
UNIT 4 THEORY OF PUBLIC GOODS

Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Classification of Goods
- 4.3 Characteristics of Public Goods
- 4.4 Theory of Public Goods
 - 4.4.1 Lindahl's Equilibrium Model
 - 4.4.2 Samuelson's Pure Theory of Public Expenditure
- 4.5 Non Private Goods
 - 4.5.1 Club Goods
 - 4.5.2 Merit Goods and De-merit Goods
- 4.6 Free Rider's Problem
- 4.7 Local and Global Goods
 - 4.7.1 Local Public Goods
 - 4.7.2 Global Public Goods
- 4.8 Let Us Sum Up
- 4.9 Key Words
- 4.10 Some Useful Books
- 4.11 Answers or Hints to Check Your Progress Exercises

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.

.....

.....

.....

.....

.....

2) State a few bases for classification of goods.

.....

.....

.....

.....

.....

3) Distinguish between goods and services.

.....

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

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:

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

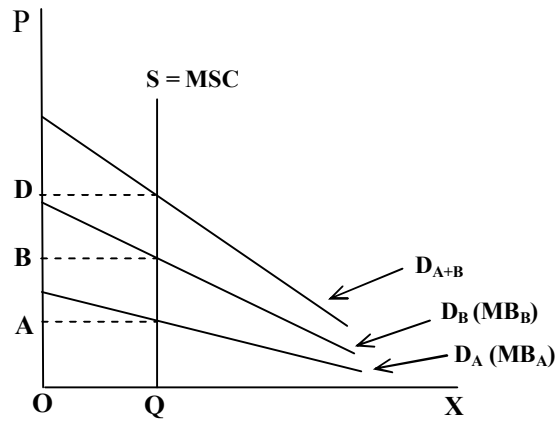


Fig. 4.2: Determination of Quantity and Individual Prices (Taxes) of Public Good X

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_1B_1 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

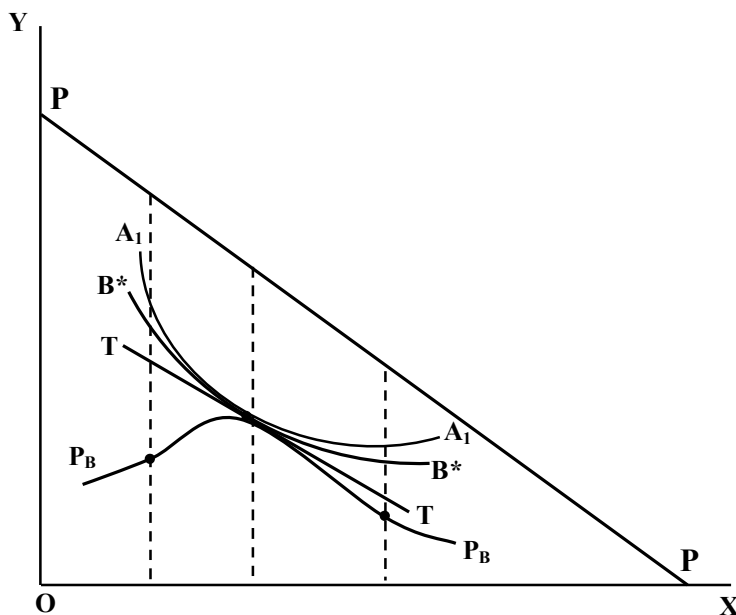


Fig. 4.3: Derivation of Availability Curve from Production Possibility Curve and Indifference Curve

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).

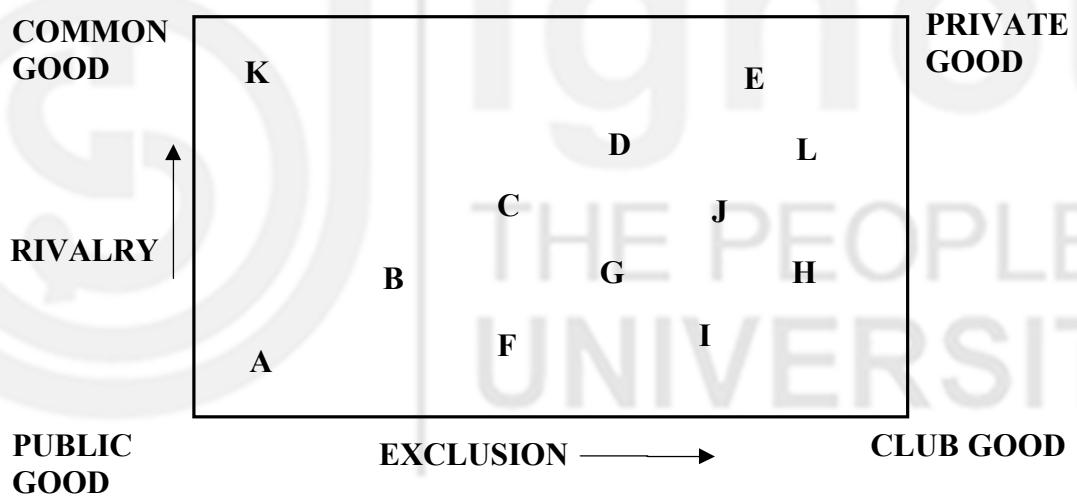


Fig. 4.5: Goods in Real World

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?

.....
.....
.....
.....
.....

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

.....
.....
.....
.....
.....

Public Goods and Externalities

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

.....
.....
.....
.....
.....

4) What is a congestible public good?

.....
.....
.....
.....
.....

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

.....
.....
.....
.....
.....

6) Define merit and demerit goods.

.....
.....
.....
.....
.....

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

.....
.....
.....
.....
.....

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

.....
.....

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

.....

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

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.

Public Goods and Externalities

| | |
|---------------------------------|--|
| 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.