

STEPS AND IMPORTANCE OF RESEARCH INVESTIGATION AND STATISTICAL TOOLS - AN OVERVIEW

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Abstract

Day-to-day life relies on hopes, projections and assumptions. Without being willing to consider improvement or plan action, company can't advance. In any field of operation, the educated usage of data is of direct interest. In carrying out preparation, designing, gathering evidence, evaluating, drawing concrete analysis and documenting the study results, statistical methods are involved. The mathematical analysis brings significance to the statistics that are irrelevant, thereby breathing life into lifeless results. Only if proper mathematical analysis/tests are used are the findings and inferences precise. The purpose of this paper was to provide a summary of the significance of statistics and statistical instruments in science.

INTRODUCTION:

Research is aimed at seeking information and knowledge about a specific subject or subject. In other terms, studies are an art of rigorous empirical analysis of the topic. This is achieved by gathering data; recording details; and reviewing and evaluating the data or information, following acceptable methodologies recommended and applicable to practitioners in the respective fields and academic disciplines. The main aim of every form of analysis is to figure out the truth and details that apply to the study problem. Of course, any research operation has its own special purpose. The analysis is commonly divided into: 1. Fundamental or fundamental analysis and 2. Applied experiments. It is further divided into three divisions on the basis of the aforementioned general classification: exploratory, descriptive and causal, each having a different function. Descriptive, Association, Causal-Comparative/Quasi-Experimental are the four primary forms of quantitative analysis.

Without data and mathematical methods, no analysis is complete. The task of statistics in science is to act as a method for research planning, interpretation, and drawing conclusions from research results. In order to present a valid finding, a significant quantity of raw information/data gathered must be sufficiently minimized such that it can be viewed with sufficient review. Therefore, in research by scholars, the concept

of mathematics and mathematical devices should not be overlooked. The two key fields of statistics are analytical statistics and inferential statistics for information/data analysis. Descriptive figures are for the creation of such raw data/information metrics. Inferential statistics, i.e. "inferences" from data/data, to render forecasts. In order to take decisions, the need for statistical instruments helps in the selection, presentation and interpretation of statistical data/information. In order to make things easier to comprehend, it can transform raw data into summarized form.

ROLE OF STATISTICS AND STATISTICAL TOOLS IN RESEARCH

The science of learning from (numbers that change/things that change) (information/data) is a (related to studying numbers) field. (related to studying numbers) knowledge helps you to use the correct information/data collection methods).). The data/data, the correct analysis and the results are presented effectively. Statistics is a critical method of making decisions based on information/data received/got and making (statements about possible future events). Statistics help you to grab/understand a topic much more deeply.

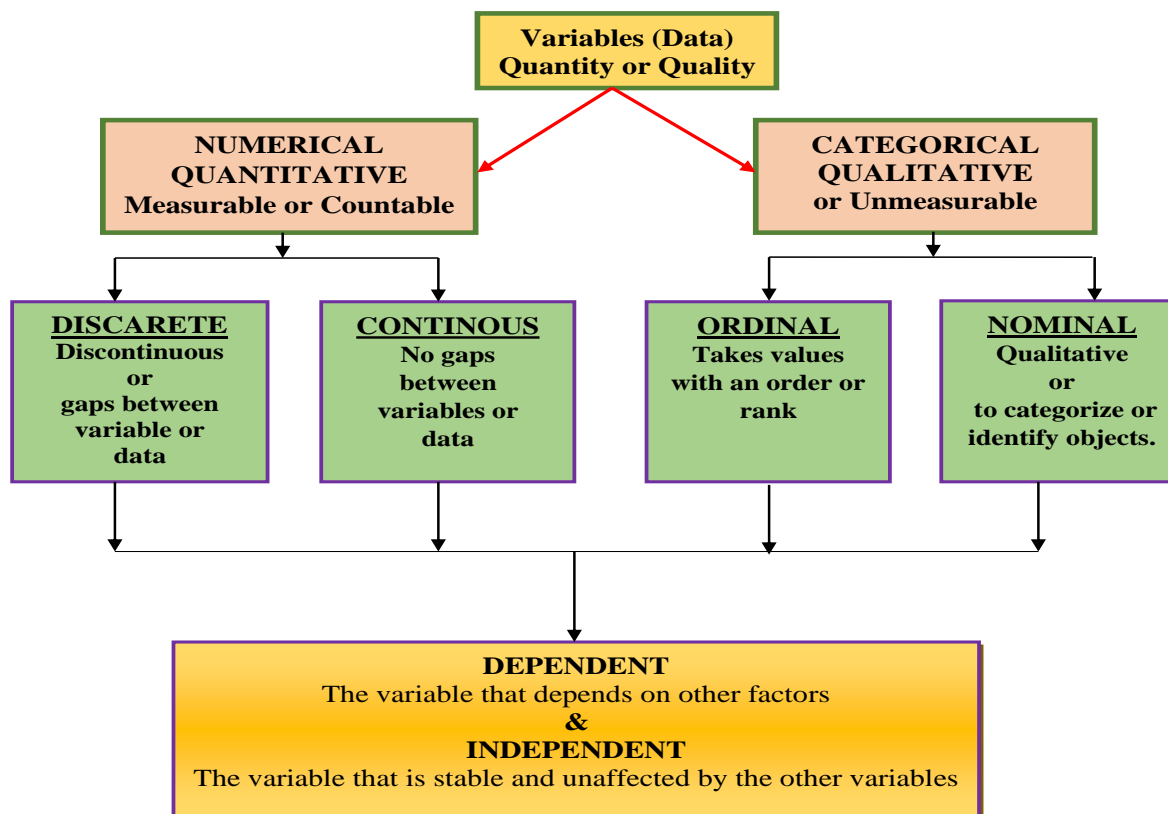
In order to make sure that information/data is presented, understood/explained and carefully studied correctly, (related to studying numbers) methods and tools are needed/demanded to provide meaningful and significant information/data relationships. (related to studying numbers) data/information are number-based values that describe certain data/information properties.

In research, the function of statistics is to design research, carefully study the data/information received/got and finally decide something from it. A large book of raw data is the result of research studies. They must be well enough reduced so that they can easily read the same and be used for further analysis. No (person who works to find information) can ignore the science of statistics. Collected information that is otherwise referred to as information. Information/data is better known in statistics as a set of (having to do with measuring things with numbers) or (having to do with figuring out the quality of things without measuring them with numbers) 'variable' values. Research involves the (instance of watching, noticing, or making a statement) of these (numbers that change/things that change). The (instances of watching, noticing, or making statements) are received/got from the data on these factors. (quality of changing over time or at different places) is the very nature of the data and is therefore referred to as a (number or thing that changes).



Chart –1

Classification based on Nature of Data (variables)



Variables are the characteristics or condition that change or has different values of different individuals.

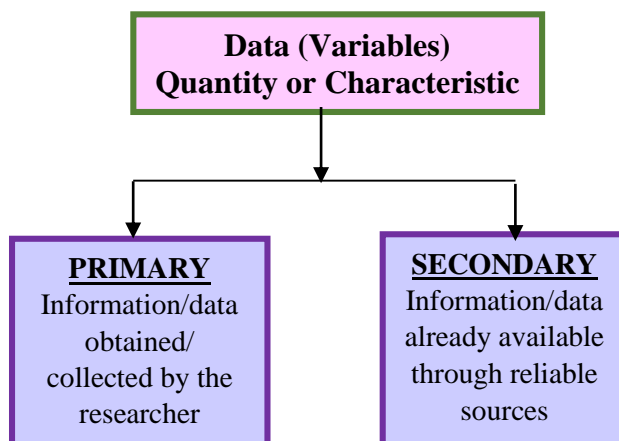
An independent variable, **sometimes called experimental or predictor variables**, is a variable that is being manipulated in an experiment in order to observe the effect on a dependent variable, sometimes the same is called an **outcome variables**.

Some examples for Dependent and Independent Variables are as follows:-

1. **Job satisfaction and Salary** – Here the job satisfaction (dependent variable) on the Salary (Independent variable) of the individual.
2. **Education and Earnings** – Here the education (dependent variable) on the earnings (Independent variable) of the person.

Chart –2

Data Collection Methods



To achieve the required objective the collected/classified variable/data are to be processed further to arrive at the conclusion. Descriptive statistics and Inferential /analytical statistics are used to arrive at the correct decision on the processed data/variable. Descriptive statistics are used to provide detailed information about particular variable (information/data) that is being analysed. Inferential/analytical statistics are used to get to conclusions about variable (information/data).

NEED OF STATISTICAL METHODS AND TOOLS FOR REASEARCH

The mean, average of numbers, middle-point and mode, range, breaking up/spreading out, standard moving away, inter-quartile range, coefficient of difference/different version, etc., are the most widely used (related to studying numbers) methods. The development of software packages such as SAS and SPSS that are useful for understanding/explaining the results of information and software technology.

(related to studying numbers) analysis depends on the information gathered or received/got in relation to the study situation and location. It is important for a (person who works to find information) to be aware of the basic ideas of (related to studying numbers) methods and instruments to be used for successful study. The well-designed and organized analysis offers true and (very close to the truth or true number) results. (not working correctly) ends/end results can result from wrong use of (related to studying numbers) ways of doing things. Bad statistics and (understanding/ explanation) of statistics will lead to bad research. It is necessary to have a (good) enough knowledge of statistics and to use appropriate (related to studying numbers) tools and tests. This will go a long way in improving the study designs and creating quality research that can be used in the (pertaining to each person or thing) field of research for creating guidelines.

PROCESS of STATISTICS

Step 1: Identify the research objective

Step 2: Collect the information needed

- Conversion of information into data/variables for further study

Step 3: Organize and summarize the information

- Descriptive statistics
- Visual methods such as tables, charts and graphs
- Numeric methods such as calculations

Step 4: Draw conclusions from the information

- Inferential statistics
- Parametric and Nonparametric

A parameter is data about an entire population (refers to the total set of observations).

Parametric statistics **are based on assumptions** about the population (refers to the total set of observations) from which the sample (set of observations drawn from a population) was taken.

Nonparametric statistics **are not based on assumptions**, that is, the data can be collected from a sample that does not follow a specific distribution (distribution in statistics is a function that shows the possible values for a variable and how often they occur).

Parametric test which assumes parameters and the distributions about the population., the group is known.

Nonparametric tests do not rely on any distribution. They can thus be applied even if parametric conditions of validity are not met.

- Apply appropriate statistical tool for analysing the drawing conclusions

Nonparametric tests do not depend on any distribution. They can this way be applied even if parametric conditions of (something is truly what it claims to be) are not met.

-Apply appropriate (related to studying numbers) tool for analysing the finally deciding something

Choosing the right test and tool to compare, analyse and understand/explain the information/data/variable is really a very hard job. Tests for parametric and non-parametric data depends upon the nature of the study, data collected for the study and the guessing (based on what you've been told) the (person who works to find information) wants to arrive at. (related to studying numbers) tests are based upon the idea (you think is true) that the data are sampled from an (usual/ commonly and regular/ healthy) distribution, also known as the Gaussian distribution, is a chance distribution that is (having a left half that's a perfect mirror image of the right half) about the mean, showing that data near the mean are more frequent in event than data far from the mean.

STATISTICAL INSTRUMENTS OF ANALYSIS PRACTICE.

When utilizing statistical techniques, the main objective is to reply to a hypothesis or analysis generated on the basis of limited data. A hypothesis is a suggestion of what the potential might be. It outlines the nature and key goals of your study. A hypothesis is an effort to describe a real phenomenon. Hypothesis assessments are very popular in academics, industry and politics. It is tests of expectation that each population parameter are stable. It depends on the details and the matter for the analysis. Hypothesis research is used to evaluate a hypothesis about an empirical scenario. Hypothesis experiments are an efficient means of determining cause and effect relationship. Statistics deal with explaining the interaction between variables in a dataset (data). Study results, some from a survey to draw inferences in the wider population set. The mean, the median, the mode, range, dispersion, standard deviation, and variance coefficient are the basic statistical instruments.

Mean -The average, more generally known as the baseline.

Standard deviation- is essentially a calculation of distribution of a population across the norm. The standard deviation helps to assess dispersion of results.

Regression analysis- is used to measure the association between dependent and explanatory variables.

Statistical approaches play an important role in conducting a study as they include preparing, designing, gathering evidence, review, drawing conclusions and interpretation of the results. Statistics gain significance from irrelevant statistics. The sample knowledge is only used for hypothesis checking. If the information is known, it is a parametric test and if the information is uncertain then it is a nonparametric test.

t-test- is a simple test for two classes. The t test confirms the distinctions between classes.

One widely applied statistical measure is the F-test, which is used to assess if two groups have normal distributions.

z-test- is a test focused on the presumption of regular distribution of the element of interest, which would determine the z-score. A z score is a single number from a regular normal distribution.

Study of difference (ANOVA)- In parametric test, the following are usually employed:

The Wilcoxon signed rank test (also called the Wilcoxon signed rank sum test) is generally indicates that the data's distribution is not natural. The Wilcoxon signed rank test can be used while the two variables are usually distributed.

Mann-Whitney test is typically used to assess if two samples are indicative of the same group (i.e., that the two populations have the same shape).Mann Whitney U is a measure for normality of sample distributions. It is used to equate two or more distinct classes, whose sample sizes are similar or different.

Friedman test- is an alternative to the repetitive calculation ANOVA. IQ research is intended to measure correlations and disparities between people. This testing scheme will be used to evaluate the exams.

Chi-square- goodness checks whether samples are a fair reflection of the population. The chi-square test of independence is used to analyze the association between two

variables in order to see if they are connected or not. It checks whether distributions of categorical variables are alike or not.

The Mc Ne mar test- is used for evaluating accuracy of answers on different variables.

Spearman rank correlation - shows the intensity and interaction between variables.

Cochran's Q-test- will be used to evaluate the outcomes of two sample sets.

Cronbach's alpha - is a coefficient used in the measurement of internal durability. This is a widely used test score for a sample of participants.

TECHNOLOGY WILL SHIFT THE DIRECTION IN STATISTICS.

Technology cannot be overlooked regardless of its contributions to society. This 20th century is the age of science and technology. Statistical principles can be gained through usage of statistical software. Application engineers ought to understand learning and design requirements. There would be a major shift as organisations embrace modern ways in teaching skills. There are also benefits of utilizing websites in science. Best Predictive Methods of 2020.

Max Stat statistical software is very user-friendly and effective. Study the fundamentals of statistics and do the documentation on the knowledge and assistance offered by Max Stat.

It is essential to **Wizard Macdno** programming for data analysis. It provides the graphical figures which help you examine and analyse data, and to predict the results from the options.

AcaStat offers numerous mathematical estimates for things like frequency tables, descriptive statistics, and probability models. Lots of mathematical and graphical analysis are accessible to analyse results.

STATWING is the quickest statistical method available, but can do tasks five times faster than with MS Excel or other statistical applications. The program combines well with Excel to render statistical analysis easy.

STATA offers full solution for all required data collection, management and graphics. Online statistical analyzer platform is available for data study.

IBM SPSS offers a lot of predictive and market analytics.

SAS software is organized to handle and maintain details, create and deploy models.

MINITAB program enables fast transferring of the Microsoft Excel XLX files through Minitab Express.

SPSS is one of the most commonly deployed software applications within the area of Human Behaviour Science. AMOS stands for statistical study of moment systems. AMOS is an additional SPSS module for conducting Structural Equation Simulations, direction analysis, and confirmatory factor analysis. An alternative is a program that can do causal simulation.

R is a versatile analytical program kit that can be used in various fields.

MATLAB (The Math Works) is a programming language used for many in the fields of engineering and science.

Microsoft Excel provides a lot of methods for data processing and mathematical computing.

Graph Pad Prismis is a graphical instrument used in biological research.

CONCLUSION.

Awareness of statistical methodologies used in a research study is significant. This would make the data that gets processed more consistent and specific. Inappropriate use of statistics may lead to false assumptions. Poor numbers may result in bad science, and unethical research is very bad. Statistics is important to research. Analysis methodology strengthening will be done because of improved comprehension of simple mathematical methods. Speculations regarding the potential need to recognize tomorrow's expectations and problems because of the issues of today. Future futures ought to be closely studied and considered before choices are produced.

“The quiet statisticians have changed our world; not by discovering new facts or technical developments, but by changing the ways that we reason, experiment, and form opinions” -Ian Hacking

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