9
INDEX NUMBERS
Problems and Uses

9.1 INTRODUCTION

In the previous lesson you have learnt about the meaning, characteristics and methods of construction of index numbers. We have to face several problems when we attempt to construct an index number, for example in selection of items, weights, base period etc. This lesson attempts to explain the nature of these problems in the construction of an index number. It has many uses in practical life. It is an extremely useful statistical information for government. In this lesson we will also learn about the uses of an index number.

9.2 OBJECTIVES

After going through this lesson you will be able to :

- explain the problems arising in the construction of an index number;
- explain the important uses of an index number;
- study an index number in some book or newspaper and make out its meaning.

9.3 PROBLEMS IN THE CONSTRUCTION OF AN INDEX NUMBER

While constructing index numbers in actual practice, we are faced with the following problems :

1. The purpose of an index number :
First of all we should carefully decide the purpose of constructing an index number, that is, what exactly we are going to measure and also how we want to use it. An index number, if properly constructed for the purpose in mind, is the most useful and powerful tool. But if it is not properly constructed, it can be a dangerous one because it is likely to give wrong and misleading result. There is no all-purpose index number. Every index number is of limited

and particular use. Decisions regarding selection of goods and services to be included in index number and their prices, selection of base period/year (reference period) etc., which we shall study in the following pages, very much depend upon the purpose of an index number. Hence, there is need for extra caution in this respect.

2. Selection of base period :

Price index number, as mentioned earlier, is expressed as a price relative. Therefore, we have to choose a suitable reference for comparison, This is called base or reference period. This base period is the period with which comparisons are made. It may be a year, a month or a day. The choice of base period depends on the objective or purpose of the index number. It should not be a period too distant in the past because with the passage of time some of the old commodities fade in importance and some new commodities appear to satisfy given wants. Also this period should be a period of normal economic activities. It should not be a period during which any war, earth-quake, or any other natural calamities, like floods, droughts and epidemics had taken place.

3. Selection of goods and services :

This also depends on the purpose of the index number. The commodities and services selected for the purpose should be representative of the group. These should be popular and should represent the tastes, habits, customs and fashions of the people for whom the index number is constructed. Suppose we want to construct cost of living index number for industrial workers of Okhla (in Delhi). We should make a list of goods and services consumed by these people. Industrial workers are extremely unlikely to use goods like woollen carpets, refrigerators, cakes and pasteries, VCR etc. Hence, they sould not be included in the list. It is essential to add that the selection of goods and services, their quantities and numbers etc., are best judged from what we call family budget enquiries. These enquiries can be conducted on the people for whom we are constructing an index number. In our case the people are the workers of an industrial area (for example, Okhla in Delhi). We can select some families amongst them and enquire about the goods and services they are generally consuming, prices they are paying and places from where they are buying. We can also find the quantities of each good and service used by them.

4. Selection of price quotations :

Selection of the prices of goods and services (also called price quotations) included in index numbers is our next problem. This also can be solved by looking at the results of the family budget enquiries mentioned above. It would be out of place to take wholesale prices or the prices prevailing in fashionable areas because these workers neither buy on wholesale rates nor from fashionable areas. Perhaps the goods and services they buy might not available in fashionable area at all. To study the cost of living of our industrial workers we have to construct what is called consumer price index number or cost of living index number. For cost of living index only retail prices are justified.

5. Choice of weights :

It is an important problem in the construction of index numbers. From the family budget enquiries again, it will become clear that all goods and services consumed by our group do

not occupy the same place or importance. Some goods and services do not force us to spend a greater portion of income. For example, food items in the budget of industrial workers occupy greater importance as in percentage terms, he spends a big proportion of income on it. In contrast he spends a lower percentage on education, entertainment or medicines although items (things) like medicines might be sometimes more important than clothing etc. Therefore, the weights are decided on the basis of the proportion of income spent by the people on each item or group of items/goods. There are various ways of providing weights to different items (or goods). Some prefer to use base year quantities (q_0), some current year quantities (q_1), and still others use value weights (p_0q_0).

6. Choice of average :

We have already read that index number is a statistical device with a purpose of showing average changes in one or more related variables over time and space. Now the question arises which average-arithmetic mean, mode, median, geometric mean etc., - should be used for this purpose. It is held that geometric mean is a better method for averaging. But due to difficulties of calculation, it is rarely used. So most commonly arithmetic mean is used. Once this decision has been made, the next problem in this category is whether we shall use simple/unweighted average or weighted average method. For less important studies, simple/unweighted average might serve the purpose. But for more accurate studies, it is essential to use a suitable weighted average.

7. Choice of method :

This also depends on the purpose of index number.

POINTS TO REMEMBER

- Before constructing an index number its purpose should be clear.
- Base period should not be chosen too far off in the past. Also it should be a period of normal economic activity.
- Selection of goods and services to be included in the construction of an index number very much depends upon the purpose of index number and the class of people for which it is being constructed.
- Selection of goods and services and their weights can be made easy with the help of family budget enquiries.
- Prices of goods and services included in the index number should be obtained only from those markets which actually are used by the people for whom the index number is being prepared.
- Although geometric mean is a better type of 'average' yet largely we use arithmetic mean, in constructing an index number.

INTEXT QUESTIONS 9.1

Fill in the blanks with suitable words out of those given in the brackets :

a) First of all we should decide what is the ..... of constructing an index number. (weight, formula, purpose, price quotation)

b) Base period should be a period of ..... (normal economic activities, war, floods)

c) While constructing cost of living index number for industrial workers we should include.....
   i) Food items, refrigerators and television sets
   ii) Food items, clothing, fuel and rent
   iii) Entertainment, education, VCR and TV sets.

d) We should take..... prices in constructing cost of living index numbers. (wholesale, retail).

9.4 IMPORTANCE OF INDEX NUMBERS

Index numbers have several uses. Some of the uses are explained below :

1. Price index is a **measure of cost of living.** Prices of goods and services we use do change over time. Generally, we observe that prices of goods and services we use at home or in business have a tendency to rise over the period. It leads to rise in the cost of living. The employees in turn demand higher wages, more dearness allowance, more rent, etc. How much should be the rise in wages etc. is the concern of employers. Price index is a useful guide in this respect. The decisions regarding fixation of minimum wages, dearness allowance, etc. can be conveniently taken by government on the basis of price index.

2. Price index is also a good **measure of inflationary and deflationary tendencies** in the economy. Governments take suitable policy measures to control these tendencies.

3. Production index is a good **indicator of the economic progress** taking place in the different sectors of the economy. They can also be used to forecast, future trends in production. As such these indices are extremely useful for planning.

4. Other indices relating to national income, exports, imports, are also useful. National income index measures the rate of growth. Per capita income index indicates the rate of economic development and also an indicator of the level of poverty.

5. Index numbers can also be used to make comparison among different regions of a country and among different countries.

9.5 READING AN INDEX NUMBER

Suppose you come across a certain index number in some newspaper, magazine or a book. Let this be a wholesale price index of country 'X' given below :

Index No. of Wholesale Prices (Base 1980-81 =100)

	Primary Articles	Manufactured products	Fuel,power light and lubricants	All commodities
Weights	41.67	49.87	8.49	100.0
1	2	3	4	5
Last week of				
1980-81	100	100	100	100.0
1985-86	149	163	229	162.6
1990-91	249	267	400	270.7
1995-96	331	391	609	359.3

Let us see what conclusions we can derive from the above index about the changes in wholesale prices in the country 'X'. The index classifies all commodities into three groups :

(a) Primary articles comprising of food grains, non-food articles and minerals.
(b) Manufactured products classified into food products; textiles; chemicals and chemical products ; basic metals, alloys and metal products; and machinery and transport equipment.
(c) Fuel, power, light and lubricants.

We can say the following about the above index number :

1. The base year is 1980-81 which is taken to be 100. Prices of all other years are expressed as percentage of this.
2. It is weighted index. Different groups of commodities are assigned different weights. Primary articles, manufactured products, fuel etc., are respectively assigned 41.67%, 49.87% and 8.46% weights out of total of 100.
3. Index number is prepared on the basis of prices prevailing in the last week of the year (Column 1).
4. Price index of each year indicates the change in price level in comparison to the price level of 1980-81 only.

   For example, price index of all commodities (column 5) price levels in the year 1985-86 were 162.6% of the price level in 1980-81 indicating an increase of 62.6% during 5 years.

   Similarly price levels in the year 1990-91 were 270.7% of the price level in 1980-81 indicating an increase of 170.7% during 10 years.
5. If we want to compare the index of some particular year with the year different from base year ; some more calculations have to be made.

For example, suppose we want to compare price level of primary articles in the year 1995-96 with the year 1990-91. How much percent is the price level of 1995-96 as compared to the price level of 1990-91 can be known through calculating a simple percentage in the following manner.

$$\text{Price level of 1995-96 as percent of 1990-91} = \frac{\text{Price index of 1995 - 96}}{\text{Price index of 1990 - 91}}$$

$$= \frac{331}{249} \times 100 = 133 \text{ approx.}$$

The conclusion, therefore, is that price level increases by 33 per cent, during the period of 5 years between 1990-91 to 1995-96.

6. We can also make commodity, groupwise comparison about changes in the price level over different years.

POINTS TO REMEMBER

- Price index is a good measure of cost of living and inflationary and deflationary tendencies.
- Production index measures economic progress and national income index measures rate of economic growth.
- Per capita income measures rate of economic development.
- Index numbers are also useful for making comparison among nations and among regions.
- Comparing a year with a year different from the base year involves extra calculations.

INTEXT QUESTIONS 9.2

Fill in the blanks using appropriate word from the choices given in brackets :

(a) ..... index is a good indicator of inflationary and deflationary tendencies.(Production, Price)

(b) Rate of economic growth is measured by..... income index. (per capita, national)

(c) Rate of economic development is measured by ..... income index. (per capita, national)

(d) Comparing a year with a year different from the base year..... extra calculations.(involve, does not involve)

ACTIVITY

1. Make a list of about 10 goods and services which, you think, must be included in constructing the cost of living index number of daily wage workers in your locality or city. Also try to know their importance in workers' budgets. Now write on the various difficulties you have faced in going through this exercise and compare with what has been explained in this lesson.

2. Visit your nearest Super Bazar or some departmental store or some shop and note down the prices of food items (about 10), toilet soaps (about two brands), tooth paste (about two brands) and cooking oils (about two brands). Do these prices represent base year or current year prices? Which group of commodities is relatively more important to the rich and the poor families?

WHAT YOU HAVE LEARNT

- Purpose of an index number is an important factor in its construction. It helps in solving various problems which we face in its construction. It must be carefully decided.
- The selection of base year/reference year is an important decision. It should be a period of normal economic activity, that is, there should be no war, no droughts, floods or other natural calamities. It should not be period too far in the past.
- Selection of goods and services is another problem faced in the construction of index numbers. It very much depends upon the class of people for which it is being constructed.
- Weighted index number is always better than an unweighted or simple one. Weights signify the relative importance of each good or service in the budget of the people for whom index number is being constructed.
- Another problem in the construction of index number is that of price quotations. Prices should be obtained from those markets from which these people buy the goods and services.
- Index numbers are useful in measuring cost of living, inflationary and deflationary trends etc.
- Index numbers are useful indicators of production, economic growth, etc.

TERMINAL EXERCISE

1. Explain the problem of selection of base year in constructing an index number.
2. Explain the problem of choice of weights in the construction of an index number.
3. Explain the problem of choice of average to be used in the construction of an index number.
5. Explain some of the uses of the index numbers.

6. Describe the following index number :

Index Number of Wholesale Price in country 'X' (Base 1980-81 = 100)

	Primary Articles	Manufactured Products	Fuel, Power Light and Libricants	All Commodities
Weights	41.67	39.87	8.46	100
1	2	3	4	5
1993-94	308	301	509	322
1994-95	322	331	559	345
1995-96	331	391	609	359

ANSWERS

Intext Questions 9.1

a) purpose b) normal economic activities c) (ii) Food items, clothing, fuel and rent d) retail.

Intext Questions 9.2

(a) Price (b) national (c) per capita (d) involves

Terminal Exercise

1. Read section 9.3 (2)
2. Read section 9.3 (5)
3. Read section 9.3 (6)
4. Read section 9.4
5. Read section 9.5

Guidelines to Activities

1. Use the idea of family budget enquiries. Keep in mind the difficulties discussed in the section 9.3.

2. First draw the list of the commodities and services decided by you. Then go to the Super Bazar or shop or some departmental store in or nearby your locality to note down their prices. Do mention the unit of measurement such as kilograms, metres or litres or per dozen etc. Since we take into account the present prices, they represent current year prices (p_1). Food items shall be relatively more important for the poor than for the rich.