



BLOCK 2
PUBLIC GOODS AND EXTERNALITIES

BLOCK INTRODUCTION

Block 2 is on ‘**Public Goods and Externalities**’. It has three units: Units 4 to 6.

Unit 4 is on ‘**Theory of Public Goods**’. Markets can allocate resources optimally only in the case of private goods. Pure public goods are characterised by non-rival and non-excludability in consumption. Keeping the larger social benefit in view, such goods can be provided only by the government as they are not efficiently provided by the market. Further, there are many goods which share either only one of the characteristics of pure public good or partly share both its characteristics. This means that exclusion and rivalness are not necessarily zero or absolute. With changes in rising incomes and technology, there is a further distinction made in literature between ‘local public goods’ and ‘global public goods’. The unit introduces the idea behind the classification of these type of goods dwelling more on the theory behind the optimal quantity of production of public goods. This is done by applying the concepts of ‘partial equilibrium model’ and ‘general equilibrium model’ developed by Lindahl and Samuelson respectively.

Unit 5 is on ‘**Externalities and Solutions**’. Quite often, the social cost of producing a commodity is higher than the private cost. Such costs are ignored by private firms while making a decision on the quantum of production of output. This is the concept of externality which is discussed in this unit. While positive externalities need abatement (i.e. encouragement or assistance), negative externalities need abatement (i.e. lessening, discouragement). The instruments for achieving these like subsidies (for encouraging) or taxes (for discouraging), and the conditions required to be established for their achievement (e.g. clear property rights, low transaction costs) are explained in the unit.

Unit 6 is on ‘**Local and Global Public Goods**’. Based on their inherent characteristics, a distinction is first made between local and global public goods in this unit. Such characteristic differences need to be identified to adopt distinct policy approaches required to deal with their negative fallouts. The unit provides an exposure to the various issues underlying such policy approaches.

UNIT 4 THEORY OF PUBLIC GOODS

Structure

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- 4.1 Introduction
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4.0 OBJECTIVES

After reading this unit, you will be able to:

- classify the goods into private goods and public goods;
- state the characteristics of public goods;
- discuss the two theoretical models (Lindahl's Equilibrium Model and Samuelson's Pure Theory of Public Expenditure) in the context of public goods;
- identify the special goods having the characteristics of public goods;
- distinguish between 'merit goods' and 'demerit goods' explaining why consumption of merit goods are encouraged and those of demerit goods are discouraged;
- outline the problem of free riders; and
- differentiate between local public goods and global public goods.

4.1 INTRODUCTION

A thing good for me is a 'good' for me. And a thing bad for me is a 'bad' for me. And most, if not all, of the things that are 'goods' for me are also good (not bad) for others (or at best, they would be neutral between good and bad). Goods and bads, in this sense, have positive meaning (not normative meaning). Bread, shirt and car are goods but so are poison, smoking and alcohol and that is why we pay for them. Things we wish to part with and pay for their removal, like garbage, are bads. On that count, pollution is also bad as we want to lessen it.

Goods are classifiable in several ways but there is a special classification that puts all goods into two distinct categories viz. private goods and public goods. Though public goods have existed from antiquity (i.e. for many, many years), their clear exposition is not even a hundred-year old. Market which is found to be an efficient allocator of resources for optimum supply of private goods, fails to carry out this function in the case of public goods. It therefore calls for State to undertake their provisioning out of its revenue proceeds.

In this unit, we shall study about the two special characteristics of public goods and the problems they give rise to in resource allocation (or pricing). We will also study briefly about goods which share only one of these characteristics or only partly share these characteristics. We shall also learn about the merit goods and de-merit goods, which find a special place in public policy arena. We will have some idea about local public goods and global public goods as well.

4.2 CLASSIFICATION OF GOODS

Goods are classifiable in various ways. There are goods which we must consume even if our income is zero and there are goods which would consume only if we are sufficiently rich. The former ones are known as necessities or necessities and the latter ones, luxuries. They are generally not substitutes of each other. Of the necessities, some are normal while others are 'inferior'. With improvement in income, consumption of certain goods is substituted by that of others. As we move higher in income ladder, we substitute local fruits with exotic ones, local flowers by imported ones. *This classification is based on income.*

Law of demand holds that the relationship between change in price and change in quantity is inverse. This holds true for normal goods. Sometimes, it is found that both price and quantity change are in the same direction. Actually, people consuming such goods are not rich. These goods are called Giffen goods (in honour of Robert Giffen who first observed it). Similarly, Thorstein Veblen observed that high prices attract certain rich people to demand those goods as their possession gives them distinction or exclusivity. He called such consumption as 'conspicuous consumption'. Such goods are referred to as Veblen goods. *This classification is based on prices.*

On the basis of chief uses or properties, goods that are bought by producers for making other goods are called 'capital goods' whereas goods that are directly consumed are called 'consumer goods'. Often, a distinction is made between a single-use consumer goods (like chocolate) that gets exhausted in one use and a durable-use consumer goods which is consumed over time (like refrigerator).

Goods may be free or priced. Goods may be produced for self-consumption or for sale (often called commodities). Except free goods all goods are private goods.

Though public goods existed for long (perhaps with society itself), but articulation in terms of distinction between public and private goods is not that old. It was found that market which is an efficient allocator of resources for private goods failed to do so when it came to public goods. We will study more on these public goods in the next section.

Goods are often distinguished from services. Goods are tangible whereas services are intangible. Goods can be stored and consumed later whereas services are consumed the moment they are produced. However, goods here include services as well. The phrase 'public service' has a different meaning and is not dealt with in this unit.

4.3 CHARACTERISTICS OF PUBLIC GOODS

Public good in economics has different connotation than public good in political science where it is just well-being of the public. Public good has its plural and a technical meaning. We observe that there are goods which we gladly share with others like air or sun-shine in the open or bathe in a lake or watch TV show together in our living room. This is because my consumption does not get diminished or depleted when others consume it simultaneously. Such goods are non-rival in consumption. Thus, goods may be divided on the basis of rival-ness in consumption. For goods whose consumption is rivalrous, like tea, coffee, biscuit, racket and shirt, we can write $X = X_1 + X_2$, where X is total supply and X_i , $i = 1, 2$ is the amount of consumption by consumer i . For goods whose consumption is non-rivalrous, like air, sun-shine in the open, street-light or cricket match, we can write $X = X_1 = X_2$. In this case, both the consumers, if they so wish, can consume the whole of it. Rivalry is the inability of other consumers to consume together simultaneously and non-rivalry is their ability to do so.

Among the non-rival consumption goods, there are goods where certain consumers can be excluded from consuming it. For example, in the case of street light, no passer-by can be excluded from its consumption. But, in the case of cricket match, those who have not bought the ticket or received the pass can be excluded. Producers are able to exclude certain consumers. Whether consumers can be excluded from consuming the good in question or not is therefore the issue.

Private goods possess both the characteristics of rivalry in consumption and excludability from consumption. By contradistinction (i.e. the quality of being), public goods are non-rivalrous and non-excludable (Fig. 4.1). However, there are pure private goods and pure public goods (as in most cases there would be non-total rivalry and/or non-total exclusion). Pure private goods are divisible and quantities consumed may be different whereas pure public goods are non-divisible and quantity consumed is one and the same for all consumers. Some analysts have added the quality of non-rejectability as produced public goods are presumably not to be rejected by public (e.g. electricity).

Public Goods and Externalities

Exclusion	Yes	No
Rival-ness		
Yes	PRIVATE GOODS Medicine, Shirt, Bread, Coffee	
No		PUBLIC GOODS Defence, Police, Street-light, Flood Control

Fig. 4.1: Characteristics of Pure Private Goods and Pure Public Goods

Check Your Progress 1 [answer within the given space in about 50-100 words]

1) Give some examples of good and bad goods.

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2) State a few bases for classification of goods.

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3) Distinguish between goods and services.

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4) State the meaning of non-rivalry (or non-rivalness) in consumption.

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4.4 THEORY OF PUBLIC GOODS

Many methods have been attempted to determine the quantity of a public good or its distribution [by considering its cost as prices (or taxes)] to different consumers. These can be classified as partial equilibrium type and general equilibrium type. The former is chiefly associated with Erik Lindahl while the latter is with Paul Samuelson. Here we discuss two simplified versions of the two models.

4.4.1 Lindahl's Equilibrium Model

Buyers pay one single price in a market but receive different quantities of the good as per their respective demand schedules. Aggregate of the individual quantities is the total supply of the good. In the case of a pure public good, everybody receives (or enjoys) the same quantity with the aggregate also remaining the same. Since demand schedules of different consumers for a public good are different, we can expect different prices to be paid by the consumers.

Since many public goods need to be produced, it would involve cost. Cost of production could compulsorily be apportioned to different consumer-citizens. But the rule for apportionment cannot be uniform. Knut Wicksell proposed that (i) each public good should be financed by a separate identifiable tax and that (ii) all members of the society should unanimously decide the quantity to be supplied. This is known as Voluntary Exchange Model. The idea was furthered by Eric Lindahl. His solution is shown diagrammatically in Fig. 4.2. Lindahl's approach can be explained as follows.

Let there be only two consumers, A and B, of a public good. How much this public good (say, street light) should be produced and how should the cost be apportioned? Let D_A and D_B be their demand curves, reflecting their marginal utilities. Let X-axis plot quantity from left to right in absolute terms. Let Y-axis plot the price (or marginal utility) that they are willing to pay for a given quantity of this public good. Note the difference in language: for private goods, we say '*for a given price how much quantity*' but in case of public good, we say '*for a given quantity, how much price*'. It means we attempt horizontal summation of individual demand curves for a private good but do vertical summation for a public good.

In Fig. 4.2, we draw D_A , D_B and D_{A+B} (as a vertical summation of D_A and D_B). For ease of exposition, they are straight lines. Let us draw supply curve S representing the marginal social cost (MSC). We can see that public good has to be produced in OQ quantity and while A and B have to pay OP_A and OP_B prices respectively [which represent their marginal benefits (or utilities) MB_A and MB_B], for a public good, we can write:

$$MSC = MB_A + MB_B \quad (4.1)$$

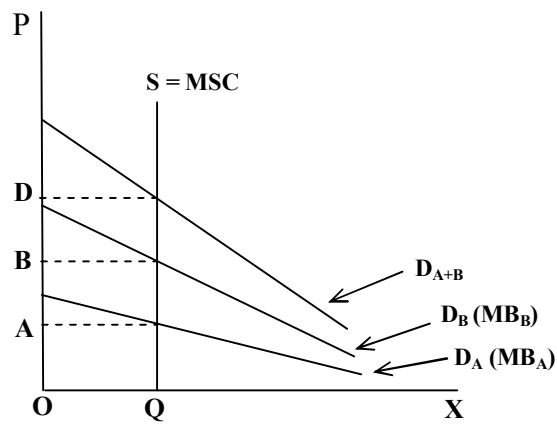


Fig. 4.2: Determination of Quantity and Individual Prices (Taxes) of Public Good X

For a private good, $MSC = MB_A = MB_B$ where Q will be sum of Q_A and Q_B (not shown here) while D_A and D_B would be summed up horizontally.

4.4.2 Samuelson’s Pure Theory of Public Expenditure

Samuelson considered the case of a pure public good naming such public goods as ‘collective consumption goods’. By contrasting with private goods, he specified the optimality conditions for the efficient production of the public good and the private goods simultaneously. He called it as pure theory of public expenditure without entrusting it to any institutional structure. An abridged version of this model is as follows.

Let X be the public good (national defence) and Y be the private good. By virtue of non-rivalry, X is equally and simultaneously consumed by both the consumers A and B and hence there is no need for subscribing X . Y being a private good, it is shared between the two consumers in two different quantities so that $Y = Y_A + Y_B$ i.e. it is fully consumed and there is no saving. Let PP be the Production Possibility Curve (Transformation Curve or Opportunity Cost Curve): the more Y is produced, the less X is produced and vice versa. $F(X, Y) = 0$ is the Production Possibility Curve. MRT (Marginal Rate of Transformation) will represent the opportunity cost of obtaining one more unit of X with the sacrifice of some quantity of Y . With straight line PPC , MRT is the same across all points.

Individual utilities are functions of common quantity of public good X and individual quantities of Y i.e. $U_A = f(X, Y_A)$ and $U_B = g(X, Y_B)$. U_A and U_B are represented by the maps of their indifference curves (see Fig. 4.3). Let A_1A_1 and B_jB_j represent their sets of indifference curves. If A ’s utility level is fixed and B ’s utility is maximised, the economy reaches consumption efficiency in Pareto fashion. Let us fix A ’s utility level at U_{A1} and draw only one indifference curve A_1A_1 for consumer A . For a given level of X , let us find out $Y_2 = Y - Y_1$, which would give the locus of available consumption basket for consumer B , given the indifference curve for A at A_1A_1 . For obtaining this, draw a few vertical lines and for a given X , find out $Y_2 = Y - Y_1$. Connect these points and call the curve $P_B P_B$ as the ‘availability curve’ for consumer B . Draw the highest possible indifference curve B^*B^* attainable, which is tangent

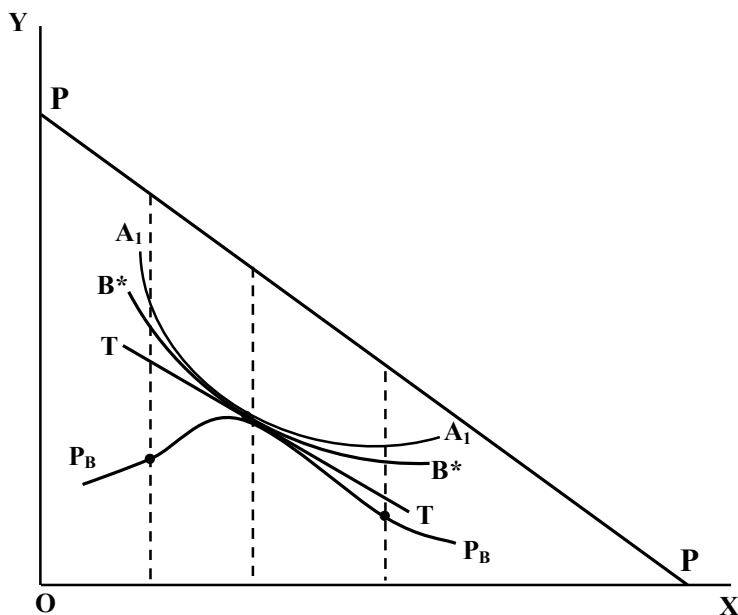


Fig. 4.3: Derivation of Availability Curve from Production Possibility Curve and Indifference Curve

with the availability curve. This gives the ‘marginal rate of substitution’ for B (MRS_B) which is B’s sacrifice of Y to gain one more unit of X. For another level for A’s utility, there will be another availability curve and from it the highest possible indifference curve can be obtained as B^+B^+ . This way, at different X’s, there shall be different MRS_B ’s. With similar exercise by fixing B’s utility levels, we can obtain a whole schedule of MRS_A for different X’s. Since both A and B have to, per force, consume the same amount of X whatever Y_A and Y_B they may consume, MRS_A and MRS_B can be vertically summed up. Hence, one can write:

$$MRS = MRS_A + MRS_B \quad (4.2)$$

A diagram can then be drawn on the lines of Fig. 4.3 where MRT is just MSC and MRS_A , MRS_B , and MRS replace D_A , D_B , and D_{A+B} respectively as price of getting public good X is in terms of private good Y. For efficient provision:

$$MRT = \Sigma MRS = MRS_A + MRS_B \quad (4.3)$$

The intersection point of ΣMRS and MRT curves gives the quantity Q of X and Y to be produced and its division between Y_A and Y_B .

Samuelson insists on the use of a social welfare function (or grand utility function), having the shape of an indifference curve. The tangency point between production possibility function and grand utility function would provide the exact shape of social welfare function (being determined by more out of ethical considerations than economic).

4.5 NON PRIVATE GOODS

In Fig. 4.1, two empty boxes were crossed as if either both the properties rivalry and exclusion have to exist together or not exist at all. But there exist goods in which only one of the two exists and other does not. So we may fill up

Exclusion	Yes	No
Rivalness		
Yes	PRIVATE GOODS Medicine, Shirt, Bread, Coffee	COMMON POOL GOODS Forests, Lakes, Sea Coast (Fish Stock)
No	CLUB GOODS Toll Road, Schools, Theatre	PUBLIC GOODS Defence, Police, Street-light, Flood Control

Fig. 4.4: Four-fold Classification of Goods Based on Rivalry and Exclusion

these two boxes as well (see Fig. 4.4). Generally, the goods with non-rival consumption but with exclusion are known as Club Goods and goods with rival consumption and non-exclusion are known as Common (Pool) Goods/Resources. There exist goods where partial rivalry and/or partial exclusion may exist. In fact, there may exist a continuum of rivalry from nil to full as well as a continuum of exclusion from nil to full. Thus, there are four poles enclosing a whole space rather than two boxes or four boxes. Goods may occupy any point in the whole space, depending on the level of rivalry and exclusion (see Fig. 4.5).

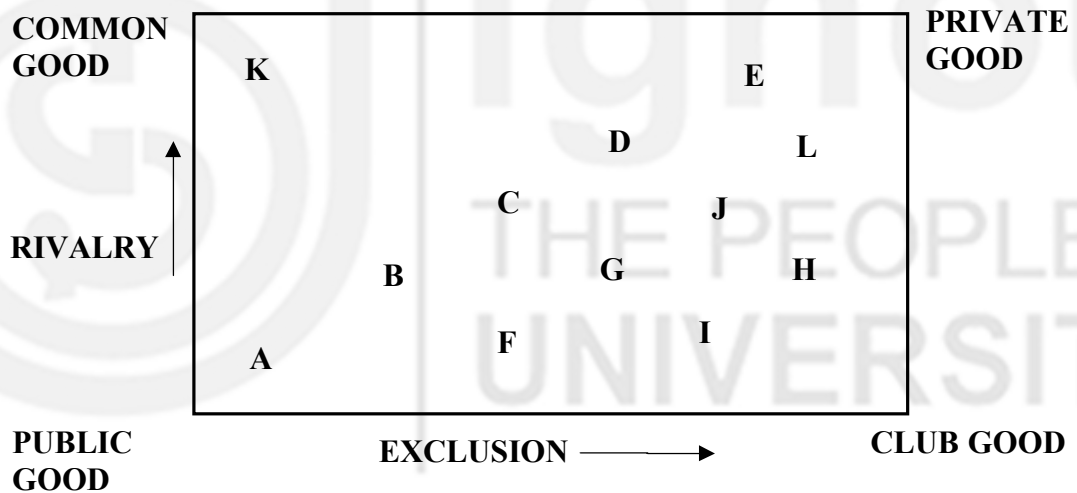


Fig. 4.5: Goods in Real World

4.5.1 Club Goods

Goods that have no issue of rivalry, but consumers can be excluded, are semi-public goods or quasi-public goods. They have been named by James Buchanan as ‘club goods’ (as club members enjoy certain privileges which others do not). Toll roads, swimming pools, public parks and museums fall in this category. Even a school would fall in this same category (as would be the case of copyrighted works whose use by anyone does not cost any marginal cost). Some analysts consider EU services as club goods as only its members can enjoy certain services. Such goods may be provided privately by a club/public agency. Security to a housing society is privately provided (as it makes sense for residents to form an association and manage security on private basis where cost is borne by residents) but toll roads and public museums are often managed by some public agency.

When marginal cost of providing a public good to additional consumer (not production, which is in terms of units) start rising, say after the number of consumer reaches N^* , we call it 'congestible public good'. For instance, as public road starts attracting more users, traffic becomes slow and probability of accidents increases and hence the cost of accommodating more consumers increases. It then makes sense to ration its use through imposition of toll.

4.5.2 Merit Goods and De-Merit Goods

Goods in economics are goods as their usage or consumption makes the consumers feel good though not necessarily useful. The consumers may have little appreciation for their consumption. For instance, one may not like medicines but they are useful; on the other hand, one may like smoking while it is not useful. Likewise, children may not like to go to school but it helps them in later life. Again, children hardly understand the importance of vaccination, but the government often encourage parents to get their children vaccinated to ward off potential disabilities and dangerous diseases.

Richard Musgrave gave expression to such goods as merit good. Consumers are made to consume such goods and government provides them out of public budget over and above what is provided through the market. It thus interferes with the idea of consumer sovereignty as there is a kind of paternalistic imposition. But in the eyes of the society or government, consumption of merit goods (such as elementary education, public health, public libraries, and museums) are useful both for the consumer from a life term perspective as also the society. Such goods are a kind of private goods but market cannot supply them to the extent they are demanded by the society. In such cases, markets are not missing but they are incomplete. Therefore, government (or some other societal arm) steps-in to complement.

Private consumption of merit goods has a lot of positive externalities to the rest of the society. An educated person is supposed to behave more appropriately and a vaccinated person would cause no harm to fellow travellers. Thus, it possesses two merits: it is useful to the consumer (who may underestimate its benefits) and is beneficial to society (though consumed only by some persons). Economists consider this aspect as so important that they treat merit goods worthy of subsidisation. Others argue that public subsidisation has to be only a temporary measure as people over time would realise their importance and demand them for their intrinsic value. Government also carries out public campaign to encourage their consumption. By extension, there may be goods which are harmful but individuals consume them as they like those goods. Goods such as smoking, drugs, gambling and alcohol are considered de-merit goods. Some call them merit bads which is not quite correct as the individuals who consume them consider them good!

Besides the fact that such goods are harmful to the consumer, they have negative externalities. For instance, a smoker causes passive smoking and a drunken person may cause nuisance in public. Thus, they have two demerits: one they are harmful to the consumer and two, they cause negative externality. Government often imposes taxes to discourage the consumption and make social campaigns against their use.

4.6 FREE RIDER'S PROBLEM

The solutions outlined above for pure public goods take care of aggregate societal demand. However, there is no incentive for any consumer to reveal his

real preference when he knows fully well that he cannot be excluded from consuming the good although he is not paying for it. In other words, some may not reveal at all while some may understate their true preference i.e. *revealed preference* would always be less than the real preference. There is thus no way of deriving the real demand curve. This is known as free-rider's problem which leads to market failure. There is enough incentive for each consumer to give false signals and pretend to have less need for the consumption of a good. Decentralised market pricing system can not serve to determine optimal level of the usage of a public good in the presence of free rider's problem.

People may privately agree that air ambience must be improved but once they are asked to contribute to pollution abatement charges they may not be forthcoming. The result is less than the desired level of service to do away with air pollution. The problem becomes acute when the number of consumers of a public good is very large as the transaction cost of negotiation is high. If the number is small, the problem will not be that acute. For instance, if there are only two consumers A and B, with each one knowing fully well that supply would be zero if they are not truthful to indicate their real preference, there is a reason for them to reveal their true preference even though both A and B are likely to have different intensities in their preferences. Market mechanism is likely to fail to adequately supply pure public goods because entrepreneurs are unlikely to enter the market, given the impossibility of charging consumers at the point of consumption. It thus becomes a case of missing market.

Since voluntary exchange model (i.e. market for a private good) does not work well, governments are called upon to make the provision and defray the cost out of general revenue. We may appeal for altruism whereby some people pay for others and certain goods may be turned into club goods (i.e. privately managed and paid by only members who would benefit from it). However, goods like lighthouses are pure public goods even though they may be managed privately.

4.7 LOCAL AND GLOBAL GOODS

The idea of public good in terms of non-rival consumption and non-exclusion from consumption finds expression in several contexts. One such public good is the provision of national defence, a pure man-made public good. It was asserted that people would not reveal their true preferences for such a good as they believe that they would enjoy their consumption (without contributing to the cost of its provision) as it is well nigh impossible to exclude them. In other words, for such goods market is missing. In fact, there is no way consumers can reveal their preference.

Since late 1960s, economists have found many public goods whose characteristics are those of above type of public goods but which could be global or international in nature. Pollution, climate change, terrorism, etc. are example of such public good (or bad). Such developments have given rise to a distinction on 'local public goods' and 'global public goods'.

4.7.1 Local Public Goods

A public good with a local reach is a local public good. Examples may be streetlight, community radio, city parks, scavenging, garbage collection, and so on. These goods possess both the characteristics of non-rivalry and non-excludability but the reach is local in the sense that only residents in the area

are not excluded. They thus are akin to club goods. However, in 1950s, Charles Tiebout came with interesting ideas about local public goods and competition between civic jurisdictions to attract residents with revelation of true preference by the consumers through choice of jurisdiction (under certain conditions).

4.7.2 Global Public Goods

Knowledge for long was recognised as a global public good as nobody on earth could be excluded with ease the benefit from knowledge to the individual and the society. But with enlightenment, people are discovering a lot of goods which have global reach. In fact, they are truly trans-national and cross-border. Due to globalisation and disintegration of many countries, there has been an increase in global and transnational public goods. Our awareness of them has increased only in recent years. For a start, new products and technologies are increasing the number of activities with cross-border or global effects.

Recall that chlorofluorocarbons (CFCs) and related compounds were used extensively for refrigeration, propulsion and cleaning. They have depleted the stratospheric ozone layers leading to exposure of greater ultraviolet radiation worldwide. However, as methods for identifying cross-border issues (such as carbon accumulation in the atmosphere) improved, our awareness of the global aspects of these problems also improved. Peace, security, clean environment, climate change mitigation, containment of ozone layer depletion, etc. all fall in this category. They are expected to extend to all countries, nations, peoples and generations.

However, for public goods whether of national reach or local reach, there is a government for one to turn to for a mechanism of delivery. In the case of global public goods, there is no such government. We need to negotiate issue by issue and arrive at regional and international consensus.

Check Your Progress 2 [answer within the given space in about 50-100 words]

- 1) How are individual demand curves added up to find the societal demand curve in the case of a public good?

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- 2) State the marginal conditions of Lindahl's model.

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3) Distinguish between Lindahl's model and Samuelson's model.

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4) What is a congestible public good?

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5) How does a club good differ from public good?

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6) Define merit and demerit goods.

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7) What is free rider's problem? What are its implications for efficient provision of a public good?

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8) What are local public goods? Give some examples.

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- 9) What kind of competition can emerge if sufficient variety of local public goods are in existence?

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- 10) State the reasons for the emergence of global public goods.

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4.8 LET US SUM UP

The unit began by introducing the concepts of ‘goods’ and ‘bads’ as distinguished in economics. Classification of goods on the basis of income and prices was then explained. After noting the characteristics which mark a good as a pure public good, we noted that all goods are not purely private or purely public. There are some non-rival goods where consumers can be easily excluded. Moreover, exclusion and rivalness need not necessarily be zero or absolute. This necessitates the recognition of goods as club goods which are non-rival only for included consumers. Case of Merit Goods, which are individually consumed but are useful socially was then discussed.

The unit has discussed the application of partial equilibrium model (due to Lindahl) and general equilibrium model (due to Samuelson) in their simplified versions to find out the optimal quantity of the public good in question if the consumers revealed their true preferences. However, owing to impossibility of exclusion, consumers may not reveal their preference at all leading to free-riders’ problem. Extensions of the idea of public goods viz. local public goods (which are important from the point of view of competition among civic jurisdictions) and global public goods (which are arising due to technological and political developments) were finally discussed in this unit.

4.9 KEY WORDS

Club Goods

: Non-rival consumption goods which could be restricted for consumption by an exclusive group.

Congestible Public Goods	: Unlike in case of public goods where no extra cost is incurred when an additional consumer joins, in certain cases, beyond a size of consumer group, marginal cost starts rising. Such public goods are known as congestible public goods.
Demerit Goods	: Goods that consumers like but are actually harmful and therefore their consumption is discouraged are known as demerit goods.
Free Rider's Problem	: If it is not possible for providers to exclude one from consumption of the good, one has incentive to free ride the use of the good without sharing the cost of its provisioning. This is referred to as the free rider's problem.
Global Public Goods	: Public goods with global reach or global spill-over or global implications are called global public goods.
Local Public Goods	: Public goods with local reach only, restricted to non-rival consumption by local population, are called local public goods.
Merit Goods	: Goods that are useful to not only consumers but to the society at large are recognised as merit goods and their consumption is encouraged by society or government.
Private Goods	: Goods that are rival in consumption and consumers can be excluded with ease are called private goods.
Public Goods	: Goods that are non-rival in consumption and consumers cannot be excluded altogether are public goods.

4.10 SOME USEFUL BOOKS

- 1) Ambar Ghosh and Chandana Ghosh (2014). *Public Finance*, Prentice Hall India Learning. Edition 2nd.
- 2) David N Hyman, *Public Finance: A Contemporary Application of Theory to Policy*, South Western Cengage Learning, Edition 10th or beyond.
- 3) Richard A Musgrave and Peggy B Musgrave, *Public Finance in Theory and Practice*, McGraw Hill, Edition 4th or beyond.

4.11 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Things that we like to consume (eat up, use, possess) are goods. Tea, burger, pants, bike, streetlight, and smoking are few examples. Things that we like to part with are bads. Garbage, litters, pollution, and global warming are examples.
- 2) Income, price, durability, and use could be some of the bases.
- 3) Goods include services, like day includes night. When they are to be distinguished, goods are tangible, services are intangible. Goods can be stored and consumed later, services are to be consumed the moment they are produced.
- 4) If one's consumption of a good does not diminish the quantity of good available for consumption by someone else, the consumption is non-rival.

Check Your Progress 2

- 1) Vertically when X-axis represents quantity and Y-axis represents individual marginal utilities/benefits.
- 2) $MSC = MB_A + MB_B$ where A and B are two consumers.
- 3) Samuelson employs general equilibrium model whereas Lindahl employs partial equilibrium approach.
- 4) When marginal cost of administering public good to additional consumers start rising above zero, the public good is said to be congestible.
- 5) A club good differs from a public good in the sense that its consumption can be restricted to a certain section of people.
- 6) Merit goods and demerit goods are respectively goods which are either not realised as good or are liked by their consumers despite their long term ill effects. While consumers are not able to fully appreciate the extent of usefulness of the merit goods, consumers fail to fully estimate the harmfulness by the consumption of demerit goods.
- 7) Because of non-excludability, consumers have incentive not to reveal their true preferences. This fact has implications for optimal provision as societal demand would be underestimated.
- 8) Streetlight, fumigation for killing mosquitoes, garbage removal, etc. are examples of local public goods.
- 9) Competition among local governments could give rise to attracting residents through the provision of local public goods.
- 10) Globalisation of economies, cultures, ideas, technologies and maturity of international community.

UNIT 5 EXTERNALITIES AND SOLUTIONS

Structure

- 5.0 Objectives
- 5.1 Introduction
- 5.2 Externalities
 - 5.2.1 Negative Externalities
 - 5.2.2 Positive Externalities
- 5.3 Internalisation of Externalities
 - 5.3.1 Negative Externality and Taxation
 - 5.3.2 Negative Externality and Property Rights
 - 5.3.3 Positive Externality and Corrective Subsidy
- 5.4 Policy Instruments
 - 5.4.1 Command and Control
 - 5.4.2 Capping and Trading of Pollution Rights
- 5.5 Let Us Sum Up
- 5.6 Key Words
- 5.7 Some Useful Books
- 5.8 Answers or Hints to Check Your Progress Exercises

5.0 OBJECTIVES

After reading this unit, you will be able to:

- define externality with illustrations;
- discuss how externalities cause inefficiency when markets are incomplete;
- explain how internalisation of negative externalities could be a solution to externalities through the instruments of taxation and property rights;
- state Coase theorem and offer grounds on which it is criticised;
- outline how internalisation of positive externalities through corrective subsidy could help the government/consumers; and
- describe the major policy instruments available as ‘solutions’ to the issue of externalities.

5.1 INTRODUCTION

In recent decades, governments and other organisations (both local to global) have increasingly shown concern about degradation of environment through pollution, a lot of which is being caused by human activities of production and consumption. Shall we stop production and consumption? No, the answer is we shall find better ways to reduce pollution (of air, water and soil) by adjusting level of production and consumption as well as by developing cleaner technologies.

The important fact is that most of the economic activities also impact people other than those who are directly involved (i.e. the producers and consumers). For instance, paper is produced along with its obnoxious gases and liquid effluents, which affect people who are neither its producers nor consumers. Producers earn income from the activity and consumers derive utility while using the product (e.g. writing, printing, painting, and packaging) whereas other people bear the cost in terms of suffering. Thus, social cost of producing a commodity may be higher than the private cost, which is often ignored by the private parties while making a decision on quantum of output. This is known as externality which market does not automatically take care. Solutions to externalities, particularly negative externalities, needs to be devised so as to internalise them. This is an arena of public policy. However, all externalities are not negative. For instance, my activity of having a well maintained garden in the foreyard of my house, may please the neighbours who do not share its cost. This is a case of positive externality. Public good is an extreme case of positive externality. In certain cases, it may not be easy to pinpoint the source of an externality as the cause may lie outside the society.

5.2 EXTERNALITIES

Externalities are the costs borne by (or benefits accrued to) third parties who are neither producers nor consumers. Social costs (or benefits) are costs (or benefits) from an activity which touches the entire society either directly or indirectly. Such effects would accrue irrespective of whether one is voluntarily or involuntarily involved. If a road is constructed near my house (which is definitely not constructed only for me), valuation of my house improves. On the other hand, if a flyover is constructed opposite to my house, valuation of my house comes down. But a lot of commuters enjoy the benefits of flyover. The first one is known as positive externality and the second one as negative externality. Such externalities therefore emanate from production activities. But they may also emanate from consumption activities. For instance, if I get vaccinated against a contagious disease, people who come into contact with me would have smaller chance of getting infected with that disease. This is a case of positive externality from consumption. But if I smoke, I am likely to make many people smoke passively and thus harm them. This is a case of negative externality from consumption. There is hardly any activity (production or consumption) which has no external cost and/or external benefit. But our references in this unit would be of ones with social significance.

External costs/benefits are the wedge between private costs/benefits and social costs/benefits. Since most of the analysis is carried out in ‘marginal’ terms, it can be said that marginal social cost (MSC) and marginal social benefit (MSB) diverge from their private counterparts (i.e. MPC and MPB). The difference between them is accounted for by marginal external cost/benefit (MEC/MEB). Thus:

$$MSC = MPC + MEC \quad (5.1)$$

and

$$MSB = MPB + MEB \quad (5.2)$$

When goods and services produced are purely private in nature, perfectly competitive markets are found to allocate resources efficiently. However, markets usually do not capture ‘marginal external cost’ (MEC). It tends to

equate ‘marginal private benefit’ (MPB) with MPC and end up either overproduce when ‘marginal social cost is greater than marginal private cost’ (i.e. $MSC > MPC$) or under-produce when ‘marginal social benefit is greater than marginal private benefit’ (i.e. $MSB > MPB$). Since most of the cases dealt with in literature are concerned with negative externalities, we shall first deal with implications of negative externalities.

5.2.1 Negative Externalities

A paper mill effluents emptying into a water stream affect the people who live nearby. So do effluents from a cloth dying unit or a sugar factory. If the people were collecting water for drinking from it or bathing in it, they are deprived and alternatives will cost them. The stream may be stinking and people suffer from it and may fall ill; the stream may become a colony for mosquitoes forcing them to buy appliances or repellents or bear the cost of treatment. It may be a river or a lake where people once enjoyed fishing, boating and swimming but with increasing pollution they are losing them. Thus, the industry is costing them negatively. These people are the third party bearing the cost of the activity without benefitting in any manner from it. Likewise, low flying aircrafts cause a lot of noise to those living near the airport and disturb their sleep. Some of these people may never board an aircraft but such persons bear the cost of disturbance by the flying of well-off people. New railway lines may disturb the buildings nearby and people may lose their earlier quietness. These are some of the examples of negative externality.

Suppose the sugar industry is operating in a perfectly competitive market (where intersection of demand and supply curves determine the output and price of the commodity). Demand curve represents ‘marginal private benefit’ (MPB) and supply curve represents ‘marginal private cost’ (MPC). In cases where negative externalities exist, supply curve should ideally reflect MSC i.e. $MPC + MEC$ (Equation 5.1) rather than MPC. Under the assumption that no negative externalities exist, MPB will reflect MSB as well. Let us therefore see the consequences of equating MPB with MPC (Fig. 5.1).

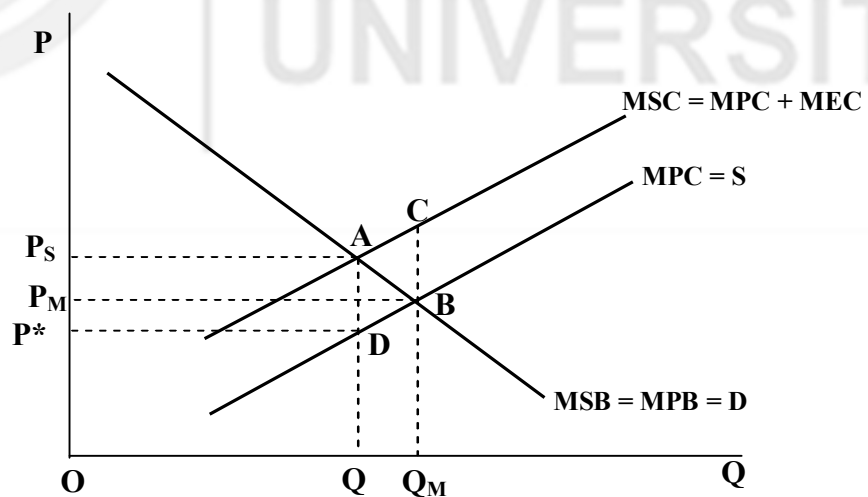


Fig. 5.1: Case of Negative Externality with Production

For simplicity, let the MPB and MPC be respectively downward and upward sloping straight lines and MEC be a constant amount per unit of output. MSC will be parallel to MPC but upward as MSC will be higher by a constant MEC for each level of output measured (say, in terms of tons per month). It is quite

possible that MEC increases with increase in output and MSC is steeper than MPC. If the producers do not take externalities into account, market equilibrium output would be Q_M and price charged from the consumers would be P_M . But we know that external cost is also an opportunity cost (as are private costs in terms of wages and material used) because the stream had other uses as well i.e. only when stream had no use, would dumping waste into it be economically acceptable (but not socially) as stream's usefulness to others would not be impaired. From societal point of view, for any activity, MSB should be equated with MSC to attain efficiency so that resources are properly allocated. Since MPB is not different than MSB, the equilibrium condition would be:

$$MPB = MSB = MSC = MPC + MEC \quad (5.3)$$

From Fig. 5.1, it is evident that efficiency requires output to be Q_S and price should get set at P_S . Thus, non-consideration of MEC allows over-production of the commodity and charging of lower price. $MSC > MSB$ at quantity Q_M but Q_M is inefficient and its production misallocates resources. It therefore makes sense to reduce output from Q_M to Q_S thereby avoiding deadweight loss equivalent to ΔABC . In short, when a negative externality exists, too much output is produced and sold in a competitive market relative to efficient quantity.

5.2.2 Positive Externalities

We produce or buy many things for our use but they may cast positive impacts on those who do not share the cost. For instance, my apple orchard may help neighbouring bee-keepers. One person getting inoculated or vaccinated against certain infectious diseases, would reduce the chances of many others catching infection from that disease. Likewise, if a smoke detector or fire proofing is installed in a building, it reduces the chances of fire and thereby persons in the neighbouring buildings would not be affected. These are cases of positive externalities as the third party [neighbours] do not share the cost but receive benefit.

Under the assumption that there are no simultaneous negative externalities from inoculations i.e. $MSC = MPC$, we draw Fig. 5.2. Like in Fig. 5.1, the MPB and MPC are respectively downward and upward sloping straight lines and 'marginal external benefit' (MEB) is a constant amount per unit of output. MSB is parallel to MPB but upward as MSB will be higher by constant MEB for each level of output measured (e.g. in terms of thousands of inoculations per month in the town). Consumers generally do not negotiate with the third parties benefitting from their actions and thus ignore MEB. Output based on market equilibrium condition of $MPB = MPC (=MSC)$ would be Q_M and price charged from the consumers would be P_M . But we know that external benefit is also a gain to society. From societal point of view, for any activity, MSC should be equated with MSB, not MPB, to attain efficiency so that resources are properly allocated. Since MPC is not to be different from MSC, the equilibrium condition would be:

$$MPB + MEB = MSB = MSC (=MPC) \quad (5.4)$$

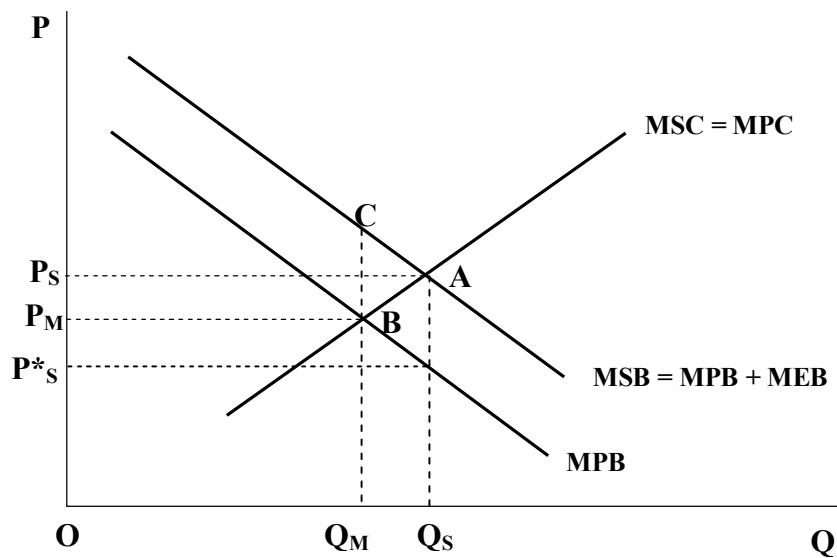


Fig. 5.2: Case of Positive Externality with Consumption

From Fig. 5.2, it is clear that efficiency output should be Q_S and price should get set at P_S . Thus, non-consideration of MEB restricts production and charging of lower price OP_M as well. It can be seen that by increasing output from Q_M to Q_S , it also leads to higher price P_S . For Q_S quantity consumers would be willing to pay only price equal to OP_S^* . Price has to fall to OP_S^* somehow if the deadweight loss equivalent to ΔABC has to be avoided. In short, when a positive externality exists, too little output is produced and sold in a competitive market relative to efficient quantity.

Check Your Progress 1 [answer within the given space in about 50-100 words]

1) Give illustrations of identifying the third party in the externality context.

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2) Define positive and negative externalities.

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3) Distinguish between social cost and social benefit with an example for each.

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- 4) State the relationship between social, private and external costs in 'marginal' terms.

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- 5) Define external cost and external benefit from production activity.

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- 6) State the social efficiency condition.

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- 7) Suggest a way by which output of a good with positive externality could be increased without making consumers pay more.

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5.3 INTERNALISATION OF EXTERNALITIES

Internalisation of externalities means adjusting external cost (benefit) to the private cost (benefit) thereby arriving at social cost (benefit). However, it is easier said than done. Private valuation of cost and benefit is done by private

persons. In most cases, it is difficult to identify persons who get affected by an externality. For instance, a car emitting smoke plies on different roads on different days and people it passes by may not be the same. It is also difficult to assign monetary value to the external cost. Likewise, in the case of positive externalities (e.g. due to inoculation), it is difficult to assess who is getting benefitted and how much. In such cases, economic policies are mired in controversies.

5.3.1 Negative Externality and Taxation

Suppose it is possible to estimate marginal external cost (MEC) and obtain the marginal social cost (MSC) schedule/curve. Arthur Pigou, a noted economist, suggested imposition of a tax, known today as corrective tax. It is also referred to as the Pigovian Tax. Corrective tax is also known as sin tax when the commodity involved is an intoxicant.

Let the tax T imposed be exactly equal to MEC (Fig. 5.3) so that $MSC = MPC + T$ ensures that $MPB = MSB = MSC = MPC + T$ and the equality results in the desirable level of output and thereby an acceptable level of pollution. While net gain in the well-being is the same i.e. ΔABC , the government also gets revenue equivalent to the area of rectangle $P_SADP_M^*$. This is known as the ‘polluter pays’ principle.

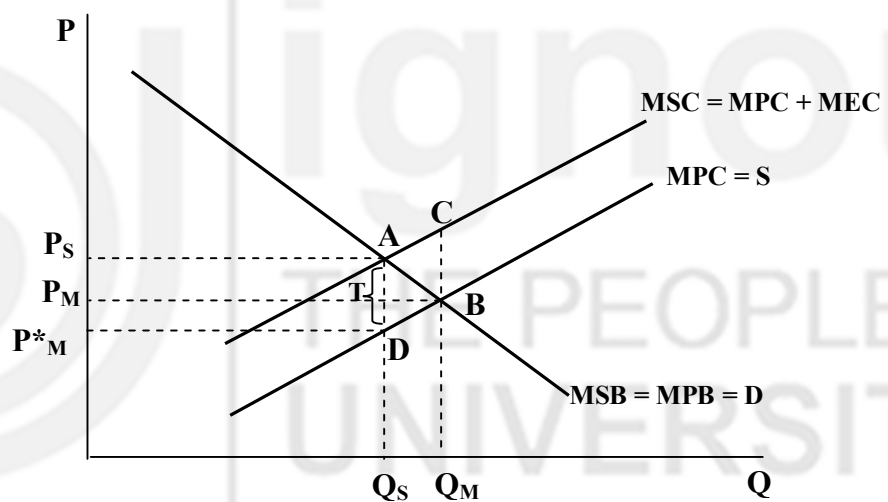


Fig. 5.3: Internalisation of Negative Externality through Corrective Tax

The question is what should be done with the revenue collected? Since pollution reduces but does not get eliminated, revenue could be used for undertaking measures to further reduce pollution levels. Revenue from corrective taxes could reduce other taxes. In short, internalisation of external cost due to negative externality such as pollution, leads to –

1. Increase in price of the good and reduction in output of the good to the efficiency level where $MSB = MSC$.
2. Transfer of income from polluting producers and consumers to those who are affected by an indirect effect by either reduction of pollution or by being beneficiary of tax reduction or increased government services.
3. Reduction in disposal of waste in the stream and thus pollution level, though not elimination of either.

5.3.2 Negative Externality and Property Rights

In 1960, Ronald Coase (who was awarded Nobel Prize for this work in 1991), suggested an altogether different solution to the problem of negative externalities where social cost of an activity exceeds private cost. Governments generally impose a liability on the producer of a negative externality to compensate the people who suffer from the externality. Coase suggested the solution that the government should clearly assign property rights and reduce transaction costs. Coase Theorem, says that market outcome of an industry which generates negative externality, would be efficient if the property rights are clearly assigned. The efficiency is irrespective of who is assigned the rights (i.e. a principle called the invariance principle) so long as the transaction costs involved in bargain between the parties are zero. In other words, a clear delineation of property rights is an essential prelude to market transaction. Note that whether I have a right to clean air or you have the right to smoke is immaterial because so long as one of us have clear unambiguous right, the other one would negotiate. Given the bargaining power by rights, a mutually acceptable settlement would result.

Two phrases are important here: property rights and transaction cost. Government has the right to assign property rights and property is not necessarily physical. For instance, financial property and intellectual property are not physical but we buy and benefit from them as they are clearly established. We can sell some of these rights (e.g. the use of copyrighted material for consideration of money). There are many traditional rights like fishing in ponds but no rights are assigned. Industries have been traditionally dumping their waste water into rivers but no rights are assigned. Coase argues that rights (including right to exchange) would equalise the uneven situation so that the scope for the affected parties to come together and negotiate is created. His emphasis is on law on property rights instead of liability laws. Transaction cost includes every other cost other than production cost and transportation cost. One has to search the opposite party, bargain with it for price and quantity, get the deal done into formal contract, and get the bargain enforced in case of disputes. For short, one can call it as bargain cost.

Under the liability law (or the torts as they are called in law), the one who perpetrates is liable to pay for the damage (e.g. pollution). Zero pollution means zero production! If there are no rights to the people who are at the receiving end, the amount of pollution would be inefficient (i.e. beyond limits). On the other hand, if I have right to clean air and you cannot do without smoking, you would bargain for a limited smoking by compensating me for the amount of smoking I have to tolerate. The amount of smoking would be efficient as I will be left not worse-off with a combination of more clean air and some money. If you have right to smoke and I cannot stand it, I would bargain with you and offer you money to limit smoking. You would not be left worse off with some smoking and some money in your hand. Smoking would be 'limited' in either case. The outcome is efficient irrespective of who is assigned the right. Here transaction cost was zero as both of us could speak the same language. Were we speaking two different languages, transaction cost could be high as an interpreter who knows both the languages needs to be hired.

Another example is the case involving a railway line passing through clove fields. Railway company uses steam engines which emit sparks that can burn

clove crop. Assign the right to the railway company to continue using spark emitting engines but allow it to trade its right. Clove farmers would bargain with the railway company to make good the loss by operating fewer trips. Assign the right to clove farmers to have spark-free running of trains but allow them to trade their right with the railway line. Railway company would bargain with clove farmers to permit some trains to run. Less the number of the trains, less the marginal revenue to the railway company. More the trains, more the marginal damage to the crops. Exact number of trains would be determined by equality (i.e. by equalising the marginal loss to the party who has to curtail the activity with the marginal gain to the party who has to get that activity curtailed).

The Coasian solution is, however, fraught with certain issues. Transaction cost increases as the number of parties increases. Parties involved may not be individuals but organisations and they may have internal transaction costs too. Last party to bargain, once he comes to know that all others have agreed, may demand a very high compensation. Assigning the right arbitrarily by government, even if clearly, may not be viewed right by the judiciary. Further, initial assignment of rights matters psychologically. There is also criticism on the grounds of the examples cited i.e. in terms of a culprit (polluter) and a victim as they do not constitute the typical market.

5.3.3 Positive Externality and Corrective Subsidy

One simple method of internalising a positive externality is to subsidise the activity. Called as corrective subsidy, it can be paid either to the consumers or to the producers. Fig. 5.4 illustrates the case of a good with positive externality (like an inoculation) sold in a perfectly competitive market.

Suppose it is possible to correctly estimate the ‘marginal external benefit’ (MEB) thereby obtaining the ‘marginal social benefit’ (MSB) curve. This would enable the determination of corrective subsidy to consumers. Let the subsidy be exactly equal to MEB. Now, since $MSB = MPB + S$, it ensures that $MPB + S = MSB = MSC$ and it results in the desirable level of output. While net gain in the well-being is the same as ΔABC , the government will have to pay out subsidy equivalent to area of rectangle $P_SAD P_S^*$. This can be done provided subsidy does not cause complications as it has to be given to each individual purchasing the good.

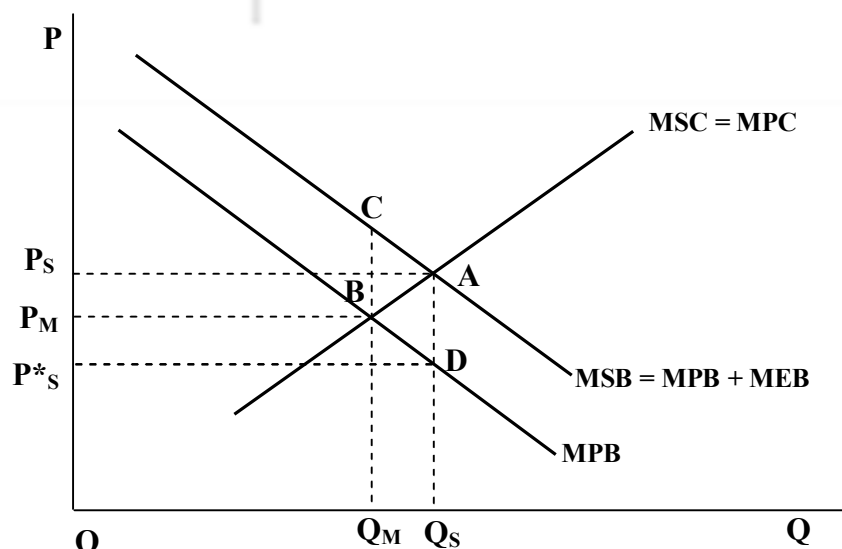


Fig. 5.4: Internalisation of Positive Externality through Corrective Subsidy

Governments often subsidise primary education (and many other services) which generate positive externalities. Subsidies generally come from general revenue and at times from a cess collected on a tax (e.g. income tax) for a particular purpose. In India, Government of India collects educational cess on income tax.

Check Your Progress 2 [answer within the given space in about 50-100 words]

1) What is meant by internalisation of externalities?

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2) State the idea of transaction cost.

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3) What are the criticism levelled against the application of Coase theorem?

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4) State the implications of corrective tax for obtaining efficient output.

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5) Indicate how subsidy produces socially efficient output in an otherwise perfectly competitive market.

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- 6) Illustrate how revenue collected from a tax imposed for correcting a negative externality can be utilised for the welfare of the sufferers.

5.4 POLICY INSTRUMENTS

Two methods, commonly adopted as policy instruments, as solutions to the problem of externalities viz. (i) command and control method and (ii) capping and trading of pollution rights are discussed here.

5.4.1 Command and Control

Governments across the world generally attempt to reduce the pollution level by ‘command-and-control’ method for human activities. For instance, in order to control air pollution, Government of India has imposed (in 2010) Bharat IV standards on all engines including motor vehicles. Such standards are developed for various pollutants from stationary sources such as power plants, smelters, factories/mills, etc. as well as for mobile sources like trains, buses, trucks and cars. Similar standards are set for water pollutants and soil pollutants for different industries. Such standards are set on the basis of sound scientific and technical studies keeping in view that economy should not get paralysed. However, such standards may be found to be inefficient as different plants and vehicles are not equally technologically advanced or of the same capacities.

Let us consider two power plants A and B in two but similar locations. Let us measure tons of emissions on X-axis. Let them have two different marginal social benefits, MSB_A and MSB_B . Since locations or cities are similar, power

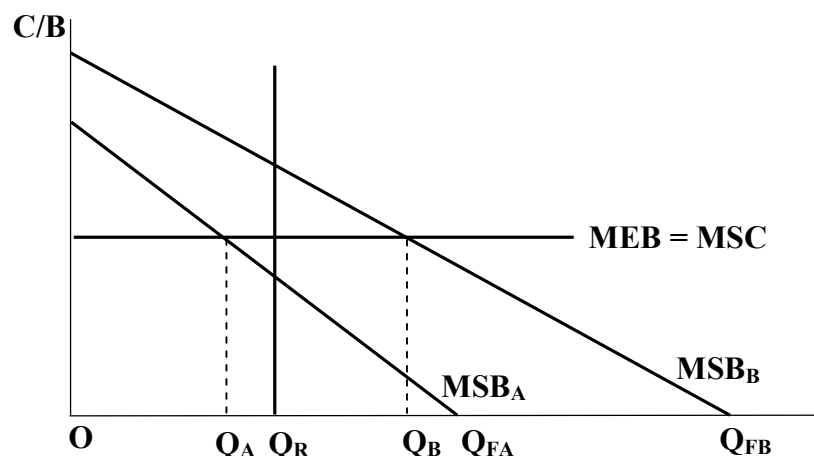


Fig. 5.5: Consequences of Policy Standards in terms of Efficiency

plants face the same marginal external cost (MEC). For ease, let the MEC be constant irrespective of pollution level. With zero marginal private cost, marginal social cost line would coincide with the marginal external cost line (Fig. 5.5). If there were no restrictions, Plants A and B would produce at the level of Q_{FA} and Q_{FB} . When Q_R is imposed by the Government, both have to limit their pollution level to Q_R . Now, let us bring marginal social cost into picture. Efficient amount of pollution for Plants A and B are Q_A and Q_B respectively. Plant A is producing more pollution than it ought to while Plant B is producing less pollution. Society loses on both counts.

A case can be built where capacity of the two plants are the same but they are located in two so different locations that the marginal external/social costs are different. Efficient levels of pollution would then be different as conditions of equality in two different locations 1 and 2, viz. $MSC_1 = MSB_A$ and $MSC_2 = MSB_B$ would also be different. Thus, there is scope for introducing flexibility into policy to take care of differences in capacity, technology and circumstances. But that is not easy to implement in practice.

5.4.2 Capping and Trading of Pollution Rights

In order to reduce acid rain to half the level it had in 1980, in 1995, the Environmental Protection Agency (EPA) in the United States decided to allocate each year a fixed number of pollution permits (or rights) to be achieved. This was sought to be achieved by the cutting down of sulphur dioxide emission from power plants. This can be called 'capping' as they cannot emit more than the permission granted. However, individual plants were allowed to trade among themselves (or buy from EPA) if they needed to emit more. Those which emit less could sell their permits to those who needed to emit more. This can be called 'trading' as permits saved can be sold to other plants which want to emit more. This fixes the level of total pollution by all plants put together. EPA also auctioned a small number of permits every year. Revenue earned by EPA was used to grant rebate to existing power plants holding permits in proportion to their initial holding. This policy thus became market based and in line with Coase's proposal.

Such pollution rights to emit pollutants into atmosphere (or release effluents into water) are like property rights which can be transferred. They are considered superior to corrective Pigovian tax as they could be monitored by a regulatory authority. The authority can increase or decrease the supply of such permit. The price of permit would be determined by the aggregate market demand reflecting the marginal social benefit (Fig. 5.6).

Given the supply determined by the regulatory authority, price of pollution per unit would be determined by MSB for an optimal supply equal to S^* . In the absence of fixed supply, aggregate pollution would have been equal to F . Individual firms will buy emission permits depending on where their respective demand curves would intersect with their supply curve. Firms have clear choice to buy fewer units of pollution permits or reduce pollution. Firms which would not find either option good would close down. In the short run, firms which find it more profitable to have more pollution rights would purchase from those which have saved them. Creation of market for such pollution rights also draws from Coase theorem as it has very low transaction costs and rights are clearly delineated. There is also incentive to access better technology and technologists too would find it profitable to invest in better technology. India has made an attempt, on trading of certificates on carbon saving through clean

development mechanism. Let us take a look at the cap-and-trade mechanism of pollution permits, as designed by Esther Duflow and his colleagues.

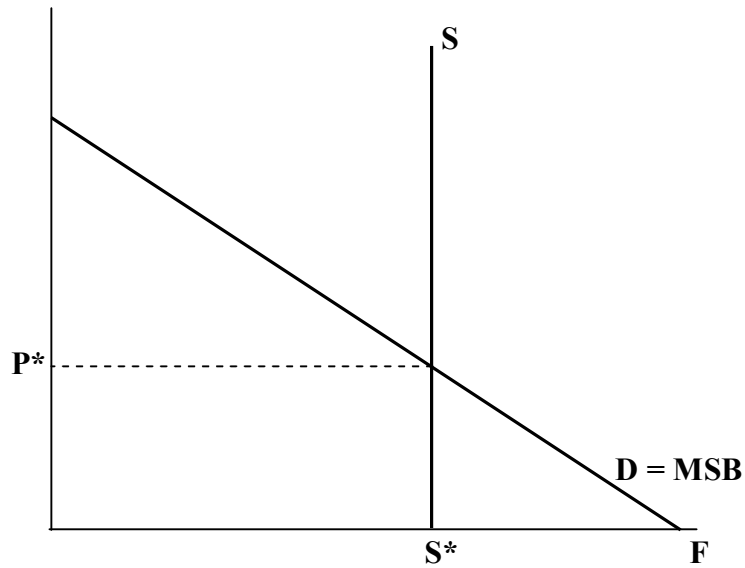


Fig. 5.6: Case of pollution permits by Government

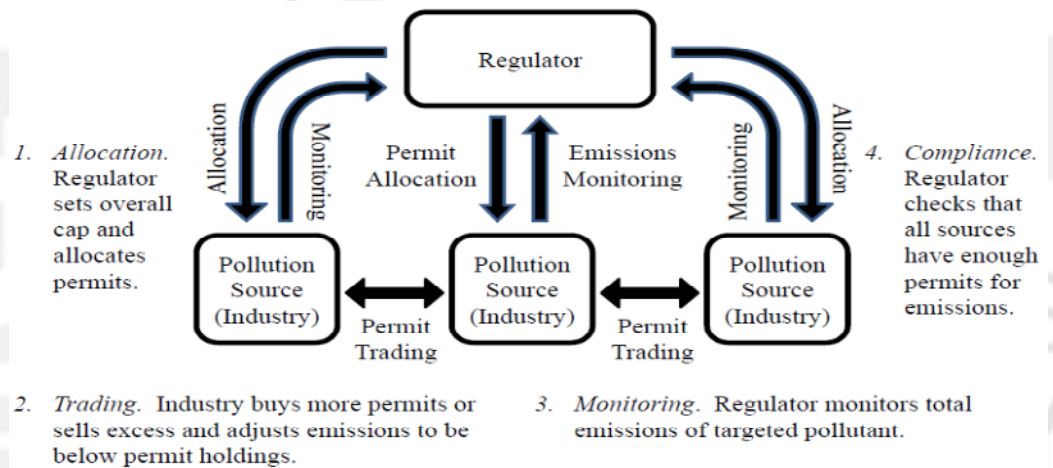


Fig. 5.7: Role of Regulator in a context of Cap-and-Trade

Check Your Progress 3 [answer within the given space in about 50-100 words]

1) What is cap-and-trade policy in the context of pollution control?

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2) What would be the shape of supply curve for individual plants when aggregate supply curve is vertical?

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- 3) Indicate the role of the national regulator for controlling the pollution in enforcing the cap-and-trade policy.

5.5 LET US SUM UP

Most of the economic activities, whether production or consumption, are found to create externalities, either positive or negative. Negative externalities in the form of pollution of air and water due to industries, have increasingly become the concern of the humanity as many of health problems are found to be associated with them. Markets, in the presence of externalities, even if perfectly competitive, are found to be inefficient. Internalisation of negative externalities through corrective tax mechanism is proposed as an answer in such situations. Such proposals were based on the 'Polluter Pays Principle'. The method of Corrective Subsidy is advocated to take care of positive externalities. Both these options made into literature in the early part of 20th century. By 1960, Coase suggested market solution through bargaining between the parties. But it needed clear delineation of property rights and lowest possible transaction cost. For long, governments believed in regulating polluters by imposing certain standards. But this solution is found to be inferior compared to internalisation of externalities through either mechanism. More recent developments relate to the policy of cap-and-trade pollution permits. For an identified pollution, pollution permits or rights are sold by the regulating authority to the polluting units. The US has succeeded in curtailing SO₂ in atmosphere through this mechanism. Carbon trading is operating on similar principle. India is likely to initiate such a mechanism for particulate matter in atmosphere.

5.6 KEY WORDS

- Coase Theorem** : Under the condition of zero transaction cost, a clear delineation of property rights of resources leads to efficient solution through bargaining between parties.
- Corrective Subsidy** : A subsidy meant to internalise a positive externality.
- Corrective Tax** : A tax meant to internalise a negative externality.

Public Goods and Externalities

Externality	:	Side effect of an activity which makes an impact on third party who is neither a producer nor a consumer of the activity.
Internalisation of Externality	:	A method which takes into account the externality so as to measure the full social cost or full social benefit.
Negative Externality	:	An externality which causes harm to a third party.
Pollution Rights	:	Right to pollute made available free or on charge by the government or an agency of the government.
Positive Externality	:	An externality which benefits a third party.
Property Rights	:	Rights to use, benefit/earn from, transfer, and mortgage an asset are considered property rights.
Social Cost	:	Cost of an activity to all members of the society, including those who are not directly involved as producers and consumers. It is full measure of opportunity cost of resources.
Subsidy	:	A sum of money granted by the state or a public body to help an individual, an industry or a business to keep the price of a commodity or service low.
Tax	:	Exaction or compulsory levy by the State with no promise to give anything in return.
Third Party	:	A party affected by an activity, without consent, who is neither a producer nor a consumer.
Transaction Cost	:	Costs involved in exchange of goods, assets and rights, beyond production and transportation, constitute transaction cost. Cost of search, bargain, contract, warranty, guarantee, enforcement, etc. are all transaction costs.

5.7 SOME USEFUL BOOKS

- 1) David N Hyman, *Public Finance: A Contemporary Application of Theory to Policy*, South Western Cengage Learning, Edition 10th or beyond.
- 2) Richard A Musgrave and Peggy B Musgrave, *Public Finance in Theory and Practice*, McGraw Hill, Edition 4th or beyond.

- 3) Ambar Ghosh and Chandana Ghosh (2014). *Public Finance*, Prentice Hall India Learning. Edition 2nd.
- 4) N. Gregory Mankiw, *Principles of Economics*, South Western Cengage Learning, Edition 6th or beyond.
- 5) Smith, S.(2011). *Environmental Economics: A Very Short Introduction*, Oxford University Press.

5.8 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) A person, household, community, or business who/which is not direct beneficiary of the activity but gets affected is a third party.
- 2) If the third party is benefitted without sharing the cost, the externality is positive. If the third party is injured (shares the cost) without sharing the benefit, the externality is negative.
- 3) Social cost includes private cost and third party cost. Cost borne by an illiterate community suffering from effluent discharge into a stream has to be added to the cost of raw material, labour, hiring of machine, rent for lease of land. Attempt answer for social benefit in a similar way.
- 4) $MSC = MPC + MEC$.
- 5) An industry like sugar mill imposes 'external cost' on the neighbourhood in terms of obnoxious gases and liquid effluents causing health hazards. An industry producing scents might spread pleasurable fragrance and thus benefit people in the neighbourhood.
- 6) $MSC = MSB$.
- 7) Corrective subsidy to producers would make them charge less from the consumers.

Check Your Progress 2

- 1) To take into account external cost/benefit in the calculus of cost/benefit.
- 2) In purchase of a good, particularly a durable good, an asset or in hiring people, you have to incur cost on search for quality, negotiation, guarantee, warranty, contract, enforcement litigation, etc.
- 3) Number of parties, free riding, internal transaction costs within organisations, etc.
- 4) Besides output being efficient, price would marginally rise for consumers and government would earn revenue.
- 5) In the presence of positive externalities, perfectly competitive market does not produce socially efficient output as it equates MPB with MSC. Subsidy helps to equate MSB with MSC.
- 6) Revenue may be used for compensating the people who suffer by reducing other taxes and undertaking other beneficial activities.

Check Your Progress 3

- 1) Fixing a limit for pollution is capping but permitting savers to sell to those who want to go beyond is trading. Such a policy is called cap-and-trade policy.
- 2) Horizontal, parallel to axis measuring pollution.
- 3) To set limits of pollution, sell the rights to pollute in units, permit trading among the holders of such rights and monitor compliance.



UNIT 6 LOCAL AND GLOBAL PUBLIC GOODS

Structure

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Local Public Goods
 - 6.2.1 Tiebout Model
 - 6.2.2 Club Goods
- 6.3 Global Public Goods
 - 6.3.1 Peace and Security
 - 6.3.2 Global Peace Index (GPI)
- 6.4 GPG Perspectives on Environment and Poverty Reduction
 - 6.4.1 Knowledge as GPG
- 6.5 Let Us Sum Up
- 6.6 Key Words
- 6.7 Some Useful Books
- 6.8 Answers or Hints to Check Your Progress Exercises

6.0 OBJECTIVES

After reading this unit, you will be able to:

- outline the characteristic features of ‘local public goods’ (LPGs) with illustrations;
- discuss the applicability of Tiebout model for providing efficient local public goods;
- differentiate between ‘club goods’ and ‘public goods’ with illustrations;
- specify the classificatory framework and characteristics of GPGs (global public goods) with illustrations;
- highlight the importance of ‘peace and security’ for global peace and GPGs;
- write a note on ‘global peace index’;
- present the perspective of GPGs on environment and poverty reduction; and
- explain how ‘knowledge’ is regarded as a ‘global public good’ (GPG).

6.1 INTRODUCTION

Unlike Private goods, the two important characteristics of a Public good are: (i) non-excludability and (ii) non-rivalness in consumption. Due to ‘free-rider problem’ in ‘public goods’, market failure occurs. This requires government intervention for the production and provision of ‘public goods and services’ through public expenditure. In this context, ‘local public goods’ (LPGs) are goods provided by local governments/authorities for the consumption of local

population. ‘Global public goods’ (GPGs), on the other hand, are such goods like ‘knowledge’ whose benefits could reach across borders of national boundaries benefiting the world or the mankind in general (e.g. a vaccine for a dreaded disease). In light of this, the following as ‘priority’ characteristics are identified for GPGs: (a) preventing the emergence and spread of infectious disease, (b) tackling climate change, (c) enhancing international financial stability, (d) strengthening the international trading system, (e) achieving peace and security and (f) generating knowledge. There are thus characteristic differences between local and global public goods each of which requires distinct policy approach.

6.2 LOCAL PUBLIC GOODS

Local public goods (LPGs) are goods like ‘common property resources’ established by local authorities/governments mainly for the consumption of local population. From an administrative standpoint, local bodies have certain advantages in the provision of local public goods and services. These are: (i) local knowledge required in their provision (e.g. local preferences), (ii) local accrual of benefits and costs and (iii) appropriate incentives at local level. Local governments across the world provide a variety of local public goods [e.g. (i) water supply and drainage, (ii) street lights and pavements, (iii) waste management, (iv) parks and recreation spaces, (v) roads and traffic management, (vi) museums and galleries, (vii) libraries and swimming pools, (viii) education and healthcare and (ix) social housing]. These public goods have many differentiating factors based on which they can be categorised into either: (i) pure public goods or quasi/semi public goods or (ii) public goods that can be provided by private agencies. Table 6.1 shows a criteria of classification of public goods based on a ‘low-medium-high’ trichotomy in terms of their extent of usage.

Table 6.1: Characteristics of Local Public Goods and Services

	Rivalry in Consumption		
	<i>Low</i>	<i>Medium</i>	<i>High</i>
Excludability of Consumption	<i>Low</i>	Street lights, parks and recreation	Streets, pavements
	<i>Medium</i>	Flood protection	Sports grounds, public conveniences
	<i>High</i>	Museums and galleries	Libraries, swimming pools, recreation spaces
			Public transport, waste water, waste disposal, parking

The provision of public goods and services by public agencies is based on the costs of services (rather than on demand, as in the case of private goods/services). The consumer demand is therefore not considered in the process. Public choice theory, however, argues that the consumer’s demand should be elicited through a democratic political process. For instance, in a democracy, citizens could

explicitly vote 'for or against' the quantum of public goods/services to express their preference. The preference of median voter choice is then considered for identifying the demand. However, it could be difficult or costly to get the 'median voter choice' for every set of public good/service provided by the local government. Moreover, in representative democracy, elected politicians who choose the quantum of public good/service provision, may not reflect the public preference. Thus, although local governments have been providing local public goods (and services) for a long time, their choice is largely reflective of the control of political and bureaucratic system. There is thus a lack of explanation of 'citizen-consumer' choice. Tiebout attempts to offer an explanation to this as follows.

6.2.1 Tiebout Model

Tiebout believed that consumer's preference/choice of public goods can be captured through a 'competitive metropolitan market' of local governments. Tiebout finds a 'market type' solution to determine the level of expenditure on local public goods. For this, he takes forward Musgrave-Samuelson's analytical framework. The major issue in the Musgrave-Samuelson's approach to public goods is the 'lack of a mechanism by which consumer preferences for public goods can be measured'. This is because rational consumers may understate preferences to enjoy goods in order to pay lower tax. Tiebout's concern is about getting this consumer preferences 'rightly revealed' so that they can feel satisfied like the consumption of private goods. This would then enable taxing him accordingly. Tiebout's theory is based on certain assumptions. These are: (i) consumer-voters are fully mobile and will move to that community where their preference patterns, which are set, are best satisfied, (ii) consumer-voters are assumed to have full knowledge of differences between revenue and expenditure patterns and react to these differences, (iii) there are large number of communities in which the consumer-voters may choose to live, (iv) the population is considered to be living on dividend income thereby avoiding employment restrictions, (v) public goods/services supplied do not exhibit any external economies or diseconomies, (vi) for every set pattern of community services, there is an optimal size in terms of cost and (vii) communities below the optimum size attract new residents so as to lower the average costs while those above the optimum size do the opposite. Those at the optimum, try to keep their population constant.

Under the above set of assumptions, the movement of consumer-voter takes place from a greater than optimal size community to a less than optimal size community so as to satisfy the preference pattern of a consumer. In the process, the respective jurisdictions will operate at the lower average costs (cost-efficient) in supplying the public goods/services. The act of moving (or failing to move) replaces the usual market test of willingness-to-buy a good thereby revealing the consumer-voter's demand for the public good (or a set of public goods with associated individual tax). Thus, each locality has a revenue and expenditure pattern that reflects the desire of its residents. This is analogous to the consumer walking into a private market place to buy his goods, the prices of which are already set. In other words, Tiebout places the consumers in a position of walking into a community where the prices of community services are pre-set. Thus, spatial mobility provides the local public-goods a private market's shopping trip. In Tiebout's terms, the preference/choice of a location by moving signals the consumption choice of public good/service in exactly the same way as the consumer's choice in a shopping mall signals his/her consumption choice of private good/service.

Policy Implications: Three policy implications are offered by Tiebout. These are: (i) municipal integration is justifiable only when more of any service is forthcoming at the same total cost without any reduction in any other service. This means, metropolitan consolidation should be considered only if it leads to the provision of more quantum of public services at same tax cost. (ii) Policies that promote residential mobility (and increase the knowledge of consumer-voter) will improve the allocation of government expenditures in the same way as the mobility among jobs improve the allocation of private resource. (iii) The policy of fixed revenue-expenditure pattern is not possible in large, dynamic metropolis but only in small rural and suburban localities. This happens because of the nature of local public goods as smaller localities spend efficiently in line with citizen preferences. Besides these, one of the main policy implications that was not proposed by Tiebout (but interpreted by others subsequently) is that decentralisation would serve better for the governance of metropolitan areas than a centralised approach. Although the argument for decentralisation comes from ‘the theory of fiscal federalism’, Tiebout’s theory accords support to decentralisation as a better means of serving the public by providing public goods/services of their choice. In other words, Tiebout’s theory supports the ‘decentralisation theory’ of public finance, policy and administration.

Critique of Tiebout Model: One of the main criticisms of Tiebout’s theory is that since ‘agglomeration and scale economies’ play an important role in large metropolitan areas, a single authority can perform better than competitive multiple local governments by leveraging the advantages. A second criticism is that it ignores the equity dimension. Sorting of people according to preferences may give rise to undesirable outcomes (e.g. racial segregation, segregation of people by income). A third criticism is that multiple jurisdictions (under Tiebout model) may lead to fragmentation and proliferation leading to urban (suburban) sprawl and complicated metropolitan governance (i.e. coordination and accountability issues). A fourth criticism is that some unorthodox economic theory groups (that do not believe in the concept of local public goods), disagree with the usefulness of taxation as an instrument for signalling the movement for re-location of individuals/firms.

6.2.2 Club Goods

Club goods are a type of goods that are excludable but non-rivalrous until at least a point where congestion occurs. Club goods have artificial scarcity, exhibiting high excludability but lower rivalry in consumption characteristics. They essentially have ‘zero marginal cost’ and are generally provided by natural monopolies. Buchanan (1965) in his work on ‘An Economic Theory of Clubs’ addresses the question of how the size of the group influences the voluntary provision of a ‘public good’ by providing a theoretical structure of collective ownership-consumption arrangements (Fig. 6.2). He considers ‘voluntary

Table 6.2: Club Goods and Public Goods

	Private Goods	Common Pool Resources
Rivalrous	Food, clothing, cars, parking spaces	Fish stocks, timber, coal
Non-rivalrous	Club Goods Cinemas, private parks, satellite, television	Public Goods Free-to-air TV channels National defence

clubs' to show how an optimal number of members of such a club can maximise utility for its members. He takes the example of a private good like 'shoes' to illustrate the concept. Two people cannot wear the same pair of shoes at the same time. But two or more people can take turns wearing them. As the number of people sharing the same pair of shoes increases, the amount of utility each person derives from the shoes diminishes. Each new member (or co-owner) helps reduce the cost of the 'club good' but there is an optimal size that maximises the benefits for the members.

Check Your Progress 1 [answer within the given space in about 50-100 words]

- 1) Define 'local public good' with illustrations.

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- 2) Identify the 'gap' that exists in the provision of LPGs by the local governments. Why does this gap exist? In what way is this gap filled-up theoretically?

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- 3) State the essence of Tiebout model/theory.

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- 4) State the 'policy implications' of Tiebout's theory.

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- 5) What are the grounds on which 'Tiebout's prescriptions' are criticised?

- 6) Distinguish between ‘club goods’ and ‘public goods’ with illustration.

6.3 GLOBAL PUBLIC GOODS

World Bank defines ‘global public goods’ (GPGs) as ‘commodities, services and systems (of rules or policy regimes) with cross-border externalities important for development and poverty reduction’. GPGs can be supplied in sufficient quantity only through cooperation and collective action of countries, both developed and developing. GPGs are, thus, goods (with benefits that extend to all) bearing the following characteristics: (i) are public goods provided by individuals, communities and nations with international implication (and hence requiring international cooperation), (ii) are essentially of public participation in the determination of level of goods, (iii) whose accrual of benefits depend on capacities and cost of access of different groups and (iv) carry priority for special problems of developing countries. The three ‘triangle of publicness’ (i.e. publicness in consumption, publicness in decision-making and publicness in distribution of net benefits) is therefore what determines whether a good is to be regarded as a GPG (global public good) or not. This concept is used to evaluate the structure of international institutions, decision-making processes, framing and enforcement of rules and distribution of net benefits among member countries. The concept of ‘triangle publicness’ is useful in designing a fair institutional mechanism for the supply of GPGs.

Public goods (PGs) can also be classified according to their geographical or spillover area. This is the range over which their benefits (or dis-benefits) are felt. On the basis of their range, the GPGs can be classified into: (i) local (benefits affecting a small locality), (ii) national (pertaining to a nation), (iii) regional (relating to groups of nations) and (iv) global (pertaining to the entire world). Thus, garbage dumped by a person is a local public ‘bad’ as the stench affects only a small locality. The donation made by a rich person to a public park falls under the same category. Defence expenditure leading to a feeling of security is a public good for the entire nation. A trade block is a regional good as it benefits a group of nations. Green house gas emission is a global public ‘bad’ as it affects people all over the globe. Achievement of MDGs (millennium development goals) amounts to ensuring the reach of the benefits of GPGs to population across nations (Table 6.3) and hence MDGs are unambiguously the most important of all GPGs.

Table 6.3: Millennium Development Goals as Global Public Goods

Goal	Type of GPG
Eradicate extreme poverty and hunger	Merit goods, GPG by global public choice.
Achieve universal primary education	Merit good, GPG by global public choice.
Combat HIV/AIDS, malaria and other diseases	GPG
Promote gender equity and empower women	GPG
Ensure ‘environmental sustainability’ by: <ul style="list-style-type: none"> • integrating the principles of ‘sustainable development’ in the policies of countries and reverse the loss of environmental resources; • halve by 2015 the proportion of people without sustainable access to safe drinking water; and • achieve by 2020 a significant improvement in the lives of at least 100 million slum dwellers. 	GPG, Merit good, GPG by global public choice (all three bullets)
Develop a ‘global partnership for development’ by: <ul style="list-style-type: none"> • developing an open, rule-based, predictable, non-discriminatory trading and financial system; • including a commitment to good governance, development, and poverty reduction – both nationally and internationally; and • addressing the special needs of the least developed/land locked countries and small developing states. 	GPG GPG (for equity) GPG by global public choice (for equity)

6.3.1 Peace and Security

World peace is an ideal of ‘freedom, peace and happiness’ among and within all nations and people. World Peace is an idea of planetary non-violence by which nations willingly cooperate (either voluntarily or by virtue of a system of governance that prevents warfare). The term ‘world peace’ is sometimes used to refer to a cessation of all hostility amongst all humanity. For instance, world peace could include the agreement to allow for the crossing of boundaries (via human rights, animal rights, technology, education, engineering, medicine, diplomats), or to put an end to all forms of fighting. Since 1945, the United Nations has strived to work for resolving conflicts without war. However, nations have entered into

numerous military conflicts. The most effective way to diminish human suffering and the massive economic costs of conflict and their aftermath is to prevent conflicts in the first place. In this, the UN plays an important role in 'conflict prevention' using diplomacy, good offices and mediation. Among the tools the organisation uses to bring peace are special envoys and political missions in the field.

'Peace keeping' has proven to be one of the most effective tools of UN to assist host countries navigate the difficult path from conflict to peace. Its multidimensional peace-keeping operations are called upon not only to maintain peace and security, but for a variety of reasons (e.g. facilitate political process, protect civilians, assist in disarmament, for demobilisation and reintegration of former combatants, to support constitutional processes and organisation of elections, protect and promote human rights, assist in restoring the rule of law and extending legitimate state authority, etc.). Peace keeping operations get their mandates from the UN Security Council whose troops and police are contributed by member states. UN peace building activities are aimed at: (i) assisting countries emerging from conflict, (ii) reducing the risk of relapsing into conflict and (iii) laying the foundation for sustainable peace and development. The UN is being increasingly called upon to coordinate the global fight against terrorism. It advances international peace and security through the pursuit of the elimination of nuclear weapons and other 'weapons of mass destruction' and the regulation of conventional arms.

6.3.2 Global Peace Index (GPI)

GPI measures the relative position of a nation's (and regions') peacefulness. GPI ranks 163 independent states and territories (covering 99.7 percent of the world's population). The GPI is a report produced by the Institute for Economics and Peace (IEP) with data collected by the Economist Intelligence unit. The Index was first launched in May 2007 with subsequent reports being released annually. In 2017 it ranked 163 countries. The GPI gauges global peace using three broad themes: (i) the level of societal safety and security, (ii) the extent of ongoing domestic and international conflict and (iii) the degree of militarisation. Factors are both internal (such as level of violence and crime within the country) and external (such as military expenditure and wars). It has been criticized for not including indicators specifically relating to violence against women and children. However, reliable international data on these subjects is either unavailable or very sparsely reported in many countries. The 2018 GPI indicates Iceland, New Zealand, Austria, Portugal and Denmark to be the most peaceful countries and Syria, Afghanistan, South Sudan, Iraq and Somalia to be the least peaceful. Long-term findings of the 2017 GPI include a less peaceful world over the past decades, growing inequality in peace between the most and least peaceful countries and a widening impact of terrorism with high numbers of people killed in terrorist incidents over the last few years.

In assessing peacefulness, the GPI investigates the extent to which countries are involved in ongoing domestic and international conflicts. It also evaluates the level of harmony or discord within a nation. GPI's assertion is that low crime rates, minimal incidences of terrorist acts and violent demonstrations, harmonious relationship with neighbouring countries, a stable political scene and a small proportion of the population being internally displaced as refugees could be suggestive of peacefulness. India's rank is 136 on the basis of 2018, GPI Index.

Check Your Progress 2 [answer within the given space in about 50-100 words]

- 1) How does the WB define 'global public goods' (GPGs)?
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- 2) State the characteristics of GPGs. What basically determines the GPGs?
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- 3) How are GPGs determined? In what way this deterministic feature useful?
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- 4) What is GPI? What does it measure? How does the GPI gauge 'global peace'?
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- 5) State the five factors considered by the GPI to regard a region as 'peaceful'?
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6.4 GPG PERSPECTIVES ON ENVIRONMENT AND POVERTY REDUCTION

Public goods contribute to individual welfare. Such goods cannot be provided by individual producers. This is because of its two essential characteristics: (i) their property rights are non-exclusive (or imperfectly exclusive) i.e. no one can be excluded from their benefits or avoid the negative effect and (ii) they are non-rival in use i.e. the use by one person does not compete with the use by another person. Because of these two characteristics, individual use cannot be adequately priced, free-riding cannot be avoided and markets typically fail in providing these goods. Policy interventions are therefore necessary to organise collective action, starting with agreements between actors involved, to provide for specific public goods. The concept is relevant for different levels of decision-making. For instance, it can also be applied to the issue of poverty reduction and global environmental management. Providing GPGs is particularly challenging as it requires cooperation and collective action involving many countries and stakeholders. Examples of global public goods are the protection of the ozone layer, peace and macro-economic stability. Development and poverty reduction rely, among other things, on the provisioning of environmental goods, some of which are public and global and local (e.g. soil conservation) and others private (e.g. commodities). Three categories of GPGs that are relevant for poverty reduction and global environmental change are:

- ‘environmental GPGs’ for their relevance for poverty reduction at different scale;
- ‘socio-economic GPGs’ that are influenced by the change in environment and by the increasing scarcity of natural resources; and
- ‘capacity related GPGs’ that are necessary to bring about collective action at the global level to provide GPGs.

6.4.1 Knowledge as GPG

Socio-economic development is strictly associated with the capacity to generate, absorb and diffuse knowledge. Analysing the economic characteristics of knowledge, many thinkers (e.g. Richard Nelson, 1959; Kenneth Arrow, 1962) have noted that knowledge is a commodity quite different from others. On the one hand, it is generated for competitive purposes (e.g. armies and companies invest time and money to develop new and superior knowledge to be used against their rivals). On the other hand, it seldom happens that those who generate knowledge can manage to keep it only for their private benefit beyond a limited time frame. This means, neither industrial and military secrecy nor intellectual property rights can, in the long run, impede the dissemination of knowledge. A large portion of those generating knowledge (including academicians and their universities/institutions), diffuse their results for the sole satisfaction of seeing their achievements acknowledged and their reputation enhanced. In fact, the dissemination of knowledge is the ultimate goal of their activity.

It is not easy to identify the components of knowledge that are ‘private’ or ‘public’, ‘national’ or ‘global’ (Nelson, 1992). The debate on these issues are often passionate, especially when they have normative implications i.e. should knowledge be generated for the benefit of everybody? Is it right to keep secret (or proprietary) some knowledge that may have crucial implications for health

or security? Should the outcome of knowledge generated with the taxpayers money of a country be disseminated globally? These issues are not only theoretical but have important policy implications of far reaching practical relevance. They can be posed as follows.

- To what extent public institutions, regulations and norms should protect the intellectual property rights of inventors and innovators?
- Should universities and institutions make profit from the ideas they generate?
- Should national institutions provide free access to knowledge generated in them to scholars and students of rival countries?

Knowledge has only some characteristics of a public good, especially since it is non-rivalrous in consumption. There are economic and institutional methods that would potentially allow making knowledge excludable, but they are never totally effective. Knowledge is very close to be a pure public good when it is used on turnkey basis, viz. when it is not required of users to understand how it works and how it is developed. In most cases, users have to learn to use knowledge, and the more it is sophisticated and complex, the more it will require investment of time and resources. In these cases, even when knowledge is free to use, it can be used only by affording the relative costs. Therefore, what makes knowledge differing from public goods is not the related production process, rather its process of diffusion. This aspect has been scarcely addressed in standard economic theory.

Knowledge is so crucial for welfare, and its characteristics as commodity so different, that public players have always taken a very active role in its promotion and distribution. Public policies and regulations, in all countries, aim at rewarding the producers of good ideas, to increase the investment in knowledge and to induce inventors to disclose their discoveries. Governments have promoted knowledge to: win wars, increase security, safeguard public health, explore the sky, improve communications and advance education and learning. Policy makers may not totally perceive the characteristics of 'public good' of knowledge, but they certainly appreciate the fact that generating and disseminating knowledge has strong positive externalities.

Intellectual property rights (IPRs) protection explicitly aim at making 'knowledge' excludable thereby preventing its imitation and curtail the possibility of its further sale. IPRs are not needed if there are technical devices that impede the forgery of technology. In that case, normal property rights are sufficient guarantee. The rationale for IPRs therefore resides on the fact that knowledge in itself is often non-excludable. Since the explicit aim of IPRs is to make the 'implicit-knowledge' in a product excludable, it appears that there is a contradiction in the government's policy of IPRs. This is because, on the one hand, it encourages the generation and diffusion of knowledge having the characteristics of a pure public good, while on the other hand, it makes it a 'private good' by making it excludable through its IPRs legislation. Hence, the issue of knowledge as a 'public good' has a direct implication for the design of IPRs. Governments have a large number of instruments to make IPRs strong and weak [e.g. (i) the length of protection provided to inventors, (ii) the requirements of novelty to qualify for the granting of a patent, (iii) courts' ruling on controversies about infringements, (iv) the level of enforcement guaranteed by the police against forgeries, etc.]. The lens of global public goods require that, the

more the governments decide to make IPRs strong, and thereby promote institutional exclusivity, the more it will need to use other channels to promote knowledge in areas of priority. Such areas of priority include health, environment, communications, mobility and security, all of which require the development of new knowledge. In such areas, new scientific and technological competencies are far from being confined to one country only. On the one hand, any significant breakthrough has an impact beyond the borders of the state that has actually produced the knowledge. On the other hand, it is very likely that the most significant knowledge are the ones which are the outcome of developments in other locations. In spite of this, many national governments develop their own agenda of science and technology policy on the implicit assumption that sooner or later they will benefit from basic research funded and performed elsewhere. But when such an attitude becomes general, the free-riding syndrome will prevail i.e. each country might be tempted to wait until others will invest in finding out a solution. This, in turn, will lead to an underproduction of the good.

Public goods are considered 'global' when they cover a large group of countries and when it is difficult or impossible to identify a geographically restricted community of beneficiaries. Financial stability, peace, combating climate change and transmittable diseases are all cases of public goods that do not have a clear geographical space as directly or indirectly they affect everybody. Besides this geographical criterion, Kaul et al. (1999) also stress the existence of a temporal dimension i.e. goods (or bads) that could benefit (or damage) not only the current generation, but also future generations. Therefore, though knowledge might not entirely fit into the framework of public goods, it is certainly a 'global good' since it is only in a few occasions, and for short periods of time, that institutions and companies manage to maintain their knowledge within their confined boundaries. Even in the case of top secret investigations, such as those associated with the military sector, knowledge is likely to spill-over to rival countries. Hence, excludability may be obtained in the short run, but less and less in the long run. If the impact on future generations is also included, it is hard to imagine how some knowledge can provide benefits to a specific local or national community and not to all the others.

Public institutions, members of national academic communities and of other publicly funded institutions always have a strong propensity to exchange their wisdom, insights and perceptions with foreign colleagues. Some of the instruments used to guarantee the international dissemination of ideas include academic societies, international journals, conferences, sabbatical years and mobility grants. National governments have encouraged the academic community to be open to cross-border collaborations because there is awareness that the outcomes are non-rivalrous and therefore they should be also made non-excludable, both within borders as well as across borders. Moreover, there is a clear self-interest i.e. collaboration implies not only knowledge outflows, but also inflows.

People potentially benefit from knowledge that has been generated elsewhere and often paid for by taxpayers of other countries. The propensity to act as free-rider is constrained by the very characteristics of knowledge. On the one hand, countries that do not invest enough have lower absorptive capacity and would be slower or inefficient in putting into practice what has been generated elsewhere. On the other hand, countries which invest more in knowledge are also those who are able to learn and assimilate the knowledge generated elsewhere. That is, countries manage to capitalise what they pay for. Thus, the potential to benefit

from scientific and technological expertise by ‘catching-up countries’ is constrained by the level of capabilities of the absorbing (or free-riding) countries. This is a typical case where the difference between the freely available knowledge and knowledge that can be used without incurring costs becomes relevant. Even if significant portions of knowledge are freely available, it does not mean that other countries are able to enjoy the benefit of transfer without the necessary infrastructures and skills. Countries that have managed to absorb knowledge generated are also those that have invested massively in endogenous infrastructures i.e. R&D and education. Japan in the 1950s and 1960s, South Korea and Taiwan in the 1970s and 1980s, China in the 2000s are all examples of countries that have taken advantage from knowledge generated elsewhere because they made an enormous endogenous effort to acquire it. To consider knowledge as a pure public good is therefore fraught with risks of diffusing the view that developing countries could benefit from the competencies of developed countries if the latter are prepared to remove ‘barriers to the transfer’. Clearly, this is inaccurate because institutional hindrances (such as IPRs) or economic hindrances (such as industrial secrecy) are not the main obstacles to the use of knowledge. The main obstacle faced by developing countries is the lack of ‘endogenous absorptive capabilities’.

The business sector is increasing its role in the development of knowledge not only within borders, but also internationally. Companies contribute to perform R&D, upgrade skills, disseminate technical and engineering capacities, both at home and abroad. Firms are therefore less and less associated to a national territory. The activities they carry out outside their nation, including R&D, have increased substantially. Several leading MNCs have built their own intra-firm and international innovation centres. New products introduced by firms are traded in the international markets. Likewise, new processes are scrutinised and diffused by competitors at home and abroad. Ultimately, therefore, the externalities associated to knowledge generation are less and less restricted to a specific nation. It, therefore, raises the question: ‘to what extent the knowledge generated by MNCs is private or public while their investment in R&D and innovation are multi-national (rather than uni-national)?’. This is particularly important since they generate substantial externalities across national borders. MNCs are therefore important vehicles for the international spread of knowledge. They do not necessarily manage to keep their knowledge to themselves but often act as ‘fertilisers for skills that are picked-up and further developed in host countries’.

Check Your Progress 3 [answer within the given space in about 50-100 words]

- 1) State the three categories of GPGs that are relevant to reduce poverty and protect environment.

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- 2) Is ‘knowledge’ a ‘public good’? Why?

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Public Goods and Externalities

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3) If you concede that 'knowledge' may not often be a 'pure public good', on what grounds the rationale for IPRs arise?

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4) When is a 'public good' considered a 'global public good' (GPG)? Give examples of GPGs.

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5) On what grounds does Kaul (1999) hold out that though 'knowledge' may not be a 'public good', it certainly qualifies as a 'global public good'?

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6) Do you agree that in case of 'knowledge', potential to free-ride is implicitly curtailed? How?

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6.5 LET US SUM UP

The unit explains the concepts of ‘local public goods’ and ‘global public goods’ with the help of Tiebout model, Millennium Development Goals, Peace and Security, Environment and Knowledge. Tiebout model explains the existence of competitive market for provision of local public goods. Knowledge has some characteristics of public good, such as being non-rival in consumption and in the long run non-excludable. But knowledge cannot be transferred at low or negligible costs i.e. prospective users should invest to develop their ‘absorptive capacity’. Consequently, free-riding in knowledge is less likely to be successful than with pure public goods. This aspect has important implications for national and global policies.

6.6 KEY WORDS

- Free-rider Problem** : Due to non-excludability and non-rivalness in consumption characteristics of public goods, nobody is willing to pay for it thinking that there is no chance for getting deprived of it.
- Tiebout Model** : Says that people who are not pleased with the goods and services being provided by their town can improve their welfare position by moving to a locality offering a mix of goods and services more in harmony with their preferences.
- Economic Theory of Club** : Conveys that the size of the group influences the voluntary provision of a public good by providing a theoretical structure of collective ownership-consumption arrangements.
- Triangle of Publicness** : Refers to publicness in consumption, publicness in decision-making and publicness in distribution of net benefits.

6.7 SOME USEFUL BOOKS

- 1) Aronson, J. Richard (1985). *Public Finance*, McGraw Hill Book Company, International Student Edition.
- 2) Arrow, Kenneth. (1962). “ Economic Welfare and the Allocation of Resources for Invention” in the *Rate and Direction of Investment Activity: Economic and Social Factors*, edited by Richard Nelson for the *NBER* , 609-626. Princeton: Princeton University Press.
- 3) Ostrom, M. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press.

6.8 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) LPGs are like ‘common property resources’ established by local authorities/governments mainly for the consumption of local population. Examples of LPGs are: water supply and drainage, street lights and pavements, waste management, parks and recreation spaces, roads and traffic management, etc.
- 2) The gap is the non-consideration of public or consumer choice in the provision of LPGs. The gap exists due to the fact that it is difficult to consider consumer choice in the provision of every LPG and in democracies it is the elected leader who decides on this which may not be reflective of consumer choice. Theoretically, this gap is filled-up by the Tiebout theory or model.
- 3) Essentially, Tiebout places a consumer in a mobile situation whereby he moves from a place of less satisfaction (or preference) to a place where he gets higher satisfaction or preference. This mobility accords Tiebout’s theory the required ‘spatial characteristic’ to the consumer. Thus, in essence, the mobility accords a market-like-place to consumers to shop for where they want to settle thereby establishing a missing-market for LPGs.
- 4) (i) Decentralisation in providing LPGs should be maintained till such time their integration is proven to provide the LPGs with the same average cost. (ii) Policies that promote mobility of residents optimises the return on public expenditure. (iii) Smaller localities spend efficiently in line with citizen preferences thereby according the local authorities efficiency in adopting the ‘fixed revenue-expenditure pattern’.
- 5) (i) ignoring the effect of ‘agglomeration and scale economies’ in large metropolitan areas for one authority centralised approach, (ii) ignoring the dimension of ‘equity’ which arises by ‘sorting people according to preferences’ and (iii) multiple jurisdictions might lead to problems of ‘fragmentation and proliferation’ in large cities (e.g. emergence of slums).
- 6) ‘Club goods’ (e.g. private park) are provided by natural monopolies and bear the characteristics of ‘excludability’ but with ‘zero marginal cost’. Public goods (like ‘national defence’), on the other hand, are both ‘non-rivalrous’ and ‘non-excludable’ in their nature.

Check Your Progress 2

- 1) As: ‘commodities, services and systems (of rules or policy regimes) with cross-border externalities important for development and poverty reduction’.
- 2) (i) public goods provided by individuals, communities and nations with international implication, (ii) have public participation, (iii) benefits depend on capacities and cost of access and (iv) carry priority for special problems of developing countries.
- 3) It is basically determined by the ‘triangle of publicness’ i.e. ‘publicness’ in consumption, decision making and distribution of net benefits. It is useful in designing a fair institutional mechanism for the supply of GPGs.

- 4) GPI is a report produced by the Institute for Economics and Peace (IEP) with data collected by the Economist Intelligence unit.. It measures the relative position of a nations' (and regions') peacefulness. The GPI gauges global peace using three broad themes: (i) the level of societal safety and security, (ii) the extent of ongoing domestic and international conflict and (iii) the degree of militarisation.
- 5) (i) low crime rates, (ii) minimal incidences of terrorist acts and violent demonstrations, (iii) harmonious relationship with neighbouring countries, (iv) a stable political scene and (v) a small proportion of the population being internally displaced as refugees.

Check Your Progress 3

- 1) Environmental GPG, socio-economic GPGs and capacity related GPGs.
- 2) Strictly speaking, 'knowledge' is not a pure 'public good' since it is non-rivalrous in consumption even though there are methods that can potentially make 'knowledge' excludable. Further, if it is used without applying mind on understanding 'how it is developed' or 'how it works', then 'knowledge' qualifies as a pure 'public good'.
- 3) It arises from the fact that no technical device can impede the forgery of technology. If this were possible, then normal property rights would have sufficed. The rationale for IPRs stems from the fact that 'knowledge in itself is often non-excludable' but a product based on 'knowledge' is excludable.
- 4) Public goods are considered 'global' when they cover a large group of countries and when it is difficult or impossible to identify a geographically restricted community of beneficiaries. Examples include: financial stability, peace, combating climate change and transmittable diseases.
- 5) He does it by introducing the 'temporal dimension'. The introduction of this dimension makes 'knowledge' questionable as a 'public good' although in the short run companies or firms may treat it for their exclusive benefit. But once the temporal dimension is introduced, in the long run, any knowledge is beneficial only when it is shared widely.
- 6) Yes. This is because, even to free-ride, there should be past investment for increasing the 'absorptive capacity' of countries.



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