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PG DEPARTMENT OF ECONOMICS

LEARNING RESOURCES

STATISTICAL METHODS - I

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STATISTICAL METHODS - I

[PART - B, Q & A]

1. What is statistics?

Statistics meant the data in relation to the activities of the state collected for official purposes. But gradually it gained broader meaning. Because of its wider applicability to various problems apart from the state activity. The word statistics means the "numerical statements as well as statistical methodology".

2. Write any three definition on statistics.

Different authors have different definition of statistics from time to time.

Statistics are numerical statement of facts in any department of enquiry placed in relation to each other".

- Bowley,

"By statistics we mean quantitative data affected to a market extent by multiplicity of cause".

- Yule and kendall,

"Statistics is the science of estimates and probabilities".

-Boddington,

"Statistics is a body of methods for making decisions in the face of uncertainty".

-Wallis and Roberts,

3. What are the characteristics that statistics should possess?

Science if it possesses the following characteristics.

1. Laws of science should be based on cause and effect relationship.
2. Its knowledge should be systematic and its methods should be logical.
3. Being a systematised body of knowledge based on certain principles, science is capable of general application.

Art has the following characteristics:-

1. Art does not describe facts, but examines merits and demerits and tells the way to achieve the desired result.
2. Art is a system or rules for the attainment of a given end.
3. Art teaches us how to do things.

4. What is frame?

A list of all units under study is known as frame. It is important to identify the units which constitute population. For instance, we are asked to find out the capital invested and workers engaged in match factories of a particular place. For this, we must have a complete list of all match factories in that particular place. The list of names with their addresses is known as the frame for the enquiry.

5. What are the characteristics that a statistical unit must possess?

- a) The unit must be suitable to the purpose of enquiry.
- b) The unit must be simple, easily understandable in the process of enquiry.
- c) The unit selected should be free from deficiency and inaccuracy.
- d) The unit must be standard and uniform.
- e) The unit must have comparability.
- f) The unit should be precise and in unambiguously defined terms.

6. Distinguish between primary data and secondary data:-

Statistical data may be classified as primary and secondary. Primary data are those which are collected for the first time and they are original in

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character. If an individual or an office collects the data to study a particular problem, the data are the raw materials of the enquiry. They are primary data collected by the investigator himself to study any particular problem.

Secondary data are those which are already collected by someone for some purpose and are available for the present study. For instance, the data collected during census operation are primary data to the department of census and the same data, if used by a research worker for some study, are secondary data.

7. Mention the use of statistics

Statistics are useful to bankers, brokers, insurance companies, social workers, labour unions, trade associations, chambers of commerce and to the politicians. These references to statistical applications are not intended to be exhaustive but they simply suggest the diversity of applications of the underlying methods and ideas of statistics. In fact, the applications of statistics are so numerous that statistics today has risen from the science of statecraft to the science of universal applicability.

The reader must understand that statistics is not dry. Abstract and unrealistic pursuit followed by a small group of highly trained mathematicians, but rather a vitally important part of the economic and business life of the community. The usefulness of statistics to the reader depends to a great extent on his ability to use his imagination in applying this tool to his own particular situation.

8. Mention the application of statistical method in economics.

There are five applications in statistical methods.

1. Collection of data.
2. Organisation of data.

3. Presentation of data.

4. Analysis of data.

5. Interpretation of data.

9. Define Statistical population.

A population (or universe) is the totality of items or things under consideration. It is a collection of all measurements of a particular type of interest to the decision - maker. Population may be finite or infinite

Finite:

A population that is not infinitely large or that contains only a finite number of items.

Infinite:

A population that includes an infinitely large number of elementary units .

10. Define tabulation of data.

By tabulation we mean, a systematic presentation of numerical data in columns and rows in accordance with some salient features or characteristics. Columns are vertical arrangement and Rows are horizontal arrangement.

Croxton and Cowdon state that "either for one's own use or for the use of others, the data must be presented in a suitable form". It facilitates comparison. It also facilitates analysis.

11. What are the objects of tabulation?

"Tabulation is the process of condensing classified data in the form of a table, so that it may be more easily understood and any comparisons involved may be more readily made:

The main objectives of tabulation are,

1. to clarify the object of investigation,
2. to simplify complex data,
3. to clarify the characteristics of data,
4. to present facts in the minimum of space,
5. to facilitate comparison,
6. to detect errors and omission in the data,
7. to depict trend and tendencies of the problems under consideration,
8. to facilitate statistical processing,
9. to help reference.

12. Mention the parts of a table .

A good statistical table is an art. The following parts must be present in all tables,

1. Table number
2. Title
3. Head note
4. Caption
5. Stubs
6. Body of the table
7. Foot- note
8. Source - note.

13. What is the purpose of statistical tabulation?

1. General purpose table
2. Special purpose table

General purpose table:

It is also known as informative table and provides information for general use; and usually in chronological order. The detailed table in the census reports cure of this kind. Government agencies prepare this type of tables. These are used by research workers and statistics. There are placed in the appendix of a report for reference.

Special purpose table:

It is also called a summary table or text table or analytical table or derivative table or derived table. It presents the data relating to a particular or a special purpose. Ratios, Percentages, etc., are used to facilitate comparison.

14. What are the objectives of classification?

The chief objectives of classification are

1. to condense the mass of data.
2. to present the facts in the a simple form.
3. to bring out clearly the points of similarity and dissimilarity.
4. to facilitate comparison.
5. to bring out the relationship.
6. to prepare data for tabulation.
7. to facilitate the statistical treatment of the data.

8. to facilitate easy interpretation.

9. to eliminate unnecessary details.

15. What are the different methods of classification?

The classification of data primarily depends on the purpose and methods of the enquiry. There are four important methods of classification.

They are:

1. Geographical method, i.e., area wise or region wise or district wise.
2. Chronological method, i.e., on the basis of time
3. Qualitative by character or by attributes
4. Quantitative or numerical or by magnitudes.

16. Define classification

Classification is the process of arranging the available facts into homogeneous groups or classes according to resemblances and similarities.

“The process of grouping a large number of individual facts or observations on the basis of similarity among the items, is called classification”
-Stockton and clerk .

17. What are advantages of getting primary data through questionnaire?

1. of all the methods the mailed questionnaire method is the most economical.
2. it can be widely used, when the area of investigation is large.
3. it saves money, labour and time.

4. error in the investigation is very small because information is obtained directly from the respondents.

18. What is meant by a questionnaire?

A questionnaire consisting of a list of questions pertaining to the enquiry is prepared. There are blank spaces for answers. This questionnaire is sent to the respondents who are expected to write the answers in the blank spaces. A covering letter is also sent along with the questionnaire, requesting the respondents to extend their full co-operation by giving the correct replies and returning the questionnaire duly filled in time. This method is adopted by research workers private individuals, non-official agencies and state and central governments.

19. Distinguish between the census and sampling methods of collecting data.

Census method:

The object of a census or complete enumeration is to collect information for each and unit of the population. In census or universal coverage every element of the population is included in the investigation. When we make a complete enumeration of all items in the population it is known as census method of collection of data.

Sampling method:

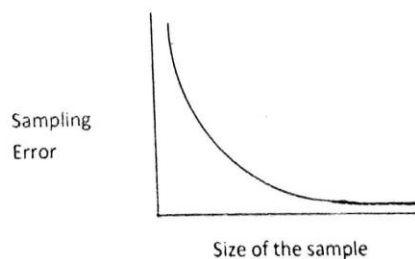
If only a representative part of the universal is studied and some representative units are selected it is called sample enquiry. The theory of sampling has been developed recently but theory of sampling is not new. In our everyday life we have been using sampling theory without knowing about it. For example, a house-wife tests a small quantity of rice to see whether it has been well-worked, but will not inspect all the rice.

20. What are the advantages of sampling methods?

1. It saves time, because fewer items are collected and processed. When the results are urgently required this method is very helpful.
2. It reduces cost only a few and selected items are studied in sampling.
3. Sampling provides more detailed information. As it saves time, money and energy. We can collect more detailed information in a sample survey.
4. Sampling method is sometimes the only method possible. If the population under study is infinite, sampling method is the only method to be used.
5. Administrative convenience: The organization and administration of sample survey are easy.
6. More scientific: The method has full justification for the expenditure involved.
7. The degree of accuracy obtainable in this method is higher than that in the census method.

21. How can you reduce the sampling error?

As the sample size increases, the element of error is reduced. That is the easy method of reducing the sampling error is to increasing the sample.



The diagram shows that when the size of the sample is very small, sampling error is very large. Sample with an increase in its size, becomes more representative of the population.

22. Write a note on quota sampling.

This sampling is similar to stratified sampling. It is used in the U.S.A for investigating public opinion and consumer research. To collect data, the universe is divided into quota according to some characteristics. Each enumerator is then told interview a certain number of persons who are his quota. The selection of sample items depends on personal judgment.

23. What is random sample? Give an example.

Random sampling methods are those in which every items in the universe has a known chance, or probability, of being chosen for sample. This implies that the selection of sample items is independent of the person making the study-that is, the sampling operation is controlled so objectively that the items will be chosen strictly at random.

24. What are sampling error?

Even if utmost care has been taken in selecting a sample, the results derived from a sample study may not be exactly equal to the true value in the population. The reason is that estimate is based on a part and not on the whole and samples are seldom, it ever, perfect miniature of the population. Hence sampling gives rise to certain errors known as sampling errors. These errors would not be present in a complete enumeration survey. However the errors can be controlled. The modern sampling theory helps in designing the survey in such a manner that the sampling errors can be made small.

Sampling error are of two types, 1. biased and 2. unbiased.

27. What are the different sources of secondary data :

The various sources of secondary data can be divided into two broad categories:

- 1) Published Sources
- 2) Un published Sources

1. Published Sources:

Various governmental, international and local agencies publish statistical data, and chief among them are:

- a) International publications
- b) Official publications of central and state government
- c) Semi-official publications
- d) Publications of Research Institutions.
- e) Publications of commercial and Financial Institution
- f) Reports of various committees and commissions appointed by the government
- g) Journals and Newspapers.

2. Unpublished Sources:

They are the records maintained by various government and private offices, the researches carried out by individual research scholars in the universities.

28. What do you mean by Arithmetic mean:

It is the most common type and widely used measure of central tendency. Arithmetic average of a series is the figure obtained by dividing

25. What is an absolute biased error?

Boddington say, "The arithmetic difference between the approximated figure and the original quality is known as absolute error. Absolute error is the difference between the two value and estimated value or approximated value of quantity. This, thus true

Absolute Error = Actual value - Estimated value

$$A.E = a - e$$

The absolute error may be either positive or negative.

26. What are the different methods of selecting sampling?

There are many methods of sampling. The choice of method will be determined by the purpose of sampling. The various methods can be grouped under two groups.

1. Random sampling method

a) Simple or unrestricted random sampling

b) Restricted Random sampling

1) Stratified sampling

2) Systematic sampling

3) Cluster sampling

2. Non- Random Sampling.

1) Judgment or Purposive Sampling

2) Quota Sampling

3) Convenience Sampling

31. What is Deciles?

Percentile value divides the distribution into 100 parts. We get 99 dividing positions; for e.g P_1, P_2, \dots, P_{99} etc.

32. What is Mode?

Mode is the most common item of a series. Mode is the value which occurs the greatest number of frequency in a series.

“The mode of a distribution is the value of the point around which the item tend to be most heavily concentrated”. -Croxton and Cowden.

33. What is the Geometric mean?

Geometric mean is defined as the N^{th} root of the product of N items. If there are two, we take the square root; if three, the cube root; and so on. The geometric mean is never larger than the arithmetic mean. If there are zero's or negative values in the series the geometric mean cannot be used. To solve a question to find out the geometric mean help is taken from logarithms so as to save the time and labour. Therefore geometric mean is the antilog of the arithmetic average of the logarithms of different items.

34. What is Harmonic mean?

Harmonic mean is the reciprocal of the arithmetic average of the reciprocal of values of various items in the variable. The reciprocal of number is that value, which is obtained dividing one by the value. For example, the reciprocal of 7 is $1/7$; of 9 is $1/9$.

35. Define Dispersion :

“Dispersion is the measure of the variation of the items” -A.L.Bowley.

“Dispersion is a measure of extent to which the individual items vary”

the total value of the various items by their number. There are two types of Arithmetic average.

1. Simple arithmetic average
2. Weighted arithmetic average

29. Define Median

Median is the value of item that goes to divide the series into equal parts. Median may be defined as the value of that item which divides the series into two equal parts. One half containing values less than it. Therefore the series has to be arranged in ascending or descending order, before finding the median.

“The median is that value of the variable which divides the group into two equal parts, one part comprising all values less than median”.

-L. R. Connor

“The median as its name indicates, is the value of the middle item in a series when items are arranged according to magnitude”.

-Ya Lun Chou

30. What is Quartile?

A measure which divides an array into four parts is known as Quartile. Each portion contains equal number of items. So there are three quartile – first quartile or lower quartile to be denoted as Q_1

- Second quartile or median to be denoted by Q_2

- Third quartile or upper quartile to be denoted by Q_3

-L.R.Conner.

The degree to which numerical data tend to spread about an average value is called the variation or dispersion of the data. -Spiegel

36.What is Range?

Range may be defined as the difference between the largest and smallest observation. Thus L and S denote the largest and smallest observations.

$$\text{Range} = L - S$$

$$\text{Co-efficient of range} = \frac{L - S}{L + S}$$

37.What is Quartile deviation?

By eliminating the lowest 25% and the highest 25% of items in a series, we are left with the central 50% which are ordinarily free of extreme values. To obtain a measure of variation we use the distance between the first and the third quartiles.

$$\text{Inter quartile range} = Q_3 - Q_1$$

Quartile deviation is defined as half the distance between the third and the first quartiles.

$$\text{Semi -Inter quartile range} = \frac{Q_3 - Q_1}{2}$$