in fact reduced and that the decline in agricultural product in 1919-20 found by Schultz was entirely due to reduction in winter crop which could have result from low rainfall. Notwithstanding the criticize this is one method of approach.

The second method of estimating the static surplus is to take the difference between labour available and the labour required to produce the current level of agricultural output with given techniques, making due allowance for the seasonality of production. The estimate and the magnitude of surplus labour in this case will vary with local conditions.

The third approach is to estimate agricultural production function to test whether elasticity of output with respect to labour is significantly different from zero. This approach indicates whether or not there is surplus labour, but does not measure it magnitude.

When discussing labour's marginal product in agriculture and the extent of disguised unemployment, two important distinctions need to be made between harvest and non-harvest time and between farms that hire labour and those that do not. Within the production function approach this distinction is easily made explicit and it is very fruitful approach for that reason. As for the distinction between hired and non-hired labour is concerned, the marginal product of family labour can hardly be zero if workers are hired, nor can be marginal product of the hired workers be zero if they are paid.

Desai and Mazumdar (1970) have taken a sample of Indian farms and divided into those who use hired labour and those who do not. The differences between two groups are striking. The marginal product of labour on the big farms hiring labour is significantly different from zero, while on farms not hiring labour, the marginal product is not significantly different from zero.

It should be remembered, however, that zero marginal product per man hour or per man day is not necessary condition for surplus labour. Surplus labour can take the form of a small number of hours or days worked. On the other hand if marginal product per man hour or per man day is zero, there must be some surplus labour which may be termed as disguised unemployed labour.

S. Nath (1974) has made a distinction between harvest and not-harvest labour. He suggests that busy-season and stack-season labour inputs should be included separately in the production function. He adopts the approach of production function in a cross-section analysis of 150 farms in Ferozepur district (Punjab), for the period 1966-68, relating annual output to busy-season labour

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stack-season labour and other inputs using a Cobb-Douglas production function. Nath finds the marginal product of busy-season labour is indeed positive and the marginal product of stack-season labour is not significantly different from zero.

The inference that can be drawn from these studies is that marginal product of labour on family farms with no hired labour in the stack season will be zero. In this sense a static surplus exists, but where agriculture is partly commercialized particularly in the harvest season, the marginal product of labour positive. The reduction in agricultural labour during that period of time may impair agricultural output. Defenders of the classical model of development argue that no one has ever argued that the withdrawal of labour under all circumstances will not affect output. The purpose of classical of labour in industry for exceeds the marginal product of labour in agriculture and those who support and use classical model normally stipulate some dynamic change as migration takes place. This leads to a question of measurement of the dynamic surplus, which is the difference between actual labour employed and labour required when change in technique takes place.

Type: These may be genuine differences in the extent of disguised unemployment within and between countries and different investigators may have been estimating different things, but the fact remains that a large past of labour surplus arise from the seasoned nature of production. Studies that exclude this possibility will certainly overestimate the existence of disguised unemployment. If disguised unemployment is interpreted in terms of seasonal unemployment, then dynamic surplus may be very large. At least five types of disguised unemployment can be distinguished.

- Unrealized potential output per worker due to low nutritional and health level of the labour force.
- Low level of output per unit of labour input due to inadequate motivation for the cultivators to pursue maximization.
- Low average product due to low aspirations for material income compared with leisure.
- Unemployment due to lack of co-operant factor (technological unemployment).
- Seasonal unemployment.

The above discussion reveals that there are two strands of thought. Those who believe that disguised unemployment is the result of low marginal product of labour in agriculture and those who disagree with this type of thinking. A reconciliation is provided by the distinction between the amount of labour employed, and the number of persons employed. In a wage payment system it is extremely unlikely that labour would be employed to the point where its marginal product is zero. If wage is positive, marginal product will also be positive. Labour is employed to the point where marginal product of a unit of labour time is equal to the wage and disguised unemployment takes the form of a small number of hours worked per person. It is not that there is too much labour terms but too many

labourers spending it. Total output would fall if workers were withdrawn from land unless those remaining worked danger hours to compensate.

A.K. Sen's view: The precise conditions under which remaining labour force would supply more work effort have been formalized by Sen (1966), if workers are rational they will work (dv/dl) is equal to the marginal disutility of work (dv/dl). The marginal utility of income from work can be expressed as under.

$$\frac{dV}{dL} = \frac{dY}{dL} \times \frac{dV}{dY} \qquad ...(i)$$

Where dy/dl is the marginal product of labour and dv/dy is the marginal utility of income. Welfare maximization implies that

$$\frac{dY}{dL} \times \frac{dV}{dY} = \frac{dV}{dL} \qquad ...(ii)$$

Or

$$\frac{dY}{dL} = \frac{dV}{dL} \div \frac{dV}{dY}$$

$$= \frac{\text{marginal disulitity of work}}{\text{marginal utility of income}} \qquad ...(iii)$$

The amount of disguised unemployment is affected by the organization of agriculture. If the organ is achieve is less capitalist, the amount in utilized labour is likely to be greater, in a situation of no wage pay meant system (like joint family system). The distraction between a unit *g* labour and a unit of labour time becomes redundant. In a joint family system it is the average product that matters for a group as a whole and not the product of the last worker or hour (marginal product). The average product may still be above the subsistence level when the marginal product of labour time is below it. It may be difficult to represent both cases on the same diagram.

Disguised Unemployment

Some Related Issues:

Having discussed with meaning and measurement of disguised unemployment. We will now discuss related issue connected with the concept of disguised unemployment. The related issues are discussed below:

1. **Is disguised unemployment a blessing in disguise?** It is said that disguised unemployment comes to the rescue of backward country when it makes an attempt to develop itself. It is a known fact that most developed countries suffer from scarcity of labour and have abundance of other factors. The under developed countries have scarcity of capital goods and technical skill with an abundance of manpower. If these countries begin to develop they can procure capital goods from foreign countries and import technical skill and the required labour can be got from rural areas where were is

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disguised unemployment. To that extent disguised employment is helpful for development purposes. It might, therefore, be regarded as a blessing in disguise unemployment that is not disguised can also come to our rescue when we need manpower for development purposes. But there is more distress when there is unconcealed or open unemployed. The fact however remains that unemployment whether disguised or open is an indication of waste of human productive efficiency.

2. **Shift of labour: a loss or gain in output?** When there is no disguised unemployment and if labour is shifted from agriculture to manufacturing industries, the output of the enterprise where it is drawn decreases. When there is disguised unemployment such a decrease does not take place this is the advantage that people have in mind when they say that disguised unemployment is a help to the country that embarks on a program of economic development, while this is true as far this argument goes but one must remember that disguised unemployment causes loss of a productive factor, without actually remaining idle, the surplus labour in agriculture remains in employment without adding to the total product of the farms.

   Another problem connected with shifting of labour from agriculture to industries is the availability of food for migrated workers. When there is disguised unemployment shift of labour from agriculture to other industries does not decrease output of farms. This is one great advantage. But is those who still remain employed in agriculture begin to consume more than before what would those who have been withdrawn for agriculture consume this is the great advantage. But if those who still remain employed in agriculture begin to consume more than before what would those who have been withdrawn for agriculture consume? This is the danger, and something has to be done to ensure that food and other products of agriculture would be available for those who have shifted to other industries. The advantage of disguised unemployment would be partially last if nothing is done to prevent people in rural areas from consuming more than they were consuming before.

3. **Disguised unemployment and capital formation:** It has been explained about that labour is required for development project and this can come from rural areas where there is surplus labour in the form of disguised unemployment. Apart from labour other factors of production like capital goods are also required. When surplus labour shifts from agriculture to manufacturing industries, it has to be provided with capital goods. Where from we are to get them capital good can be imported from foreign countries or where the required raw materials are available or they can be produced out home supply raw materials to the migrated labour and let them make capital goods. For development projects, besides machinery we need transport, communication houses factory building etc.

To provide where with all for development projects money is needed. It is also needed for buying or hiring factors of production. Let us take the care of the factor labour wages have to be paid to them for the work they do in their new employment. This money can come from the savings of the people whether made by individuals, by companies or by the government. If private individual save money and if it is not used up in financing the already existing industry it can (through capital market) become available for payment of wages to labourers migrated from agriculture.

Another source of funds is the government money in the form of taxes levied on the people. When people are taxed they are forced to some extent at least, to save money. They money thus saved can become available for payment wages. The government can also borrow money for this purpose. The borrowed money does not help in increasing the national saving. If borrowed money is used for productive purpose it would create additional income out of which some amount could be served.

The main advantage that people generally think is that disguised unemployment means disguised saving. When disguised unemployment workers are shifted from agriculture to industries, the total production of agricultural output is not decreased. The shifted workers get the opportunity to do some work which give their income. Previously those worker income was zero as their contribution to output was zero. The process through which disguised workers earn their income leads to some saving which is termed as disguised saving. Theoretically it may appear an easy position, but practically it is difficult one.

Critical Appraisal

Nurkse's concept of disguised unemployment as concealed saving potential has come in for good deal of criticism from the point of view of its practical utility in underdeveloped over populated countries. They various difficulties that hinder its smooth looking are as under:

1. **Propensity to consume does not remain constant:** Nurkse analysis is based on the assumption that propensity to consume of the farm workers and those employed in new projects remain constant. This appear to be an unrealistic assumption. In underdeveloped countries the living standard of the people is very low and when their income rise, they tend to satisfy their pent-up demands and it raises their propensity to consume. The demonstration effect also helps in raising their consumption expenditure. In this connection, K.K. Kurihara state propensity to consume for the whole economy may well rise in consequence of uprising the previously unproductive but presently productive consumers the disguised unemployed. In this event, the pressure will for allocating to the consumer goods sectors those resources which might otherwise be used to increase output of capital goods.

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2. **Problems connected with collection and distribution of food not discussed:** Nurkse fails to throw light on the problem as how to collect surplus food from the forms and distribute that among the newly employed workers. How much each farmer should contribute? If anyone refuses to contribute, what action is to be taken against him? These are certain problems which Nurkse perhaps failed to visualize.
3. **It is difficult to transfer the disguisedly unemployed:** It is very difficult to the disguised unemployed persons as they are generally attached to their land and kith and kilns and they perhaps might not be prepared to leave their village and work at new places besides they are under the influence of social customs and traditions that they tend to stick to their hearths and homes. It is rightly social that of all the goods, labour is difficult to transport.
4. **Problem of inflation:** From the definition of disguised unemployed it is difficult to identify the disguisedly unemployed persons. The migration of such workers from subsistence sector would be possible when they are given higher wages in capital project work. But these projects have long gestated period and as such there remains a danger of inflation any person on prices. In this connection. This will also import of goods, with adverse effect on the balance of payment if their effects are relented by strict is to swell the sun of many circulating at home and so put greater pressure on the domestic prices. Rising prices might defeat the purpose of capital formation.
5. **Unskilled labour along is not needed:** The disguisedly unemployed labour is generally unskilled & nontechnical but capital project need skilled & technical labour. According to Kurihara, even if the entire surplus labour is transferred to capital projected which are generally labour instantiate. Cannot be expected to turn out capital and quality equipment of industrialisation. Dr. A.M. Khusro observes if you attempt to create only employment without regard to efficiency, output and surplus you will soon surplus many labour intensive schemes which seen to be giving a lot of employment per unit of capital is in fact an optical illusion. It throws back into unemployment or under-employment all or many of the initially employed. Employment to be of permanent must be generated in eventually. Self permanent must be generated in eventually. Self finance, surplus generating scheme.
6. **Directly productive capital is more important for eco development:** Nurkse has suggested the employment disguised employed person in the constriction of social overhead capital roads dams, building, irrigation project etc. Hirschman holds a different view.

   He is of the opinion that social overhead capital is a permission factor which serves as an incentive to private investment only whereas directly productive capital such as machine load and iron and steel industry is a compulsive factor in economic development and is more significant for economic

development. Hence the use of disguised workers for capital formation as suggested by Nurkse is applicable to social overhead capital only and not in directly productive activities which require skilled and technical labour.

7. **Unfavourable effect of increasing population on capital formation:** In underdeveloped countries population grows at a fast rate and if eats up surplus likely to be created by labour migration from subsistence to investment sector. When population growth out strips the growth of capital formation that implies that disguised unemployment grows faster than can be absorbed productively by the very stock of capital that he disguised unemployed increase in total output.
8. **Less possibility of significant increase in total output:** Kurihara is of the view that if unskilled and ill equipped labour is put on capital projects. It may not increase significantly the output of fixed capital which is of great importance in increasing the level of output besides, the experience of Latin American states show that the disguisedly unemployed person is in the habit of abstention and their contribution to total output is negligible.
9. **Fall in agricultural productions:** It is pointed out by Schultz that transfer of surplus labour from agricultural to the new capital projects will adversely affect agricultural production. In his own word, no evidence for any poor country anywhere that would suggest that a transfer of even some small factor say percent of the exiting labour force out of agriculture with other things equal could be made without reducing its production.
10. **Additional administration burden:** The starting of new capital projects adds to administrative and financial burden and underdeveloped countries lack the capacity to cope with the rising burden. When new capital projects are started. Unskilled burdens tools and equipment are needed along with capital. But capital scarcity is proverbial in underdeveloped countries. Again, store houses are got to be constructed for the safe custody of tools and equipment. All this would put additional financial burden on the administration.
11. **Not practicable in democratic states:** The mobilization of surplus labour from the substances to the capital sector might require using of coercive methods as happed in communist countries. This may not be practicable in democrat underdevelopment countries. Nurkse himself was not unaware of this difficulty when he said some of the underdevelopment countries do have potential domestic resource available for capital construction. But it may be very hard any way & impossible to mobilize them without resorting to coercive methods where masses were driven to work on capital formation where masses were work driven to capital projects just on bare subsistence.
12. **Inadequacy of complementary saving:** As discussed above the success of Nurkse depends upon the availability of contemporary saving occurring in the sector other than subsistence one. It's a doubtful if contemporary saving from other sectors. The inadequacy of complementary saving feature

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stand in the way of an effectively use of disguised unemployment as source of capital formation Dr. K.N. has observed the answer that the existence of which is available for practiced action. On the basis of above discussion, one may say that disguised unemployed as a concerned saving potential is of little practical significance for democratic countries. One might conclude formative in the words of Jokes Viner, 'There is little or nothing it all the phenomena disgusted as disgusted unemployment as hidden unemployment or as under employment which is in for account by competent informed and compressive analysis of the phenomenon of low productivity & its possible remedies.'

Check Your Progress

6. Amartya Sen's capability approach revolves around which factor?
7. Which index's creation is known to have been inspired by the capability approach?
8. As per Nurkse, disguised workers can be used for which type of capital formation?

6.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. As per Rostow, the political factor was reactive nationalism's reaction against the fear of foreign domination which acted as a potent force in bringing about the transition.
2. Drive to maturity is the period when a society has effectively applied the range of (then) modern technology to the bulk of its resources.'
3. According to Rosenstein-Rodan, investment in social and economic overheads is irreversible in time and hence it must precede other types of investment.
4. SOC creates external economies while the DPA appropriates external economies.
5. Investment sequences are generated by profit expectations and political pressures. Profit expectations generate the sequence from SOC to DPA and political pressures from DPA to SOC.
6. Amartya Sen's capability approach revolves around people as human being.
7. The capability approach is perhaps best known for having inspired the creation of the human development India (HDI).
8. The use of disguised workers for capital formation as suggested by Nurkse is applicable to social overhead capital only and not in directly productive activities which require skilled and technical labour.

6.8 SUMMARY

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- Professor W.W. Rostow has sought an historical approach to the process of economic development. As seen before, he distinguishes five stages of economic growth, Viz (1) the traditional society (2) the pre-conditions for take-off (3) the take-off: (4) the drive maturity; (5) the age of high mass-consumption. Let's have a detailed look at each of these stages.
- The theory of the 'big push' is associated with the name of Professor Paul N. Rosenstein-Rodan. The thesis is that a 'big push' or a large comprehensive programmed is needed in the form of a high minimum amount of investment to overcome the obstacles to development in an underdeveloped economy and to launch it on the path to progress.
- Rosenstein-Rodan distinguishes between three different kinds of indivisibilities and external economies. One, indivisibilities in the production function, especially the indivisibility of the supply of social overhead capital; two, indivisibility of demand; and three, indivisibility in the supply of saving.
- The concept of unbalanced growth has been popularized by Hirschman. It is his contention that deliberate unbalancing the economy, according to a predesigned strategy, is the best way to achieve economic growth in an underdeveloped country. According to Hirschman, investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way to further economic development.
- According to Hirschman, when new projects are started they appropriate external economies created by previous projects and create new external economies that can be exploited by subsequent ones. There are some projects that appropriate more external economies that they create which he calls convergent series of investments. Hirschman also calls them induced investments for they are net beneficiaries of external economies. There are other projects too that they appropriate which he characterizes as divergent series of investments.
- The capability approach is a theoretical of framework that contains two core normative claims: first that the freedom of achieving wellbeing is of primary moral importance and second that freedom to achieve well-being is to be understood in terms of people's capabilities.
- Sen's approach is both comprehensive and flexible. It provides dignity to human race because the economic model of development has reduced people to the status of producers and consumers. If the GDP growth model dis-empowers then, the capability approach makes their empowerment a central issue. Rather than taking of some theoretical equality of people or seeking them in terms of numbers, the capability approach explicitly recognizes the differences among individuals. It also accepts that people's abilities are affected by external factors coming from interaction with other people, social arrangements, access to infrastructure and public services,

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discriminations, opportunities to participate in social and political activities, freedom to speak and influence state policies.

- The capability approach focuses directly on the quality of life that individuals are actually able to achieve. This quality of life is analysed in terms of the core concepts of functioning and capability. Functionings are states of being and doing, such as being well nourished, having shelter. They should be distinguished from the commodities employed to achieve them. Capability refers to the set of valuable functionings that a person has effective access to.
- In the capability perspective, poverty is seen in terms of a short all of 'basic capabilities'- a kind of basic capability failure'. Such failure involves the inability to achieve certain minimally adequate levels of crucially important functionings, such as being nourished and being sheltered.
- The explanation of Nurkse theory is based on disguised unemployment. The term disguised unemployment is generally defined in terms of margined productivity of labour being zero. This is loose interpretation of the concept.
- Nurkse's concept of disguised unemployment as concealed saving potential has come in for good deal of criticism from the point of view of its practical utility in underdeveloped over populated countries.

6.9 KEY WORDS

- **Traditional society:** It has been defined 'as one whose structure is developed within limited production functions based on pre-Newtonian science and technology and as pre-Newtonian attitudes towards the physical world'.
- **Social Overhead Capital:** It has been defined as 'comprising those basic services without which primary, secondary, and tertiary productive activities cannot function.'
- **Functionings:** It refers to states of being and doing, such as being well nourished, having shelter. They should be distinguished from the commodities employed to achieve them.
- **Capability:** It refers to the set of valuable functionings that a person has effective access to.

6.10 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What are the three sectors of the economy as per Rostow?

2. Enumerate the factors on which the rapid growth of the leading sectors depend as per Rostow.
3. How does Rostow explain the stage of mass consumption?
4. Why does Rodan regards his theory of development superior to the traditional static equilibrium?
5. Give a critical appraisal of Rosenstein Rodan's theory of economic development.
6. Briefly explain why, according to Hirschman, LDCs do not give due importance to the part played by exports in their economic development.
7. What are the similarities between balanced and unbalanced growth?
8. Differentiate between functionings and capabilities.
9. What are the different types of disguised unemployment?

Long Answer Questions

1. Describe Rostow's stages of economic growth.
2. Give a critical appraisal of Professor Ronstein Rodan's theory of economic growth.
3. Describe Hirschman's strategy of unbalanced growth for economic development.
4. Explain Sen's capability approach and its relation to income inequality.
5. Discuss the critical appraisal of Nurkse's theory of undisguised employment.

6.11 FURTHER READINGS

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UNIT 7 APPROACHES TO ECONOMIC DEVELOPMENT

NOTES

Structure

7.0 INTRODUCTION

The primary factor used to distinguish developed countries from developing countries is gross domestic product (GDP) per capita a figure calculated by dividing a country's GDP by its population. For example, a small country with a GDP of $1 billion and a population of 50,000 has a GDP per capita of $20,000.

One unofficial threshold for a country with a developed economy is a GDP per capita of $12,000. Some economists prefer to see a per capita GDP of at least $25,000 to be comfortable declaring a country as developed however many highly developed countries, including the U.S have high per capita GDPs of $40,000 or above.

Exceeding even the $12,000 GDP does not automatically qualify a country as being developed. Developed countries share several other characteristics: They are highly industrialized, their birth and death rates are stable, they do not have excessively high birth rates because thank to quality medical care and high living standards, infant mortality rates are low. Famines do not feel the need to have high numbers of children with the expectation that some will not survive. They are more women working particularly in high-ranking executive positions. These career oriented women frequently choose to have smaller families or eschew having children altogether. They use a disproportionate amount of the world's resources, such as oil. In developed countries, more people derive cars, fly on airplanes and power their homes with electricity and gas. Inhabitant of developing countries often don't have access to technologies that require the use of these resources. They have higher levels of debt. Nations with developing economics cannot obtain the kind of seemingly bottomless financing that more developed nations can.

Another measuring device, the human development index (HDI) was developed by the UN as a metric to assess the social and economic development levels of countries. It quantifies life expectancy, educational attainment and income into a standardized number between 0 and 1. The closer to 1, the more developed the country. No minimum requirement exists for developed status, but most developed countries have HDIs of 0.8 or higher.

It is important to remember no set minimum or maximums measures exists for these metrics. Economists look at the totality of a country's situation before rendering judgment, and they do not always agree on a country's development status. For example, countries such as Mexico, Greece and Turkey are considered developed by some organizations and developing by others.

7.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of underdeveloped countries
- Enumerate the common characteristics of the underdeveloped countries
- Examine the developed countries
- Discuss the characteristics of developed countries

7.2 DEVELOPED AND UNDERDEVELOPED COUNTRIES

The economies of the world are classified as developed, underdeveloped or developing economies on the basis of different indicators of economic development. Considering per capita income as the basis, the World Development report recognized the economies of the world into high income upper-middle income and lower middle income and low income economies. The units for this measure and for the thresholds is current US Dollars.

At the bank, those classifications are used to aggregate data for groups of similar countries. The income category of a country is not one of the factors used that influence lending decisions.

Each year on 1st July, bank updates the classifications. They change for two reasons:

1. In each country, factors such as income growth, inflation, exchange rates, and population change, influence GNI per capita.
2. To keep the Dollar thresholds which separate the classifications fixed in real terms, bank adjust them for inflation.

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New thresholds are determined at the start of the bank's fiscal year in July and remained fixed for 12 months regardless of subsequent revisions to estimates. As of 1 July 2017, the new thresholds classification by income are:

Threshold	GNI/Capita (current US$)
Low-Income	< 1,005
Lower-middle income	1,006-3,955
Upper-middle income	3,956-12,235
High-income	>12,235

Usually, high income countries are known as developed economies and low income level countries are known as under developed economies. However, all high income economies are not developed countries. For example, middle-east oil producing countries are high income economies but are not treated as developed economies. Also, to be noted is the point that some of the middle and low income economies are developing faster than high income economies. Underdeveloped economies showing high potential of growth in terms of their natural, physical and human resources are often referred to as developing economies. Other than high per capita income, developed or advanced economies are characterized by high standard of living, universal and quality education, better health care facilities and high life expectancy, whereas in underdeveloped or developing economies such characteristics are found only as symptoms.

Another expression, currently in vogue, is 'South, for less developed countries and north for advanced countries of the world'. It is because most underdeveloped fall in the Southern Hemisphere of the globe while most developed countries fall in the Northern Hemisphere of the globe. Economists often use the terms, first world, second world, and third world for the developed, communist and underdeveloped economies respectively. This is one of the broadest classifications of the different economies of the world. The terms traditional backward, poor southern-third world etc. are used for the underdeveloped countries. So far as division of world population on the basis of per capita income is concerned, it may be noted that nearly 80 per cent of the world population is living in underdeveloped economies and the rest 20 per cent is living in developed economies.

7.2.1 Criterion for Classifying Economics as Developed and Underdeveloped

It is very difficult to suggest a commonly accepted criterion of classifying the whole economies as developed and underdeveloped. Prof. Samuelson is of the opinion that every country is an underdeveloped country because a country never achieves the perfection of development. There is always a scope for further development. There are plenty of natural resources in USA, Russia and Germany. These

economies are developed economies. Likewise, there are plenty of natural resources in most countries of Latin America, and African continent, but these are all underdeveloped economies. So, it is difficult to classify economies as developed and underdeveloped on the basis of their resources potential. Further, countries like Canada, Australia, France, Britain and Switzerland thinly populated countries and are well recognized as advanced nations. On the other hand, Congo, Guinea, Sudan, Argentina and Nepal are equally thinly populated and are known as underdeveloped countries. Thus, on the basis of population also, it is difficult to characterize different nations as developed and underdeveloped. Some economists are of the view that the economies with the predominance of secondary and tertiary activities (such as industries, trade, insurance, banking etc.) are advanced economies, while the economies with the predominance of primary, fishery, mining etc.) are underdeveloped economies. This criterion of classifying economies as developed and underdeveloped may hold good in the case of economies of India, Pakistan and Bangladesh. But it does not hold good in case of countries like Australia, Denmark and New Zealand. These countries are developed countries despite being predominantly agricultural.

Thus, it is not easy to evolve any common criterion to classify economies as developed and underdeveloped. However, there is a set of common characteristics of under developed economies such as low per capita income, low levels of living high rate of population growth, illiteracy, technical backwardness, capital deficiency, dependence on backward agriculture, high level of unemployment, unfavourable institutions and the likes. It is on the basis of these characteristics that we draw a line of distinction between developed and underdeveloped economies.

What are Developed Economies?

A developed country, industrialized country, more developed country, or more economically developed country (MEDC) is a sovereign state that has developed economy and advanced technological infrastructure relative to other than less industrialized nations. Most commonly, the criteria for evaluating the degree of economic development are gross domestic product (GDP), Gross National product (GNP), the per capita income, level of industrialization, amount of widespread infrastructure and general standard of living, which criteria are to be used and which countries can be classified as being developed are subject of debate.

Economic criteria have tended to dominate discussions. One such criterion is income per capita; countries with high gross domestic product (GDP) per capita would thus be described as developed countries. Another economic criterion is industrialization, countries in which the tertiary and quaternary sectors of industry dominate could thus be described as developed. More recently, another measure, the Human Development India (HDI) which combines an economic measure, national income, with other measures, indices for life expectancy and education has become prominent. This criterion would define developed countries as those with a very high (HDI) rating. The index however, does not take into account

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several factors, such as the net wealth per capita or the relative quality of goods in a country. This situation tends to lower the ranking for some of the most advanced countries. Such as the GT members and others.

A developed country is a nation that offers economic security and a high quality of life to its population.

Features of a Developed Country

The following are the basic features of a developed country:

1. **High gross national income per capita:** A high per capita income is calculated as economic output of a nation divided by its population. It should be noted that in some countries this number is heavily influenced by a small number of individuals who hold significant wealth.
2. **Good Health:** Access to modern health care often measured with average life expectancy under under-five mortality rates. This is developed countries is higher.
3. **Education:** Access to education often measured as the percentage of the population who complete a minimum number of years of school. This percentage is high in developed countries.
4. **Industrialization:** An industrialized nation is a country with a large manufacturing sector. Historically, development and industrialization where virtually synonymous. A developed economy is thereby considered to be one that is industrialized.
5. **Service Economy:** Service economy is a nation's output of services. For example, travel, restaurants, software and business services. Developed nations are experiencing a shift whereby services are increasing important to economic output.
6. **Knowledge Economy:** The knowledge economy is the development of valuable knowledge such as processes, procedures, methods, designs, formulations and software. This includes creative outputs such as an advertising campaign that generates feelings for a brand. It is possible that highly developed nations of the future will mostly shift to services and knowledge economy and industrial production will be viewed as a smaller part of the world's economic output.
7. **Infrastructure:** Soft infrastructure such as public institutions and hard infrastructure such as bridge. Infrastructures makes a nation more productive, efficient, stable and attractive to labour and capital. As such, it is one of the primary advantages that highly developed nations have over developing countries.
8. **Stability:** Another condition for economic prosperity is political, economic and social stability. This includes physical and information security such as a

public health care and pension system shelters people and give them room to pursue the knowledge and experimentation required to innovate.

9. **Quality of Life:** As the world becomes most economically prosperous, competition between nations is shifting towards the happiness of people. All else being equal, a nation with clean air is considered more developed than a nation with polluted air. This is usually captured as a measurement known as quality of life, that is based of asking a population if they are happy, quality of life is an economic advantage in a knowledge economy where global competition for talent can be intense. In many cases, talented individuals will avoid work in a polluted, dangerous unsightly or uninteresting city

What is an underdeveloped Economy?

The term underdevelopment refers to that state of an economy where level of living masses are extremely low due to very low levels of productivity and high growth rates of population.

Thus, developing country or less developed country, less economically developed country (LEDC) or underdeveloped country, is a country with a less developed industrial base and a low Human Development Index (HDI) relative to other countries. However, this definition is not universally agreed upon. There is also no clear agreement on which countries fit this category. A nation's GDP per capita compared with other nations can also be a reference point.

Features of Developing Economics

Developing countries tend to have some features in common. These characteristics are as follows:

- Low income and general poverty
- Existence of underdeveloped natural resources
- Primary producing countries
- Existence of over population
- Low expectation of life
- Higher proportion of population in younger age-group
- Backward Human Resources
- Technological Backwardness
- Foreign Trade orientation
- Unfavourable institutional structure

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Check Your Progress

1. What are the terms used for developed, communist and underdeveloped countries?
2. Mention the most common criteria for evaluating the degree of economic development.
3. What does HDI not into account?
4. Define knowledge economy.

7.3 DIVERSITY AMONG DEVELOPING COUNTRIES

It is difficult to generalize 160-member countries of the United Nations (UN) that constitute the third world. While all are almost poor in money terms, they are diverse in culture, economic condition and social and political structures.

(i) World Bank Classification

The most common way to define a developing world is by per capita income. Several international agencies including the Organization for Economic Cooperation and Development (OECD) and the United Nations have classified development countries by their economic states. The best known system is offered by the International Bank for Reconstruction and Development (IBRD), more commonly as the World Bank Classification. According to this classification system, economies with a population of at least 30,000 are ranked by their levels of 2008 Gross National Income (GNI) per capital. On the basis of this criterion, economies are classified as low income (LIC), Lower-middle income (LMC), Upper middle income (UMC), high income OECD and other high-income countries.

Income group classified according to the 2008 GNI per capita, Low-income countries are defied by the world Bank as having a per capita gross national income (GNI) of $975 or less, lower middle income countries are (LMCs) have incomes between $976 and $3856 and $11,905 and high-income countries have incomes of $11,906 or more. This classification has been shown in Table 7.1 sometimes a distinction is made among upper-middle income economics, that have relatively achieved advanced manufacturing sectors and are designated as newly industrialized countries (NICs). These include eleven countries namely, Argentina, Brazil, Greece, Hong Kong, South Korea, Mexico, Portugal, Singapore, Spain, Taiwan and Yugoslavia. This table includes a few countries grouped as 'other high income economies' have developed export sectors. But significant part of their population remains uneducated, unemployment with low per capita income or in poor health. Oil exporting countries such as Kuwait, Qatar and United Arab Emirates (UAE) fall in this category.

Another way of classifying the developing countries is based on their degree of classifies the countries as severely indebted, moderately indebted and less indebted.

(ii) OECD Classification

Organization for Economic Cooperation and Development (OECD) classification and some other UN agencies offer a separate category for the member of the Organization of Petroleum Exporting countries (OPEC). OPEC includes low income countries such as Nigeria and Indonesia, middle-Income countries (MICs) like Ecuador and Gabon. Even a few high income OECD and other high-income countries.

(iii) UNDP Classification

Another way of classifying the developing countries has been suggested by United Nations Development including health and education attainments. Because of its great importance, Human Development Index (HDI) has been evolved all the countries with in the range of O (lowest HDI) and 1 (highest HDI) and is based on the three goals of development: (1) Longevity, measured by the life expectancy of birth (ii) knowledge, measured by adult literacy (two-third) and schooling (one-third), (iii) Standard of living, measured by real per capital income. These are main components of HDI.

Physical size and Income Level: The physical size population and income levels are the important variables which distinguish one developing country from another. There are countries with large population like India, Brazil, Egypt and Nigeria existing side by side with small countries like Nepal, Jordan, Chad and Paraguay. Out of 160 developing countries that were full members of the United Nations in 2000, 87 had fewer than 5 million people, 58 had fewer than 2.5 million and 38 had fewer than 5,00,000. Large size usually is a mixed blessing. A large country gains certain advantages of diverse factor endowment, large potential markets, and lesser foreign dependence. It also faces certain problems of national integrations, regional imbalances, administrative control. A small country too enjoys certain advantages and faces problems. More over the size of the country is not necessarily related with the level of income. For example, in 2000 India with a population of over one billion had an average per capita income level of 460 dollars whereas Singapore with only 4 million people had per capita income of 24,740 dollars. Table 7.2 illustrates the point by listing ten most and least populated countries in 2005 and their respective per capita income.

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Table 7.1 *Classification of Economies by Region and Income, 2007*

East Asia and the pacific		Jamaica	LMC	Rwanda	LIC
American Samoa	UMC	Mexico	UMC	São Tomé and Príncipe	LIC
Cambodia	LIC	Nicaragua	LMC	Semegal	LIC
China	LMC	Panama	UMC	Seychelles	UMC
Fiji	LMC	Paraguay	LMC	Siera Leone	LIC
Indonesia	LMC	Peru	LMC	Somalia	LIC
Kiribati	LMC	St. Kitts and Nevis	UMC	South Africa	UMC
Korea, Dem. Rep.	LIC	St. Lucia	UMC	Sudan	LIC
Lao PDR	LIC	St. Vincent and the Grenadines	UMC	Switzerland	LMC
Malaysia	UMC	Suriname	LMC	Tanzania	LIC
Marshall Islands	LMC	Trinidad and Tobago	LMC	Togo	LIC
Micronesia, Fed. Sts.	LMC	Uruguay	UMC	Uganda	LIC
Mongolia	LIC	Venezuela, RB	UMC	Zambia	LIC
Myanmar	LIC	**Middle East and North Africa**		Zimbabwe	LIC
Northern Mariana Islands	UMC	Algeria	LMC	**High Income OECD Countries**	
Palau	UMC	Djibouti	LMC	Australia	
Papua, New Guinea	LIC	Egypt, Arab Rep.	LMC	Austria	
Philippines	LMC	Iran, Islamic Rep.	LMC	Belgium	
Papua, New Guinea	LIC	Egypt, Arab Rep.	LMC	Austria	
Samoa	LMC	Iraq	LMC	Canada	
Solomon Islands	LIC	Jordan	LMC	Denmark	
Thailand	LMC	Lebanon	UMC	Finland	
Timor-Leste	LIC	Libya	UMC	France	

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Tongo	LMC	Morocco	LMC	Germany	
Vanuatu	LMC	Oman	UMC	Greece	
Vietnam	LIC	Syrial Arab Republic	LMC	Iceland	
Europe and Central Asia		Tunisia	LMC	Ireland	
Albania	LMC	West Bank and Gaza	LMC	Italy	
Armenia	LMC	Yemen, Rep.	LIC	Japan	
Azerbaijan	LMC	**South Asia**		Korea, Rep.	
Belarus	LMC	Afghanistan	LIC	Luxumberg	
Bosnia and Herzegovina	LMC	Bangladesh	LIC	Netherlands	
Bulgaria	LMC	Bhutan	LIC	New Zeland	
Croatia	UMC	India	LIC	Norway	
Czech Republic	UMC	Maldives	LMC	Portugal	
Estonia	UMC	Nepal	LIC	Spain	
Gergia	LMC	Pakistan	LIC	Sweden	
Hungary	UMC	Sri Lanka	LMC	Switzerland	
Kazakhstan	LMC	**Sub-Saharan Africa**		United Kingdom	
Kyrgyz Republic	LIC	Angola	LMC	United States	
Latvia	UMC	Benin	LIC	**Other high Economics**	
Lithuania	UMC	Botswana	UMC	Andorra	
Macedonia, FYR	LMC	Burkina Faso	LIC	Antigua Barbuda	
Maldova	LMC	Burundi	LIC	Aruba	
Poland	UMC	Cameroon	LMC	Bahamas, The	
Romania	LMC	Cape Verde	LMC	Bahrain	
Russian Federation	UMC	Central African Republic	LIC	Bermuda	
Serbia and Montenegro	LMC	Chad	LIC	Brunei Darussalam	
Slovak Republic	UMC	Comoros	LIC	Cayman Islands	

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Tajikistan	LIC	Congo, Dem. Rep.	LIC	Channel Islands	
Turkey	UMC	Congo, Rep.	LMC	Faeroe Islands	
Turkmenistan	LMC	Côte d'Ivoire	LIC	French Polynesia	
Ukraine	LMC	Educational Guinea	UMC	Greenland	
Uzbekistan	LIC	Eritrea	LIC	Guam	
Latin America and the Caribbean		Ethiopia	LIC	Hong Kong, China	
Argentina	UMC	Gabon	UMC	Isle of Man	
Barbados	UMC	Gambia, The	LIC	Israel	
Belize	UMC	Ghana	LIC	Kuwait	
Bolivia	LMC	Guinea	LIC	Liechtenstein	
Brazil	LMC	Guinea-Bissau	LIC	Macao, China	
Chile	UMC	Kenya	LIC	Mata	
Colombia	LMC	Lesotho	LMC	Manaco	
Costa Rica	UMC	Liberia	LIC	Netherlands Antilles	
Cuba	LMC	Madagascar	LIC	New Caledonia	
Dominica	UMC	Malawi	LIC	Puerto Rico	
Dominican Republic	LMC	Mali	LIC	Qatar	
Ecuador	LMC	Mauritania	LIC	San Marino	
El Salvador	LMC	Mauritius	UMC	Saudi Arabia	
Grenada	UMC	Mayotte	UMC	Singapore	
Guatemala	LMC	Mozambique	LIC	Slovenia	
Guyana	LMC	Namibia	LMC	Taiwan, China	
Haiti	LIC	Niger	LIC	United Arab Emirates	
Honduras	LMC	Nigeria	LIC	Virgin Islands (US)	

Source: World Bank data

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Table 7.2 *The ten most and least populated countries and their per capita Income, 2005*

Most populous	Population (Millions)	GNP Per Capita (U.S. $)	Least Populous	Population (Thousands)	GNP Per capita (U.S. $)
1. China	1,305	1,740	1-Palau	20	7,670
2. India	1,095	730	2-Saint Kitts and Nevis	48	7,840
3.United States	296	43,560	3-Marshall Islands	63	2,930
4. Indonesia	221	1,280	4-Domica	72	3,800
5. Brazil	186	3,550	5-Antigua and Barbuda	83	10,500
6. Pakistan	156	690	6-Seychelles	84	8,180
7. Russia	143	4,460	7-Kiribati	99	1,210
8.Bangladesh	142	470	8-Tongo	102	1,750
9. Nigeria	132	560	9-Grenada	107	3,860
10. Japan	128	38,950	10-Micronesia	110	2,300

Historical background of third world countries has not been uniform. Most countries of Africa and Asia remained under the colonial rule of west European countries primarily Britain and France. The economic structures, educational patterns and social institutions were influenced by the policies of colonial rulers. Moreover, the countries of Africa which got their independence in 1950s and 1960s were more concerned with the consolidation of their economic and political structures than the rapid industrialization. The policies of such countries were influenced by the economic and political issues. In contrast, the countries of Latin America have a long history of political independence together with common colonial heritage (Is Spanish and Portuguese). Despite geographical and demographic diversity, these countries have similar economic and social institutions and also face similar problems. Such a similarity is not found in the countries of Asia as they have been under different colonial heritage. For example, India and Pakistan have been under the British rule, Laos under the French and Indonesia under the Dutch rule. Educational patterns, social and institutional systems ae also diverse in these countries.

Resource Endowments: The economic growth and strength of any country depends upon physical resource endowments (such as minerals, raw materials, power etc.) and human resources endowments (quantity and quality of man power). In the world countries there are extreme cases of resource endowments. For example, the Persian Gulf states virtually enjoy monopoly in Civil and Latin American countries Brazil and Chile which are rich in minerals. On the other extreme are countries like Bangladesh, Togo and Laos where resource endowments of oil and minerals are relatively small and even negligible.

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In the realm of human resource endowments, not only sheer numbers of people and their skill levels are important but also are their cultural outlooks altitude towards work access to information willingness to innovate and desire for self-improvement. More over the level of administrative skills will often determine the ability of the public sector to alter the structure of production and the time in which such structural alteration can occur. Here one gets involved with the whole complex of interrelationship between culture, tradition, religion ethnic and tribal fragmentation for cohesion. Thus, the nature and character of a country's human resources are important determinants of its economic structure and these clearly differ from one country to the other.

Relative Importance of public and private sectors: Most developing economies have mixed economic systems featuring both public and private ownership and use of resources. The division between the two and their relative importance are mostly a function of historical and political circumstances. Thus, in general, Latin American and south east Asian nations have larger private sectors than South Asian and African nations. The degree of foreign ownership in private sector is another important variable to consider when differentiating among LDCs. A large foreign-owned private sectors usually creates economic and political opportunities as well as problems not found in countries where foreign investors are less prevalent. Often countries like those in African with severe shortage of skilled human resource have tended to put greater emphasis on public-sector activities and state run enterprises on the amputation that limited skilled manpower can be best used by coordinating rather than fragmenting administrative and entrepreneurial activities. The widespread economic failure and financial difficulties of many of these public concerns in countries such as Ghana, Senegal, Kenya and Tanzania raise questions about the validity of this assumption. As a result, these and other American countries have moved in recent years toward less public and more private enterprises. The most dramatic examples are found in the 15 countries of former Soviet Union and other once centrally planned economies, which have privatized a majority of their state-owned economies. Economies policies, such as those designed to promote more employment, will naturally be different for countries with large public sectors and once with sizable private sectors. The economies with public sector would forces on direct government invest projects and rural work program, whereas private oriented economies would go in for induced investment economies would go in for induced investment ventures. Finally, the degree of corruption differs widely across developing countries and may influence both the size of public sector and the design of privatization program.

Industrial Structure: Most of the third world countries are agrarian in character. Agriculture is not only a means of subsistence, but it is the principal activity of vast majority of the people of Asia, Africa and Latin America. In these countries the agrarian systems and patterns of land ownership quietly differ, but the margins problems are somewhat similar. Recording industrial structures, a wide variation exists in the manufacturing and service sectors. Of late; however small in relation

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to its large publication Table 7.3 provides the information regarding the distribution of labour force in agriculture, industry and services sectors. Table 7.3 show the structure of employment of men and women and value added in the agricultures, industrial and service sectors, in developed countries, agriculture represent a very small share of employment and output in U.S.A. and U.K. The share of employment in industry in these two countries is actually smaller now than in some developing countries. However, is the most African and Asian countries agriculture still provide a substantial share of employment. In Latin America the share of agriculture employment is smaller but still substantial. With lower industrialization, developing nation have tended to have a higher dependence of primary exports. Most developing countries particularly on relative small number of agricultural and mineral exports. In spite of common problems, the development strategies may vary from country to country depending upon the degree of independence among its primary, secondary and tertiary sectors.

Table 7.3 *Share of the Population Employed in the Industrial Sector in Selected Countries, 2000-2005 (%)*

	Agriculture			Industry			Services		
	Males	Females	Share	Males	Females	Share	Males	Females	Share
Africa									
Egypt	28	39	15	23	6	46	49	55	39
Ghana	60	50	38	14	15	23	27	36	39
Madagascar	77	79	28	7	6	16	16	15	56
South Africa	13	7	3	33	14	30	54	79	67
Uganda	60	77	33	11	5	25	28	17	43
Asia									
Bangladesh	50	59	20	12	18	27	38	23	53
Indonesia	43	45	13	20	15	46	37	40	41
Malaysia	16	11	9	35	27	52	49	62	40
Pakistan	38	65	22	22	16	25	40	20	53
South Korea	7	9	3	34	17	40	59	74	56
Philippines	45	25	14	17	12	32	39	64	53
Thailand	44	41	10	22	19	44	34	41	46
Vietnam	50	60	21	21	14	41	23	26	38

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Latin America									
Colombia	32	8	13	21	16	34		76	53
Costa Rica	21	5	9	26	13	30		82	62
Mexico	21	5	4	30	19	26		76	70
Nicaragua	43	10	19	19	17	28		52	53
Developed Countries									
Untied Kingdom	2	1	1	33	9	26	65	90	73
United States	2	1	1	30	10	22	68	90	77

Source: World Bank, *World Development Indicators, 2007* (Washington, D.C. World Bank, 2007), tabs. 2.3 and 4.2.

External dependence: The vast majority of the developing countries are dependent on external force and their dependence on developed countries is substantial. In some case the foreign forces touch every fact of life, almost all developing countries are depend on foreign capital, foreign goods and services. These external forces influence the consumption pattern, the people in third world countries. The country's ability to chalk out its economic density largely depends on the degree of dependence on external forces.

Political structure: Political structure is another factor differentiating developing countries. The political structure has largely been determined by the vast countries. These groups are small but powerful segments of the population and have shaped the economic, social and political structure the third world countries. The developing countries have been ruled directly or indirectly by these small and powerful vested interests to a greater extent than are the developed nations. Todaro's analysis is comprehensive in treatment and is based upon statistical facts and ground realities. It makes a comparison of diversities prevailing in developing countries of Asia, Africa and Latin America. This analysis correctly depicts the diverse nature of developing economies.

Conclusion

Despite the obvious diversity most developing nations share a set of common and well defined goals. These include a reduction in poverty, inequality, and unemployment, the provision of basic education, health, housing and food of every opportunity, and the forging of cohesive nation. States related of these economic social and political goals are hampered by serious and worsening environment decay, antiquated and inappropriate educational technologies, institute and value system. Even with these weaknesses. There is so much that developing countries can do trough appropriate policy strategies to speed up economic and social progress.

Check Your Progress

5. What is World Bank's classification of economies?
6. What are the endowments on which the economic growth and strength of a country depends?

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7.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Economists often use the terms, first world, second world, and third world for the developed, communist and underdeveloped economies respectively.
2. Most commonly, the criteria for evaluating the degree of economic development are gross domestic product (GDP), Gross National product (GNP), the per capita income, level of industrialization, amount of widespread infrastructure and general standard of living, which criteria are to be used and which countries can be classified as being developed are subject of debate.
3. HDI index does not take into account several factors, such as the net wealth per capita or the relative quality of goods in a country.
4. The knowledge economy is the development of valuable knowledge such as processes, procedures, methods, designs, formulations and software.
5. As per World Bank's classification, economies are classified as low income (LIC), Lower-middle income (LMC), Upper middle income (UMC), high income OECD and other high-income countries.
6. The economic growth and strength of any country depends upon physical resource endowments (such as minerals, raw materials, power etc.) and human resources endowments (quantity and quality of man power).

7.5 SUMMARY

- A developing country (or a low and middle income country) less developed country, less economically developed country or under developed country is a country with a less developed industrial base and a low human development index (HDI) relative to other countries.
- The Term developing describes a currently observed situation and not a changing dynamic or expected direction of progress.
- Developing countries tend to have some characteristics in common. For example, with regards to health risks, they commonly have: low levels of access to safe drinking water, sanitation and hygiene, energy poverty, high

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level of pollution, high proportion of people with tropical and infectious diseases, high number of road traffic accidents often there is also widespread poverty, low education levels and a lack of so-called good governance. Effects of global warming (climate change) are expected to impact developing countries more than wealthier countries, as most of them have a high climate vulnerability.

- Developed countries are the countries that enjoy certain high standards. Such countries generally have a good infrastructure stable economy with very high per capita income. The degree of development industrialization and generally standard of living for its citizens is very high. In developed economies the service sector generally generates more wealth than the core industrial sector. The exports of a developed economy are very robust.
- There are other non-economic factors as well that play a crucial role in making a country a developed one. The Human Development Index (HDI) is one of the most important parameters. HDI reflects the relative level of education that is prevalent, literacy rate and availability Health care services. Due to this, the life expectancy of the citizens of these developed countries is more. The birth rate and death rate of such countries is less. The population burden on the infrastructure of such countries is less that helps in better chances of a good life style.
- Developed countries generally have a stronger base of skilled work force that earns descent wages which are generally higher than their counter parts in developing nations.

7.6 KEY WORDS

- **GDP (Gross Domestics Product):** The market value of all officially recognized final goods and services produced within a country in a given period.
- **Under development:** It implies a low level development compared to the developed countries of the world. They typical indicators of development is: per capita income, literacy rate, life expectancy etc. are found to be floating at their base level, implying a poor quality of life.
- **Birth rate:** Birth rate is the term used to define the number of babies born every year per 1000 people in a population.
- **Death rate:** Death rate is the term used to define the number of death every year per 1000 people in a population.

7.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

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Short Answer Questions

1. What is the meaning of quality of life?
2. How does the Organization for Economic Cooperation and Development work?
3. State the relative importance of public and private sectors in developing and developed countries.
4. How is political structure a differentiating factor in developing countries?

Long Answer Questions

1. What are the main characteristics of a developing economy? To what extent are they found in Indian Economy?
2. Explain the main features of an underdeveloped economy.
3. What is an underdeveloped economy? Discuss the main features of an underdeveloped economy.
4. Write a long essay on underdeveloped countries.
5. Distinguish between a developed and underdeveloped economy.
6. What are the criteria for classifying economies as developed and underdeveloped?
7. Define developed countries. What are the common characteristics of these countries?

7.8 FURTHER READINGS

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UNIT 8 DEVELOPMENT STRATEGIES - I

NOTES

Structure

8.0 INTRODUCTION

John von Neumann was a renowned mathematician, physicist and computer scientist. His contributions are immense in these fields. In economics, his contribution was in the form of his growth model which is said to be based on the game theory. The development strategy presented by him is considered to have been a watershed movement to separating the classical and newer models. In fact, formalism as a movement too has gained much from his growth model theory. Neumann model is also known significantly for providing a theorem to explain equilibrium. In this unit, we will have a look at development strategies in economics through Neuman's growth models and modifications.

8.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the von Neumann Growth Model
- Explain the Neumann theorem

8.2 THE VON NEUMANN GROWTH MODEL

John von Neumann works with the theory that equilibrium of the economy expands at a uniform rate. For this he makes several assumptions to ensure the equilibrium including: constant returns to scale; pure and perfect competition; no consumption from producers who save the totality of their income and unlimited quantities of goods available through the productive process (this applies to land and labour, no primary factors existing in the model). The von Neumann growth model is defined by a technology of the standard activity analysis with an output matrix B

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and an input matrix A. It is assumed that every good in the system is the output of some activity and that every activity requires some good in the system as an input. It can be viewed as a closed model in which even labour is produced by an activity, using consumer goods as inputs or as an open model in which labour is never scarce and no activity has labour as its only input.

We shall make use of the idea of indecomposable as applied to this system. The system (B, A) is said to be indecomposable, if there is no subset of goods which can be produced without using at least one input not in the subset. The decomposability of the system depends on the relationship between the zero in the B and A matrixes. Von Neumann's original assumption was that the place (I, j) was occupied by a non zero in either the B or the A matrix, a very strong assumption that rules out may interesting economic models.

We shall construct a simple growth model by assuming that the activities y(t) require the whole of the time period to produce their output, so that the inputs have to be in existence at the commencement of the perish.

Because of the possibility of joint outputs, the von Neumann model is particularly adapted to a true capital model with depreciation by use, as opposed to invert or external capital models. Consider, for example simple model with two capital goods, both in the production of either. We suppose that either type of capital is part out after one use, completely worn out after two uses. Four goods in the system as follow;

x_1; New type capital

x_2; Once used type I capital

x_3; New type II capital

x_4; Once- used type II capital

Then an activity using new capital will give an output of used capital of the same kind jointly with its new product. If one used capital is an input, it does not reappear.

Such a model would have a technology of the following kind, where the first four activities producing new type I capital are shown:

$$B = \begin{pmatrix} b_{12} & b_{12} & b_{13} & b_{14} \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{pmatrix}, A = \begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & a_{23} & a_{24} \\ 1 & 0 & 1 & 0 \\ 0 & a_{42} & 0 & a_{44} \end{pmatrix}$$

This kind of capital model can not be developed unless joint products are permitted.

the basic constraints of the von Neumann are therefore,

$$A_y(t) \leqq B_y(t-1)\, y(t), y(t-1) \leqq 0$$

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we are interested in the balanced growth mode of the model, with $\alpha_y(t-1) = y(t)$. We are dating of y and investigate the following problem the technological expansion problem.

Find a positive or which is a maximum subject to the constraints.

$$\alpha A_y \leqq B_y, y \geqq 0$$

This is a nonlinear problem since α, y, both unknown, appear multiplied together in the constraint. To show that we can find a positive α and that this A a maximum, write the constraints in the form

$$(B - \alpha A) y \geqq 0,\ y \geqq 0$$

Since B_y >> for some $y \geqq 0$ (because every good is the output of some activity, we can find some positive a small enough to satisfy the constraints.

On the other hand, α is bounded and so has a maximum since, by making it large enough, we can make (B – αA)y contain at least one negative element for every y≥ 0.

We shall denote the maximum value of α by α∗ and the associate vector y by y*.

The real insights into the working of this model are obtained by setting up a dual problem, the interpretation of which will be apparent later.

Find β*, P* such that β* is the minimum of all β's which satisfy

$$\beta_p A \geqq P^B,\ P \geqq 0$$

We can use the same kind of arguments as, those used for the primed problem to convince ourselves that β has a minimum which is positive.

We shall now show that $\beta \geqq \alpha^*$.

It is clear that (B – α*A) y >> 0 has no non-negative solution since, if it has, we could increase α*, contradicting its maximum property. Using a property of linear inequalities, we can therefore assert that $P(B - \alpha) \leqq 0$ has a semi-positive solution. It follows that, since β * is the minimum of all β's satisfying $P(B - \beta A) \leqq 0$ for $P \leqq 0$ we have $\beta^* \leqq \alpha^*$.

Using the materials we have assemble we are now ready to stats and prove the following fundamental theorem.

Von Neumann Theorem: For the model defined by the technology (B, A) in which every good is the output of some activity and every activity requires some good as input, there exist semi-positive vectors y, P and a positive scalar Y such that:

(a) $\gamma AY \leqq BY$; (b) $\gamma PA \leqq pB$; (c) $P(\gamma A - B)y = 0$; and (d) *** the technology (B, A) is indecomposable, g has a unique value $\gamma^* = \alpha^* - \beta^*$, where α^* and β^* are as defined earlier.

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Result (c), which implies that if $\gamma A^i < P$ then $P_1 = 0$ or if $\gamma A^i > PB^i$ then $y_j = 0$ has a resemblance to the equilibrium theorem of linear programming which should be noted.

To prove the theorem, put $\alpha^* \geqq \gamma \geqq \beta^*$, which is possible since $\alpha^* \geqq \beta^*$. Then γ, along with the vectors y*, p* associated with α^*, β^* certainly satisfy (a) and (b).

To prove (c), we have $PB \leqq \gamma PA$ and since $y \geq 0$, this implies $PB_y \leqq \gamma PA_y$, so that we must have $PB_y = \gamma PA_y$ or $P(\gamma A - \beta)_y$.

In the general case any value of γ between α is a solution, and there will usually be vectors P, Y other P* and Y* are semi-positive.

$$\alpha^* P^* A_y^* \leqq P^* B_y^* \leqq \beta \,\&\, P \,\&\, A_y^*$$

So that $(\beta^* - \alpha^*) P^* A Y^* \geqq 0$.

If we can show that $P^* AY^* > 0$, then we will have shown that $\beta^* \geqq \alpha^*$. But we have already shown that $\beta^* \leq \alpha^*$, so this will imply that $\beta^* = \alpha^*$.

It is obvious that $B^i Y^* \geqq 0$ for every I and that $B^i y^* >= 0$ for at least one I sine Y* is semi-positive and every good appears as the output of some activity. Suppose that we had $B^i Y^* = 0$ for some i. Since $B^i Y^* \geqq \alpha^* A^i Y^*$ for all I we could only have $B^i Y^* = 0$ if we also had $A^i Y^* = 0$. This would imply that activity vector Y* neither produced nor used good i and therefore that all gods other than i formed an independent subset. Thus if the system is indecomposable, we must have $\beta Y^* << 0$ and since $P^* \geq 0$, $P^* \beta Y^* > 0$. But $\beta^* P^* AY^* \geqq P \,\&\, \beta Y^*$ and $\beta^* > 0$, so that $P^* AY^* > 0$.

This if the system is indecomposable $\beta^A = \alpha^*$ so that result (d) of the theorem is proved.

We can interpret the theorem, for the indecomposable case, in the following way.

From (a), the output of each good is at least equal to Y* times the input of that good, which is assumed not greater than its output in the previous period. Thus the output of every good is growing at rate at least 1 – 1. From (c) any good whose output is growing a rate greater than Y* - 1 will have a zero price. All good with positive prices will have the same growth rate, Y*.

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From (b), the proceeds from operating any act at unit level are less than or equal to Y* times the cost of the input used, at the equilibrium prices. P*S process one period earlier, Y* - 1 can be regarded as "shadow" interest rate or rate of return on investment. From (c), no activity which at the equilibrium price fails to give the shadow rate of return will be used. All activities actually used will give the same rate of return Y* - 1.

Although we have examined only the dynamically simple balanced growth model – the general idea which emerge from analysis of Von Neumann model are fundamental to the general theorem of growth in a multi-sector economy.

A simple input-output technology, with B = I and A square, could be treated as a special case of the Von Neumann model. In this case we would have $\gamma^* = 1/\lambda^*$, where λ^* is the dominant root of the semi-positive square matrix A, while Y*, P* would be the associated column and row characteristics vectors (sometimes called the right and left hand eigenvectors). Otherwise the analysis would basically the same.

Check Your Progress

1. State the factor on which the decomposability of the system depends in the von Neumann growth model.
2. Mention the reason because of which the von Neumann model is particularly adapted to a true capital model with depreciation by use.

8.3 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The decomposability of the system depends on the relationship between the zero in the B and A matrixes.
2. Because of the possibility of joint outputs, the von Neumann model is particularly adapted to a true capital model with depreciation by use, as opposed to invert or external capital models.

8.4 SUMMARY

- The von Neumann growth model is defined by a technology of the standard activity analysis kind with an an output matrix B and an input matrix A. It is assumed that every good in the system is the output of some activity and that every activity requires some good in the system as an input.
- It can be viewed as a closed model in which even labour is produced by an activity, using consumer goods as inputs or as an open model in which labour is never scarce and no activity has labour as its only input.

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- The system (B, A) is said to be indecomposable, if there is no subset of goods which can be produced without using at least one input not in the subset.
- The decomposability of the system depends on the relationship between the zero in the B and A matrixes. Von Neumann's original assumption was that the place (I, j) was occupied by a non zero in either the B or the A matrix, a very strong assumption that rules out may interesting economic models.
- Because of the possibility of joint outputs, the von Neumann model is particularly adapted to a true capital model with depreciation by use, as opposed to invert or external capital models.
- Four goods in the system as follows:
  - x_1; New type capital
  - x_2; Once used type I capital
  - x_3; New type II capital
  - x_4; Once- used type II capital
- The basic constraints of the Von Neumann are therefore, we are interested in the balanced growth mode of the model, with $\alpha_y(t-1) = y(t)$.
- For the model defined by the technology (B, A) in which every good is the output of some activity and every activity requires some good as input, there exist semi-positive vectors y, P and a positive scalar Y such that:

  (a) ; (b) ; (c) ; and (d) *** the technology (B, A) is indecomposable, g has a unique value
- The general idea which emerge from analysis of Von Neumann model are fundamental to the general theorem of growth in a multi-sector economy.
- A simple input-output technology, with B = I and A square, could be treated as a special case of the Von Neumann model. In this case we would have $\gamma^* = 1/\lambda^*$, where λ^* is the dominant root of the semi-positive square matrix A, while Y*, P* would be the associated column and row characteristics vectors (sometimes called the right and left hand eigenvectors). Otherwise the analysis would basically the same.

8.5 KEY WORDS

- **Linear inequalities:** It refers to an inequality which involves a linear function.
- **Decomposability**: It is defined as an inequality measure such that the total inequality of a population can be broken down into a weighted average of the inequality existing within subgroups of the population and the inequality existing between them.

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8.6 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Why is the von Neumann model viewed as a closed model?
2. What is the assumption of the von Neumann growth model?

Long Answer Questions

1. Prove the von Neumann growth model theorem.
2. Interpret the theorem for indecomposable case.

8.7 FURTHER READINGS

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UNIT 9 DEVELOPMENT STRATEGIES-II

NOTES

Structure

9.0 INTRODUCTION

There has been a considerable controversy about the techniques of production that should be adopted by under developed countries. Whether capital intensive techniques will be more suitable to them or they should prefer labour intensive techniques. These countries generally how a large manpower supply and suffer from scarcity or capital scarcity of capital resources. They are faced with an urgent problem of accelerating the rate of economic growth which requires a higher level of productivity for which the use of modern capital intensive techniques is a must. But their capacity for adopting capital intensive techniques severely limited due to paucity of capital resources, inadequate supply of modern equipment and scarcity of technical skills.

The labour intensive techniques of production is that which uses comparatively larger amount of labour and smaller amount of capital on the other hand, the capital intensive technique is that which uses comparatively larger amount of capital and smaller of labour.

The choice of technique in a country is a different and complex problem. Various factors are to be taken into consideration before deciding in favour of labour or capital intensive technique and no simple rules can be laid down for such a decision making.

The best way for these countries is to have such a combination of the methods of production which could ensure a high rate of growth of income on the one hand, and a rise in the level of consumption and employment on the other. Both types of techniques can be used simultaneously. The capital intensive techniques should be adopted in capital goods industries and the development of infrastructure while labour intensive techniques should be adopted in agriculture and consumers goods industries.

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9.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the problem of choice of techniques in LDCs
- Describe the labour-intensive technique
- Describe the capital-intensive technique
- Explain the intermediate and appropriate technique for LDCs
- Interpret the problems and suggestions related to choice of techniques

9.2 THE CHOICE OF GOODS AND TECHNIQUES

The choice of techniques is an area of economics in which the question of the appropriate capital or labour-intensity of the method of the production of goods is discussed.

9.2.1 Labour Intensive and Capital Intensive Techniques

One of the problems in front of the underdeveloped countries is how best to utilize the available resources in order to accelerate the growth rate of the economy. The majority of such countries have abundant labour but scarce capital. These two major factors pose the problem of choice of technique – that of using the traditional or the modern methods of production.

Meaning: The problem of choice of techniques refers to the type of combinations for any particular project or enterprise. A combination chosen in particular case gives the type of technique. The number of alternatives open to an under developed country are between labour intensive and capital intensive techniques, b/w light and heavy industries and between labour – intensive and capital intensive techniques. "Different techniques often imply quite different strategies in economic development with very different efforts on the performance of the economy."

There is a great controversy on the question of choosing between labour intensive and capital intensive technique in LDCs. All concerns differ to each other. Some are in favour of labour intensive technique, while others advocate capital intensive technique. The ultimate object is to choose that technique which is more efficient that other technique keeping in view the existing factors proportions. An efficient technique is one that minimizes the costs of a given output or maximizes output from given inputs.

Process of Technological Development: For technological development, a society has to pass through a long historical process – from simple to complex techniques, from those satisfying local needs to those meant for distant markets and from those using local resources to those requiring foreign capital. However Kuznets traces some distinct patterns in the growth of technology: (i) a scientific discovery or an addition to technical knowledge, (ii) an invention that is, making

the use of already existing knowledge to useful end, (iii) an innovation implying a significant application of an invention to economize production, and (iv) an improvement, signifying a invention usually accompanied by improvements.

The successful completion of these successive phases in the evolution of technology requires four factors. First, there is the necessary condition of increased scientific knowledge. Secondly, each phase requires heavy capital investments and skilled labour force. Thirdly, innovations require entrepreneurial skill and ability to put invention to beneficial uses. Lastly, the spread of innovation depends on the willingness of the people to adopt the new product and processes for mass production. Technological development is thus a necessary condition for economic growth.

Labour-Intensive Techniques: Keeping these points in view, the problem of choice of techniques boils down to one of adopting output – increasing techniques that raises labour productivity per unit of capital and are capital light and labour intensive. Fig 9.1 explains the impact of labour – intensive techniques on output. Initially, output represented by the isoquant Q was being produced in the economy by employing OK amount of capital and OL or labour. Now with the new technique the same of capital OK helps in producing a larger output represented by a higher isoquant Q_1 and at the same time it uses more labour LL1. Such techniques should also fulfill the twin objectives of skill and capital formation. Agricultural production can be increased through the spread of minor irrigation schemes, better tools and implements, the introduction of short duration crops leading to larger fields from the same land; the use of fertilizers and high yielding seeds, etc. In India the substitution of the fly-shuttle for the throw shuttle loom held to the increase in the productivity of the hand-loom weaver by 50 percent. But if is not true that the choice of more labour intensive techniques will necessarily lead to either more consumption or greater employment over a period of time. The problem is one of evaluating the time streams of consumption associated with the choice of alternative techniques over the relevant time horizon. Moreover under developed countries fail to use output – increasing labour intensive technique because of the limits set by the shortage of capital and lack of skills.

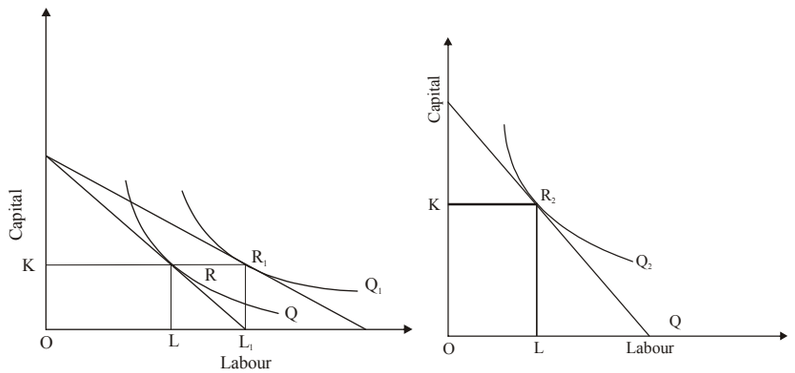

Fig. 9.1 and 9.2

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Capital Intensive Modern Techniques: The other alternative commonly suggested is the use of capital – intensive techniques. Since under developed countries are unable to follow the path of technological evolution of the advanced countries they should use the technology of the latter on an extensive scale.

Fig. 9.2 depicts the use of advanced technology which is capital – intensive. It uses more capital OK in relation to labour OL. The level of output is higher in this technique on the supposition that the isoquant Q_2 is above R_1 of fig 9.1. As Galenson and Leibenstein opine: 'Successful economic development. . .particularly in the face of gross backwardness, lingers, largely upon the introduction of modern technology upon as large a scale as possible'. For a 'continuing and compounding effect' on the growth rate of income, advanced techniques are considered to be in dispensable. Further, their use will help change customary working habits, living conditions, social institutions and the very outlook of the people.

But the adoption of modern technology in under developed countries is a very ticklish question and we should not forget Nurkse's remarks that 'the same capital-intensity as in the economically advanced countries should be neither desired nor permitted'. First, it is a matter of common knowledge that these countries have a plethora of the unemployed and an acute shortage of capital. Modern technology is, however, highly capital-intensive and labour-saving. It involves high costs and excessively large amount of capital thereby making it unsuitable for under-developed countries. Second, imports to plant and equipment are not only costly but also entail a number of difficulties with regard to repair, maintenance and availability of spare parts. A UN Report observes: 'Automatic devices suited to conditions in advanced industrial countries are often left unused in under-developed countries, while the intricacy of many machines though appropriate to the type of labour available in industrial countries, tends to magnify repair and maintenance cost in factories in less developed countries which depend upon a high proportion of unskilled labour'. As a result, the same equipment produces less in such countries. It means in terms of our fig. 9.2 that the isoquant Q_2 is at a lower level. Third, heavy imports lead to balance of payments difficulties. And the net addition to the national income accruing from the use of imported plant and equipment is less, for a part of the income flows to the technique – exporting country. Fourth, modern technology also requires complementary supplies of highly and skilled, technical and managerial personnel not available in less developed economies. Fifth, it is meant from the setting up of large enterprise whereas the small size of the market in such countries necessitates the expansion of small enterprises. In such a situation, write Bauer and Yamey, there is the danger of confusing standards of technical efficiency with those of economic efficiency. There is no use recommending techniques which may be efficient technically but are wasteful in terms of resources and inappropriate at the level of technical achievement of the local population. Sixth, modern technology was evolved under different socio-economic and geographical set up. It is meant to accommodate labour shortages and other requirements of an advanced country. it is appropriate to high

real wages and a high standard to living. Seventh, the possibility of introducing such technology will, however, depend on 'technological spread' – the gap separating the techniques already in vogue in the less developed country and those imported from abroad. The larger the gap between the local and the imported techniques, the greater will be the social discontent and unrest following industrialization through the introduction of advanced technology. Last, the adoption of modern technology presupposes the existence of power, transport and communications facilities of highly trained technical personnel and a large number of related services which are non-existent in under developed countries. Under the circumstances, the use of advanced technology will only result in repeated breakdown in the machinery, lower production, increase in costs and wastage of capital.

Use of Abandoned Techniques of Advanced Countries:

But the problem of economic development is concerned with change in factor proportions and how rapidly they change. It depends on the time – period involved. Capital light and labour intensive techniques might help in raising the level of output, employment income during the short period to some extent. Development, however, aims at their continuous maximization over the long period. The question is whether an underdeveloped country should go slow or make rapid strides towards developing its economy. Should it introduce modern technology or continue to use backward methods of production or adopt obsolete techniques abandoned long ago by the advanced countries? Taking the last question first, the other two having been already discussed above, backward economies have frequently make use of obsolete equipment and techniques of the advanced countries. The history of the Japanese, textile industry reveals that it developed in its early phase on discarded British machines. Israel and Argentina have also been importing used equipment of the advanced countries. Though discarded machines are considered to be somewhat cheap and of a lower capital intensity, they entail high cost in terms of repeated breakdowns and constant repairs therefore, prudence demands that developing countries should benefit from the vast fund of knowledge in the field of technology of the advanced countries and modify and adapt the techniques of the latter according to their social, economic and technical absorption capacity and requirements. These requirements necessitate in the initial stage of development, the adoption of labour-intensive and capital-saving techniques so that the limited amount of capital available is broadly spread in utilizing larger human and other resources.

9.2.2 Intermediate Technology

Professor Schumacher favours intermediate technology for LDCs. According to him, if we define the level of technology in terms of 'equipment cost per work place', the intermediate technology would be on the level of – symbolically speaking £100 equipment cost per average work – place, whereas it is £1 for the indigenous

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technology of a typical developing country and £1000 – technology for the developed countries. Such a technology necessitates regional approach to development and requires four conditions for its success. First, work place should be created in those areas where the majority of the people live and not in metropolitan areas where they tend to migrate. Second, work place should be cheap so that they can be created in the large numbers without requiring high level of capital formation and imports. Third, methods of production should be fairly simple, requiring low skills and suitable for maintenance and repair on the spot. Fourth, production should mainly depend upon local materials and be mainly for local use. Thus, the intermediate technology will be 'labour-intensive' and will be suitable in small scale industries. Therefore, such a technology can be used to produce only those commodities which are urgently needed by the people living in rural areas.

Such commodities can be building materials, clothing, house old goods, agricultural implements etc.

Appropriate Technology

There is, however, unanimity among economists over the choice of appropriate technology. According to Yale Brozen, 'The appropriate technology for an area depends on its resources, patterns and its market'. It is, therefore, defined as 'an amalgam of skills, methods, techniques appliances and equipment that can contribute towards solving the basic socio-economic problems of the concerned communities'. It should be utilized for development purposes in the name of social justice and should be capable of satisfying the felt needs of the people. It should be economically viable, technically feasible, and should fit in the socio-economic fabrics of local communities. It should be able to produce some surplus, so as to encourage capital formation and stimulate further growth. It should be simple and comparatively cheap and use local resources. It should ensure dispersal of wealth among the largest number for people and create a sense of participation and decision making at the local level. It should be capable of creating self-reliance and should perpetuate the emotional attachment of the workers with their jobs, tools and work places. It should encourage production by masses rather than mass production. It should be ecologically sound and should be in complete harmony and conformity with local, environments.

Dependence on non-renewable sources of energy should be able to absorb innovation thus promoting to improve efficiency and productivity. In other words, appropriate technology should be able to absorb innovation, thus promoting to improve efficiency and productivity. In other words, appropriate technology should change with the time, and people should accept improved & latest versions of it that fit in the new environments. It should neither be based on traditional technology nor reject modern technology.

In all advanced countries from the US to Japan, there are small industrial units and agricultural areas where techniques and equipment of low capital-intensity

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are used. Efforts should be directed towards 'choosing the simplest of such alternative techniques, the sturdiest of available capital equipment, the small the of plant consistent with technical efficiency, the technology that makes the best use of the most plentiful factors of production, in certain case much simpler modern techniques involving small capital may bring about large increments in output in the case of small industries.'

Low cost high productivity equipment and machines can be imported from advanced countries and their prototypes manufactured within the country with indigenous skill and raw materials. It will serve the dual propose of skill and capital formation. In the agricultural sphere, the use of power driven pumps, the Japanese method of rice cultivation, high yielding maize hybrids and improved fertilizer can go a long way in increasing productivity per workers. In the case of those underdeveloped countries which have just started on the path of economic development, it is better to adopt well-tried, capital-saving, labour-intensive technology. For instance, India manufactures a large number of from implements indigenously designed, such as the mechanical plough, animal driven. Ploughs of a number of varieties, hand tools irrigation equipment, dairy and poultry farm equipment which can fit in the factor proportions of similar country without any difficulty.

This is nothing except appropriate technology, Vikal and Brahmanand also favour this when they opine that each country has to work out its own salvation and particularly find out which production methods are feasible for it. They recommended the following techniques for use in underdeveloped countries: (a) those which can be easily learnt in a short time; (b) those requiring small initial investment; (c) those which reduce the gestation period of investment; (d) those requiring less investment in specialized and skilled labour; (e) those saving scarce resource rather than labour; and finally, those which raise the level of production and increase supplies of minerals or electricity. These guidelines point towards the use of appropriate technology in developing countries in keeping with their local conditions.

As Henry Aubrey emphasizes, 'It may be sound procedure to improve technology step by step in many places at once, rather than to sink large portions of a limited capital supply in a few large ventures'. The policy is advantageous in many ways. It spreads the benefits accruing from the use of different techniques in the various fields more equally over the entire population; helps in skill formation at all levels; raises the average productivity income level and the size of market. It promotes more employment, better distribution of wealth and paves the way towards self-sufficiency.

The strategy of gradual change over from capital-light and labour intensive methods of production to produce up-to-date capital-intensive method is best suited to under-developed countries in the early stages of industrialization. Such a policy will not economize the use of available capital resources but will also create large employment opportunities. By increasing the supply of agricultural and

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manufactured consumer goods, it will obviate the necessity of importing food and raw materials. It will not be essential to import much capital goods either. Thus, its strategy the choice of techniques will tend to check inflationary tendencies and balance of payments difficulties inherent in the development process.

Labour Intensive v/s Capital Intensive Techniques

A common characteristic of underdeveloped countries is the scarcity of capital and abundance of labour. In other words, the capital labour ratio is extremely low. Common sense tells us that in such countries, efficient production calls for labour intensive techniques. But this is essentially a static argument. It is relevant to conditions prevailing at a point of time. Therefore, this technique is not very suitable for a developing country. As Dobb says, 'It start from a given endowment of capital in each country, whereas the crucial questions at issue in discussing policies of economic development concerns change in the capital endowment of country and how rapidly this capital endowment should be changed.'

Through Professor Nurkse holds the view that underdeveloped countries should adopt labour intensive techniques of production in the early stages of industrial development, majority of economists favour the adoption of capital intensive techniques in such countries. Let us discuss the arguments advanced in favour of either of these techniques.

Arguments for Labour-Intensive Techniques:

The arguments usually advanced in favour of labor-intensive techniques are the following:

1. The first is the employment argument. A characteristic feature of underdeveloped countries is the abundance of ideal manpower. It is only by using labour intensive technique that increasing employment opportunities can be provided to the idle or under employed labour force.
2. When employment increases through the adoption of labour intensive techniques, 'they spread the total income generated more widely over the population.' This powers the way for an egalitarian structure of society.
3. The third is the latent resources argument. In underdeveloped countries there is an acute shortage of capital and entrepreneurial resources. The use of labour-intensive techniques would be more appropriate for releasing these score resources to be used in more important uses.
4. Similarly, labour-intensive techniques are import-light, i.e. they require simpler tools and implements which need not be imported from abroad, and thus there is considerable saving in foreign exchange.
5. Labour-intensive techniques are indispensable for counteracting inflationary pressures in a developing economy. They quickly increase the supply of consumable goods and thus obviate the danger of inflation.

6. The use of labour-intensive techniques is usually found in the villages and small towns. This would mean considerable saving in the community's expenditure on social overheads in the initial stages of development which could be utilized on more important projects.
7. Moreover, labour-intensive methods, being spread out into villages and small towns enjoy all the advantages of decentralization and avoid the evils of the factory system.
8. The emergence of monopolies and concentration of economic power in the hands of a few in also avoided.

Arguments for Capital-Intensive Techniques

It has been strongly argued that those investment projects should be chosen which are capital-intensive rather than labour intensive. According to Galenson and Leibenstein, 'Successful economic development … particularly in the face of gross backwardness, hinges largely upon the introduction of modern technology upon as large a scale as possible.' The grounds on which this argument is based are:

1. Enterprises using capital-intensive techniques lead to a large share of the resulting income going to entrepreneurs and a smaller share going to wage earners. Since the propensity to save is higher on the part of entrepreneurs, savings increase and a large proportion of them are utilized for investment. Thus, the rate of economic growth is accelerated.
2. As a corollary to this, we can say that since growth rate is much faster under capital-intensive techniques that under labour-intensive techniques, more employment will be offered to the labour force in the long run.
3. In the majority of underdeveloped countries, the growth rate of population is very high and unless capital-labour ratio is raised, output per head will not increase. This will tend to dampen the rate of capital accumulation. So, the use of capital-intensive techniques is indispensable for increasing, the tempo of development.
4. Further, capital poor countries can not afford to waste capital though obsolescence, and depreciation. Under-developed countries should, therefore, choose highly capital-intensive production techniques that do not become obsolete soon. Thus, a small production of capital goods is required to be replaced in the future and more capital is available for further capital formation.
5. Capital-intensive processes of production are more profitable than labour-intensive techniques because under the farmer productivity uses more rapidly in relation to coats. This is due to the economies of large scale production enjoyed by them.
6. In reality, the use of highly capital-intensive techniques leads to the production of quality products and lowering of costs. Low costs mean low-price and

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provided the basis for a rapid rise in living standards later on. Professor Hirschman opines: 'The firm requirement of high standards of quality is an element in favour of, rather than, as would usually be believed, against the introduction of this type of production into underdeveloped countries.'

7. Capital-intensive techniques have far-reaching effect on the process of economic growth. A few capital-intensive projects have a greater total impact on the economy that a number of labour-intensive projects. As Hirschman points out: 'When a government undertakes the construction of a large hydro-electric station or of a steel mill, it cannot afford to let such ventures go wrong, it places itself under a far stronger compulsion to deliver than if it were to spend some funds on a large number of projects.'
8. Hirschman further argues that capital-intensive techniques are bound to enhance skills and efficiency and assist in training management 'in the performance of new unfamiliar and perhaps some what uncongenial tasks. Thus, capital intensive techniques possess the twin-property of 'efficiency enhancing and coordination – promoting.'
9. For providing economic and social overheads large capital investments our essential in under developed countries.

Conclusion

We have studied both sides of the problem and it is rather difficult to decide as to which technique should be adopted in an underdeveloped country. In fact, the two approaches are not altogether different from each other. The use of labour-intensive techniques tends to increase production and employment in the economy. On the other hand, the adoption of capital-intensive techniques tends to accelerate the rate of capital formation and then to maximize productive capacity and employment in the long run. But in making a choice between labour and capital intensive techniques in the context of an underdeveloped country, it is necessary to consider a variety of factors: their comparative cost of production; effect on employment, income, saving, and investment over different time periods; use of domestic resources; effect on domestic and foreign demand; their ability to ease inflationary pressures; and balance of payments position. The cost of production of goods manufactured with labour-intensive methods is higher than that with capital-intensive techniques because of the inability of the former to realize economies of scale. But this fact should not deter the planners from deciding upon labour-intensive techniques which economic on the use of scarce capital resources. Such methods of production create large employment opportunities and help in increasing the supply of consumer goods, obviate the necessity of impacting raw materials, food and capital goods from abroad. Thus, they tend to check inflationary tendencies and balance of payment difficulties inherent in the development process. But there is a snag. Use of labour-intensive techniques cannot step up the rate of capital accumulation as fast as that of capital-intensive techniques. No doubt, labour intensive methods create more employment and thereby raise income levels, but

of those whose incomes are low and propensity to consume is high. So a smaller proportion of the incomes generated is available for saving and reinvestment. But keeping in view the large interest of the masses, labour-intensive techniques should be used in the consumer goods sector. For a 'continuing and compounding effect' on the rate of growth of income, capital-intensive techniques should be confined to the capital goods sector.

Check Your Progress

1. Mention two advantages of capital intensive technique.
2. What do you mean by appropriate or intermediate technique.
3. Point out two advantages of labour-intensive technique.
4. Name two factors affecting choice of technique.
5. Give two suggestions to solve the problem of choice of technique in LDCs.

9.3 ANSWER TO CHECK YOUR PROGRESS QUESTIONS

1. Two advantages of capital-intensive technique are:
   (i) Quicker rate of Growth
   (ii) Bulk Production possible
2. Technology that is suitable to the social and economic conditions of the geographic area in which it is to be applied, is environmentally sound, and promotes self-sufficiency on the part of those using it.
3. Two advantages of labour intensive technique are:
   (i) Employment
   (ii) Encouragement to collage industries.
4. Factors affecting choice of technique are: (i) factor endowment (ii) Technological level already attained.
5. Suggestions to solve the problem of choice of technique are: (i) Co-ordination of different Techniques (ii) Appropriate plants.

9.4 SUMMARY

- One of the problems facing the underdeveloping countries is how best to utilize the available resources in order to accelerate the growth rate of the economy. The majority of such countries have abundant labour but scarce capital. These two major factors the problem of choice of techniques – that of using the traditional or the modern methods or production.

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- The problem of choice of technique refers to the type of combinations for any particular project or enterprise. A combination chosen in any particular case gives the type of technique. The number of alternatives open to an under developed country are between labour intensive and capital intensive techniques.
- It is proposed that appropriate technologies are those technologies which are appropriate for the promotion and maintenance is sustainable culture. A developing country's choice of an appropriate technology from among those available for use in a particular industry is critical: alternative technological strategies that involve varying mixes of capital, labour and social costs could have significantly different impacts not only on the industry but also on the country itself, especially one whose industrial base is restricted.
- The appropriate technology for an area depends on its resources, patterns and its markets. It is therefore, defined as an amalgam of skills, methods, techniques appliances and equipment that can contribute towards solving the basic socio-economic problems of the concerned communities.
- It should be utilized for development purposes in the name of social justice and should be capable of satisfying the felt needs of the people. It should be economically viable, technically feasible and should fit in the socio-economic fabrics of local communities. it should be able to produce some surplus, so as the encourage capital formation and stimulate further growth. It should neither be based on traditional technology nor reject modern technology.

9.5 KEY WORDS

- **Choice of technique:** It refers to the type of combinations for any particular project or enterprise.
- **Labour intensive technique:** It refers to a process or industry that require a large amount of labour to produce its goods or services.
- **Capital-intensive techniques:** It refers to business processes or industries that require large amounts of investment to produce a good or service.

9.6 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What are the factors which pose the problem of choice of technique?
2. Mention Kuznets' distinct patterns in the growth of technology.
3. Write a short-note on the use of abandoned techniques of advanced countries.

4. What are Vikal and Brahmanand's views on appropriate technology for underdeveloped countries?
5. Write short notes on:
   (i) Capital intensive technique
   (ii) Labour intensive technique

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Long Answer Questions

1. Critically define labour intensive techniques.
2. Explain the intermediate or appropriate techniques of production for LDCs.
3. Evaluate the merits and demerits of capital intensive technique.
4. What do you mean by choice of technique? What are the factors affecting it?
5. Explain the problems in the choice of technology. Give appropriate suggest for these.
6. Suggest appropriate technique for LDCs.

9.7 FURTHER READINGS

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UNIT 10 DEVELOPMENT STRATEGIES-III

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Structure

10.0 INTRODUCTION

Prof. Gautam Mathur gave emphasis on production and of consumption of necessary goods with the help of labour intensive mechanized light machinery, to provide adequate employment and equal distribution of income to contain inflation. Prof. Mathur also gave the index of Disparity Tax that has no place in wage-good model. The fact is that Prof. Mathur has given emphasis on consumption necessary sector.

Mathur's (1986) assertion of wage-good constraint for employment and development is still relevant in the Indian economy. It needs to be noted carefully that a large population of India spend 90% of their income on wage-goods. Due to increase in prices the real wage decline with distortions on cost of production of wage goods and creates a situation of crisis which can be averted by resorting to wage-good sector for the optimal use of labour and other resources including efficient use of savings which will further lead to non-dependence on foreign loans and less political interference. The objective of reducing inequalities is possible only by adopting this strategy.

10.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the Mathur's model of non-inflationary growth
- Describe the relative relevance of Mathur's and Brahamananda model

10.2 MATHUR'S PARADIGM OF NON-INFLATIONARY GROWTH: WAGE GOODS/ LIGHT AND HEAVY STRATEGIES

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The model of non-inflationary growth is adopted by Prof. Gautam Mathur. In the context of underdeveloped countries is derived from Saraffa - Neumann-Joan Robinson approach to steady growth. The model deals with same theoretical problems of planning non-inflationary growth in underdeveloped countries and the policy mandates like avoidance of inflation during the process of long-term plan of economic growth. It highlights the optimum long-term path through which an underdeveloped economy can reach the stage of optimum golden age, i.e., a state of steady growth of full employment level.

The essence of planning for non-inflationary growth lies in keeping the balanced allocation ratio as the parameter of economic planning. The balanced allocation ratio, according to professor Mathur is to be maintained between expenditure on quick yielding projects of short gestation period, producing consumer necessaries on the one hand and the expenditure on long gestation period projects, producing capital goods on the other. Thus the two streams of expenditure, are inflation dampening and inflation creating. They must maintain a reasonable ratio between them. This ratio is called the 'Balanced Allocation Ratio' therefore a long-term strategy of economic planning must at Balanced Allocation Ratio between inflation creating and inflation-dampening type of investment. Mod-allocation of resources in designing of the plan frame may lead to unbalanced growth which is not a proper mode of growth for the optimum path of development.

The allocation of resources, according to Prof. Mathur must be consistent with the long-term strategy of growth. Because it is the nature of the ends towards which these resources are allocated that determines whether we have balanced growth or inflation. For example, if resources are allocated to unproductive schemes like beautifying of city streets or public celebration, there is bound to be inflation even if resources are raised through taxation. On the other hand, if the resources are created by deficit financing and is entirely used in producing consumer necessaries (in Cn sector) through short gestation period projects, the commodity side may be larger than its money counterpart resulting disinflation. Hence deficit financing need and necessarily be inflationary. It is the wrong application of this instrument which is responsible for high degree of inflation in India not the instrument itself. As such, quantity of money in any economy is not a crucial variable that can be treated as a factor in inflation. At the same time, the public borrowing which is generally accepted as an anti-inflationary device cannot be proved anti-inflationary because it cannot reduce the consumption level of any section of the society. In the absence of the consumer goods, even cash losses its convertibility, hence liquidity. Moreover, with periodic accrual of interest, the total claim on goods would be much more than otherwise. According to Prof. Mathur, borrowing could be more

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inflationary while deficit financing could be dis-inflationary. The determining variable is not the source of expenditure, not even the level of expenditure, but the pattern of expenditure.

Hence neither the level of expenditure nor the means adopted to maintain the level, is the cause of inflation in India, but a fairly allocation of resources between inflation creating and inflation dampening investment together along with a rise in money wages is the main cause of inflation in our country. Other factors like wrong fiscal and monetary policies, administrative lapses leading to unavoidable delays, misspending and over-spending and unsocial activities of the business community have been aggravating the situation. But these are not the basic cause of inflation. The basic cause lies in inability to maintain the "Balanced Allocation Ratio" between inflation-creating techniques like the Heaving-Investment sector and the inflation dampening techniques like the spends in the sector for consumption necessaries.

For an underdeveloped country like India, with a sufficient larger non-employed population, the heavy investment strategy, according to Prof. Mathur is considered to be the optimum. In the optimum strategy we should allow the fast expansion of the Heavy-Investment industries referred to as the H-sector. For this purpose, we would require consumption goods for the workers engaged in heavy investment sector. Unless these consumption goods are available in sufficient quantities, scarcity will occur and prices of necessaries will rise. To ensure a non-inflationary growth, there ought to be investment in the consumption goods sector in line with extra demand created by the heavy-investment sector that is satisfied by the surplus created above consumption within the sector of production of necessaries. Thus, Heavy-investment industries which are basic to the production of all capital goods forms a subset. Capable of reproducing themselves no diversion of heavy output should be permitted, because such diversion of H-sector output into luxury consumer durable sector (L Sector) has resulted in less-employment, slow growth of H-sector and more inequitable distribution of income and wealth in the society. On the other hand, to meet the growing demand for consumption necessaries (Cn). Only de-mechanized techniques should be used. For the expansion of Cn sector, the labour-intensive techniques which are not only H-conserving but inflation dampening should be selected. The sophisticated luxury consumption durable (Cn) which have a tremendous snob appeal in our society should be discouraged. The existing unit of production in this sector should be allowed to produce only for purpose of exports to earn foreign exchange.

The fiscal policy required for an optimum non-inflationary growth strategy, as suggested by Prof. Mathur, is entirely different from the existing policy. In the context of non-inflationary growth, the tax mechanism should be used primarily to maintain the "Balanced Allocation Ratio" between the inflation creating and inflation dampening expenditure. The "Disparity Tax" that encourages and reward investment and consumption in the right direction and discourage and penalize investment and consumption in the unwarranted lines is best suited to realize the objectives in a mixed economy like ours.

Thus allocation of resources of the H-Sector as well as the low mechanized consumption goods sector will be the logical outcome of adopting the disparity tax. In this system it is consumption that is the base of taxation rather than income. As such, the Disparity Tax simultaneously acts as a misconsumption tax, a misexpenditure tax and a procurement incentive. It is an antimonopoly device, by penalizing all those who are acting against the interest of the optimum strategy. Thus in achieving the desire "Balanced Allocation Ratio" for an optimum non-inflationary growth strategy. The Disparity Tax measure according to Prof. Mathur, may prove invaluable.

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10.3 THE RELATIVE MERITS AND RELEVANCE OF BRAHMANANDA – MATHUR CONTROVERSY UNDER INDIAN CONDITIONS

The apparent difference between the wage-goods model and the model of non-inflationary growth is largely on the role of quantity of money as well as the policy measures suggested for long-term plan of economic development.

Brahmananda considers changes in the growth of money supply without corresponding to production of wage-goods resulting in rapidly growing unemployment, acute poverty and a severe and prolonged inflation in the economy. Hence, according to him the supply of money which is the major casual source of inflation is to be regulated at the same average rate at which output and supply of wage-goods are growing. Thus, in the context of non-inflationary price level path, they call for a parity between money supply and maximum short period of feasible rate of expansion in the index of basic consumption necessaries and suggests that only with a higher growth rate of wage-goods, it is possible to achieve targets of both acute poverty eradication and employment expansion more easily and more definitely.

In contrast, Mathur believes that the quantity of money in any economy is not a crucial variable and can be treated as the casual factor in inflation. Because the determining variable of inflation is neither the source of expenditure (whether created through deficit financing, public borrowing or taxation) nor the level of expenditure, but the pattern of expenditure. In this sense borrowing or taxation can be more inflationary while deficit financing can be disinflationary. Hence it is the faulty allocation and such resources is responsible for inflation not the resources itself.

Mathur suggests that the allocation of resources should be maintained between expenditure on quick-yielding projects of short gestation period producing consumers necessaries and the expenditure on long gestation period projects producing capital goods so that the two stream of expenditure, one inflation dampening and other inflation creating may be maintained at a reasonable rate.

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This ratio according to Mathur is the Balanced Allocation Ratio.

Thus, opposed to Brahmananda, Mathur attributes the supply of money is not the basic casual factor of inflation. The basic cause lies in inability to maintain. The balanced Allocation Ratio during the process of plan economic development.

Another area of disagreement between these two models lies in their policy recommendation regarding the effectiveness and practicability of monetary and fiscal policies in the context of a non-inflationary price level path.

Wage goods modelists want to regulate money supply through an appropriate monetary policy so that there may be balance between the scale and rate of growth of bank credit allocation with the stock and the rate of growth of basic goods or wage goods. Besides restricting the money-supply, the model also refers to a programme of population stabilization saving promotion and an adequate public distribution system along with priority attention towards investment in agriculture so that the capacity for large volume of employment in each short period can be built up in the context of a non-inflationary price level path under Indian conditions of development.

While the fiscal policy for an optimum non-inflationary path as suggested by Mathur is entirely different from this policy. According to him tax mechanism has a vital and crucial role in the process of an optimum inflationary growth. Guidance of allocation through inductive and punitive measures, therefore, should be the primary goal of taxation. Hence, the development-oriented tax policy should operate as an allocative instruments in various sector in way that the 'Balanced Allocation Ratio' between inflation dampening and inflation creating expenditure can be maintained at a reasonable ratio during the process of an optimum non-inflationary growth. For this goal, the Disparity Tax according to Mathur, is best suited to realize the objective in a mixed economy like ours. Because in this system of taxation, the tax payable will not only depend upon the type of goods as well as the consumption level of the persons buying it but will also treat rates of profit in essential and non-essential industries differently. Thus, the 'Disparity Tax' may encourage investment and consumption in the right direction and discourage and penalize investment and consumption in the unwanted lines.

The controversy of wage-goods model and the model of non-inflationary growth reflects a deep difference of attitudes forwards the effectiveness of monetary and fiscal policies in the context of a non-inflationary path of development. Wage goods model prescribes monetary regulation along with other measures like population stabilization, saving promotion and an adequate public distribution system to regulate and control excess demand as well as proper allocation of resources in favour of production of wage-goods for creating larger volume of employment, income generation and poverty eradication as the main goal of this strategy.

Similarly, the model of non-inflationary growth also supports allocation of resources in favour of production of consumption necessaries for the vast majority of population so that the nation may free from a 'Glass curtain Economy'. Where

the whole economic structure of production is for a particular class and the government is also trying to satisfy the demand for an affluent section of the society by increasing luxury production.

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But Mathur did not want to regulate money supply or deficit financing as he through that the determining variable of inflation is not the source of expenditure, nor even the level of expenditure but the pattern of expenditure. Therefore, he wanted to regulate the pattern of expenditure in a reasonable ratio between consumption goods sector and capital goods sector through the regulating mechanism of fiscal policy like that of disparity tax.

Conclusion

In the light of the discussion, we may conclude that so far the relevance and practicability of both the methods in the context of poverty alleviation, mass unemployment and the non-inflationary path of development are concerned, the wage-goods strategy of development is more relevant, consistent optimal, practical and best suited to the specific requirements of larger over-populated countries like India. It has identified the real cause of acute poverty growing unemployment and severe and prolonged inflation as a result of the existence of wage-goods supply gap in the system of production in the economy since the inception of second five year plan and has rightly suggested to regulate the growth rate of money supply by reference to global rate in the availability of stocks of basic goods or their rate of growth, on the other hand although the model of non-inflationary growth seems to be attractive and logical in theoretical foundation, its practical applicability in the context of the Indian economy is very doubtful. In essence particularly some peculiar institutional factors and structural bottlenecks obtained in our economy, make it very difficult for proper functioning of the 'Disparity Tax' as an allocative instrument in various sectors in our economy. It is therefore necessary to bring about an alternative strategy of development in the formulation of the eight plan in the light of wage-good strategy of development which can make a significant dent an acute poverty, mounting unemployment and the high rate of inflation in the years ahead. Not only this strategy would be necessary for an adequate investment policy, with strong bias in favour of wage-goods production but also for the optimal utilization of resources under a massive programme of rural development to lift the weaker sections to a level of living comparable to the rest of the population as an integral part of the development plan.

Hence special attention has to be said for rural and agricultural infrastructure lines like irrigation, afforestation, promotion and retention of soil fertility command area, facilities for mixed farming, supplies of rural and agricultural tool, etc., requirements of power and fuel for rural and agricultural needs and so on. In an over-populated agrarian economy like India, a sustain increase in agricultural productivity with related and other wage-goods is an essential condition for sustaining the momentum of development, for controlling inflationary pleasures

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and for expanding the market for industrial products because the categories like capital stock, resource use pattern, production goods and services, exports and imports, government expenditures, credit allocation technologies employment avenues all are directly or indirectly by inevitably involved in the production and supplies of subsistence and wage-goods and services on the basis of prevalent conventional norms regarding the subsistence and wage-goods and services on the basis of the prevalent conventional norms regarding the subsistence and real wage components and on efficient production method.

Check Your Progress

1. Which growth model was provided by Mathur?
2. On what economist's model is Mathur's growth model based on?
3. What is the full form of W.G.S.?
4. Who gave the idea of disparity tax?

10.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Mathur provided non-inflationary growth model.
2. Prof. Mathur derived his model from Saraffa and Neumann–Joan Robinson's model.
3. The full form for of WGS is Wage-goods Sector.
4. Prof. Gautam Mathur gave the idea of disparity tax.

10.5 SUMMARY

- Gautam Mathur has developed a model on the basis of Newsman's and Sraff's analysis. He also given emphasis of adequate production of consumption necessary goods with the use of labour intensive Mechanized Light machinery to provide adequate employment favourable distribution of income and to contain inflation. So he has suggested for a balance allocation ratio between high order capital (which reproduces itself and makes the Mechanized Light Machinery) and consumption. Necessary sector and claimed that with this ratio any size of plan would be non-inflationary whatever the size of money supply. Because investment in high order capital is inflation creating and investment in consumption necessary sector in inflation Dampening.
- Mathur has suggested to adopt the policy of Disparity Tax, i.e. Misexpenditure/ Misconsumption tax in the place of income tax to channelize

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the expenditure in the right activities. He has an option that all the traditional models of raising the resources are highly inflationary and only the policy of deficit financing, which lowers the interest element in cost in anti-inflationary, if used for the production of consumption necessary goods with quick yielding techniques,

- Brahmananda treats deficit financing completely inflationary and is firm on this point that the prospective growth rate in money supply does not exceed the prospective growth rate in output. The world/country is fully aware with the inflationary impact of the deficit financing. Mathur's proposed of Disparity Tax also has no place in wage-good model, because the proposal does not seen to be practicle.
- Wage-goods model has a problem of resource scarcity and so the entire emphasis is on pinpointed investments on wage-goods sector. But Mathur has no problem of such type with faith on deficit financing. So he is in favour of simultaneous investment on high order capital and consumption necessary sector in a balanced way. But both Brahmananda and Mathur are common to give importance the consumption necessary sector i.e. wage-goods sectors.

10.6 KEY WORDS

- **Glass Curtain Economy:** Glass curtain economy is the economy through which poor people can only see the consumer durables, but have no entry to the market, as they do not possess the purchasing power.
- **Disparity Tax:** The term disparity tax or fiscal disparity refers to the difference in commercial-industrial tax base wealth between taxing districts. The fiscal disparities program is a system for the partial sharing of the commercial-industrial property tax base among all jurisdiction within a geographic area.

10.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answers Questions

1. What is Mathur's Paradigm of development?
2. Write short notes on:
   i. Disparity Tax
   ii. Glass Curtain Economy.
3. What is the Mathur's non-inflationary growth model?

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Long Answers Questions

1. Write an essay on 'The Relative merits and relavance of Brahmananda Mathur controvercy'.
2. Analyse Mathur's paradigm of non-inflationary growth.

10.8 FURTHER READINGS

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UNIT 11 PLANNING MODELS-I

NOTES

Structure

11.0 INTRODUCTION

In the previous unit you learned about the strategies of planning. In this unit, you will learn about planning models.

Planning models have been increasingly used in LDCs for the drawing up of plans for economic development. A model expresses relationships among economic variables which explain and predict past and future events under a set of simplifying assumptions. In other words, a model consists of a series of equations, each of which represents association among certain variables. 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, savings, investment etc. On the other hand, exogenous variables are determined from outside the system such as prices, exports, imports technological changes etc.

In the present unit we will explain the elements, types, uses and criticisms of planning models. Different countries use planning models depending upon the nature of the economy, the availability of the information, the capacity to use and manage such models. Some of the major models are;

(i) The H-D. Growth model: The H-D. model is a simple analysis of capital accumulation in the absence of technological progress. The simple version H-D model is given by the following equation:

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$$Y - k/a$$

where Y is the rate of growth, k = the savings (investment) rate and a = the capital–output ratio. The equation simply says that the rate of economic growth is determined given the technology, by the rate of investment.

(ii) Input-output model: I/O model provides a microscopic view of the national economy. It is a statement of the output goods and services produced by a sector, the volume of goods and services produced by a sector and the volume of goods and services which are consumed to produce a given unit of production in that sector. Since different sectors of the economy are inter-related, and each sector will depend on other sectors for input and to sell output goods.

There are other models such as linear programming, computable general equilibrium model and so on.

11.1 OBJECTIVES

After going through this unit, you should be able to:

- Explain the meaning of the planning models
- Describe the elements of planning models
- Mention the types of planning models
- Interpret the uses of planning models
- Critically evaluate the planning models

11.2 INTRODUCTION AND MEANING OF PLANNING MODELS

In economics, a model is a theoretical construct representing economic processes by a set of variables and a set of logical and/or quantitative relationship.

Planning (development) models are economic models which are defined as an organised set of relationships that described the functioning of an economic entity, whether it is an individual household or firm. The national economy or the world economy, under a set of simplifying assumptions of growth models, explain the process of economic growth in a mature economy. They seek to analyse the inter-relationship among critical variables under the assumption that during the process of growth, state intervention was absent and growth process could unfold itself within a capitalistic framework. On the other hand, a development model seeks to analyse the inter-relationship among those critical variables that might play an important role in the development process, including structural change, in the currently underdeveloped countries. The latter models take an explicit notice

of state intervention as a critical exogenous variable in the development process. Thus while growth models are mainly descriptive models, development models may be considered as operational, decision or policy models, when development models are used to solve certain planning problems, they may also be referred to as planning models.

11.3 ELEMENTS AND CHARACTERISTICS OF PLANNING MODELS

Most of the planning models are operational, decision or policy models. They seek to analyse the relationship between plan objectives and the policy measures that might be adopted to attain the former. The following are the important elements of planning models:

1. **Objectives of Economic Policy:** When a plan is formulated, the planner must explicitly lay down the goals of the economic policy to be pursued or maximised under the plan. Normally a plan in LDCs may have one or more of the following objectives:
   - **i.** A stipulated increase in per capita income
   - **ii.** A stipulated increase in employment
   - **iii.** A relatively stable price level
   - **iv.** Equilibrium in the balance of payments
   - **v.** Reduction of in equalities in income distribution
   - **vi.** Balanced regional development
   - **vii.** Diversification of the economy through structural change.

   These objectives of the plan are specified as dependent variables of the model.
2. **Instrument Variables:** These are the policy measures which need to be adopted to achieve the specified objectives of a plan. The policy measures or instrument variables would depend upon the objectives of the plan. Raising the saving-income and the investment-income ratios population policy, import substitution and export promotion, achieving a certain sectoral and regional balance in development, etc. could be some of the independent variables of the model since their values are exogenously specified by the planner.
3. **The functional relationship:** The objectives and the policy instruments (the dependent and independent variables of the model) are functionally related to each other in the form of structural or behavioural equations of the model. These functional (i.e. causal) relationship are expressed in the form of coefficients. These coefficients show the response of the dependent variables as specified. If for example, in the model, the change in the national income is exogenously determined, then marginal propensity to save or the saving coefficients shows how much change in aggregate savings would be

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required. Here while national income is an independent variable, the functional relationship between the two is specified in the form of the saving coefficient.

In a planning Model, the values of the policy instruments may be independently determined and these may be functionally related to the dependent variables or the objectives so as to obtain the values of the latter.

11.4 CLASSIFICATION OF PLANNING MODELS

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 three types, viz aggregative or macroeconomic models, sectoral models, and comprehensive inter-industry models. These three types of models are discussed below:

11.4.1 Aggregative or Macroeconomic Models

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, the problem may be 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. Alternately, 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 requirement to attain that growth rate. Thus, the problem at hand is of an aggregative, macroeconomic nature where it may not be necessary to go into the sectoral details.

Harrod-Domar model, which was initially developed as a growth model to specify the requirements of steady growth at full employment in a developed capitalist economy, it has come to be increasingly used as a simple aggregative macroeconomic planning model. The overall growth rate of the economy or the size of the plan can be worked out with the help of the Harrod-Domar growth equation.

The Harrod-Domar Equation can be derived as below:

S = sY, where is the average propensity to save. ...(i)

K -= KY, where k is incremental capital – output ratio i.e. $\frac{I}{\Delta Y}$ ...(ii)

I = $_{\Delta}$K = K $_{\Delta}$Y, where I or $_{\Delta}$K is net investment ...(iii)

It is assumed that S = I

Therefore, $sY = K \Delta Y$ (From equation (i) and (iii) (iv)

Or $\frac{\Delta Y}{Y} = \frac{S}{K}$ which is the Harrod-Domar growth equation.

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In a planning model like this, the growth rate of income, $\Delta Y/Y$ may be taken as a dependent variable, so that the independently determined values of S and K assumed to be constant, the growth rate of income can be workout. Alternatively, $\Delta Y/Y$ may be independently determined (As a political decision that during the plan the national income has to grow by a given percentage per annum). In this case, the Harrod-Domar model may be employed to deal with some simple macroeconomic problems like the ones indicated here, for instance, if in a typical LDC, the incremental capital-output ratio (k) = 3, and net foreign aid is 2% of its GNP, then for $\Delta Y/Y = 4\%$, a saving income ratio of 10% is needed and for $\Delta Y/Y = 6\%$, a saving income ratio of 16% is needed and so on.

In the Harrod-Domar model, the key constraint to development is low saving income ratio. Besides, other constraints like the scarcity of foreign exchange or skilled labour, can also be introduced into the model. The model could be used to determine other plan objectives like level of employment or balance of payments equilibrium etc. The model being a macroeconomic exercise, does not go into sectoral details, which is its merit as well as a short coming.

11.4.2 Sectoral Models

The sectoral models are of two types: (i) Single-Sector project models and (ii) complete main sector models. In the case of former a single-sector is treated as huge project individually. 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 turned out to be more than the available resources, some of the projects may be excluded from the plan. Yet there are always the possibilities that the plan may merely remain a bundle of several projects.

The complete main-sector planning models are a more developed from of sectoral models. In most LDCs, the main planning problem is that of bringing about structural change. Therefore, it is necessary to specify in the plan the appropriate growth rates of each sector. Thus, the main sector planning models are based on differentiation of main sectors of the economy, specification of their individual growth rates, taking an explicit note of their inter-dependence.

The main-sector planning models will satisfy certain general conditions as below:

(i) The models should be complete, it must cover the entire economy. Even a two-sector model can be complete. For example, in a bi-sector model, the differentiation of sectors may be: agricultural sector and non-agricultural sector, so that the latter includes all the residual sectors.

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(ii) The model should be realistic. Realism can be built into the model in two ways. Firstly, the aggregate resources requirement of the plan should not be more than what is available. Secondly the model must specify the important relationships among various variables.

(iii) The model must be internally consistent. The inter-sectoral relations must be such that, non-agricultural sector should not demand more raw material from agricultural sector than the latter can supply.

Besides the division of main sectors into agricultural and non-agricultural sectors, some other paid of sectors could be consumption goods and investment goods sectors or exports and home market sectors. In the four sector Mahalanobis model, the main sectors are: capital good sector, factory consumer goods sector, agriculture and household industries sector and service sector.

The following is a simple main sector planning model.

Suppose the entire economy is divided into the consumer goods sector and the investment good sector. Then,

$$X_1 + X_2 = GDP = Y$$

Where X_1 is the total output of the consumer goods sector, X_2 is the total output of the investment goods sector, and GDP is the Gross domestic product.

Further suppose that C denotes the marginal (= average) propensity to consume. Then it is clear that

$$\frac{X_1}{X_2} = \frac{C}{1-C}$$

where 1 – C is the marginal propensity to save. If C = 0.8 then,

$$\frac{X_1}{X_2} = \frac{0.8}{0.2} = \frac{4}{1}.$$

If the relative growth rates of the two sectors can be determined during the plan period by the propensities to consume and save, there would be little, if any, structural change. Such a structural change is necessary for a faster rate of growth of the entire economy. For, if the investment goods sector grows faster, the consumer sector would also grow faster through the increased supply of capital goods. The model must take an explicit notice of the inter-dependence of the two sectors. Thus, the growth targets of the two sectors cannot be set independently. The target must be mutually consistent. This would need the following Harrod-Domar types of information:

(i) A target growth rate of GDP : $\frac{\Delta Y}{Y} = \frac{\Delta X_1 + X_2}{X_1 + X_2}$

(ii) The propensity to consume and save, c and 1 – C;

(iii) The sectoral incremental capital-output ratios (ICOR) K_1 and K_2

The Harrod-Domar growth equation would yield the value of (i), if the value of (ii) and (iii) are known.

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Thus, suppose that *c* is expected to remain constant at 0.8, then 1 – C (1C .8) = 0.2.

The sectoral incremental capital-output ratio is empirically ascertained from the current behaviour of the economy, and suppose $K_1 = 3$ and $K_2 = 6$. The global incremental capital-output ratio would be the weighted average of the sectoral ICORs. Thus,

$$k = ck_1 + (1-c)k_2$$

$$= 0.8 \times 3 + 0.2 \times 6$$

$$= 2.4 + 1.2 = 3.6$$

The Harrod-Domar model may be written as,

$$\frac{\Delta Y}{Y} = \frac{\Delta X_1 + \Delta X_2}{X_1 + X_2} = \frac{s}{k} = \frac{1-c}{ck_1 + (1-C)k_2}$$

By substituting the respective values in the above equation, we get

$$\frac{\Delta Y}{Y} = \frac{0.2}{3.6} = 5.6\% approx.$$

Thus, we get a growth rate of output of 5.6% per annum.

Instead of taking only two main sectors, the number of sectors could be increased depending upon the availability of reliable sectoral data. The main sector models are more complex and elaborate in comparison to the simple macroeconomic models. But even the former does not unfold the inter and intra-sectoral relationships which may be important from the point of view of internal consistency of a plan. It is for this reason that inter-industry models are used in planning.

11.4.3 Comprehensive Inter-industry Models

The inter-industry models make use of two important techniques of economic analysis viz;

(ii) input-output technique

(ii) the linear programming technique.

While the first technique may be used for purposes of setting consistent sectoral targets and thus for ensuring the internal consistency of a plan, the latter technique may be utilised for optimisation of an objective function like output or consumption in the terminal year of the plan, or over the plan period.

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Consider a static inter-industry planning model making use of the input-output technique such a model may be used to produce an internally consistent plan. The problem is that keeping in view the inter-industry relations the targets for different industries or sectors must be mutually consistent so that both shortages and surpluses are avoided.

The static input-output model is made up of two sets of equations:

(i) the balance equations

(ii) the structural equations.

There would be a balance equation for the product of each 'sector' or 'industry'. It shows that the output of a given industry is used in the following manner:

$$X_i = \sum_{i=1}^{n} x_{ij} + x_{ic} + x_{i1} + x_{ix} \quad \text{...(i)}$$

Where x_i = total output of industry; $\sum_{i=1}^{n} x_{ij}$ denotes the total of inter-industry transactions or delivery of the ith sector output to j sectors which are n in number; x_{ic} = the use of the ith product for consumption; x_{i1} = use of the ith product for investment purposes; and x_{ix} = export of the ith product. While $\sum_{i=1}^{n} x_{ij}$ is the total inter-industry use of the ith good, $x_{ic} + x_{i1} + x_{ix}$ is the total final use or demand for the ith good. Such a disposal of the sectoral outputs may be expressed for all the *n* sectors in the economy.

The objective of constructing an inter-industry model of this type may be to formulate an internally consistent plan. For this purpose, the technological relations in the economy should be specified in the form of the following type of structural equations.

$$Xij = aijXj \quad \text{...(ii)}$$

Where *aij is* the technological coefficient or input coefficient, showing the amount of ith input needed to produce each unit of ith good. Equation (ii) shows that if the output target of the jth good (ie *xj*) is independently determined then if we multiply it by the input coefficient, we get the total amount of the ith input that would have to be delivered to jth industry to enable the latter to fulfil its output target. By substituting equation (ii) in equation (i), we get–

$$X_i = \sum_{j=1}^{n} aijx_j + x_{ic} + x_{i1} + x_{ix} \quad \text{...(iii)}$$

In equation (iii), if the final demand for the ith good as shown by $X_{ic} + X_{iI} + X_{ix}$ is exogenously determined, the output of the ith good needed for

inter-industry deliveries to enable all the *j* sectors of the economy to fulfil their output targets can be determined with the help of the input-output model. The model would be a system of *n* simultaneous equations, one for each sector or industry with *n* unknown variables which can be solved to find consistent output targets for each industry.

The above is a static model. The inter-industry model may also be a dynamic one in which an explicit notice is taken of the need to build up stock of capital goods out of current output to attain higher output level in future. Thus, in the Leontief dynamic input-output model, the current output can be used for current inter-industry use as an input, for current final use (such as for current consumption, investment and exports as in the static model), and for building up stock of capital for future use.

11.5 FACTORS AFFECTING CHOICE PLANNING MODELS

There are different types of planning models available to a developing country. An intelligent and informed choice of planning models or framework depends on four main considerations:

1. **Stage of Development:** The choice of a plan model obviously depends on the exiting level of country's economic development. If a country is dominated by subsistence agriculture, has a limited monetary sector and little or no inter-industry relations, then, it may have either aggregative or sectoral model of planning. However, in the later stages of development, inter-industry planning model may become more feasible.
2. **Institutional structure:** The institutional structure of the economy is another important consideration. If private sector plays a relatively passive role, then the public sector is expected to provide the initial stimulus and continued overall direction. So, public investment projects will get greater attention. However, if private sector is more active, then the plan strategy will concentrate on the creation of favourable conditions for private economic activity. In the case of conflict between public and private interests the former will normally take precedence over the latter.
3. **Availability and Reliability of Data:** It is the third factor in the formulation of development plan. If the existing data are the in adequate and unreliable, then there is little scope for using inter-industry or sectoral planning models. The planner may have to resort to aggregative planning model till such time when the empirical information is both adequate and reliable to warrant the adoption of detailed planning model.
4. **Resource Constraints:** The resource constraints or bottle necks impinging on the economy also influence the character of a development planning model. In general, capital and foreign exchange are the principal bottle necks

to rapid economic development. In such a situation, labour-intensive projects may have to be stressed to economise the use of limited capital and foreign exchange resources.

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11.6 USES OF PLANNING MODELS

Models have been used in different contexts in actual planning. According to Ashok Rudra, the following are the uses of models in planning:

1. **To provide a frame for checking the consistency or optimality of plan targets:** The inter-industry models, can be used to check the consistency of various targets set in a plan and optimality of such targets can also be ensured. According to Ashok Rudra "A model can be used to generate a whole set of alternative development programmes by varying over appropriate ranges the value of all the parameters and exogenous variables that are subject to uncertainty and also by changing the objective functions or numerical weights of composite objective functions.
2. **To provide a frame for the Actual Setting of Targets:** Model building activity in LDCs may lead to a stage where actual targets for the plan may be set with the help of computers by feeding relevant data into them and receiving back readymade plans.
3. **To provide a frame for the Evaluation and Selection of Projects:** Plan model could be designed which would provide a justification for the selection of some and rejection of other projects. In project evaluation and cost-benefit analysis, use of shadow prices is sought to be made in the interest of optimum use of resources. Shadow prices for the economy may be estimated with the help of programming models. However, a problem that arises in this connection is that in the case of inter-temporal programming models, it has been noted that there is a good deal of inter-temporal instability in the shadow prices yielded by such models. So the question would be as to which shadow price to use for project evaluation.
4. **To help make better Policy Decisions:** Ashok Rudra observes that, "… the principal contribution of plan models is to provide such s insight into the working of an economy as to make official plan makers better equipped to take policy decision than they could possibly without the help of any such models."

   The planner can make alternative assumptions about the values of the instrument variables of the model and then work out the result in each case. Thus, a rational basis can be provided for the policies chosen during a plan. The models therefore, provide intellectual backbone to each plan in the matter of choice of policies.

11.7 CRITICISMS OF PLANNING MODELS

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Analytically, planning models have several drawbacks, Paul Streeten observes in this connection that "the trouble with many current models is that they are shapely and elegant but lack of the vital organs." The main drawbacks in plan models have been grouped under four heads by Paul Streeten which are as below:

1. **Neglect of Non-economic Factors:** The planning models do not consider non-economic factors, such as attitudes social satisfaction, quality of the political leadership and civil administration as important in the process of development. These are not, therefore, taken as the instrument variables of the models. The non-economic factors, being generally non-quantifiable are taken by the model builders as something which would adopt themselves to the change in important, quantifiable, economic variables or that the former would automatically be modified to suit requirements of economic development. The neglect of economic factors by the planning models' builders is a serious lapse which greatly impairs the usefulness of such models.
2. **One-Factor Analysis:** There is a tendency on the part of economists to isolate a single factor as the critical instrument variable. This is especially the case in the aggregative models. In the Harrod-Domar model, for instance, saving-income or investment income ratio is taken as the most important instrument variable, to the alter neglect of other factors. Such one-factor analysis in the models may land a country using such models in trouble.
3. **Misplaced Aggregation:** There is a tendency on the part of model builders and planners in LDCs to build models in terms of national aggregates like unemployment, savings, investment, etc. as if these variables are homogeneous in character. Such an assumption may be justified in the developed countries where there is greater degree of specialisation among factors of production and this economics also happen to have a more homogenous socio-economic structure. In LDCs however, such aggregation is misplaced. For instance, savings and investment take a different form in the corporate sector than what happens in that part of the farming sector which is engaged in subsistence agriculture. Saving and investment in the two sectors cannot be clubbed together.
4. **Illegitimate Isolation:** The development process is a complex of inter-relationships among a large number of variables. However, different planning models illegitimately isolate a few variables of economic policies as the critical variables in the process of planned development. The result is that some important complementary relationships may be overlooked. For instance, the variable which are excluded from the model may be the ones which, if included, might have led to a faster rate of development.

   Ashok Rudra enumerates those important parts of the economy which the Indian plan models left out of account, or the errors of omission which were

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committed by such models. These are: neglect of institutional factor, resource endowment of the country, skilled man-power, and infrastructure. Other draw backs of Indian plan models are: their exogenous treatment of final demand, their neglect of behaviouristic propensities of different classes of consumers their assumption of linearity (e.g. the assumption of fixed input co-efficients in the input-output models), etc.

Conclusion

In spite of the above mentioned criticism against the plan models, it cannot be denied that these models impart an element of rationality to the process of plan-making. In the absence of plan models, this process would lack the objectivity which is essential for the quantitative analysis contained in plans. Richard Eckaus is right in observing that "development models are one but by no means the only method of knowing more about the detailed structure and working of a developing Economy".

Check Your Progress

1. Define the Planning Model.
2. Name the two types of Planning Models.
3. Mention two uses of Planning Model.
4. State two demerits of Planning Models.
5. State the main elements of Planning Model.

11.8 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. A planning model expresses the relationships among economic variables which explain and predict past and future events under a set of simplifying assumptions.
2. The two types of Planning Models are (i) Aggregative model, (ii) Sectoral Model.
3. The two uses of Planning Models are (i) To help make better policy decisions, (ii) To provide a framework for checking the consistency or optimality of plan targets.
4. The two demerits of Planning Models are: (i) One factor analysis, (ii) Multi placed Aggregation.
5. The main elements of Planning Models are:
   - Balanced regional development
   - A relatively increase in per capita
   - Equilibrium in the BOP.

11.9 SUMMARY

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- A planning model specifies relationships between endogenous and exogenous variables and aims at ensuring the consistency of the proposed plan for economic development. "It is meant to yield an optimally balanced collection of measures, known as Model Targets, which can help the planning authority in the drawing of an actual plan."
- A U.N. study defines a planning model as that based on precise knowledge of medium and long-term economic aims, which is mathematically expressed in the form of a preference function and reflects the initial conditions of the economy including economic policy measures already proposed and show the most probable path of economic development.
- Planning models are of three types: aggregate, multi-sector and decentralisation. Aggregative models trace the optimal path of development overtime of such economy-wide aggregates as income, saving, consumption, investment, etc. The Harrod-Domar Models and the two gap models are of this type. But it is not possible to build highly aggregative models in LDC, because of the lack of accurate data computational devices. Therefore, multi-sector models are designed which connect macroeconomic aggregates with the sectors constituting the operational content of the plan.
- The Mahalanobis two sector and four sector models are of this type. Multi sector models are also set in terms of input-output models. They are consistency models based on the Leontief inter-industry system. The consistency, model for India's fourth plan by Manne, Rudra and others, and the model of Indian fifth plan were framed in terms of the input-output models.
- Further optimising or Linear Programming models are also multi sector planning models. They extend the consistency models of the input-output types to optimisation of income or employment or any other quantifiable plan objective under the constraints of limited resources and technological conditions of production. Such models can be static or dynamic. Static LP models solve the systems of equations for optimal solutions in relation to a single year, while dynamic LP models explain the optimal growth path over the entire plan period.
- Decentralised models have sector or project level variables which are used to prepare models for individual sectors or projects. Such models are useful in the early stages of a country's economic development when information is available for only individual sectors or projects.
- The usefulness of planning models in actual plan-making are (a) to provide a frame for the checking of the consistency or the optimality of the official plan targets, (b) to provide a frame for the actual setting of targets, (c) to

provide a frame for the evaluation and selection of projects and (d) to provide an insight into the structure of the economy and its dynamics to help better policy decisions.

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11.10 KEY WORDS

- **Planning models:** A planning models is a series of mathematical equations which help in the drawing up of a plan for economic development.
- **Endogenous variables:** Endogenous variables are those whose values are determined from within the system such as national income, consumption, saving, investment etc.
- **Exogenous variables:** Exogenous variables are deformed from outside the system such as prices exports, imports, technological change etc.

11.11 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Bring out the difference between a growth models and a development model.
2. What factors influence the choice of a planning model?
3. With the help of an inter-industry model show how internal consistency of an economic plan can be ensured.

Long Answer Questions

1. Discuss the important merits and drawbacks of planing models as a tool of plan formulation.
2. Derive Harrod-Domar growth equation. If the ICOR is estimated at 3, and the net inflow of foreign capital is estimated to be 3% of the national income, what rate of domestic saving would be needed to achieve 5% growth rate?
3. Write short notes on–
   i. Uses of planning models
   ii. Factors affecting choice of planning models
   iii. Sectoral Models
4. Write a descriptive essay on 'Classification of Planning Models'.

11.12 FURTHER READINGS

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UNIT 12 PLANNING MODELS – II

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Structure

12.0 INTRODUCTION

The Feldman-Mohalanobis model is a Neo-Marxism model of economic development, created independently by soviet economist Grigory field in 1928 and Indian statistician Prasanta Chandra Mahalanobis in 1953, Mahalanobis become essentially the key economist of India's second five year plan, becoming subject to much of Indian's most dramatic economic debates.

The essence of the model is a shift in the pattern of industrial investment toward building up domestic consumption goods sector. Thus the strategy suggests in order to reach a high standard in consumption, investment in building a capacity in the production of capital goods is needed first. A high enough capacity in the capital goods sector in the long-run expands the capacity in the production of consumer goods. The distinction between the two different-types of goods was a clearer formulation of Marx's ideas in *Das Kapital*, and also helped people to better understand the extent of the tradeoff between the levels of immediate and future consumption. These ideas were however first introduction in 1928 by Feldman, an economist working for the GOSPLAN planning commission, presenting theoretical arguments of two-department scheme of growth. There is no evidence that Mahalanobis knew of Feldman approach, being kept behind the border of the USSR.

Input-output model is a qualitative economic technique that represents the interdependencies between different branches of a national economy or different regional economies. Wassily Leontief (1906-1999) created a model by developing this type of analysis and earned the Nobel Prize in Economics for his development of this model.

12.1 OBJECTIVE

After going through this unit, you will be able to:

- Describe the Feldman growth model
- Explain the Mahalanobis growth model
- Describe the Leontief's input output model

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12.2 FELDMAN MODEL

1. Introduction

G.A Feldman, a Russian economist, constructed his model of growth, which served as a launching pad for the Russian First Five Year Plan. This model is based on the concept of unbalanced growth stressing priority for the capital goods sector in investment allocation for speedy development. The main thrust of this model has been to transform the backward Russian peasant economy into a developed industrial economy. Investment plays a dual role. On one hand, it creates productive capacity and on the other hand, it has income-generating effect. This model is based on the productive capacity effect of investment with a view to give momentum to capital goods production. This model was formulated in the context of socio-economic environment prevailing around 1928 in Russia, and it rejects the scenario of soviet economy on the eve of its First Year Plan.

2. Explanation of the Model

This model is based on following assumptions:

1. It is a closed economy. It means that international trade and foreign capital do not influence the growth of an economy.
2. The economy is divided into two sectors-Capital goods sector and consumer goods sector.
3. It rules out the role of private capitalism. There is a role of state capitalism.
4. Production is marked by constant returns to scale.
5. Production is assumed to be independent of consumption.
6. There are no time lays in the adjustment process of growth variables.
7. Supply of labour is assumed to be limited.
8. Prices are assumed to be constant in the economy.
9. Capital formation is considered an engine of growth. As such, it assumes the role of a key variable.
10. There is no full employment in the economy.

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This model highlights two important features. One is the concept of unbalanced growth and second is the Marxian scheme of production. The first feature i.e. unbalanced growth implies higher proportion of investment for capital goods industries. This sector has been looked upon as a source of vast growth of national income in the long period. The key variable in the proportion of investment allotted to the capital goods sector. This sector occupies a core position in Feldman model of growth.

The other important feature is that this model is based on Marxiam scheme of production. Under this scheme, the total output of an economy (y) is divided into two categories.

Category I, comprise the output of capital goods sector and category II, includes the output of consumer goods sector. The production of each sector is composed of three elements constant capital (C), variable capital (V) and surplus value (S). The total output of each sector is represented by the equations given below:

$Y_1 = C_1 + V_1 + S_1$ …… (capital goods sector)

$Y_2 = C_2 + V_2 + S_2$ ….. (consumer goods sector)

It should be noted that division of total output between the two sectors depends upon the productive capacity of each sector. With this background, we now proceed to discuss the mathematical interpretation of this model.

The basic equations of this model are expressed as under:

$K_1 + \beta \cdot I$ (1)

K_1 = the annual rate of net investment allocation in capital goods sector.

β = Proportion of total investment allocated to capital goods sector.

I = annual rate of investment of the whole economy.

The increment in the stock of capital in 't' period of time is determined by dividing K_1 by its capital output ratio V_1 & is expressed as under:

$$\frac{dI}{dt} = \frac{K_1}{V_1}$$

Substituting the value of K_1 (from equation (1) in the above equation we get)

$$\frac{dI}{dt} = \frac{\beta \cdot I}{V_1} \quad (2)$$

Cross multiplying

$$\frac{dI}{I} = \frac{\beta}{V_1} \cdot dt \quad (3)$$

Integrating equation (3), we get

$$\int_{I_0}^{I} \frac{dI}{I} = \int_{I_0}^{I} \frac{\beta}{V_1} \cdot dt$$

[I_0 is the lower limit and represents the investment in initial period of time. I is the upper limit and represents investment in current period of time.]

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$$\left[\log eI\right]_{I_0}^{I} = \left[\frac{\beta}{V_1} \cdot t\right]_0^t$$

$$\because \quad \left[\int \frac{dx}{x} = \log_e^x \right] \int dx = x, \int dt = t$$

$$\log eI - \log eI_0 = \frac{\beta}{V_1}\left[t - 0\right]$$

$$\log e \frac{I}{I_0} = \frac{\beta}{V_1} \cdot t$$

$$\because \quad \left[\log e^m - \log e^n = \log e \frac{m}{n}\right]$$

$$\frac{I}{I_0} = e^{\frac{\beta}{V_1} \cdot t}$$

$$I = I_0 \cdot e^{\frac{\beta}{V_1} \cdot t} \tag{4}$$

This equation reveals that total investment (I) in 't' period of time is equal to initial investment (I_0) multiplied by the exponential coefficient $\frac{\beta}{V_1} \cdot t$. It shows that total investment varies directly with b and inversely with V_1 (capital output ratio). To simplify the calculations, let us assume that initial investment I_0 is unity. On this assumption, the equation (4) can be expressed as:

$$I = e^{\frac{\beta}{V_1} \cdot t} \tag{5}$$

So far, we have discussed the case of produce goods sector. Now we takes up the discussion of consumer goods sector. Taking the clue from equation (1), the basic equation of the consumer goods sector can be expressed as under:

$$K_2 - (1 - \beta)I \tag{6}$$

The notations used in the above expression carry the some meaning. Substitute value of I (from equation 5) in equation 6, we get

$$K_2 - = (1-\beta) \cdot e^{\frac{\beta}{V_1} \cdot t} \tag{7}$$

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This equation reveals that constant exponential growth rate of investment $e^{\frac{\beta}{V_1}\cdot t}$ is also applicable to the investment in consumer goods sector and $(1-\beta)$ is the fraction of investment in this sector. The increment in the stock of capital in respect of category II, is determined by dividing K_2 by its capital output ratio and is expressed as under:

$$\frac{dC}{dt} = \frac{K_2}{V_2}$$

Substituting the value of K_2 (from equation (7) in above expression, we get

$$\frac{dC}{dt} = \frac{(1-\beta)}{V_2} \cdot e^{\frac{\beta}{V_1}\cdot t} \tag{8}$$

This equation reveals that increment of investment in consumption goods in 't' period of time $\left[\frac{dC}{dt}\right]$ is equal to the exponential rate of growth of fraction of investment i.e. $(1-\beta)\cdot e^{\frac{\beta}{V_1}\cdot t}$ divided by the capital coefficient (V_2) of this category.

Cross multiplying we get,

$$dC = \frac{(1-\beta)}{V_2} \cdot e^{\frac{\beta}{V_1}\cdot t} \cdot dt$$

Integrating the above expression, we have

$$\int_{C_0}^{C} dC = \int \frac{(1-\beta)}{V_2} \cdot e^{\frac{\beta}{V_3}\cdot t} \cdot dt$$

$$C = \frac{(1-\beta)}{V_2} \int_0^t e^{\frac{\beta}{V_1}\cdot t} \cdot dt$$

]Constant $\frac{(1-\beta)}{V_2}$ has been taken out of integration]

$$[C]_{C_0}^{C} = \frac{(1-\beta)}{V_2} \cdot \left[\frac{e^{\frac{\beta}{V_1}\cdot t}}{\frac{\beta}{V_1}}\right]^t \quad \because \quad \left[\int e^{3x} dx = \frac{e^{3x}}{3}\right]$$

$$= \frac{(1-\beta)}{V_2} \cdot \frac{V_1}{\beta}\left[e^{\frac{\beta}{V_1}\cdot t}\right]_0^t$$

$$C - C_0 = \frac{(1-\beta)}{V_2} \cdot \frac{V_1}{\beta}\left[e^{\frac{\beta}{V_1}\cdot t} - 1\right]$$

[$\because$ anything raised to power zero in unity]

$$C - C_0 = \frac{(1-\beta)}{\beta} \cdot \frac{V_1}{V_2}\left[e^{\frac{\beta}{V_1} \cdot t} - 1\right]$$

$$C = C_0 + \frac{(1-\beta)}{\beta} \cdot \frac{V_1}{V_2}\left[e^{\frac{\beta}{V_1} \cdot t} - 1\right] \quad (9)$$

This equation reveals that total consumption (C) is equal to the initial consumption (C_0) plus exponential growth rate of the proportion of investment (b, (1- b) multiplied by the ratio of capital coefficient $\left(\frac{V_1}{V_2}\right)$ minus one.

The annual output of the economy is composed of the output of capital goods sector (I) and consumption goods sector (C). This can be expressed in the form of an equation given below:

$$y = C + 1 \quad (10)$$

Differentiating it w.r.t 't' we have

$$\frac{dY}{dt} = \frac{dC}{dt} + \frac{dI}{dt}$$

Substituting the values of $\frac{dC}{dt}$ (from equation 8 and $\frac{dI}{dt}$ (from equation 2) in the above expression, we get

$$\frac{dY}{dt} = \frac{(1-\beta)}{V_2} \cdot e^{\frac{\beta}{V_1} \cdot t} + \frac{\beta \cdot I}{V_1}$$

$$\frac{dY}{dt} = \frac{(1-\beta)}{V_2} \cdot e^{\frac{\beta}{V_1} \cdot t} + \frac{\beta}{V_1} \cdot e^{\frac{\beta}{V_1} \cdot t} \qquad [\because I = e^{\frac{\beta}{V_1} \cdot t} \text{ from equations}]$$

$$\frac{dY}{dt} = \left[\frac{(1-\beta)}{V_2} + \frac{\beta}{V_1}\right] \cdot e^{\frac{\beta}{V_1} \cdot t}$$

$$\frac{dY}{dt} = \left[\frac{V_1(1-\beta) + V_2\beta}{V_1 V_2}\right] \cdot e^{\frac{\beta}{V_1} \cdot t}$$

$$\frac{dY}{dt} = \frac{e^{\frac{\beta}{V_1} \cdot t}}{V_1 V_2}\left[V_1(1-\beta) + V_2\beta\right]$$

$$\frac{dY}{dt} = \frac{e^{\frac{\beta}{V_1} \cdot t}}{V_1 V_2}\left[V_1 - V_1\beta + V_2\beta\right]$$

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$$\frac{dY}{dt} = \frac{e^{\frac{\beta}{V_1}\cdot t}}{V_1 V_2}\left[V_1 - \beta(V_1 - V_2)\right] \tag{11}$$

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This equation expresses the incremental output of an economy in 't' period of time in terms of incremental output attributing to consumption goods and producer goods sector.

Reverting back to equation (10) which states that

$Y = C + I$

Substituting the value of C & I (from equations 9 and 5 in the above expression, we get

$$Y = \cot\frac{(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\left[e^{\frac{\beta}{V_1}\cdot t} - 1\right] + e^{\frac{\beta}{V_1}\cdot t}$$

Adding and subtracting 1 on the RHS of expression, we get

$$Y = C_0 + 1 - 1 + \frac{(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\left[e^{\frac{\beta}{V_1}\cdot t} - 1\right] + e^{\frac{\beta}{V_1}\cdot t}$$

$$= C_0 + 1 + \left[e^{\frac{\beta}{V_1}\cdot t} - 1\right] - \frac{(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\left[e^{\frac{\beta}{V_1}\cdot t} - 1\right]$$

$$= C_0 + 1 + \left[e^{\frac{\beta}{V_1}\cdot t} - 1\right]\cdot\left[\frac{1+(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\right]$$

For the sake of simple calculations, it was assumed that initial investment I_0 may be treated as one. Now converting one into initial investment, we get

$$Y = C_0 + I_0 + \left[e^{\frac{\beta}{V_1}\cdot t} - 1\right]\cdot\left[\frac{1+(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\right]$$

$$Y = Y_0 + \left[e^{\frac{\beta}{V_1}\cdot t} - 1\right]\cdot\left[\frac{1+(1-\beta)}{\beta}\cdot\frac{V_1}{V_2}\right] \tag{12}$$

$[\because C_0 + I_0 = Y_0]$

This is the fundamental mathematical equation of Feldman model. It indicates that equation of Feldman model. It indicates that total output of an economy is dependent on the initial output (Y_0), exponential growth $\left[e^{\frac{\beta}{V_1}\cdot t}\right]$, proportions of investment allocated to capital goods sector (β)and consumer goods sector

$(1 - \beta)$ and their capital output ratios (V_1 and V_2). However, the important factor influencing the total output is the productive capacity of capital goods sector.

This model therefore, conveys a message that to raise the national output, planners should focus their attention to the productive aspects of investment in producer goods industries. In other words, the planner should concentrate on the strategy of unbalanced growth for raising the level of national output and self-sustained growth of an economy.

3. Implications

Having study, the explanation of Feldman model of growth, one can sort out the main points to understand its implications.

1. Two sector model: According to the model, the economy has been divided in two sectors – capital goods sector and consumer goods sector. This model is therefore, bisector model. With modifications, this model can address to the problems confronting the developing countries.
2. Unbalanced growth: It has already been discussed that this model does not propose to develop all the sectors simultaneously; rather it stresses on the principle of unbalanced growth i.e. priority and preference be given to the development of capital goods sector in the matter of investment allocation. Indian planners, too adopted the strategy of unbalanced growth in the Second Five Year Plan. The main focus of this point is that manufacturing sector has the maximum total linkage effect and this sector can create external economies. This model, therefore, speaks in favour of unbalanced growth.
3. State participation: This model was designed by Feldman to suit the conditions and requirements of Russian economy on the eve of First Five Year Plan. At that time, it was the regime of state monopoly which controlled and directed all the factors of production. The role of private entrepreneurs in the growth of an economy was altogether absent. However, in the modern day developing countries, the governments have diluted this implication of the model to suit the requirements of their economies. With the disintegration of USSR, the independent federal units are allowing the participation of private sector in the development and progress of their economies.
4. Propensity to save: In this model, a distinct role has been assigned to average propensity to save and marginal propensity to save. The average propensity to save determines the rate of growth of income, whereas marginal propensity to save determines the rate of growth of investment of these two, marginal propensity to save occupies an important place in the Feldman model to promote and accelerate growth, the level of investment is to be raised which in turn depends on marginal propensity to save and it is in tune with the dynamic process of development.

   The study of the above implications reveals that Feldman model of growth, with necessary modifications suiting, the requirements of an economy, can

be used by the planners for solving the problems of underdevelopment. It can be employed as one of the strategies of development for rapid growth.

4. Critical Appraisal

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Feldman model of growth provides guidelines for the promotion of development and has made significant contribution in the field of operational model of growth, yet it is not free from criticism. The main points of criticism are as under:

1. The concept of closed economy is not relevant: This model is based on the assumption of a closed economy, having no economic relations with outside world. It means this model does not recognize the role of international factors. In the present day world, the economic thinkers and development writers talk of the global economy. A closed door economy cannot enjoy the fruits of international economic relations and it is difficult to visualize that an economy can develop in isolation. So the assumption of closed economy is irrelevant and in appropriate.
2. Division of economy illogical: One of the assumptions of Feldman model is that economy is divided into two sectors – capital goods sector and consumption goods sector. This division seems to be irrational as it makes the model a bi-sector model. In actual practice, economy may comprise of a number of sectors like primary, secondary and territory sectors. When an economy is divided into two sectors, obviously the planners would focus their attention on the development of those two sectors and other sectors development will be ignored. Such a view will lead to top-sided development. Division of the economy into only two sectors, therefore, appears to be illogical and an over simplification.
3. Emphasis on capital goods unwarranted: In this model, more emphasis has been given to the development of capital goods sector as higher proportion of investment is allocated to this sector. The consumption goods sector, on the other hand has been accorded law priority, resulting in the scarcity of consumption goods and inflation. In a regimented society, the interests of consumers may be scarified but in a mixed economy like India, such a situation is not likely to be tolerated by the people. Moreover, development in a situation of inflation may not be a smooth of fair. There may be tensions and pressures when one sector is developed at the cost of other. The growth model which accords priority to capital goods sector at the cost of consumption goods sector can not help in realizing the goals of development.
4. Marxian frame work is open to question: Feldman model has been prepared and developed in the Marxian framework. It is considered an extension of Marxian model, because of its emphasis on capacity creation rater than income generation aspect of investment. Marxian framework may have its relevance on appeal to people in a system of command economy. In a democratic country like India, this model may find itself out of place.

5. Theoretical model: The basic mathematical equation (12) of this model explains that total output of an economy is dependent on initial output (Y_0), exponential growth $\left[e^{\frac{\beta}{V_1} \cdot t}\right]$, investment allocation to the two sector (b, (1 – b) and capital output ratios (V_1 and V_2) these determinants may appear to be sound, but practically, it may not be an easy exercise to calculate their values. There may arise a need for making use of electronic devices either may not be available in poor developing economies on their use may require professionals who can handle them. The availability of such professionals may also be a problem. Veering all aspects, one can infer that this model may be theoretically sound but it may not be feasible proposition in actual practice.

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Conclusion

The discussion of this model can be summed up in the words of Prof. Domar who says that, "this model contains an important element of truth; a closed economy, without well developed metal, machinery and subsidiary industries, is unable to produce a sizeable quantity of capital goods and thus, to invest a high fraction of its income, however, high its potential saving propensity may be. In Soviet economic thinking, the former consideration has to be predominant. In our recent literature, the ability to save has been emphasized." The basic propositions of this model are relevant in the system of a command economy. With necessary modification, Feldman model can address to the problems of development of underdeveloped economies.

Check Your Progress

1. What are the two main features of the Feldman Model?
2. What is a bi sector model?
3. Why is division of sector in Feldman model illogical?

12.3 THE MAHALANOBIS MODEL

Introduction

In October 1952, Mahalonobis developed a single sector model based the variable of national income and investment. It was further developed into a two sector model in 1953 where the entire net output of the economy was supposed to be produced in only two sectors – the investment goods sector and the consumer goods sector. Next he develops the famous four – sector model in 1955. We discuss this two sector and four sector models.

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1. Two Sector Model

It was Mahalanobis' s two sector model which became the basis for his formulation of the four sector model for the Second Five Year Plan. The Mahalanobis two sector model was based on the following assumptions:

(a) It is related to a closed economy where there is no foreign trade.

(b) The economy consists of two sectors: the consumer goods sector and the capital goods sector. There is no intermediate sector. The industries producing intermediate goods are grouped together with the consumer goods and the capital goods which they help to produce.

(c) There is total non-shift ability of capital equipment once installed in any of the sectors. But products of the capital goods sector can be used as inputs in the two-sectors.

(d) There is full capacity production in the consumer goods sector as well as in the capital goods sector.

(e) Investment is determined by the supply of capital goods.

(f) There are no changes in prices.

Given these assumptions, Mahalanobis divided the economy into two parts: λ_K, the proportion of net investment used in the capital goods sector and λ_C, the proportion of net investment used in the consumer goods sector.

$$\lambda_K + \lambda_C = 1 \quad (1)$$

Further, net investment (I) can be divided into two parts at any point of time (t): one, $\lambda_K\lambda_t$ to increase the productive capacity of the capital goods sector and $\lambda_C\lambda_C$ of the consumer goods sector. In this way

$$\lambda_t = \lambda_K\lambda_t + \lambda_C\lambda_t \quad (2)$$

Taking β_K and β_C as the output – capital ratios of the capital goods sector and the consumer goods sector respectively & β as the total productivity coefficient, the latter can be shown as

$$\beta = \frac{\beta_K\lambda_K + \beta_C\lambda_C}{\lambda_K + \lambda_C}$$

But $\lambda_K + \lambda_C = 1$

$$\beta = \beta_K\lambda_K + \beta_c\lambda_C \quad (3)$$

The income identify equation for the entire economy is

$$Y_t = I_t + C_t \quad (4)$$

Now, When national income changes, investment and consumption also change. The change in investment depends upon previous year's investment (I_{t-} – 1) and so does consumption on previous year's consumption (C_t – 1). So the increase in investment in period t, is $\Delta I_t = I_t - I_{t-1}$, and increase in

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consumption is $\Delta C_t = C_t - C_{t-1}$. As a matter of fact, the increase in the two sectors is related to the linking up of productive capacity of investment and the output – capital ratio. First, the investment growth path is determined by the productive capacity of investment in the capital goods sector ($\lambda_K I_K$) and its output – capital ratio (β_K), so that

$$I_t - I_{t-1} = \lambda_K \beta_K I_{t-1}$$

$$I_t = I_{t-1} + \lambda_K \beta_K I_{t-1}$$

or, $$I_t = (1 + \lambda_K \beta_K) I_{t-1} \quad (5)$$

Putting different value for t(t = 1, 2, 3, ……) the solutions of equations (5) are

$$I_1 = (1 + \lambda_K \beta_K) I_0$$

$$I_2 = (1 + \lambda_K \beta_K) I_1$$

$$= (1 + \lambda_K \beta_K)\,(1 + \lambda_K \beta_K) I_0$$

$$= (1 + \lambda_K \beta_K)^2 I_0 \qquad [\because I_1 = (1 + \lambda_K \beta_K) I_0]$$

In the same manner by putting the value of t in equation (5)

we get

$$I_t = I_0\,(1 + \lambda_K \beta_K)^t$$

$$I_t = I_0 = I_0\,(1 + \lambda_K \beta_K)^t - I_0$$

$$I_t - I_0 = I_0\,(1 + \lambda_K \beta_K)^t - 1 \quad (6)$$

similarly, by putting the value of t (t = 1, 2, 3 ….) in the consumption growth path $\Delta C_1 = C_t - C_{t-1} = \lambda_c \beta_c I_{t-1}$, we get

$$C_1 - C_0 = \lambda_c \beta_c I_0$$

$$C_2 - C_1 = \lambda_c \beta_c I_1$$

an finally $C_t - C_0 = \lambda_c \beta_c (I_0 + I_1 + I_2 + \ldots\ldots I_t)$

By substituting the value of $I_1, I_2 \ldots I_t$ in equation (6) and its related equation, the above equation can be solved as

$$C_t - C_0 = \lambda_c \beta_c [I_0 + (1 + \lambda_k \beta_k) I_0 + (1 + \lambda_k \beta_k)^2 I_0 + \ldots + (1 + \lambda_k \beta_k)^t I_0]$$

$$= \lambda_c \beta_c I_0 [1 + (1 + \lambda_k \beta_k) + (1 + \lambda_k \beta_k)^2 + \ldots + (1 + \lambda_k \beta_k)^t]$$

$$= \lambda_c \beta_c I_0 \left[\frac{(1+\lambda_k \beta_k)^t - 1}{(1+\lambda_k \beta_k) - 1}\right]$$

or $$C_t - C_0 = \lambda_c \beta_c I_0 \left[\frac{(1+\lambda_k \beta_k)^t - 1}{\lambda_k \beta_k}\right] \quad (7)$$

Now, the growth path of income for the whole economy on the basis of equation (4) is

$$\Delta y_t = \Delta I_t + \Delta C_t$$

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or $y_t - y_0 = (I_t - I_0) + (C_t - C_0)$

by substitution the values of equations (6) and (7) in the above equation, we get

$$y_t - y_0 = \left[I_0 (1+\lambda_k \beta_k)^t - 1 \right] + \lambda_c \beta_c I_0 \left[\frac{(1+\lambda_k \beta_k)^t - 1}{\lambda_k \beta_k} \right]$$

$$= I_0 \left[(1+\lambda_k \beta_k)^t - 1 \right] + \left[1 + \frac{\lambda_c \beta_c}{\lambda_k \beta_k} \right]$$

$$= I_0 \left[(1+\lambda_k \beta_k)^t - 1 \right] + \left[\frac{\lambda_k \beta_k + \lambda_c \beta_c}{\lambda_k \beta_k} \right]$$

supposing $I_0 = \alpha_0 y_0$ and substituting it in the above equation, we have

$$y_t - y_0 = \alpha_0 y_0 \left[(1+\lambda_k \beta_k)^t - 1 \right] + \left[\frac{\lambda_k \beta_k + \lambda_c \beta c)}{\lambda_k \beta_k} \right]$$

or

$$y_t = \alpha_0 y_0 \left[(1+\lambda_k \beta_k)^t - 1 \right] + \left[\frac{\lambda_k \beta_k + \lambda_c \beta c)}{\lambda_k \beta_k} \right] + y_0$$

or $$y_t = y_0 \left[1 + \alpha_0 \frac{\lambda_K \beta_K + \lambda_C \beta_C}{\lambda_K \beta_K} \left\{ (1+\lambda_K B_K)^t - 1 \right\} \right] \quad (8)$$

where Y_T = gross domestic national income P_n year t;

α_0 = the rate of investment in the basic year;

λ_K = the share of net investment used in the capital goods sector;

$\lambda_C = 1 = \lambda_K$ = the share of net investment going to the consumer goods sector;

β_K = incremental output – capital ratio in the capital goods sector;

β-$_C$ = incremental output – capital ratio in the consumer goods sector.

The interpretative value of this model is that investment in the economy consists of two parts: one part l_K is used to increase the production of capital goods, and the other part λ_C to increase the production of consumer goods. Thus, the total investment is $\lambda_K + \lambda_C = 1$.

The ratio $\frac{\lambda_K \beta_K + \lambda_C \beta_C}{\lambda_K \beta_K}$ of the equation is over all capital coefficient.

Assuming β_K and β_C to be given, the growth rate of income will depend upon α_0 and λ_K. Further assuming α_0 (the rate of investment the base year) to be constant, the growth rate of income depends upon the policy instrument λ_K.

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Given that $\beta_C > \beta_K$, it implies that the larger the percentage investment in consumer goods industries, the larger will be the income generated. The expression on $(1+\lambda_K\beta_K)^t$ of the equation shows, however, that after a critical range of time, the larger the investment in capital goods industries, the larger will be the income generated. In the beginning, a high value of the λ_K increases the magnitude $(1+\lambda_K\beta_K)_t$, and lowers the over-all capital co-efficient

$$\frac{\lambda_K\beta_K + \lambda_C\beta_C}{\lambda_K\beta_k}$$

But as time passes, a higher value of λ_K would lead to higher growth rate of income in the long run.

If $\beta_c = \beta_K$, then the reciprocal of the over all capital coefficient.

$$\frac{\lambda_K\beta_K}{\lambda_K\beta_k + \lambda_C\beta_C} = \lambda_K$$

= marginal rate of sawing. This leads us to an important policy implication of the model that for a higher rate of investment (λ_K), the marginal rate of saving must also be higher. A higher rate of investment on capital goods in the short run would make available a smaller volume, of output for consumption, but in the long run, it would lead to a higher growth rate of consumption.

Relation of the Mahalanobis Two Sector Model with the Doman Modal

Mahalanobis derived his two-sector model from the Doman Model Therefore, both model have a close relation.

First, we present the Doman model in terms of the parameters of the Mahalanobis Model.

The equilibrium equation for determining investment in the Doman Model is

$I = \alpha Y$

where I is investment, α is the saving – income ratio and Y is the national income

The growth of investment in period t is

$$\Delta I_t = \alpha \Delta Y_t \quad (1)$$

By taking investment in the initial period $I_0 = \alpha_0 Y_0$ (2)

Dividing (1) by (2),

$$\frac{\Delta I_t}{\Delta I_0} = \frac{\alpha}{\alpha_0} \cdot \frac{\Delta Y_t}{\Delta Y_0}$$

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or, $$\frac{\Delta Y_t}{Y_0} = \frac{\alpha}{\alpha_0} \cdot \frac{\Delta I_t}{I_0}$$

or, $$\frac{Y_t - Y_0}{Y_0} = \frac{\alpha_0}{\alpha} \quad \frac{I_t - I_t}{I_0}$$

$\because$ $[\Delta Y_t = Y_t - Y_0$ and $\Delta I_t = I_t - I_0]$

or, $$\frac{Y_t - Y_0}{Y_0} = \frac{\alpha_0}{\alpha}\left[\frac{I_t}{I_0} - 1\right]$$

or, $$\frac{Y_t - Y_0}{Y_0} = \frac{\alpha_0}{\alpha}\left[(1+\alpha\beta)_t - 1\right]$$

$[\because \frac{I_t}{I_0} = (1+\alpha\beta)^t$ and β is output – capital ratio]

or, $$Y_t - Y_0 = \frac{\alpha_0}{\alpha} Y_0\left[(1+\alpha\beta)^t - 1\right]$$

or, $$Y_t = \frac{\alpha_0}{\alpha} Y_0\left[(1+\alpha\beta)^t - 1\right] + Y_0$$

or, $$Y_t = Y_0\left[1 + \frac{\alpha_0}{\alpha}\{1+\alpha\beta\}^t - 1\right] \quad (3)$$

On the other hand, the final equation of the two-sector Mahalanobis mode is

$$Y_t = Y_0\left[1 + \alpha_0 \frac{\alpha_K\beta_K + \lambda_C\beta_C}{\lambda_K\beta_K}\left[(1+\lambda_K\beta_K)^t - 1\right]\right] \quad (4)$$

There are certain similarities between the two models, first, the last expression of the two equations (3) and (4) are similar i.e., $(1 + \beta)^t$ and $(1 + \lambda_K\beta_K)^t$, since Domar's $\alpha\beta$ is Mahalanobis 's $\lambda_K\beta_K$ conclusion of both are the same, investment can be increased by raising the marginal saving rate.

Despite these similarities, there is some difference between the two models. The Domar model is a single – sector and the consumer goods sector. On the other hand, Domar treats the whole economy as one sector.

2. Four Sector Model

The Mahalanobis model is not a growth model in the real sense, rather it is an allocation model. Being associated with the Planning Commission, Mahalanobis knew that the maximum funds available for net investment during the Second Five Year Plan would be approximately Rs. 5,600 crores and the aim was to provide addition employment to 10-12 million people. To these, he added a 5 percent per annum increase in national income during the Plan Period. He further estimated

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one-third of the total investment in investment goods industries, leaving two-thirds for investment in the remaining three-sectors of the economy.

He put all this data in a simple simultaneous equation system given below and obtained the solution which became the basis of India's Second Five Year Plan.

The Mahalonobis model takes a four-sector economy consisting of:

(a) the investment goods sector (K);

(b) the factory produced consumer's goods sector (C_1);

(c) the small household produced (including agricultural products) consumer goods sector (C_2); and

(d) the services (health, education, etc.) producing sector (C_3).

These subscripts K, 1, 2 and 3 are used respectively in the model for the industries producing investment goods, consumer goods (both factor and household) and services.

For each of these four sectors a set of three parameters is introduced; β's (beta), i.e., $\beta_K, \beta_1, \beta_2, \beta_3$ – the ratios of net income generated to investment or output – capital ratios.

θ's (theta), i.e., $\theta_K, \theta_1, \theta_2, \theta_3$ – the net investment required per engaged person are capital labour ratios.

λ's (lambda), i.e., $\lambda_K, \lambda_1, \lambda_2, \lambda_3$ – the proportion of investment allocated to each sector or allocation ratios.

Further, A stands for the total amount of investment to be made for the plan – period of five years, E for the total increase in income and *n* for the total increase in employment over the plan period.

Given these parametric ratios (β's, θ's and λ's) and the total amount to be invested (A), an estimate of total income (E) and employment (N) generated in the different sectors of the economy during the plan period can be had on the basis of the system of equations.

The equations of the model are:

$$E = E_K + E_1 + E_2 + E_3 \quad (1)$$

$$N = n_K + n_1 + n_2 + n_3 \quad (2)$$

$$A = \lambda_K A + \lambda_1 A + \lambda_2 A + \lambda_3 A \quad (3)$$

Now the increase in employment (*n*) is each sector is

$$n_k = \lambda_K A / \theta_K \text{ or } n_k \theta_K = \lambda_K A \quad (4)$$

$$n_1 = \lambda_1 A / \theta_1 \text{ or } n_1 \theta_1 = \lambda_1 A \quad (5)$$

$$n_2 = \lambda_2 A / \theta_2 \text{ or } n_2 \theta_2 = \lambda_2 A \quad (6)$$

$$n_3 = \lambda_3 A / \theta_3 \text{ or } n_3 \theta_3 = \lambda_3 A \quad (7)$$

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Substituting the value of $\lambda_K A$, $\lambda_1 A$, $\lambda_2 A$, and $\lambda_3 A$ in equation (3), the total investment equation becomes

$$A = n_K\theta_K + n_1\theta_1 + n_2\theta_2 + n_3\theta_3$$

Similarly, the increase in income (E) generated in each sector can be estimated as follows:

$$E_K = \lambda_K A.\beta_K \quad (8)$$

$$E_1 = \lambda_1 A.\beta_1 \quad (9)$$

$$E_2 = \lambda_2 A.\beta_2 \quad (10)$$

$$E_3 = \lambda_3 A.\beta_3 \quad (11)$$

Also, $E = n_K\theta_K\beta_K + n_1\theta_1\beta_1 + n_2\theta_2\beta_2 + n_3\theta_3\beta_3$ [$\lambda_K A = n_K\theta_K$ and so on form equation 4, 5, 6 and 7]

$$= Y_0 [(1 + n)^5 - 1) \quad (12)$$

In the Mahalanobis model the above equation is the final one when e, η (eta) is given 5 per cent annual growth rate of income, Y_0 the initial income per year, the E° is derived by applying η rate to Y_0. In the system of equations give above, A, E and N are the boundary conditions. They are constants, but at the same time they are the target variables to be achieved during the plan-period. The β's, θ's and λ's are the instrument variables.

The β's and θ's are, however, the structural parameters, determined by technological conditions and assumed to remain constant during the plan period. The λ's are the allocation parameters which are at the choice of the planner within certain limits.

In the Mahalanobis model, the allocation parameter (ratio) λ_K for the investment goods sector is given and the remaining ratios for the other three sectors (λ_1, λ_2, λ_3) are obtained as solutions of the set of simultaneous equations given above. For example, as Mahalanobis explains, "the rate of increase of income or the employment generated may be treated as variables to which desired value may be assigned. The model would then enable us, with the help of numerical, estimates of the various parameters, to study how the allocation ratios λ's that is, the proportions of total investment going into the different sectors should be chosen so that the desired aim can be realized."

Professor Mahalanobis gives the following numerical solution of his model where

A (total investment) = Rs. 5,600 crores

h (percentage increase in national income) = 5 per cent per annum

N (total employment to be created) = 110 Lakhs (11 million)

λ_K proportion of investment in investment goods industries 1/3 (or 0.33)

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The sectoral values of λ's, β's and θ's are taken as

Sectors	Parameters		
	λ	β	θ
Investment goods (K)	$\lambda_K = 0.33$	$\beta_K = 0.20$	θ_K = Rs. 20,000
Factory consumer goods (C_1)	$\lambda_1 = 0.17$	$\beta_1 = 0.35$	θ_1 = Rs. 8,750
Small and household industries including agriculture (C_2)	$\lambda_2 = 0.21$	$\beta_2 = 1.25$	θ_2 = Rs. 2,500
Services (C_3)	$\lambda_3 = 0.29$	$\beta_3 = 0.45$	θ_3 = Rs. 3,750

On the basis of the given data, the amount of investment in sector K is $\lambda_K A = \frac{33}{100} \times 5{,}600 = 1{,}850$ crores; the increase in income as a result of this investment comes to $E_K = \lambda_K A \beta_K = 1850 \times \frac{20}{100} =$ Rs. 370 crores, while the increase in employment is sector K is of the order of $n_K = \lambda_K A/\theta_K = 1850 \times \frac{1}{20000} = 0.9$ million (9 lakhs). Similarly, the allocation of increase in income, employment generated and investment for the other sectors during the planning period of 5 years in rounded figures, as calculated with the help of simultaneous equations are:

		Increase in	
Sectors	Investment (A) (Rs. Crores)	Income (E) (Rs. Crores)	Employment (N) (Million)
K	1850	370	0.9
C_1	980	340	1.1
C_2	1180	1470	4.7
C_3	1600	720	3.3
Total	5610	2900	10.0

We can sum up the Mahalanobis model thus:

In a given time period, in order to achieve a certain growth rate for the economy, the total investable amount has been divided in such a way that it leads to the required growth rate. But since the required growth rate is to be reasonably high, it can be achieved by expanding sector K and there by producing larger quantities of investment goods. However, investment in sector K is bound to generate increased purchasing power and hence demand for consumer goods which require comparatively less capital but employ more goods which require comparatively less capital but employ more labour. In this way a balance is sought to be established between the investment goods sector and consumer goods sector.

3. Critical Appraisal

The above solution of the Mahalanobis model and its practical application to India in the form of the Second five Year Plan proves that it possess great utility as an instrument to development planning. But it has its limitations and weaknesses.

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1. Fails to solve any Definite Welfare Junction: It is essentially an operational model. As already explained, it arrives at an optimal solution out of a multiplicity of solutions in relation to a preference or welfare function already prescribed. The numerical solution of the model, however, does not point towards any definite welfare function without which it is not possible to arrive at an optimum allocation of resources.

2. Arbitrary value of l_K: Mahalanobis assumes the value $\lambda_K = \frac{1}{3}$ but he does not ascribe any cogent reason for this, and simply says that it would not be possible to go beyond this value under present conditions." He could very well choose any other value or any value for any other allocation parameter with perhaps better results. The assumption of $\lambda = \frac{1}{3}$ is, therefore, somewhat arbitrary and may not help the planners is arriving at correct solutions for the optimum allocation of investments of the different sectors of the economy.
3. Technique not applicable to open Economy: Moreover, the use of l technique suggests that investment is a single homogenous fund which is utilized for a single type of investment goods. Since investment goods are of heterogeneous type, this requires the use of an investment matrix. The λ technique can be applied as long as constant relative prices are assumed. It cannot, therefore, be applied to a model of open economy where the system is not homogenous.
4. Supply of Agricultural Produce not Infinitely Elastic: The Mahalanobis model is based on the supposition that the supply of agricultural produce is infinitely elastic. This is untenable for the supply of agricultural produce has failed to meet the increase demand for food and raw materials ever since the beginning of the Second Five Year Plan.
5. Supply of Labour also not Infinitely Elastic: It also assumes an infinitely elastic supply of labour which does not seem to be correct even though an under developed country like India is faced with the serious problem of unemployment and under employment. What is required for productive structure is not simply labour but skilled and trained labour and management.
6. Production technique not constant: Like Harrod, Mahalanobis assumes the techniques of production of production to be constant during the Plan Period. In fact, technological change is bound to occur during the process of development. Thus his model does not seem to take us very far.
7. Arbitrary Values for Structural Parameters: The values assigned to the structural parameters (the β's and θ's) are also arbitrary. In fact, it is extremely difficult to have a correct estimate values of β's and θ's is an under developed country which completely lacks in sufficient reliable data. Moreover, the assumption of independence between capital output ratios

and capital labour ratios is not realistic. These parameters may change in the process of development.

8. Silent over Investment in a Mixed Economy: Further, the Mahalanobis model fails to guide the planners in deciding the share of investments in the private and public sectors. It is silent with regard to this important problem of development planning in a democratic country with a mixed economy.
9. Ignores Factor Prices: Another important defect of this model is that Mahalanobis ignores the pattern of factor prices while fixing targets on the basis of his model.
10. Closed Model: This model is confined to a closed economy. Mahalanobis assumed "that there will be no imports or exports of investment goods." Thus he ignored the impact of foreign trade on the variables of the model and deprived it of the element of reality.
11. Neglects Demand Function: The Mahalanobis model concentrates exclusively on the supply functions and neglects the demand function altogether. This is an unrealistic assumption and makes the growth model incomplete. "Actually speaking, many important considerations connected with market forces, psychological environment, popular enthusiasm and the emergence of specific pressure point are unavoidably involved in the course of development planning in a backward economy. The Mahalanobis model quietly ignores these important problems for the sake of mathematical simplicity."
12. Failure to link up Investment Decisions with the Rates of Saving Required: According to K.N. Raj, one of the weaknesses of the Mahalanobis model is its failure to link up investment decisions with the rates of saving required. The necessity of high marginal rates of saving is one of the main considerations in favour of capital – intensive techniques of production.
13. Failure to Explain the Problem of Choice of Techniques: Professor Raj further points out that from the theoretical angle, the Mahalanobis model fails to explain the problem of choice of techniques satisfactorily. He asks, if sector C is divided according to techniques of production, why should not sector K be similarly divided? Even the manufacture of machine tools there are more or less capital intensive techniques. The case of labour intensive techniques could have perhaps stated more pointedly.

Conclusion

Despite these practical and theoretical weaknesses, the Mahalanobis model was instrumental in putting the Indian economy on the right path to development planning with the Second Five Year Plan and paved the way for the subsequent bolder plans.

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Check Your Progress

4. Mahalanobis model is derived from which model?
5. When was four-sector model invented? Why is it important to India?
6. What parameters needs to be considered in four-sector model?

12.4 INPUT-OUTPUT ANALYSIS

Meaning

Input-Output is a novel technique invented by Professor Wassily W. Leontief in 1951. It is used to analysis inter-industry relationship in order to understand the inter-dependences and complexities of the economy and thus the condition for maintaining equilibrium between supply and demand. It is also known as "inter-industry analysis".

Before analyzing the input-output method, let us understand the meaning of the terms, "input" and "output". According to Professor J.R. Hicks, an input is "something which is bought for the enterprises" while an output is "something which is sold by it". The input represents the expenditure of the firm and output its receipts. The sum of the money values of inputs is the total cost of a firm and the sum of the money values of the output is its total revenue.

The input-output analysis tells us that there are industrial inter-relationships and inter-dependencies 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 between supply and demand in the economy as a whole. Coal is an input for steel industry and steel is an input for coal industry, though both are the output of their respective industries. A major part of economic activity consists in producing intermediate goods (input) for further use in producing final goods (output). 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 implies that in equilibrium, the money value of aggregate output of the whole economy must equal the sum of the money values of inter-industry inputs and the sum of the money values of inter industry outputs.

Main Features

The input-output analysis is the finest variant of general equilibrium. As such, it has three main such 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 concert itself with the demand analysis. It deals exclusively with technical problems of production. Lastly, it is based on empirical investigation.

Assumptions: This analysis is based on the following assumptions:

(i) The whole economy is divided into two sectors – "inter-industry sector" and "final demand sector," both being capable of sub-sectoral division.

(ii) The total output of any inter-industry sector is generally capable of being used as inputs by other inter industry sectors, by itself and by final demand sectors.

(iii) No two products are produced jointly. Each industry produces only one homogenous product.

(iv) Prices, consumer demands and factors supplies are given.

(v) There are constant returns to scale.

(vi) There are no external economies and diseconomies of production.

(vii) The combinations of inputs are employed in rigidly fixed proportions. The inputs remain in constant proportion to the level of output. It implies that there is no substitution between different materials and no technological progress. There are fined input coefficients of production.

The input-output analysis consists of two parts: the construction of the input-output table and the use of input-output model.

The use of Input-Output Model in Planning

The input-output tables relates to the economy as a whole in a particular year. it shows the values of the flows of goods and services between different productive sectors especially inter-industry flows. For understanding, a three-sector economy is taken in which there are two inter-industry sectors, agriculture and industry and one final demand sector.

Table 12.1 provides a simplified picture of such economy. In this table, the total output of the industrial, agricultural and household sectors is set in rows (to be read horizontally) and has been divided into the agricultural, industrial, and final demand sectors.

The inputs of these sectors are set in columns. The first row total shows that altogether the agricultural output is valued at Rs. 300 crores per year. Of this total, Rs. 100 crores go directly to final consumption, that is household and government, as shown in the third column of the first row. The remaining output from agriculture goes as inputs; 5-0 to itself and 150 to industry. Similarly, the second row shows the distribution of total output of the industrial sector valued at Rs. 500 crores per year.

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Table 12.1 *Input-Output Table (In value terms) Rs. Crores)*

		Purchasing Sector			
Sectors		Inputs to Agriculture	Inputs to industry	Final Demand	Total output or Total Revenues
Selling Sectors	Agriculture	50	150	100	300
	Industry	100	250	150	500
	Value added*	150	100	0	250
	Total Input or Total Cost	300	500	250	1050

*Value added refers to payment to the factors of production.

Column 1, 2 and 3 show that 100 units of manufactured goods goes input to agriculture, 250 to industry itself and 150 for final consumption to the household sector.

Let us take the columns (to be read downwards). The first column describes the input or cost structure of agricultural industry. Agricultural out valued at Rs. 300 crores is produced with the use of agricultural goods worth Rs. 50, manufactured goods worth Rs. 100 and labour or/and management services value at 150. To put it differently, it costs Rs. 300 crores to get a revenue of Rs. 300 crores from the agricultural sector. Similarly, the second column explains the input structure of the industrial sector. (i.e.) 150 + 250 + 100 = 500). Thus "a column gives one point on the production function of the corresponding industry" the "final demand" column shows what is available for consumption and government expenditure. The third row corresponding to this column has been shown as zero./ This means that the household sector is simply a spending (consuming) sector that does not sell anything to itself. In other words, labour is not directly consumed.

Feasibility and Consistency of the Plan

An economy behaves and assumes a certain pattern of the flows of resources in two ways: They are: (a) the internal consistency or balance of each sector of the economy, and (b) the external stability of each sector or inter-sectoral relationship. Leontief calls them the "fundamental relationship of balance and structure. When expressed mathematically they are known as the "balance equations" and "structural equations."

If the total output of says x_i of the *i*th industry be divided into various number of industries 1, 2, 3, ..n, then we have the balance equations:

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

and if the amount say y_i absorbed by the "outside sector" is also taken into consideration, then the balance equation of the *i*th industry becomes

$$x_i = x_{i1} + x_{i2} + x_{i3} + \ldots\ldots x_{in} + D_i + x_i$$

or $$\sum_{j=i}^{\eta} x_{ij} + x_i = x_i \qquad (2)$$

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It is to be noted that y_i stands for the sum of the flows of the products of *i*th industry, to consumption, investment and exports, net of import, etc. It is also called the "final bill of goods" which it is the function of the output to fill. The balance equation shows the conditions of equilibrium between the supply and demand. It shows the flows of outputs and inputs to and from one industry to other industries and vice-versa. The system of a balance equations in analysis presents the conditions of internal consistency of the plan. The plan would not be feasible without them because of these equations are not satisfied, there might be excess of some goods and deficiency of others. Since x-$_{i2}$ 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 *i*th industry.

The "technical coefficient" or "input coefficient" of the *i*th industry is denoted by:

$$aij = \frac{Xij}{X_j} \qquad (3)$$

where xij is the flow from industry I to industry j, x_j is the total output of industry *j* and *aij*, as already noted above, is a constant, called "technical coefficient" or "flow coefficient" 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. Equations (3) is called a "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.

The matrix of technical coefficient of production for any input output table with n sectors would consists of $nx\ n$ elements. There being two sectors in our example, 2×2 technical coefficients of the matrix would be arranged symbolically as follows:

Table 12.2 *Technology Matrix A*

	Agriculture	Industry
Agriculture	a_{11}	a_{12}
Industry	a_{21}	a_{22}

Using equation (3) to calculate the aij for our example of the two sector input-output Table 12.2, we get the following technology matrix.

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Table 12.3 *Technology coefficient Matrix A*

	Agriculture	Industry
Agriculture	$\frac{50}{300} = .17$	$\frac{150}{500} = .30$
Industry	$\frac{100}{300} = .33$	$\frac{250}{500} = .50$

These input coefficients have been arrived at by dividing each item in the first column of table 12.1 by first row total, and each item in the second column by the second row, and so on. Each column of the technological matrix reveals how much agricultural and industrial sector require from each other to produce a rupee's worth of output. The first column shows that a rupee's worth of agricultural output requires input worth 33 paise from industries and worth 17 paise from agriculture itself.

The Leontief Solution

The table can be utilized to measure the direct and indirect effects on the entire economy of any sectoral charge in total output of final demand.

Again using equation (3)

$$aij = \frac{xij}{x_i}$$

Cross multiplying $xij = \underline{aij} \cdot x_j$

By substituting the value of *xij* into equation (2) and transposing terms, we obtain the basic input – output system of equations.

$$x_j - \Sigma^n \cdot aij \times j = y_i$$

$i = 1$

In terms of our two-sector economy, there would be two linear equations that could be written symbolically as follows:

$x_1 - a_{11}x_1 - a_{12}\, x_2 = y_1$

$x_2 - a_{21}x_1 - a_{22}x_2 = y_2$

The above symbolic relationship can be shown in matrix from:

$x - [A]x = y$

$x - [I - A] = y$

Where matrix (I – A) is known as the Leontief Matrix

$(I - A)^{-1}\,(I - A)x = (I - A)^{-1}y$

$x = (I - A)^{-1}y \qquad [\because (I - A)^{-1}\,(I - A)]$

and I, the identity matrix $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

Hence $\begin{bmatrix}x_1\\ x_2\end{bmatrix} = \left\{\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} - [A]\right\}^{-1}\begin{bmatrix}y_1\\ y_2\end{bmatrix}$

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Numerical Solution:
Our technology matrix as per table 56.3 is

$A = \begin{bmatrix}\cdot 1 & \cdot 3\\ \cdot 3 & \cdot 5\end{bmatrix}$ and y = $\begin{bmatrix}100\\ 50\end{bmatrix}$

$(I - A) = \begin{bmatrix}\cdot 9 - \cdot 3\\ \cdot 3 - \cdot 5\end{bmatrix}$

The value of inverse = $\frac{\text{Adjoint}}{\text{Determinant}} = \frac{\text{Adj}}{|A|}$

$[Aij] = \begin{bmatrix}\cdot 5 & \cdot 3\\ \cdot 3 & \cdot 9\end{bmatrix}$

By transposing, $Aij = \begin{bmatrix}\cdot 5 & \cdot 3\\ \cdot 3 & \cdot 9\end{bmatrix}$

The value of determinant = $\cdot 9(\cdot 5) - (-\cdot 3)(-\cdot 3)$
$= \cdot 45 - \cdot 0.9 = \cdot 36$

$\therefore \begin{bmatrix}x_1\\ x_2\end{bmatrix} = \frac{1}{\cdot 36}\begin{bmatrix}\cdot 5 & \cdot 3\\ \cdot 3 & \cdot 9\end{bmatrix}\begin{bmatrix}100\\ 150\end{bmatrix}$

The total output of agriculture sector (x_1)

$= \frac{\cdot 5 \times 100 + \cdot 3 \times 150}{\cdot 36} = 264$

The total output of industrial sector (x_2)

$= \frac{\cdot 3 \times 100 + \cdot 9 \times 150}{\cdot 36} = 458$

The Dynamic Input-Output Model

So far we have studied an open static model. "The model becomes Dynamic when it is closed by the linking of the investment part of the final bill of goods of output. The dynamic input–output model extends the concept of inter sectoral balancing at a given point of time to that of inter-sectoral balancing at a given point of time to that of inter-sectoral balancing our time. This necessarily involves the concepts of durable capital.

The Lenotief dynamic input-output model is generalization of the static model and is based on the same assumption. In a dynamic model the output of a given period is supposed to go into stocks i.e. capital goods and the stock in turn are

disturbed among industry. The balanced equation is:

$$x_i(t) = x_{i1}(t) + x_{i2}(t) + x\text{-}_{i3}(t) \ldots\ldots + x_{in}(t) + s'_{i1} + s'_{i2} + s'_{i3} + s'_{i4} + \ldots\ldots s'_{in} + D_i(t) + y_i(t)$$

NOTES

Here $x_i(t)$ represents the total flow of output of *i*th industry in period *t*, which is used for 3 purposes (i) for production in the economy's industries $x_{i1}(t)$, $x\text{-}_{i2}(t)$ etc., in that period; (ii) as net audition to the stock of capital goods in n industries e., s't which can also be written as $Ds_i(t) = s_i(t+1) - s_i(t)$, where $(s_i t)$ indicates the accumulated stock of capital in the current period (t), and $s_i(t+1)$ is next years stock, and (iii) as consumption demand for the next period $D_i(t+1)$. If we ignore depreceation and wear tear, then $s_i(t+1) - s_i(t)$ is the next audition to capital stock out of current production equation (4) can therefore be written as:

$$x_i(t) = x_{i1}(t) + x_{i2} + x\text{-}_{i3} + \ldots\ldots + x_{in} + s_i(t+1) + s_i(t) + D_i(t) + y_i(t)$$

$y_i(t)$ stands for the amount absorbed by the outside sector in period *t*. Just as the technical co-efficient was devided in the case of the static model of the capital co-efficient can be found out in a similar manner, capital co-efficient of the *i*th product used by the *j*th industry is denoted by

$$bij = \frac{sij}{xj}$$

cross multiplying we have $sij = bij \cdot j$

where sij represents the amount of capital stock of the *i*th product used by the *j*th industry. *xj* is total output of industry *j* and *bij* is a constant called capital co-efficient or stock co-efficient, equations (5) is known as the structural equation is a dynamic model.

If the *sij* co-efficient is zero it means that no stock is required by an industry and the dynamic model becomes a static model. Moreover, *bij* can neither be negative nor infinite. If the capital co-efficient is negative, the input is in fact an output of an industry.

Limitations of Input-output Analysis

The output analysis has its shortcomings, Its framework rests an Leontief's basis assumption of constancy of input co-efficient of production which was split up above as constant return to scale holds and in a stationary economy, while that of constant technique of production in stationary technology. these assumption sacrifice realities. They do not treat the inter-industry analysis dynamically even in that so called "dynamic mode". It tells us nothing as to how technical co-efficient would change with changed condition. Again some industries have may use no capital. Such variations in the use of techniques of production make the assumption of constant co-efficient of production unrealistic.

Again, the assumption of fixed co-efficients of production ignores the possibility of factor substitution. There is always the possibility of some substitution even in a short period, while substitution possibilities re likely to be relatively greater over a long period.

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The assumption of linear equations which relates output of one industry to input of others, appears to be unrealistic. Since factors are mostly invisible, increases in output do not always require proportionate increases in inputs.

Moreover, the rigidity of the input-output model cannot reflect such phenomena as bottlenecks, increasing costs, etc.

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 in the economy.

Another difficulty arises in the case of "final demand" or "bill of goods". In this model, the purchases by the government and consumers are taken as given and treated as a specific bill of goods. Final demand is regarded as an independent variable. In might, therefore, fail to utilize all the factors proportionately or need more than their available supply. Assuming constancy of co-efficiency of production, the analysis is not in a position to solve this difficulty. There is no mechanism for price adjustment in the input-output analysis which makes it unrealistic. "The analysis of cost-price relations proceeds on the assumptions that each industrial sector adjusts the price of its output by just enough to cover the change in the case of its primary and intermediate output." The dynamic input-output analysis involves certain conceptual difficulties (i) The use of capital in production necessarily leads to stream of output at different points of time being jointly produced. But the input-output analysis rules out joint production. (ii) it cannot be taken, for investment and output will necessarily be non-negative.

The input-output model thrives on equations that cannot be easily arrived at. The first thing is to ascertain the pattern of equations, then to find out the necessary voluminous data. Equations pre-suppose the knowledge of higher mathematics and correct data are not easy to ascertain. This makes the final output model abstract and difficult. In the above analysis we have presented a highly simplified model of input-output of analysis. To be useful for planning purposes the input-output table should be divided into thirty of more industries or sectors. In many underdeveloped countries reliable data needed to construct a large input-output table are not easily variable. In small countries only a few industries or sector exist and the input-output table is of little use. A number of cells in it as shown is zero. Moreover, in case of the subsistence agriculture sector of, labour is the only input and output sold in the market sector is insignificant, while commercial crops are sold to the consumption sector. The input-output table is useless in such economies. Thus for the input-output table is useless in such economies. This for the input-output analysis to be useful for an undeveloped country. It is essential that it must be a large economy where the number of industries or sectors is quite large for substantial inter-industry transactions to take place and for reliable statistical information to the available. But all these condition are not met in the majority of underdeveloped countries which limit the use of input-output analysis as a technique in development planning.

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Use of Input-Output Technique in Planning

The knowledge of both the fundamental relationship of "flow coefficients" of the static model and of "capital co-efficients" of the dynamic model is required for the development plans. The input-output table tells us about the inter-relationships between various sectors and the structural relationships within each sector. On the basis of this information, the planning authority can determine the effect of a change in one sector on all other sectors of the economy and thus plan accordingly.

With the help of the static analysis "flow co-efficients" of each industry can be calculated and known during a given period of time. But in an economy fast moving towards economic development, the flow structure of the economy does not remain stable. Again, a static model takes the capital structure of the economy as given. In fact, the capital requirement of the economy change with economic development.

It is only "when we properly harmonize the capital structure with the flow structure that we get a comprehensive input-output system which is very useful for dynamic analysis in connection with planning. given the basic conditions and also time period one can calculate the flow co-efficient and the capital co-efficient of the economy. In addition to all this if the time shape of the final demand is also known, one could find out definitely. What should be the consistent and optimum levels of output of various industries after five years."

The input-output technique with its basic assumptions of constant "technical co-efficient" is of much help to a planning authority is an underdeveloped country. A linear homogeneous input-output model fits in an underdeveloped economy where reliable statistical data about technical coefficients are not easily available. By assuming constant "flow" and "capital coefficient" the need for collecting and computing vast statistical data is greatly reduced. Since inputs are considered proportional to outputs, this technique is certainly of immense help in determining the amount of inter-industry flows of goods and services in an underdeveloped country.

"From the planning point of view, the dynamic input-output model has much appeal; it helps in identifying a moving equilibrium of outputs. Investments is specified of a disaggregate level in terms of specific investment goods and is treated endogenously. The planner is help to see more clearly the implications of raising the level of investment in a particular sector, given the requirements of inter-sectoral balancing."

The input-output analysis is also used for national economic planning. The static and dynamic models can be applied in preparing the 'plan-frame' in underdeveloped economies. 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 which can estimate through the input output table the

impact of different growth rate of the various sectors of the economy and thus choose the most desired one.

A United Nation study lists the following uses of input-output models in developing programming:

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(i) 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.

(ii) The solution to the model aids in the allocation of the investment required to achieve the production levels in the programme and its provides a more accurate test of the adequacy of available investment resources.

(iii) The requirements for skilled labour can be evaluated in the same way.

(iv) 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.

(v) In addition to direct requirements of capital, labour and import, the indirect requirements in other sectors of the economy can also be estimated.

(vi) 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".

It concludes that these models are primarily applicable in economies that have achieved a certain degree of industrial development and hence have a substantial volume of inter-industry transactions.

Check Your Progress

7. State the main features of the input output model.
8. Who is the creator of input-output analysis?

12.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. This model highlights two important features. One is the concept of unbalanced growth and second is the Marxian scheme of production
2. According to the model, the economy has been divided in two sectors – capital goods sector and consumer goods sector. This model is therefore, bisector model
3. In actual practice, economy may comprise of many sectors like primary, secondary and territory sectors. When an economy is divided into two

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sectors, obviously the planners would focus their attention on the development of those two sectors and other sectors development will be ignored.

4. Mahalanobis derived his two-sector model from the Doman Model.
5. The four-sector model was invented in 1955. It became the basis of second five-year plan hence very significant to India.
6. Four parameters considered in the four-sector model, the investment goods sector (K); The factory produced consumer's goods sector (C_1); the small household produced (including agricultural products) consumer goods sector (C_2); and the services (health, education, etc.) producing sector (C_3).
7. The main features of input-output model are:

   It is not applicable to partial equilibrium analysis

   It deals exclusively with technical problems of production

   It is based on empirical investigation
8. M. Leontief is the creator of the input-output model

12.6 SUMMARY

- Feldman's approach to growth is mainly of investment and not the its income creating effect. He lays down that is capacity is made to grow uninterruptedly the rising surplus in the economy will be continuously absorbed and the process of reproduction would continue unchecked. As a matter of fact, field man's approach is representative of the needs of the Russian society under the circumstances prevailing around 1928. Rapid economic development was the compelling need of that time and hence the model concentrates on capacity creation through utilisation of the surplus generated in the economy.
- The model is stands for the technique of unbalanced growth with concentration of investment on producer – goods industries. Given the rate of investment a higher proportion of investment allotted to the producer goods industries will, as rule, result in higher rate of growth of national income in the long run. On the other hand if higher proportion of investment is allotted to consumer – goods industries, it will result in a higher rate of growth of nation income in the short run. This represents the core of Feldman's model of economic growth, in which the proportion of investment at located to the producer-goods sector is the key variable.
- Feldman's model is based on Marxian scheme of simple reproduction.
- Prof. P.C. Mahalanobis was associated with the work of the planning commission from the very beginning. at the time of the formulation of second five year plan, he was asked to prepare a draft plan frame which was

submitted to the planning commission in March 1955. In the formulation of this plan frame, he provided the basis for planning in India. Mahalanobis model though based on the famous Harrod Domar model for closed economy as he assumed that there would be no imports or exports of investment goods.

- At first Mahalanobis developed a single sector model in Oct 1952 based on variables of national income and investment. In 1953 it was developed in a two sector model in which the economy is divided into two different sectors – The investment good sector and the consumer goods sectors.
- In 1953, Prof Mahalanobis developed four-sector econometric model which served as a basis for the formulation of second five year plan.
- Input-output analysis is the name given to the attempts to take account of general equilibrium phenomenon in the empirical analysis of production W. Leontief is the sole and unchallenged creator of input – output theory. The input-output analysis or inter – industry analysis is the study of mutual interdependence of the various sectors of the economy. It is an empirical study of the quantitative inter-dependence between inter-rated economic activities. The inter dependence between the individual sectors of a given system is described by a set of linear equations. Such an analysis helps to understand the inter-dependencies and complexities of the economy and can provided us better understanding of the conditions for maintaining equilibrium between supply and demand.

12.7 KEY WORDS

- **Input:** An input is something which is brought for the enterprise in other words on input is obtained. Thus input represents the expenditure of the firm, the sum of the money values of input s the total cost of a firm.
- **Output:** Output is something which is sold by the firm, output its receipts, the sum of the money values of the output is its total revenue.
- **Four sector model:** A model which includes four sector; household sector, business sector, the government sector, foreign sector. The household sector includes everyone in an economy who consumes goods and services.

12.8 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What is the Feldman growth model?
2. State the main features of the Feldman growth model.

3. Write short notes on:-
   - The dynamic input-output model
   - Limitations of Input – output model

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Long Answer Questions

1. Describe the Mahalanobis four sector model.
2. Critically explain the Mahalanobis second five year plan mode.
3. Write a long essay on use of Input-Output Techniques in Planning
4. Describe the Input-output model.

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UNIT 13 PLANNING MODELS–III

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Structure

13.0 INTRODUCTION

In the present unit, you will study the various planning models by Vakil Brahmananda – Raj – Sen – Chakravarthy. Professors Vakil Brahmanand proposed a model for growth of income and employment in the context of developing countries in contrast to Mahalanobis plan which emphasized more on fixed capital. According to the model: For removal of poverty and increment of economic growth the capital stock is not alone enough. They specially put stress on agriculture. Thus, agriculture and other wage-good sectors should be given top priority in investment schedule. In this way unemployment, specially disguised unemployment which is large in country like India, can be minimized.

Wage-good sectors include sugar, cotton textile, agriculture which has quite good export demands so there will be a good chance of earning foreign exchange which can be used for expansion of industrial and agricultural development. Development of wage sectors will ensure the industrial development to fulfil the emerging needs of relating manufacturing equipment.

Prof K.N. Raj played an important role in India's planning and development, drafting sections of India's first five-year plan, specifically the introductory chapter when he was only 26 years old. He was a veteran economist in the planning commission. Dr. Raj was a Keynesian economist.

The third five-year plan consists of no specific plan model. It is simply based on the different relations expressed by Prof S. Chakravarthy in his famous article, "The Mathematical Framework of Third Model". It consists of thirteen equations describing the various relationships. The assumptions of the third plan model were not fully achieved and they remained well below the targets.

Amartya Sen believes that India should invest more in its social infrastructure to boost the productivity of it its people and thereby raise growth.

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13.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the Vakil-Brahmananda planning strategy
- Describe the views of K.N. Raj about Indian planning strategy
- Explain the Sen-Chakravarthy planning strategy

13.2 VAKIL AND BRAHAMANAND

Prof. Vakil and Brahamanand proposed a model for growth of income and employment in the context of developing countries in contrast to Mahalanobis plan. Mahalanobis Model put more emphasis in the fixed capital goods. But Vakil and Brahamanand put more emphasis on wage goods and for removal of poverty and for the increment of economic growth, the growth in capital stock is not alone enough. For this wage goods gap is to be eliminated.

Vakil and Brahamanand model put stress on agriculture, so agriculture and other wage good sectors should be given top priority in investment schedule. Vakil and Brahamanand model's emphasis was more on unemployment removal and minimization as they know disguised unemployment was main hindrance in developing countries.

According to Vakil and Brahamanand economic growth will be fast and self-sustaining if wage good sector is improved in terms of investment and more emphasis is on them. Wage good sector include sugar, cotton, textile, agriculture which has quite good export demands so there will be a good chance of earning foreign exchange which can be used for expansion of industrial and agricultural development.

Vakil and Brahamanand said if any economy increases its export then it will earn more foreign exchange for economy. This currency can be used for expansion of industrial agricultural development.

If agriculture sector is developed more, in other words if rate of growth in agriculture related sectors becomes high, it can lead to increase in circulating capital. Unemployment and specially disguised unemployment can be eradicated when most of the population get employment.

Development of wage good sector will be ensuring the industrial development to fulfil the merging need of relating manufacturing equipment.

Arguments in favour of Vakil and Brahamanand Model

Brahamanand has further develop and modified his wage goods model and now it is called "Extended wage goods strategy". In this extended wage goods strategy, he also gave place to capital goods on priority sector as capital goods are also required for production of wage goods. Because all capital goods as machinery,

plant, tools and raw materials are directly or indirectly involved in the production of process of wage goods. Priority of the capital goods must be assigned to those capital goods whose supply leads to the production of wage goods. Prof. Brahamanand later realized the importance of capital goods and modified his model. As the model has modified so many arguments are there in its favour:

1. Highest priority is given to wage goods along with capital goods (necessary for production of wage goods). So, capital output ration is much lower in wage good industries, especially agriculture than in basic heavy industries sector so achievement of higher growth rate becomes possible because of lower capital output ratio.
2. High rate of growth of agriculture and related sectors would provide increasing amount of wage goods.
3. Wage good model puts emphasis on agriculture sector. So, it develops other industries like cotton, textiles, sugar. And developing those industries will promote more exports. Export promotion will bring more foreign exchange in return and economy will start to grow and other sectors will also grow along with that.
4. Most importantly, as the majority of new workers get employment that will reduce poverty and lead the workers to spend more on their well-being. So, wage goods model will provide economic growth with social justice.
5. Expansion of wage goods sector that is agriculture will generate a large demand for manufacturing industries. This will ensure rapid industrial development with proper linkage with agriculture. The manufacturing industries would obtain food grains and new material from agriculture and in turn would feed latter with inputs and industrial consumer goods.

The most important kind of wage goods are food grains which are the product of agriculture and for which income elasticity of demand in the less developed countries is very high. So, by approaching unemployment that visualizes wage goods gap as the cause of unemployment assigns a paramount role to agriculture. Development is the strategy of growth so that food surpluses are made available to the newly employed workers outside the agriculture sector.

Along with agriculture sector growing, it impacts other sectors as well, leading to overall development, bringing social justice, economic growth, increase in income due to increase in employment.

Critical Approach

That the growth of non-agricultural sector depends on the availability of food grains or wage goods is obvious. When people are employed in rural public works and in industries producing capital goods outside agriculture, there will be need for food to feed them, if food is not made available to them directly through market mechanism, there employment can't be sustained– it may be asked even when employed they must be consuming food to make their living possible and so no

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extra food would be required when they are given employment. So that is if employed or unemployed people must consume food in order to live.

Basically, emphasis on agricultural development in wage goods approach has been laid for increasing supply of wage goods so that they can be used for employment creation in non-wage sector. Especially the rural public works on accumulation of capital.

A great weakness of the strategy proposed by Vakil and Brahamanand is that it ignores the need for bringing about appropriate technological and institutional changes to generate enough employment opportunities in the agriculture sector itself.

Where I represent the annual rate of investment, σ the potential social productivity of investment, α the marginal propensity to save and ΔI the increase in investment.

13.3 RAJ, SEN, CHAKRAVARTHY

The model was not worked out explicitly but was implicit in the numerical figures of the perspective plan. It worked out in the first five year documents. The basic equation, as worked out by K.N. Raj later on, were

$I_t = S_t$ …….. (1)

$S_t = ay_t - b$ …….. (2)

$I_t = \alpha K_t$ …….. (3)

$I_t = K_t - b$ …….. (4)

Where I_t is investment in period t, St is the saving, Y_t is the income and K_t is the capital stock in the corresponding period. Unlike the Harrod-Domar Model in which MPS = APS, the relation between the two is shown by equation (2). Alpha (α) is the capital-output ratio. Given these relations the growth process is given by the equation: $K_t = (K_o - b / a^{\alpha})e^{a\alpha+} + b / ad$

Where a^{α} is the asymptotic relative rate of growth of the system.

Assumptions

The model is based on the following assumptions:

(a) The marginal propensity to same is greater than the average propensity to same

(b) There is no difference between the marginal capital output ratio and the average capital output ration

(c) The economy is closed

(d) Prices are stable.

Prof S. Chakravarthy provided base for third Five Year Plan. This plan was simply base on the different relations expressed by Prof S. Chakravarthy in his famous article, 'The Mathematical Framework of Third Model'.

It consists of thirteen equations describing the various relationships;

1. The total investment is equal to the sum of the total domestic saving net foreign aid is : $I = \sum I_t = \sum S_t + F$

   I – Investment

   S – Saving

   F – Foreign aid

2. The net increase in the national income is equal to investment over whole period multiplied by output capital ration i.e.:

   $\Delta Y = \beta_1$

   ΔY = Increase in investment
   β = Output capital ratio

3. Saving time at *t* is equal to the period of saving plus saving in period *t*

   $S_t = S_o + t_a$

   a = annual increase in national savings.

4. The demand for agricultural production depends upon the level of population as well as per capita income.

   $$D_{A(+)} = P_t\left[\frac{Y_t}{P}\right]$$

5. The increase in agricultural production is equal to investment in agricultural sector multiplied by capital output ratio

   $\Delta Y_A = \beta_A I_A$

6. The total tax revenue is equal to the autonomous tax revenue plus tax revenue which depends upon time

   $I_t = nT_t + T_t$

7. The increase in tax revenue is equal to the weighted average of the rates at which consumption, agricultural and non-agricultural income are increasing.

   $$\frac{T}{T} = Y_t\frac{\Delta C}{C} + Y_2\frac{\Delta Y_{NA}}{Y_{NA}} + Y_3\frac{\Delta Y_A}{Y_A}$$

8. Total gout expenditure is equal to the sum of the current expenditure plus the proportion of total investment exp. That is to be taken

   $\sum E(t) = E_C(t) + P_i I$

9. The total increase in gout kept is equal to the total expenditure minus total tax revenue and total amount of surpluses of public exp.

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$$\Delta D = \Delta E_t - \left(\sum T_t + \sum R_t\right\}$$

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10. Total increase in output is equal to the increase in agriculture output and the non-agriculture output.

$$\Delta Y = \Delta Y_A + \Delta Y_{NA}$$

11. Total investment is equal to investment in agriculture sector plus investment in non-agriculture sector.

12. Increase in output is either consumed or saved.

$$\Delta Y_t = \Delta C_1 + \Delta S_t$$

13. Increase in demand for agri. Goods is equal to increase in supply of agri. goods.

$$\Delta DA = \Delta Y_A$$

This model was the decision model as the number of unknown is more than the equations. So, the value of two variables must be taken from outside arbitrarily and the remaining would be determined from the equation.

Prof K. Sen favoured the socialism in the Indian economy. Sen believed that one should invest more in social infrastructure to boost the productivity of its people and thereby raise growth. Investing in health and education to improve human capabilities is central to Sen's scheme of things. Without such investments equality will widen and growth process itself will falter, Sen believes.

Check Your Progress

1. Who gave the wage-good model?
2. What are the components of wage-goods?
3. State the meaning of disguised unemployment.
4. What are the two arguments in favour of wage-goods strategy?
5. State two main elements of wage-good strategy.

13.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Prof Vakil and Brahamanand gave the wage-goods model.
2. Components of wage-goods are: (i) Food grains, cereals, pulses; (ii) milk and milk product; (iii) edible oils; (iv) fish, eggs and meat; (v) sugar and

sugar products; (vi) fruits and vegetable; (vii) spices; (viii) tea, coffee; (ix) cloth; (x) matches; (xi) soap; (xii) salt; (xiii) kerosene.

3. Disguised unemployment is also known as under employment. In this kind of unemployment, more than the required people of a few people will not affect the productive capacity of that field.
4. Two arguments in favour of wage-goods model are:
   - The implementation of the wage-goods model will not involve much foreign exchange.
   - Wage-goods model gives stress on the production of wage-good industries such as agriculture, cotton textile, sugar had a large export potential.
5. Two main elements of wage-good strategy are:
   - The poverty and unemployment exist because there is a wage-goods gap.
   - To secure a rapid increase in the supply of wage-goods, capital stock (or productive capacity) designed for the production of wage goods must be expanded.

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13.5 SUMMARY

- C.B. Vakil and P.R. Brahamananda of Bombay school constituted a plan for an alternative development for India challenging the Mahalanobis plan.
- In contrast to capital goods and heavy goods sector being the core of Nehru-Mahalanaobis strategy. The centre piece of the Vakil-Brahamananda plan was 'wage-goods-sector'. They focussed on unemployment and were of the view that employment can't expand without wage goods. They accorded a prime importance to agriculture.
- Second plan model was based on the Mahalanobis model known as Heavy industry model. It was a practical application of the Harrod Model. Third plan model was also supplementary to the Mahalanobis model known as Sen and Raj Model.
- The fourth plan was also started in 1969, after a lapse of three years of plan holiday period. Fourth plan model prepared by Chakravarthy, Eckaus, Lefeber and Parikh was known as CELP model. The model had three sub-models i.e. the macro model, the input-output model and consumption model.

13.6 KEY WORDS

- **Wage-goods:** Wage goods are goods that a worker with wages might buy, perhaps now more commonly called consumption goods.

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- **Non-wage goods:** Non-wage-goods are goods that a rentier receiving profits or interest might buy, including what might now be called capital goods or investment goods.
- **Disguised unemployment:** Disguised or hidden unemployment is a kind of unemployment where some people seem to be employed but are actually not.

13.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Critically examine the wage-goods model given by Vakil and Brahamananda.
2. What is wage-goods model? In what way is it better from Mahalanobis Model?
3. Write short notes on: (i) Wage-goods, (ii) Non-wage-goods, (iii) Raj Planning strategy.

Long Answer Questions

1. Write a descriptive essay on Sen Chakravarthy planning strategy of development.
2. Highlight the contribution of K.N. Raj to the first five-year plan.
3. Critically examine the Sen-Chakravarthy strategy of development.
4. Discuss the arguments in favour of and against the wage-goods model.

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UNIT 14 PLANNING TECHNIQUES: MEANING, CONCEPTS AND IMPORTANCE

Structure

14.0 INTRODUCTION

In the present unit, you will study economic planning techniques. Economic planning is a process under which a central authority defines a set of targets to be achieved within a specified time frame related to growth and development of the country keeping in view the needs and means of the country or it refers to the method under which the central planning authority enforces economic programs and policies keeping in view the resources of the country, with a view to achieve a set of objectives related to growth and development of the country.

There are many notable features of the economic planning in India. Planning in India is comprehensive planning as it is not only focused on economic parameters but also on social parameters of growth and development. Economic planning in India confirms to a democratic pattern at the formulation level as well as the implementation level. Indian Economic planning is both prospective and perspective in nature. It covers economic as well as social spheres areas of activity. It is a sort of financial planning. It implies a focus on the allocating funds to various sectors and activities, rather than achieving the physical targets of the plan. Objectives of Indian Economic planning is to be condensed into one overall objective, that would be termed as 'Growth with social justice'.

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14.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the meaning of the planning technique
- Explain the objectives of the economic planning
- Explain the importance of economic planning
- Describe the need for planning

14.2 PLANNING TECHNIQUES

The concept of planning (or economics planning) is widespread in both developed countries and less develop countries. But the meaning nature and scope of planning varies considerably from one countries to another, mainly due to multiple reasons.

Firstly, it depends on the institutional framework of the economy which is going to practice planning for instance, planning under a socialist system is materially different from planning under democratic, this system depends a great deal on the political view of person trying to define the term and the social political system where it must be practiced. At first you must specify, how much visible control over the economics system you would favour as against the invisible control of the economics forces under Laissez-fair, before you offer a definition of planning.

Secondly even under similar economics systems, the multiplicity of the practice of planning has rendered a single definition of planning difficult.

W.A Lewis remarked regarding the plans "One Differ so much in structure and content that the title development plan no longer conveys a meaning". A.D. Dickinson defines economics planning is the making of major economics decision what and how much is to be produced, when and where to be produced and to whom to be allocated by a determinate authority based on comprehensive survey of the system as a whole.

According to levy, "Economic planning means securing a better balance between demand and supply by a conscious and thoughtful control either of production or distribution or both rather than leave this distribution or both rather then leave this balance to be effected by automatically working invisible and uncontrollable forces" (i.e. the forces of demand and supply in the unplanned economy operating though free market mechanism).

To sum up, we can take Michal P. Todaro's definition according to him, economic planning may e defined as "the conscious effect of a central authority to influence, direct and in some cases even control changes in the principle economy variable e.g. GDP consumption investment saving etc. of a certain country or region over the course of time in accordance with a predetermine set of objective" it would be noted that according to this definition of planning mainly three things

constitute planning viz (i) economic planning is a conscious effort on the part of some specified central origination in the economy to burning about desired economic changes (ii) conscious effort are taken from the influence of directed or controlling changes in the major economic variables of the economic system and (iii) these changes in the major economics variables of the economics system secure to attain certain predetermined goal.

In simple words, when the government of a countries wants to achieve certain nation objectives with the help fast of a set economics policies it may be called economic planning especially if the objectives are sought to be achieved with in a specified time frame.

It is to be noted that the above definition fits into every socio – economic environment. The only difference to be observed is that as we move from a relatively capitalized environment to a socialistic framework the emphasis shifts from "influencing changes in the principle economic variables to direct control"

Then essential features of economic planning are discussed below.

1. **Institutional set up:** The planning process presupposes the existence of appropriate institutions through which its prepared and implemented. Planning involves four main activities preparation of plans by planning commission. Planning boards etc; taking of decision in respect of plans by institutions such as parliament government etc; implementation of plans through ministries directorates local government etc. and control of plans by institutions such as ministry of finance central bank, statistical offices etc.
2. **Goal and Resources:** Given the philosophical and ideological backdrop for a plan. Planning involves quantification of goals like targets of production in a plan are nothing but the quantified goals in respect of what goods are to be produced and how much of each good is to be produced for quantifying goals, it is essential the resource availabilities be given number. It includes physical resource such as natural and manpower resources and financial resources such as bank deposits, gold, foreign exchange in setting limits to objectives and prepare a more realistic plan.
3. **Programme of Action:** The goal chosen and means available present the line of action along which the economy is to be guided. The pace is decided by the period during which the goals are to be fulfilled. The movement of the economy in the indicated direction is made possible through the policies and instruments. Thus a plan become a preconceived programme of action.
4. **Specific Period and Definite Area:** Planning involves a time dimension. It is in this context that plans are formulated with programmes to be achieved and measures for their achievement within a specific time and space frame work.

   The time envisaged can be any period one year for annual plan, five to seven years for medium term plan, ten to twenty years and even more for

long term plans. Each plan apart from signifying the different periods denotes the specific beginning and ending dates of a plan. This enables to establish a link between the past and the present functions. Thus plans are from are like pictures painted on the canvas of time.

The area of planning indicates a geographical limit within which planed action takes place. Of course, this does not mean that planning enables to establish a link between past and present on the one hand and present and future market on the other hand. Thus, plans are like picture painted on the conveys of time.

The area of planning indicates the geographical limit within which planned action needs to take place. This does not mean that differences are planned, like for the district or nation difference in plans. All these could be complementary parts one comprehensive plan. Area plans are thus full plans as well as part plans.

5. **Rational Socialized Activity:** The planning process involves the choice of goals which are compatible with one another and together they make a sensible whole. Further these goals are so tailored as to match the resources available over the plan period in the most efficient and are thus the hallmark of any meaningful plan. This process a rational activity. In general planning decisions involve areas conterminous with political boundaries such as nation plans and the goals chosen belong to the whole groups of people moreover the resources envisaged for use also go beyond what the individual needs and to comprehend larger areas and larger populations. Thus government activity becomes an essential feature of planning.

Planning and programming

The word planning and programming are sometime interchangeably used but the difference between the two should be carefully noted. The distinction between the two is made at two different levels. In the first place, the economists in the socialist countries reserve the word planning to describe the planning process in the centrally planned economics while that goes by the name of planning, in the capital countries is called programming. Thus programming and indicative planning are synonymous under programming. The planning performs the function of co-origination and forecasting. Here the present market forces are dominant. The plans cannot be enforced they are merely of an advisory was of time nature.

A second distinction that is made between the two terms is of a technical nature. Here planning refers to a wider process where national goals are set in consonance with the social welfare function of the society policy measures are designed to achieve those goals, and arrangements are made for the implementation of that policy. However, the policy measures must be internally consistent these must produce optimal results and it must be feasible to implement the plan. Thus, the plan must go through the programming process. According to P. N Rosenstein Rodan, "programming is just another word far from rational deliberate consistent

and coordinated economic policy". Thus, programming techniques make use of such methods as econometric model building linear programming input-output technique etc. for this purpose.

We might therefore say that while economic planning is the spirit or the philosophy behind any set of economic policies, economic programming is a means to provide a rational basis to such policies.

14.3 NEED FOR PLANNING IN UNDER-DEVELOPED COUNTRIES

There is no gain in saying the fact that nearly all the under developed countries have been practicing economic planning in one form or the other for the last over four decades. However, the question still remains as the what is the rational basis of planning in less developed countries (LDCs). The case for planning in these countries rests on the following grounds:

1. **To Remove Market Imperfections:** Regarding the imperfections of the market, WA Lewis observes that the merits of the market depend on the existence of competition and the perfect competition is rare. It is clear that nothing in the market mechanism itself either establish or maintain competition. Only state action can assure competition. So much else in the market economy cannot function adequately without positive support from the state[6]. It is thus interesting to notice that even for brushing up the market or making it work more efficiently state intervention is needed. This is the minimum that can be said in favour of planning. When the plans provision is made for labour training or for the dissemination of labour market intelligence through employment exchange for the establishment of money and capital market etc. the market system starts operating more vigorously. Thus the planning system is LDCs, instead of supplanting the price mechanism indeed supplements and supports it.
2. **To Ensure Socially Optimal use of Resources:** It's argued above that the market system operates on the basis of votes cast by the consumer. More of those goods would be supplied which are demanded most. Since rich people have more income their demands get reflected in the market in an exaggerated form. Poor people have fewer votes (less income to spend in the market); and therefore, their wants remain under represented in the market place. Thus, the more than proportionate resources get allocated to the rich minority. To meet the requirements of the majority, very little is allocated. Therefore from the social point of view there is a lack of optimum resource allocation. To rectify this defect of the market system planning through the democratic process or some other means tries to assess the needs of society priorities are established on the devoted to the production of more urgent good and services. Thus an optimum allocation of resource is assured.

3. **To Bring about Major Structured Changes:** One of the distinguishing feature of LDCs is that they suffer from structural disequilibria for example whether judged on the criterion of proportion of labour employed or the origin of national product agriculture is the dominant sector while the secondary and tertiary sectors happen to be in their infancy. Thus marginal productivity of labour is very low in agriculture while in industry and services it is relatively high. Clearly for optimum allocation of labour it must move from the former to the latter. Planning is need for such a structural change. It is recognised that the market mechanism is incapable of dealing with such major and sweeping structural changes since these are of a discontinuous no marginal nature. The planner need not wait for the market to allocate resources away from agriculture and in favour of industry and services. The task of allocation of resources in now done within the plan so that the process of structural changes could be hastened and there by the growth process accelerated.
4. **To Internalize External Economies and Diseconomies:** As is observed above certain structural changes are necessary in LDCs. This means setting up of industries and sectors. But when these new activities come into existence they create external economics and in some cases external diseconomies when an investment is made in a new project it might create profitable opportunities for other industries (e.g. the opening of a railway system in a given region might cheaper the cost of transportation for other industries and increase their profits). These are external economies but sometimes the starting of a new project may in fact reduce the profitability in another industry (e.g. an oil refinery may start throwing poisonous effluents into the revers which would kill fish and thereby reduce the profits of fisherman). This is an example of external diseconomies. These external economies and diseconomies by their very nature do not enter into the calculations of private entrepreneurs under the market system. However in the case of external economies the social gain is greater than private gain.

   It's only the planner taking a macro economics view, who can internalize these external economies and diseconomies in his planned calculations and thus maximize the gains from investment. This creates a strong case for planning in LDCs.
5. **To Provide for the Requirements of Future Generations:** Now realized that the price system suffers from myopia it can register of current requirement. This enough would be produced to meet such requirement. Then producers, in the lure of maximization of current profiles ruthlessly exploit natural resource. It is evident that the higher the current rate of exploitation of the exhaustible natural resource (like minerals) the less is left for the use of future generalities. The resources that are launched in the private sector will not estimate the current demand for water (or at best force cast the rise in demands in the near future). But a planner can look

few generations ahead and provide for their requirements in advance while planning the water supply scheme. Thus it's under planning alone that the requirements of future generation can be sufficiently provided for.

6. **To Cater to Collective and Big Choices:** The price system is unable to meet the challenge of big and collective choice which are very necessary for economics development of LDCs. This is because under market mechanics all the important decision relative to production and consumption are taken and macro-level in a decentralized and undesirable consequences such as production at one time and under-production at anther time. Therefore, planning is very essential to burning all round, coordinate and consistent regarding resource utilization are taken at the macro-level by the central planning authority.
7. **To Achieve Important Socio-Economics Goal:** According to WA Lewis under the market system "income is not fairly distributed and as a corollary of this the less urgent good are produced for wealthy people while poor people lack education, health, good food, decent house and ordinary comfort which could be produced through income spent in the market only the preference of the such get registered because the poor do not possess income. Thus, planning is needed to look after the interests of the poor. Besides it's a mechanism through which consumption of wealth and assets reduces further, the market may favour the introduction of capital intensive techniques of productions in the face of rising unemployment, reduction of poverty only under planning. It's therefore clear that planning is necessary to ensure genuine and broad-based development for the realization of socio-economics goals.
8. **To Break low-level Equilibrium trap:** In LDCs the problem has been not only that of initiation of the development process but also of sustaining that process it was argued during the discussing on the theory of under development that economist like N. Rosenstein Rodan Harbey Leibenstein and RK Nelson hold the inadequacy of the development effort responsible for the resistance of under development in LDCs, thus, there is again and again a relapse into the state of under development effort responsible because the development effort was below the critical minimum level required to space the low level equilibrium trap. A big push is needed to be given to the economy so that there is no slide back to the state of underdevelopment. Thus alone can be development process be sub stained over a long period till the economy has imbibed growth habits.
9. **To Facilitate the Flow of Foreign Aid:** Even the western aid giving agencies like the World Bank and the IDA prefer providing aid to those countries which have drawn up development programmes for their economies. Most of the aid flowing from these agencies is of the nature of project aid, that is, aid is provided to finance specific projects. When a plan

is already there, the aid donors find it easy to study the economic programmes of these countries, and in particular examine the socio-economic relevance of the projects for which aid is sought. Thus, the existence of economic plan in LDCs facilitates the task of the aid-donors to the extent that they are now in a position to satisfy themselves in so far as the soundness and viability of the programmes and projects are concerned.

14.3.1 Process of Plan Formulation

Plan formulation is a stupendous and very complex process which has several dimensions. As a first step in the direction of plan formulation, a planning body is constituted by the government which is known as planning commission or National Planning Board. It is staffed with economists, statisticians and technical experts in various fields. Plan formulation broadly compressive spelling out the broad objectives, laying down the priorities, formulating the objectives, finalizing consistent targets for different sectors and planning resources mobilization for carrying out various plan programmes and projects. These dimensions are explained as under:

1. **Survey of Resources and collection of Necessary Data:** Survey of resources and availability of data on various aspects of the economy are important requisites of plan formulation. The size of the plan is often limited by the availability of resources. Therefore, while formulating a plan, the planning body must know the volume of material Human and Capital resource have been properly served & the reliability of data is high. No doubt many data gaps exist while the reliability of available data gaps is questionable. Therefore, these countries are trying to overcome data problem by setting up central with a network of data collection organization.
2. **Spelling Broad Objective:** Plan formulating involves creation goal which are broadly but clearly defines & efforts are directly realize them. In a number of development countries, planning is scuttled at the implementation level because the rules have no intention to realize the objectives.

   The most abstract the aspiration – which reflect the ultimate aim of the society; the intermediate – The goals – which are still abstract but may be capable of being reached during the period over which the plan operates and the last abstract – The target – which are specific, quantitative results that the plan is designed to achieve.
3. **Time frames:** Comprehensive plans can be planed into three categories on the basis of their time frame. Long term or perspective plans usually cover a period of 15 to 20 year, since uncertainty increase with the passage of time, goals are highly aggregasive & these plans do not go into deal details on the industry-by-industries basis.

   Since uncertainty increase with the passage of time, goals are highly aggregative and these plans do not go into great detail on the industry-by-industry basis. Such plan are particularly useful in planning for social overhead

capital (SOC) projects which have a long gestation period. For example, it takes several years to conduct a pre-feasibility study and then a feasibility study for a hydro-electric project. construction may take 5 to 7 years or even more. This means that the feasibility study requires an estimate of demand for electricity 20 to 30 years in the future. Perspective plans are also useful for determining educations policies.

Medium term plan is that which commonly covers a period of 5 years. it attracts public attention the most. A good medium term plan is very detailed specifying year-by-year target variables and describing how investment variable can be used to achieve the targets. So a good medium targets as economic conditions change.

Finally, there is the annual operational plan, which is based on goals of medium – term plan but providing government budget. The medium term plan or adopt 'rolling plan' which each year extend the medium term horizon by an additional by year but concentrate on the current year.

4. **Laying down priorities:** Plan formulation requires spelling out of priorities of the public investment programme. We know that in a developing economy, infrastructure has to be developed, basic and more particularly the machine-making industries are to beset up agriculture also need to be developed so that the supply of food does not become a major constraint and finally the spread of education and medical facilities has to be taken up in right earnest. But a developing country seldom has the resources to undertake massive investment in all these sector. So it must have well-defined priorities in consonance with the objective of the plan. So laying down priorities is very essential for successful planning.

5. **Formulating strategy & Development:** Another step in the plan formulation involves a strategy for the realization of broader goal. In the absence of a proper strategy the planning might lack direction which makes all the alternate goals doubtful. Besides, it should also be chosen between growth via export promotion or via substitution. These issues along with other such as rate of capital formation, investment criteria & choice of technique have to be settled as part of the strategy.

   Aruthey Lewis has highlighted the important of development policy in economic planning the main element of development policy listed by him are as follows:

   (i) Investigation of development potential involving survey of natural resource; Scientific, research, market research etc.

   (ii) Provision of adequate infrastructure such as water, power, transform & communications etc, whether by public or private agencies.

   (iii) Provision of adequate general education and specialized training facilities, thereby ensuring necessary skills.

(iv) Helping to create more and better markets such as commodity markets, stock market banking and insurance institutions.

(v) Promoting better utilization of resources, both by offering incentives and through controls to check misuse.

(vi) Promoting and assisting potential entrepreneurs, both domestic and foreign.

6. **Balancing in the plan:** A plan should always ensure that proper balances are maintained between saving and investment, demand for and supply of goods, availability to human resources and man power requirements and so on, planners' inability to ensure these balances will result in either shortage or surplus of productive resources. For instance, most of the savings are done by the people who hardly participate in investment activity. Therefore the planners should ensure a proper balance between the two otherwise inadequate flow of saving will arrest investment activity, and in turn the growth process. Similarly, imbalance between the demand for good and services and their respective supplies and their needs to be avoided. Shortage of wage goods will push up their prices and wage. price spiral may come into being. This will make cost estimates irrelevant and the entire planning process may get in jeopardy. Further, imbalance between the supply of human resources and the demand for them will result in unemployment, both open and disguised. If the problems of poverty and inequalities are to be tackled in an effective manner, then unemployment problem has to be dealt with in a forthright manner.

   There are two types of balances that the planners have to attend to in plan formulation. The first is the financial balance which implies that planned spending at the macro level has to be equal to disposable income. Failure to ensure this balance will result in either inflation or deflation. The second is physical balance which implies inter-sectoral consistency between the demand and supply. To ensure physical balance, planners often rely on input-output the technique given by W. W. Leontief.

7. **Resource Mobilisation:** A plan often lays down investment targets for both public and private sectors. For public sector outlay, funds are arranged from both domestic and external sources. the domestic sources of finance are taxation, markets borrowings and surpluses of public enterprises. In India, small savings and state provident funds are other domestic sources. As resources raised domestically fall short of investment requirements in the public sector most developing countries seek external resources in the form of foreign assistance for their development. Besides, resource to deficit financing for raising funds for public sector plan has also become quite common.

   As regards privates sector, the major responsibility for resource mobilization rests with the private enterprises. These units raise either equity capital or

get loans from banks, other financial institutions and the governments it can also arrange Foreign Direct Investment (FDI). The role of the state in this case is secondary as it only facilitates mobilization of savings for investment in the Private Sector.

Check Your Progress

1. Write two features of economic planning.
2. What is the difference between economic planning and programming?

14.3.2 Objectives of Planning

The main objectives of economic planning in a developing country are the following:

1. **Rapid Economic Growth:** A developing country has mass poverty due to low level of production and productivity. So the primary objective of economics is to bring about rapid growth of the country. It means that real per capita income should grow at a faster rate.
2. **Rapid Industrialization**: This objective is complementary to the first one industrialization offers more productive employment opportunities and thereby, helps in rapid economic development of country. For rapid industrialization, more emphasis is laid on basic and heavy industries which will reduce dependence on foreign countries for basic industrial goods.
3. **Modernization of Agriculture:** Though agriculture is a major sector in a developing country, it suffers from backwardness and very low productivity. Therefore, another important objective of planning is the modernization of agriculture so as to improve its productivity and make the country self-sufficient in food grains and basic agricultural raw materials required for developing industries.
4. **Greater Employment Opportunities:** The basic cause of mass poverty in a developing country is mass unemployment and underemployment. Therefore, generation of productive employment opportunities on a large scale through rapid industrialization and construction of capital projects in agricultural sector emerges as another major objective of planning techniques.
5. **Reduction in Economic Inequalities:** UDCs are characterized by glaring inequalities of income and wealth, both in rural and urban areas which are likely to grow and create social tensions and political instability, especially in democratic countries where people's aspirations tend to rise continually. Hence, techniques planning should at aim reduction in economic inequalities as far as possible so that the benefits of economic development percolate to the common man.
6. **Balanced Regional Development:** In a developing country, some regions are relatively more backward as compared to other regions, the objective

of balanced regional development aims at providing employment and income earning opportunities to people in different regions in such a way as to narrow down regional disparities and to ensure proper utilization of natural and human resources in each region. This will go a long way in avoiding regional rivalries which might under mine national unity, especially in federal country like India.

7. **Expansion of Public Sector:** This is an important objective of techniques planning in private enterprise economies: Expansion of Public Sector will bring commanding heights of the economy under government control, thereby influencing the level of economic activities in the country. The profits of public enterprises will go to state, instead of the private individuals, thus resulting in reducing inequalities of wealth and income.
8. **To control inflation:** In a developing country, the fear of inflationary rise in prices is always there, and, if not controlled. It will adversely affect the growth of the economy. this is because inflation would feed on itself instead of resulting in increase in production in response to rise in prices beyond a certain limit, so control of inflation has to be adopted as an essential objective of planning.

14.3.3 Conflict among Different Objectives

Some of the above objectives come into conflict with one another when an attempt made to realize them simultaneously which is quite often the case in developing countries. The possible conflict between different objectives is examined as under:

1. **Rapid economic growth and increase in employment opportunities:** Rapid economic growth requires high rate of investible surplus which in turn requires the adoption of more capital-intensive techniques of production in various sector of the economy, especially in industrial sector. But these techniques, being labour saving, would reduce employment opportunities. On the one hand, adoption of technology-intensive techniques would increase employment on a large scale. But such technology, being labour saving would reduce employment opportunities. On the other hand, adoption of labour – intensive techniques would increase employment on a large scale. But such a technology is less efficient and so may fail to give high growth rate to the economy. Hence the conflict between two main objectives of techniques planning.
2. **Rapid Economic Growth and Reduction in Economic:** reduction in inequalities of income and wealth requires large scale adoption of more labour – intensive techniques as well as industries. Besides, taxing the richer sections, having higher saving propensity, at a higher rate and redistributing income in favour of poorer sections, which higher propensity to consume, would also help on bringing down economic disparities. But both these measures may have adverse effect on saving and investment rates in the

economy, there by lowering the growth rates of the economy. Thus, the objective of reduction in economic inequalities, though justified on social and moral grounds, is likely to come in conflict with the objective of rapid economic growth.

3. **Rapid Economic Growth and Balanced Regional Development:** In the developed regions of a developing country, various infrastructure facilities are relatively more developed. So a given amount of investment would result in higher production and a higher rate of economic growth. But under balanced regional development, resources would be diverted from relatively developed regions to backward regions where, for want to adequate infrastructure development, the same amount of investment would mean lower production and, therefore lower growth rate of the economy.

Thus, in the short run, there might be some degree of conflict among the various objectives of planning in developing countries which is resolved, not by giving up of the conflicting objectives, but by deciding a trade off point between any pair of conflicting objectives e.g. how much growth rate with how much increase in employment opportunities, how much growth rate with how much reduction in inequalities of income wealth and so on. However, in the long run, there may be no conflict among them and different objectives appear to supplement and reinforce each other. for example, once the objective of full employment or near full employment is realized. There would be more people contributing to national income. this would result in higher growth rate. Similarly, as inequalities of income and wealth get reduced over a period of time, increase in income of poorer sections of society, increase their efficiency, enabling them to contribute more to national output. This will push up the growth rate. In this way, the conflict between high growth rate and reduction in economic inequalities melts down in the long run.

14.3.4 Requisites for Successful Planning

For planning to be effective and successful in a developing country. It is necessary that certain pre-requisites or conditions must be established for the formulation and working of plans. The main requisites are examined as under:

1. **A Good Plan:** The first essential condition for successful planning is that the plan should be technically sound, economically feasible and within the country's capacity to execute. The designing of such a plan requires two things; realistic goals, and appropriate policies and instruments.

   As regards goals, these should keep in view the resources or productive capacity of the economy and should not merely reflect the aspirations of the society. However, the existing capacity should not be passively accepted as the limit.

   In fact, the country should plan as to how these resources and capabilities can be expanded. So, the goals should contain an element of boldness.

Secondly, the goals should be compatible and consistent with one another. For example a faster growth rate is compatible with capital intensive methods but is incompatible with the goal of higher employment, makers will behave over the plan period in response to various changes in the pattern of governmental regulations. Two private sectors must also have the best information about the economic development that are likely to flow from the objectives and means (policies and instruments) of the plan. This clearly shows that collection and transmission of information from and to the planning agency and private sector in essential.

The information that is collected, processed and stored should be adequate for planning to be effective. This implies that the data should satisfy the following conditions:

(i) It should provide full information for formulating and executing the plan.

(ii) It should relate to the most recent data i.e. it should be up-to-date.

(iii) It should be accurate to the extent that latest s statistical devices permit it.

(iv) It should be reliable in the sense that it has been collected through agencies. Which have the requisite knowledge and resources to collect it.

(v) Data collection should be on a continuous basis. The adequacy of statistical information requires that the planning country has a permanent agency, trained personnel and computational aids not only on private account but so on public account as a social service like the present, thirdly, realism of goals also implies their flexibility or changeability in the upward or downward direction as the situation warrants. Thus, a good plan requires that the goals should be realistic compatible and flexible.

The second character of a good plain is to ensure that the goals are fulfilled through appropriate means i.e. policies and instruments which should conform to the need of the plan and availability of instruments. When conditions or circumstances governing a plan changes, new tactics in respect to existing policies and instruments should be stopped. Thus, like goals means should also be flexible to import dynamic to the planning process.

2. **Adequacy of information:** Information about various aspects of the economy is vital for effective planning information includes statistics showing factual position of the various facts of the economy such as statistics about current resources and those likely to be available in future, enquires into the working of the economy reports about feasibility of projects etc. Apart from formulation of a plan also and policies, the implementation of a plan also depends on the ability of the planners to transmit information to others.

In mixed economies, the formulation and execution of a realistic plan depends mainly on successful coordination of plans and intentions of innumerable economic units within the country. This requires two things. One, planner should make the best possible estimates of how private decisions statistical services. Thus, adequacy of information is a sine qua non of successful planning.

3. **Rational Institutions:** Another requisite for successful and effective planning is the presence of institutional agreements which are conducive and responsive to the requirements of a plan. An institution is a process of combing resources and potentialities primarily through human beings in a manner befitting the customs and morals of the society. Planners regard institutions to be amenable to manipulation for the realizations of plan goals. This implies that certain institutions are more appropriate to the needs of planning that others one such institution is the public sector.

   Economists like Charles Bettleheim reject the institution of private sector in planning as it is deficient in statistical information in many fields of basic importance for planning. Moreover, it stands in the way of administrative institutions in fully mobilizing the national resources for use to the best advantage of planned growth. As against this, public sector has no such limitations and is more appropriate from the point of manipulation for planning.

   As against public sector that help in planning there are other institutions which form anti-rational attitude and thereby hinder the planning process. for example, the institutions like caste system, right of inheritance of property, female subjugation etc. But under the pressure of exceptional circumstances like war, revolutions etc. They change rapidly and radically as under such situations, human being adopt old institutions and establish new ones to fight out these very crises.

4. **Appropriate administrative and technical Apparatus:** The existence of a competent administrative machinery is a must for successful planning, in this context, W.A. Lewis remarked that "without a reasonably competent administrative. Machinery, there is no basis for development planning". This is because certain tasks, never performed before by Market, have to be undertaken in a planned economy. Tasks such as preparing plans, changing economic and social institutions, controlling and directing the activities of the people, laving down suitable policies and procedures etc. require a suitable administrative apparatus.

   To perform the above mentioned varied job, the administrative machinery has to be manned by technical experts in various fields such as administrations, engineers, economists, statisticians, accountants, agricultural and industrial experts etc. Without these experts, a plan can be neither formulated nor implemented effectively. The personnel has to be quantitatively adequate and qualitatively well-trained for these complex and varies tasks.

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In a developing country to begin with, competent and key personnel may have to be important from abroad due to their insufficiency in quantity and quality. But government should not squander its limited resources in these spheres where private sector has the necessary resources and expertise such as consumer goods, commerce etc. It should concentrate on new spheres, especially those requiring large and long gestation investment. the extant and nature of control. But it is very important to set up suitable institutions with in the country to build up an indigenous cadre of administrative and technical personnel in various fields of activity.

Of all types of personnel, civil administrators, who come into direct contact with the public, should be honest, efficient and sympathetic to the parties concerned. Otherwise people will lose faith in planning and turn hostile to it. One way to minimize corruption is to lay down proper procedure which will provide minimum scope for corruption, even if an administrator is prone in indulge in it. In fact, administrators cannot be much better than the environment from which they come. This means that, in the long run, it is the environment that need to be changed and made more favourable for a competent and honest administration which is the crux of successful planning.

5. **Public Cooperation:** Public cooperation and participation in the planning process is the most important condition for effective and successful planning. Arthur Lewis has rightly said that "Popular enthusiasm is both the lubricating oil of planning and the petrol of economic development – a dynamic force that makes almost all things possible".

Planning techniques is not just a business of planners and administrators. It involves radical changes in social structure attitudes and ways of the people. So unless people cooperate heartily, planning cannot succeed. If people are associated in the formulation and execution of the plan and are assured their due share in the fruits of planning their whole-hearted cooperation will be forth coming. Scarifies must be appropriately shared by all and benefits such as employment opportunities and opportunities for highest standard of living must become available to all. In a developing country, people need to be informed and educated about various aspects of planning, the costs to be borne and the benefits to be expected.

For ensuring people's cooperation at village, state and national levels and from all sections of people, viz. farmers, industrialists, workers, professionals etc., it would be necessary to create new local, regional and national institutions such as village panchayats, block samitis, zial parishads, chambers of commerce and industry, associations of bankers and merchants etc. to provide opportunities for cooperation for a maximum number of people. When people's cooperation is sought though their participation in the planning process at various levels. It amounts to decentralized planning in the real sense. This will put a check on bureaucratic evils of corruption, dehumanization etc. In a country like India where nearly 70 percent of people depend on agriculture for their livelihood. Steps like abolition of

Zamindari, Fixation of celling on holdings. Special assistance to small and marginal farmers, regulation of wages of agricultural workers etc. will have to be taken.

It is only when the gains of planning begin to accrue to the vast majority of the poor in the country that they will get interested in planning and after their willing and full cooperation to ensure its success.

The five requisites or conditions mentioned above are of general and basic nature. It is not necessary that a country should start planning only when all these conditions are fully met. The planning process, in fact, is a learning process. So, unless a country starts experimenting with economic planning, it cannot know all the requisites which are necessary and sufficient for the success of planning.

14.3.5 Limitations of Planning

The planning process in LDCs suffer from certain limitations as a result of which it fails to achieve the intended goals.

These limitations are discussed below:

1. **Lack of Suitable Administration:** Planning implies administration is not suitable for planning. Firstly, it is more tuned to the maintenance of law and order or policing function rather than to the performance of economic activities like saving, investment production etc. Secondly, Planning requires strong, competent and incorrupt administration. But unfortunately, majority of the administrative personnel are incompetent to undertake various tasks such as preparing economic legislation etc. Moreover, their craze to grab as much of funds means for development as they can for their personal ends leads to corrupt practices. Thirdly, there is lack of industrial entrepreneurs and most of the businessman merely undertake trading activity to make profits. So administrative personnel has to take up the much needed entrepreneurial function. But it woefully lacks the requisite entrepreneurial ability and so faith to fill the gap, especially in the initial stages of planning.
2. **Lack of specialized Personnel:** Planning requires a variety of specialized personal such as economists, statisticians, planner cost accountants, managers, engineers, technicians etc. to visualize long term objectives of planning, quantity short term goals and to keep a watch on the working of economic life. But such personnel are not available to the required extent. Moreover, facilities for their education, training and research are very inadequate in LDCs. This makes planning difficult partial and limited in scope as well as success.
3. **Lacks of Proper statistics:** Planning requires a strong statistical base. But the non-availability of adequate and reliable statistics relenting to resources position existing economic structure and past trends poses a major problem in LDCs. this makes plan evaluation etc. a mere guess work, wishful thinking and useless activity. The data collecting and processing agencies

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are neither adequate nor competent to undertake such an enormous exercise. This rules out comprehensive planning.

4. **Lack of Scientific Attitude and Institutions:** The dominant characteristics in these countries are rituals, customs, traditions, fatalist etc. People lack rational attitude, scientific temper and culture and here is absence of scientific institutions. All this adversely affects the altitude of the people to work, save, invest, the mobility of labour etc. As a result, it becomes quite difficult to effectively carry out national planning activities.

Conclusion: From the above analysis, it is clear that LDCs experience special difficulties in planning a against developed countries which had shed such traits long ago. It is an irony that LDCs which need planning the most, are also the countries which are affected the most with limitations in planning. But this is no cause despair. A beginning has to be made with planning proceeds and experience grows, the difficulties will gradually within away.

Check Your Progress

3. Mention two objectives of economic planning.
4. Why do developing countries needs planning? Give two points only.
5. State two types of economic planning.

14.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Two features of economic planning are:
   (i) Designing suitable schemes for realizing of the objectives.
   (ii) Determining the plan outlay and investment.
2. Economic planning is the spirit or the philosophy behind any set of economic policies; economic programming is a means to provide a rational basis to such policies. These are different in two levels:
   (i) Economic planning is the process of planning and programing is the execution of the planning.
   (ii) The technical nature of planning and programming.
3. Two objectives of economic planning are: (i) Economic development (ii) Political stability.
4. Developing countries need planning because of (i) to attain steady economic development in a free market economy.
5. Two types of economic planning are: (i) Perspective plans (ii) Five years plans.

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14.5 SUMMARY

- Planning technique is the process of conceiving, regulating and controlling the economic activity by the state to achieve the pre-determined objective in accordance with pre-fixed priorities.
- The process of conceiving, regulating and controlling economic activity by the state according to set priorities with a view to achieving well-defined objectives during a given period of time.
- The process of deciding what to do and how to do. An economic plan is an outline of schemes designed to achieve certain pre-determined economic objectives, in a particular order of priorities within a specified period of time. This is the technique that a state follows to achieve economic development.
- The economy which makes efforts to achieve development through economic plans, it known as planned economy.
- According to Dr. Dalton "Economic Planning in the widest sense is the deliberate direction by persons incharge of large resources of economic activity towards chosen ends."
- Lewis Lordwin defined economic planning as a scheme of economic organization in which individual and separate plans, enterprise and industries are treated as coordinate units of one single system for the purpose of utilizing available resources to achieve the maximum satisfaction of the people's needs within a given time.
- One of the most popular definitions is by Dickinson who defines planning as "the making of major economic decisions what and how much is to be produced, how, when and where it is to be produced, to whom it is to be allocated, by the conscious decision of a determinate authority. On the basis of comprehensive survey of the economic system as a whole.
- Planning is necessary for equitable distribution of economic power. It is a powerful instrument for eliminating instability, which is necessary concomitant of a free market economy. It makes possible for optimum, utilization of the country – as resource. It results in a higher rate of capital formation.

14.6 KEY WORDS

- **Economic Planning:** An economic plan is an outline of schemes designed to achieve certain pre-determined economic objectives, in a particular order or priorities within a specified period of time.
- **Perspective Plan:** Perspective plan is a long term plan. Generally, it is formulated for a period ranging from 15 years to 20 years.

- **Rolling Plans:** Rolling plans do not have a fixed period of time. These plans have only duration and move forward. As it moves forward the year, which was completed, it deleted and one year is added at the end.

NOTES

14.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Define economic planning or planning techniques. What are the main objectives of planning?
2. Mention the features of economic planning.
3. What is economic planning. Mention its objectives.

Long Answer Questions

1. Write an essay on "needs of planning of planning in developing countries.
2. Discuss the main features of economic planning.
3. Write short note on:
   - Types of plan
   - Objectives of economic planning.
4. Analyse the main objectives of the planning.
5. Explain the concept of planning techniques. Also mention the main features.

14.8 FURTHER READINGS

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