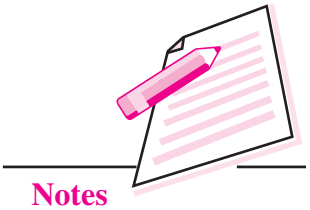

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MEANING, SCOPE AND ITS NEED IN ECONOMICS

All of us want to know about everyday life around us. We can know about the nature of things both quantitatively and qualitatively. Many times we can express things better in quantitative terms, that is, in numbers. For example, by comparing the per capita income of India and the United States, we can say that India is a developing economy while United States is a developed economy.

The word 'Statistics' is derived from the Latin word 'statis' or the Italian word 'statists' or German word 'statistic.' All these words mean a political state. In the olden days statistics was necessary for the proper functioning of the affairs of a state. Thus, in those days Statistics was called as 'science of state' or 'science of kings' as it was mainly used by the state or kings. Today statistics is defined as a field of study relating to the collection analysis, interpretation and presentation of data. In this lesson you will learn about the meaning of statistics and its scope and its need in economics.

OBJECTIVES

After completing this lesson, you will be able to:

- explain the need and scope of statistics in Economics;
- describe the importance of statistics in Economics;
- know the characteristics of statistical data;
- carry out statistical enquiry;
- identify sources of statistical data; and
- explain the functions and limitations of statistics.

5.1 NEED AND SCOPE OF STATISTICS

(a) Need for Statistical Data

Statistics plays a very important role in the field of economics. There is need of statistical data in every walk of life. No field of study is complete without the supporting quantitative information about that field. Some of the ways in which statistics is widely used in economics are as follows:

(i) **In Construction of Economic Theories:** An economic theory is first developed on the basis of what we observe in real life. It is then approved or disapproved by the analysis of statistical data relevant to the observation. For example, it is observed that consumers demand less at higher prices. This observation takes the shape of a theory when it is confirmed from actual statistical data that consumers really demand less at higher prices.

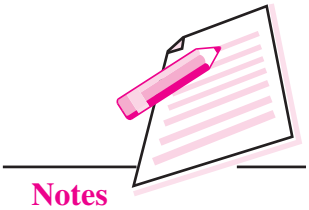
(ii) **In Economic Planning:** Statistics is an important tool of economic planning. Planners use statistical data to formulate policies for economic development. For example, India is an over populated country. However, the extent of over population can be revealed by data on population and resources available to support the population. Effective policies to control population can be framed only after we know how much over-populated India is.

(iii) **In evaluation of policies of the government:** It is not only enough to implement policies but also necessary to know whether the implementation has been proper or not. Statistical data helps us to evaluate the policies of the government. For example, how much revenue did the government get through higher taxes? It is through statistical investigations that the Finance Minister gets feedback on the taxes paid by the people and the revenue accrued to the government.

(iv) **To reveal the structure of an economy:** We study the structure of an economy with the help of data on population, natural resources, employment, national income, production, exports, imports etc. The statistical knowledge about these helps us to know about the structure of the economy and the changes in the structure of the economy.

(b) Scope of Statistics

In ancient times, statistics was used by the state for the purpose of administration. But now a days, it is widely used as a tool of all sciences. There is hardly any field whether it be biology, botany, astronomy, physics, chemistry, sociology, or psychology where statistical tools are not used. The word statistics is used in two senses: (a) the plural sense and (b) the singular sense. In a plural sense it refers to quantitative information or simply statistical data. In singular sense, it refers to



method or methods used in arriving at the quantitative information or dealing with it. We can explain the difference between the two with the help of following example:

Table 5.1: Growth of Population in India

Year	Population (in crores)
1951	36.1
1961	43.9
1971	54.8
1981	68.5
1991	84.6
2001	102.87
2011	121.01

Source: Census of 2011 Population.

The above table 5.1 records population of India in different years. Here we are referring only to the quantitative information about population. We are using the word statistics in the plural sense in this case.

When we say that population of India was estimated through the census method; that the figures are presented in the tabular form; that population of India is continuously rising and that it is rising on account of fall in death rate, we are referring to the methods of collection, presentation, interpretation of trend in data and analysis of data respectively. All these steps are statistical methods. Here we are using the word statistics in the singular sense.

Importance of Statistics in Economics

There are number of economic laws which have evolved due to statistical analysis in the field of economics, e.g. Engel's law of family expenditure, Malthus theory of population etc. Let us understand the importance of statistics keeping in view the various parts of economics.

(a) **Statistics and the study of consumption:** Every individual needs a certain number of things. He spends first on necessities, then on comforts and luxuries, which depend on his income. We discover how different groups spend their income on different items of consumption with the help of statistics.

(b) **Statistics and the study of production:** The progress of production every year can easily be measured by statistics. The comparative study of productivity of various elements of production (e.g. land, labour, capital and entrepreneurship) is also done with the help of statistics. The statistics of production are very helpful for adjustment of demand and supply.

(c) **Statistics and the study of exchange:** Production is based on national and international demand. A producer needs statistics for deciding the cost of production and selling price so that he can study competition and demand of commodity in a market. The law of price determination and cost price which are bared on the various market conditions and demand and supply can be studied with the help of statistics.

(d) **Statistics and the study of distribution:** Statistics are helpful in calculation of national income in the field of distribution statistical methods are used in solving the problem of the distribution of national income. Various problems arise due to unequal distribution of wealth and national income and are solved with the help of statistical data.

INTEXT QUESTIONS 5.1

1. Fill in the blanks with appropriate word from the brackets;

   (i) What was 'statistics' called in the ancient times .....
   (science of knowledge, science of state).

   (ii) Statistics is an important tool of .....
   (methods, economics planning).

   (iii) The word statistics in singular sense refers to statistical .....
   (method, data).

2. Which of the following refers to (quantitative/qualitative) information.

   (i) Sita's height is 5'6"., where as Meera is 5'-0".

   (ii) Sita is taller than Meera.

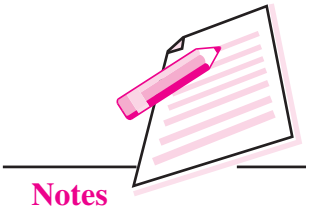
   (iii) Foodgrain production in India was estimated at 199.5 million tones in 2000-01.

   (iv) Anju is the shortest girl in her class.

5.2 MEANING OF STATISTICS

5.2.1 Statistics in plural sense

In plural sense statistics means statistical data "By statistics we mean aggregate of facts affected to a market extent by multiplicity of causes numerically expressed enumerate or estimated according to a reasonable standard of accuracy, collected



in a systematic manner for a predetermined purpose and plural in relations to each other''

In plural sense, facts expressed numerically are called statistics such as data relating to income, production, population, prices etc. In other words, statistics mean numerical statement of facts. How do the statistical data look like? Table 5.1 is an example of statistical data.

It gives information about population of India.

Here we are referring only to the quantitative information about population. We are using the word statistics in the plural sense in this case.

5.2.1.1 Characteristics of Statistical Data

(i) Statistical data are aggregates of facts: A single observation is not statistics, it is a group of observations. For example, Ram scored 60 marks out of 100 is not statistics, but a series relating to the marks of a group of students will be termed as statistics. For example, when we say that Mohan, Ram, Mary and Karim scored 35, 60, 75 and 58 marks respectively, the group of figures become statistics. Now we can compare, analyse and draw some conclusions from these figures.

For example:

1. Highest marks obtained are 75.
2. Lowest marks obtained are 35.
3. Marks range between 35 and 75.
4. Average marks obtained = $\frac{35+60+75+58}{4}$ = 57 marks

(ii) Statistics are affected by multiplicity of causes : Generally the facts and figures are affected by a number of factors working together. For example, the production of rice depends on rainfall, method of cultivation, seeds, manure, soil fertility etc. but it is very difficult to study separately the effect of each of these factors on the production of rice.

(iii) Statistical data are numerically expressed : All statistics are numerically expressed. Qualitative statements such as 'the population of India is increasing rapidly' or 'India's per capita income is low' are not statistics unless they are assigned numerical values.

Notes

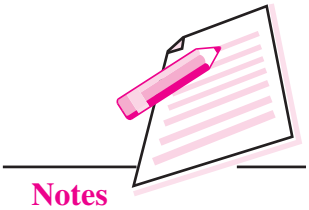
(iv) Collected in a systematic manner : Statistics should be collected systematically in a planned way. Before collecting data, a suitable plan for their collection should be prepared. Data collected in an unsystematic manner would lead to misleading conclusions.

(v) Statistical data must be obtained with reasonable degree of accuracy : Statistics are numerical statements which can be obtained with accuracy if the number of observations is small. Sometimes, when actual measurement of figures is not possible in a particular field of inquiry, then method of estimation or approximation is applied. For example, if we say that there are 30 students in XI class of XYZ public school, the figure is 100 percent accurate if we apply counting method. But, on the other hand, if we say that 20,000 people are watching the cricket match, this figure can be obtained only by estimation method i.e. as an approximation. But even this estimation must have a reasonable degree of accuracy to make sense.

(iv) Statistics are collected for a predetermined purpose : The purpose of collecting data should be decided in advance. The purpose should be clearly defined. Otherwise, collected data will be of no use. Suppose, we want to compare the performance of students at secondary level of National Institute of Open Schooling in one subject or more. We must specify the subjects and the year for which comparison is being carried out before collecting data.

INTEXT QUESTIONS 5.2

1. Tick (√) the correct answers Statistical data are:
   - (i) Numerical statement of facts.
   - (ii) Qualitative information.
   - (iii) Both quantitative and qualitative information.
   - (iv) Single or isolated facts and figures
   - (v) Aggregates of facts
2. State whether the following statements are true or false.
   - (i) Statistics are numerical statements of facts.
   - (ii) Statistical data are not single or isolated figures.
   - (iii) Statistical data are qualitative data.
   - (iv) Statistics are collected for a predetermined purpose.



5.2.2 Statistics in Singular Sense

In the singular sense, statistics means science of statistics or statistical methods. If refers to techniques or methods relating to collection, classification, presentation, analysis and interpretation of quantitative data. These are the stages through which every statistical enquiry has to pass through. We shall discuss these stages one by one.

5.2.2.1 Stages of Statistical Enquiry

Studying statistics in the singular sense implies the knowledge of various stages of statistical study.

(i) **Collection of data:** Collection of data is the first step of a statistical enquiry. Statistical data are mainly classified into primary and secondary data. Primary data are data collected directly through survey, directly from first hand sources by means of surveys, observations or experimentations. These are data that has not been previously published.

Secondary data are data collected from other sources including published and online resources. For example, Reserve Bank of India Bulletin and National Accounts Statistics are published data i.e. Secondary data. You will read more about primary and secondary data in the next lesson.

(ii) **Organisation of Data :** Organisation of the data refers to the arrangement of data in such a form that comparison of the mass of similar data may be facilitated and further analysis may be possible. An important method of organization of data is to distribute data into different classes or sub-classes on the basis of their characteristics. This process is called classification of data.

(iii) **Presentation of data :** The presentation of data means exhibition of the data in such a clear and attractive manner that these are easily understood and analysed. There are many forms of presentation of data of which the following three are well known: textual or descriptive presentation, tabular presentation and diagrammatic presentation. You will study more about this in the next lesson.

(iv) **Analysis of data :** After the data have been collected, organized and presented, they need to be analysed. Analysis of data is a technique through which significant facts from the numerical data are extracted. One of the most important objects of statistical analysis is to get one single value that describes the characteristic of the whole data. Analysis of an economic or other problems is not possible without the use of certain statistical tools such as measures of central tendency like mean, median or mode.

Notes

(v) **Interpretation of data :** Interpretation of data is the last stage of a statistical enquiry. After making analysis with the help of statistical tools, we interpret the data to derive some conclusions in order to formulate certain policies. Interpretation must be done carefully, as wrong interpretation will lead to formulation of wrong policies and hence do more harm than good.

5.3 FUNCTIONS OF STATISTICS

Main functions of statistics are given below:

(i) **Statistics simplifies complex data:** With the help of statistics a mass of data can be presented in such a manner that they become easy to understand e.g. the complex data may be presented in the form of totals, averages, percentages etc.

(ii) **Statistics presents the faits in a definite form:** By stating conclusions in a numerical or quantitative form, we can achieve definiteness.

(iii) **Statistics provides a technique of comparison:** By using statistical tools such as average ratios, percentages etc. data can be made comparable for drawing conclusion.

(iv) **Statistics studies relationship:** Correlation analysis is used to discover functional relationship between different phenomena e.g. the relationship between demand and supply, the relationship between advertisement and sales can easily be explained with the help of correlation analysis.

(v) Statistics helps in formulating policies: Many policies are framed on the basis of statistics like import, export, wage-policy etc.

(vi) Statistics helps in forecasting: The future behaviour of phenomena such as market situation for the future in predicted on the basis of available statistics of past and present.

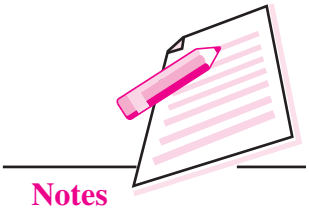
(vii) Statistics help to test and formulate theories: Statistical data and techniques are useful while testing theories e.g. whether increase in demand affects the price can be tested by collecting and comparing the relevant data.

Limitation of statistics

(i) **It does not study the qualitative aspect of a problem:** Statistics studies only the facts which can be measured quantitatively but qualitative phenomena like honesty, intelligence, poverty etc. cannot be studies in statistics unless these attributes are expressed in terms of numerals.

(ii) **It does not study individuals:** Statistics studies aggregates of facts but individual values of the observation like income of a family has no specific importance.

(iii) **Statistical laws are true only on an average:** Since the results are affected by a large number of cause, laws of statistics are not universally applicable.



(iv) **Statistics can be misused:** The results obtained with the help of statistics can be manipulated according to one's own interest which can mislead the community.

(v) **Statistical results lack mathematical accuracy:** The results drawn from statistical analysis are normally in approximations. So statistical studies are a failure in the fields where cent per cent accuracy is desired.

INTEXT QUESTIONS 5.3

1. Complete the following statements:
   (i) Statistics in plural sense means .....
   (ii) Statistics in singular sense means .....
   (iii) Statistical data are collected in a .....
   (iv) The first step in statistical enquiry is .....
   (v) The last step in statistical enquiry is .....
   (vi) Analysis of data means drawing conclusions from data with the help of .....
   (vii) Reserve Bank of India Bulletin and National Accounts Statistics are sources of ..... data.
2. Match the following:

(a) Collection of data	1. Mean, mode and median.
(b) Presentation of data	2. Primary or secondary sources.
(c) Analysis of data	3. Arriving at conclusions.
(d) Interpretation of data	4. Tables, diagrams and picture.

WHAT YOU HAVE LEARNT

- Statistics plays a very important role in economics
- Statistics is used (i) in construction of economic theories (ii) in planning (iii) in evaluation of policies of the government and (iv) to reveal the structure of an economy.
- The word statistics is used in two senses. In a plural sense, statistics refers to quantitative information or statistical data. In a singular sense it is termed as statistical methods. It means the science of collection, organization, presentation, analysis and interpretation of statistical data.

Notes

- Statistical data are (i) aggregates of facts, (ii) affected by multiplicity of causes, (iii) numerically expressed, (iv) collected in a systematic manner (v) accurate to a reasonable degree or standard, and (vi) collected for a predetermined purpose.
- A statistical enquiry passes through the stages of collection, presentation, analysis and interpretation of data.
- Sources of statistical data are primary and secondary.
- Statistical data is presented in the form of tables, graphs, diagrams and pictures.
- Statistics:
  - (i) simplifies complex data,
  - (ii) presents the faits in definite form
  - (iii) provides a technique of comparistic,
  - (iv) studies relationship,
  - (v) helps in formulating policies,
  - (vi) helps in forecasting,
  - (vii) helps to test and formulate theories.
- Limitations of statistics are:
  - (i) it does not study the qualitative aspect of a problem
  - (ii) it does not study individual
  - (iii) statistical laws are true only on an average
  - (iv) statistics can be misused
  - (v) statistical results lack mathematical accuracy.

TERMINAL EXERCISE

1. State the need of statistics in economics.
2. Describe in brief the scope of statistics.
3. Define statistics in plural and singular sense.
4. Define the term statistics in the plural sense and point out its main characteristics.
5. State briefly the various stages of a statistical enquiry.
6. What are the principal sources of data?
7. Describe any four limitations of statistics.

8. What are the limitation of statistics?
9. What is the importance of statistics in the field of business and economics?

ANSWERS TO INTEXT QUESTIONS

5.1

1. (i) Science of state
   (ii) Economic planning
   (iii) Methods
2. (i) Quantitative information
   (ii) Qualitative information
   (iii) Quantitative information
   (iv) Qualitative information

5.2

1. (i) and (v)
2. (i) True (ii) True (iii) False (iv) True

5.3

1. (i) Statistical data (ii) Statistical methods
   (iii) Systematic manner (iv) Collection of data
   (v) Interpretation of data (vi) Statistical tools
   (vii) Secondary
2. (a) 2 (b) 4 (c) 1 (d) 3

Terminal Exercise

1. Read Section 5.1 (a)
2. Read Section 5.1 (b)
3. Read Section 5.2 and 5.3
4. Read Section 5.2 (b)
5. Read Section 5.3 (b)
6. Read Section 5.3 (b) (i) 5.3 (b) (i)