Review Article

A Study of Statistical Tools and Techniques in Managerial Decision Making

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ABSTRACT

The study highlights the applications and utility of statistics in managerial decision-making. Also discussed in the study are Mathematical analytics and Applied statistics. Researchers, administrators, consultants, and students will find Methods and Uses of Statistics in Management and Business Science an invaluable resource. In the disciplines of company, management science, management science, supply chain management, mathematical finance, and economics, those who must comprehend statistical literature and execute quantitative practices in order to make intelligent business decisions on a daily basis. In reality, there are no restrictions on the reference, coverage, and scope of data. These are macroeconomic data on gross national product and the proportions of agriculture, manufacturing, and services to GDP (Gross Domestic Product). Individual firms, whether small or large, generate extensive statistics on their operations at the micro level. The annual reports of businesses include a variety of information regarding sales, production, expenses, inventories, employed capital, and other activities. Typically, these are field data collected using scientific survey methodologies. Unless they are routinely updated, such data are the result of a one-time effort and have limited utility beyond the initial situation that necessitated their collection. Like economics, mathematics, chemistry, and physics, the student has a deeper understanding of statistics as a field of study. It is a discipline that deals with data in a scientific manner and is often referred to as the science of data. In addressing statistics as data, statistics has devised appropriate methods for collecting, presenting, summarizing, and analyzing data; thus, statistics is a collection of these methods.

KEYWORDS

Statistical, Managerial Decision Making, GDP,

1. INTRODUCTION

Initially, it should be noted that the word "statistics" is used in both the singular and plural senses. In the plural sense, it refers to a collection of numbers or information. In the singular, statistics refers to the entire collection of instruments used to collect data, organize and interpret it, and then derive conclusions from it. It should be noted that both aspects of statistics are essential for quantitative data to achieve their intended purpose. If statistics as a subject is inadequate and comprises of poor methodology, we would not know how to extract the information contained within the data. Similarly, if our data are flawed, insufficient, or inaccurate, we cannot reach the correct conclusions even if our topic is well-developed.

A.L. Bowley defines statistics as I the science of enumeration, (ii) the science of averages, and (iii) the science of measurement of the social organism as a whole in all its manifestations. Statistics is the science of estimates and probabilities, according to Boddington. In addition, W.I. King defined Statistics in a broader context, stating that it is the method of judging collective, natural, or social phenomena based on the results of an analysis, enumeration, or compilation of estimates. Seligman argued that statistics is a field of study that focuses on the methods of accumulating, classifying, presenting, comparing, and interpreting numerical data in order to shed light on any area of study. Spiegal defines statistics as the scientific method for collecting, organising, summarising, presenting, and analysing data, as well as deriving valid conclusions and making reasonable decisions based on such analysis, highlighting its importance in decision-making under uncertainty. Prof. Horace Secrist defines statistics as the collection of facts affected to a significant degree by a multiplicity of causes, numerically expressed, enumerated, or estimated according to reasonable standards of precision, collected systematically for a predetermined purpose, and arranged in relation to one another. Using the preceding definitions, we can identify the following characteristics of statistics:

Statistics is the collection of facts. It indicates that a particular number is not statistical. For instance, the national income of a country for a single year is not a statistic, but the same figure for two or more years is. Statistics are influenced by a variety of factors. For instance, the sale of a product depends on a variety of factors, such as its price, quality, competition, consumer income, etc.

The accuracy of statistics must be reasonable. If incorrect data is analysed, it will lead to erroneous conclusions. Consequently, conclusions must be supported by accurate numbers. (iv) Statistics must be systematically compiled. If data are collected haphazardly, they will be unreliable and will lead to erroneous conclusions. (v) Systematically

collected for a predetermined purpose Statistics should be positioned in relation to one another. If one accumulates unrelated data, the resulting information will be confusing and will not lead to logical conclusions. Data must be comparable across time and space.

2. VARIOUS DATA AND DATA SOURCES

Statistics' base material consists of statistical data. Data may pertain to an activity of interest, a phenomenon, or an issue under investigation. They are derived from measuring, tallying, and/or observing. Therefore, statistical data are those aspects of a problem situation that can be measured, quantified, tallied, or categorised. A variable is any object, subject, phenomenon, or action that generates data through this procedure. In other terms, a variable is a quantity that exhibits some degree of variation when repeated measurements are taken. In statistics, data are classified into two main categories: quantitative data and qualitative data. This classification is based on the types of measured characteristics. Quantitative data are those that can be expressed in measurable units. These are attributing whose successive measurements result in measurable observations. Quantitative data can be further classified as continuous or discrete based on the nature of the variable being observed for measurement.

Clearly, a variable can either be continuous or discrete. I Continuous data are numerical representations of a continuous variable. A continuous variable is one that can take on any value between two points on a line segment, thereby representing a range of values. The values are quite precise, near together, and distinguishable from one another. All attributes, including mass, length, height, thickness, velocity, temperature, and tensile strength, are continuous variables. Consequently, the data recorded on these and other similar characteristics are referred to as continuous data. A continuous variable assumes the utmost unit of measurement, as can be observed. The finest in that it permits measurements with the highest degree of precision.

(ii) The values assumed by a discrete variable are discrete data. A discrete variable is one whose outcomes are quantified with discrete integers. Such data are essentially tally data. These are derived from an enumeration process, such as the number of items with or without a particular characteristic. Examples of discrete data include the daily visitors to a department store, the incoming flights at an airport, and the defective items in a consignment received for sale. Qualitative data refers to the qualitative attributes of a subject or object. A characteristic has a qualitative nature if its observations are defined and recorded in terms of the presence or absence of a discrete attribute. The data are further divided into nominal and rank categories.

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I Nominal data are the result of classifying items or units constituting a sample or population into two or more categories based on some quality characteristic. Classification of students according to gender (as males and females), workers according to skill (as skilled, semi-skilled, and menial), and employees according to level of education (as matriculants, undergraduates, and postgraduates) all yield nominal data. Given any such classification basis, it is always possible to assign each item to a particular class and calculate the sum of each class's items. The resulting tally data are known as nominal data.

(ii) Conversely, rank data are the consequence of assigning ranks to specify order in terms of the integers 1,2,3,..., n. Ranks may be assigned based on the level of test performance. There is a contest, competition, interview, or performance. Candidates participating in an interview, for instance, may be assigned ranks in integers ranging from I to n based on their interview performance. Ranks assigned in this manner can be regarded as the continuous values of a variable with performance as the quality characteristic.

3. A RANGE OF STATISTICS

Descriptive statistics and inferential statistics are the two main divisions of statistics. The term descriptive statistics refers to the collection, summarization, and simplification of otherwise cumbersome and copious data. It aims to accomplish this in a way that facilitates drawing meaningful conclusions from the data. Thus, descriptive statistics can be viewed as methods for elucidating and emphasising the latent characteristics present in a set of numerical data. It not only facilitates data comprehension and systematic reporting, but also makes the data amenable to additional discussion, analysis, and interpretation.

Inferential statistics, also known as inductive statistics, go beyond merely describing a problem situation by accumulating, summarising, and presenting the relevant data in a meaningful manner. Instead, it consists of methods for drawing inferences or making generalised generalisations about an entire set of observations based on knowledge of a subset of those observations. Population or universe refers to the totality of observations from which an inference may be drawn or a generalisation made. A sample is the portion of totality that is observed for data collection and analysis in order to acquire knowledge about the population.

4. IMPORTANCE OF BUSINESS STATISTICS

There are three primary business functions for which statistical methodologies are beneficial. These are listed below: I The planning of operations: This may involve special initiatives or the recurring activities of a business over a specified time period. (ii) The establishment of standards: This may pertain to the size of employment, the volume of sales, the establishment of quality standards for the manufactured product, daily output standards, etc. (iii) The function of control involves comparing the actual production achieved to the standard or goal established beforehand. In the event that production has fallen short of the objective, corrective measures are outlined to prevent a recurrence. Despite the fact that these three functions—operations planning, setting standards, and control—are distinct, they are highly interdependent in practise.

5. BOUNDARIES OF STATISTICS

Statistics has a variety of limitations, including the following:

(i) There are some phenomena or concepts for which statistics cannot be applied. This is due to the fact that these phenomena or ideas cannot be measured. For instance, attractiveness, intelligence, and bravery cannot be measured. There is no place for statistics in situations where quantification is impossible.

(ii) Statistics disclose the average, normal, or general trend of behaviour. If the 'average' concept is applied to a specific individual or circumstance, it can lead to erroneous conclusions and even be calamitous. For instance, if one is told that the average depth of a river from one bank to the other is four feet, there may be points in between where the river's depth is significantly greater than four feet. On the basis of this understanding, one may access potentially hazardous areas with greater depth.

(iii) Because statistics are collected for a specific purpose, such information may not be applicable or useful in other situations or instances. For instance, secondary data (i.e., data originally collected by someone else) may be of no use to the other individual. Statistics lack the precision of mathematics and accounting. This limitation should be understood by statisticians.

Statistics lack the precision of mathematics and accounting. This limitation should be understood by statisticians. It is not physically possible to cover all the units or elements comprising the universe, so sampling is typically employed in statistical surveys. The results may not be applicable to the universe as a whole. In addition, various surveys with the same sample size but different sample units may produce different results.

6. CONCLUSION

In a nutshell, "statistics" refers to numerical data conveyed in quantitative terms. In reality, there are no restrictions on the reference, coverage, and scope of data. These are macroeconomic data on gross national product and the proportions of agriculture, manufacturing, and services to GDP (Gross Domestic Product). Individual firms, whether small or large, generate extensive statistics on their operations at the micro level. The annual reports of businesses include a variety of information regarding sales, production, expenses, inventories, employed capital, and other activities. Typically, these are field data collected using scientific survey methodologies. Unless they are routinely updated, such data are the result of a one-time effort and have limited utility beyond the initial situation that necessitated their collection. Like economics, mathematics, chemistry, and physics, the student has a deeper understanding of statistics as a field of study. It is a discipline that deals with data in a scientific manner and is often referred to as the science of data. In addressing statistics as data, statistics has devised appropriate methods for collecting, presenting, summarising, and analysing data; thus, statistics is a collection of these methods.

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