



Statistics – A Vast Field to Study and to Explore

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ABSTRACT

The role of statistics is very useful in every field of knowledge. Statistics make the data in simple form and it is easy to understand. It presents information into meaningful form. The term “statistics” is derived from the Latin word “STATUS”

Which means ‘for state’? It is hardly possible to find human activity where statistics is not used. Statistics used by government, industries, astronomy, biologist, Mathematician, and by other areas. Statistics is important because today we live in an information world. We use statistics to analyze things in an easy way. Statistics mostly used by researchers like me. Researchers use statistics to collect relevant data. Statistics helps in different fields. That's why all of us use statistics in our daily life with the help of statistics we present information easily and quickly. Farmers use statistics in their daily life they use statistics to know what amount of crops are grown this year in comparison to previous year. Education- money spent on girls in comparison to boys education? For making comparison we use Statistics. Statistics has its own significance in promoting as well as in helping at the time of odds, Here are some important factors related to Statistics. Statistics are not just numbers and facts. You know, things like 4 out of 5 dentists prefer specific toothpaste. Instead, it's an array of knowledge and procedures that allow you to learn from data reliably. Statistics allow you to evaluate claims based on quantitative evidence and help you differentiate between reasonable and dubious conclusions. That aspect is particularly vital these days because data are so plentiful along with interpretations presented by people with unknown motivations.

Statisticians offer critical guidance in producing trustworthy analyses and predictions. Along the way, statisticians can help investigators avoid a wide variety of analytical traps.

When analysts use statistical procedures correctly, they tend to produce accurate results. In fact, statistical analyses account for uncertainty and error in the results. Statisticians ensure that all aspects of a study follow the appropriate methods to produce trustworthy results. These methods include:

- Producing reliable data.
- Analyzing the data appropriately.
- Drawing reasonable conclusions.

So this is the basic things that you get to witness while studying about the basic concept of statistics, Statistics comprises of a large number of calculative studies that can be influential in both positive and negative manner depending upon the person using it. Statistics is both easy and the most complicated thing to be accessed and its relevancy of work depends upon the person using it.

INTRODUCTION

We are surrounded by information and to convert that information in meaningful, and in easy form to understand we use statistics. Statistics is very helpful in making information in understandable form so we can understand easily. The meaning of statistics is different for different people for a student statistics means marks, for a football team statistics means number of goals, for a bank statistics is the amount of deposits. Each of these are using statistics but in a different way. Statistics is used in two senses statistics

as data, as methods statistics as data means numerical data and statistics as method means techniques we use to collect data like collection, interpretation etc. Statistics means quantitative data. It can be used in every field. Statistics in modern age known as “the age of planning” one can find a career in statistical profession by doing such activities such as solving problems; apply mathematical and statistical knowledge to social, economic problems. Statistics helps in jobs like statistician, lecturer, professor, statistics trainer, and biostatistician.

Statistics helps in classification of data it helps in making comparison it provides techniques to make data easy.

The history of development of statistics is very long. There are many people who have made contribution in this field, In all the countries where history has been written, proofs are available that they had a collection of statistics. During Akbar’s time Raja Todarmal collected statistics to determine land revenue. The development of modern statistics started after industrial revolution. 19th century statistics used to describe economy and social problems in 20th century statistics have been used to determine action and to settle problems. Now statistics become a universally applicable statistics is important in every field.

Statistics is both art and science. Science refers to systematic body of knowledge. Art on other hand refers to skills of handling actions statistics is science because it is concerned with knowledge. Statistics is art because it is concerned with an action it needs skill (move skilfully or carefully) in handling data. Thus because statistics is both science as well as art.

There are many method we use with the help of statistics and we use bar graph, pie chart, charts to make comparison between different data statistics helps in making comparison. We use graphs to check population, and when students use graphs in their answer sheet it helps them to capture teacher attention by differentiating themselves from other classmates. Under statistics graphs can be used in many ways. Statistics includes many methods which helps us in different fields.

Results and Discussion

Importance of statistics in different fields

Statistics plays an important role in every fields of human activity:

1. It helps in determining population growth rates.
2. It helps in every field
 - Industry and in business
 - commerce and trade
 - physics, mathematics, chemistry
3. astronomy, psychology etc
4. It helps in to collect data
5. It helps in classification of data
6. It helps in comparison of data
7. It helps in forecasting.
8. It helps in to formulate policies in different fields.
9. It helps in prediction.
10. It helps in decision making which is useful in every field.
11. It helps in making data into simple form.
12. It helps researcher to research.
13. It helps us in daily life like to know how much water we use, or electricity etc¹

CLASSIFIED ROLES OF STATISTICS IN DIFFERENT FIELDS

- THE ROLE OF STATISTICS IN BUSINESS.
- THE ROLE OF STATISTICS IN MATHEMATICS.
- THE ROLE OF STATISTICS IN ECONOMICS.
- THE ROLE OF STATISTICS IN BANKING.
- THE ROLE OF STATISTICS IN ACCOUNTING.
- THE ROLE OF STATISTICS IN MANAGEMENT AND ADMINISTRATION.
- THE ROLE OF STATISTICS IN ASTRONOMY.
- THE ROLE OF STATISTICS IN NATURAL & SOCIAL SCIENCE.
- THE ROLE OF STATISTICS IN LEGAL WORLD

Role of statistics in business:

- Statistics helps businessman in making decision statistics helps to solve business problems it helps in analysing present position of business and future impacts.
- It can be used for quality assurance.
- It helps businessman to plan production according to the taste of the customers.

¹<https://www.emathzone.com/tutorials/basic-statistics/importance-of-statistics-in-different-fields.html>

- It helps in analysing the performance or the productivity of employees.
- Statistics helps in research and development it helps in market research.

As we all know that mathematics is full of solutions and when we solve that solution we use different methods with help of statistics in mathematics statistics plays an important role.



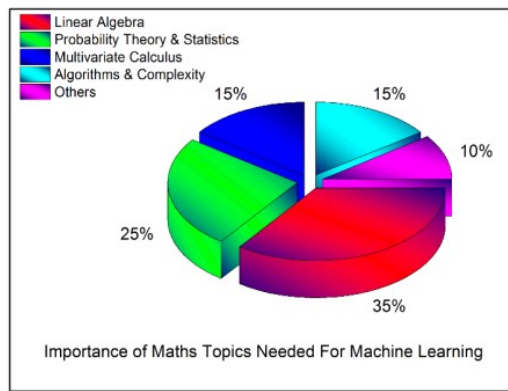
Today, there is hardly any business who is not using statistics. Every business small or big uses statistics for its daily function

Role of statistics in mathematics:

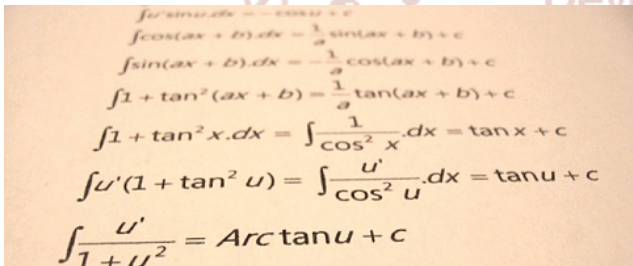
- Statistics is full of mathematics
- We solve mathematics solution with the help of statistics.
- We study probability which comes under statistics.
- We use graphs in mathematics with the help of statistics.
- We use different formula in mathematics with the help of statistics.

Role of statistics in economics:

- We use statistics in economics to collect information.
- It helps in analysing data.
- It helps in figure out inflation rate.
- It helps in figure out population and income rate.
- It helps in collecting data which helps in political terms.
- It helps in imports and exports information.
- It helps in to calculate GDP(gross domestic product) and CPI(consumer price index)

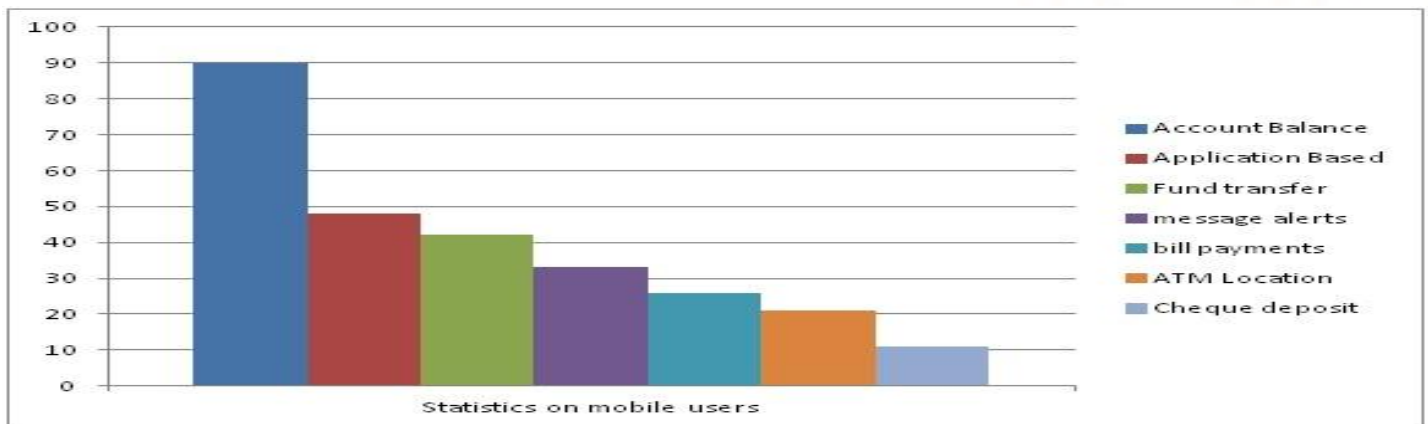


As we all know that much of economics depends on statistics.



Role of statistics in banking:

- It helps bank to find how much loan had been given
- It helps in calculating how much money people deposits
- It helps in making large calculation in easy form
- It helps in comparing deposits money with loan.



Banks use statistics for a great number of service they offer . they use statistics mainly for calculation how

past and present performance which helps in defining the problem.

many peoples deposits money ,how many had taken loan, etc statistics play an important role in banking.

Role of statistics in accounting:

- It helps in balancing and checking accounts.
- It helps in making comparison with trading and profit and loss account
- It helps in making proper balance sheet of company
- It helps in making projection for next final year.
- It helps in creating accounting reports.

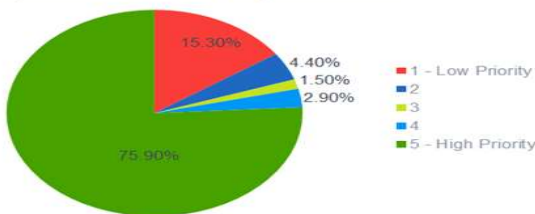


Accounting involves mostly basic arithmetic but when it comes to large calculation statistics plays an important role it helps in solving problem in easy way by using different methods.

Role of statistics in management and administration:

- It helps management and administration in decision making.
- It helps in making comparison between past and present performance.
- It helps in collecting data in systematic way
- It helps in to define a problems
- It gives proper feedback about each and every employee.

Importance of the Customer Experience to the Organization



Management and administration use statistics mainly for decision making and to make comparison between

Role of statistics in Astronomy:

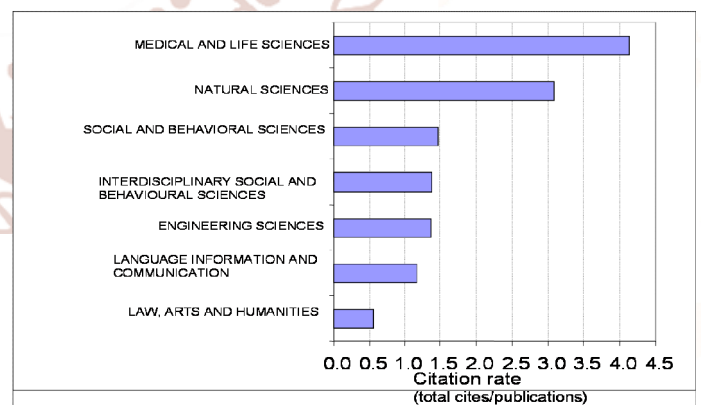
- It helps to take out measure the distance of earth from sun
- It helps in to manage temperature of the sun by measuring the problems
- It helps astronomers to guess how items in the universe are far from each other



Astronomers use statistics to measure distance and how items in universe are from each other.

Role of statistics in natural and social science:

- It helps in collecting data.
- Statistics helps in to analyze problems
- It helps in prediction.
- It helps in weather forecasting.
- And it helps in every fields
- In sociology statistics method use to communicate data received

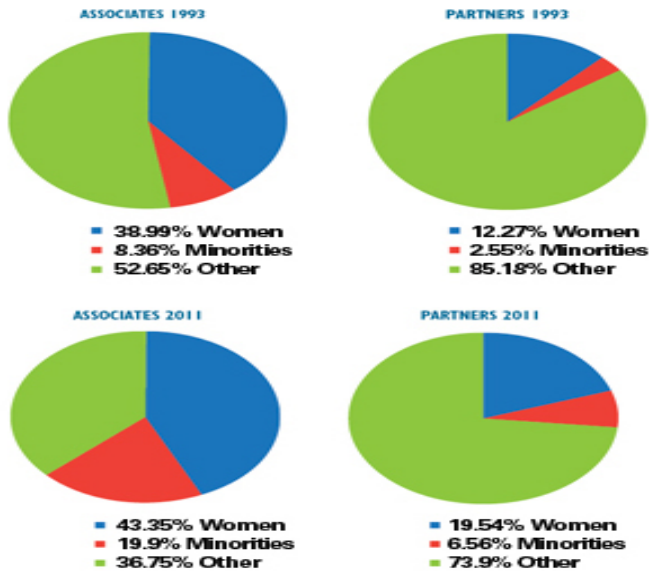


Biology, physics, chemistry, , and even information technology all use statistics . Statistic plays an important role in every field.

Role of statistics in legal world:

- Court use statistics to make data into simple form.
- Advocates use statistics to collect data
- It is very much helpful for lawyers.

- Without use of statistics no lawyer can present the proper facts of case



Statistics helps lawyers to collect and analyze data. Without collecting data no lawyer can present proper fact to judge that's why statistics plays an important role in legal world.²

So this was all about Statistics and its role in different field, it also comes with another important aspect and that is Labour Statistics ----

Overview and Discussion at Labour Statistics

As part of its remit for setting international standards, the ILO has developed a variety of standards covering different areas of Labor statistics. These standards include definitions of relevant concepts, operational definitions and guidance on implementation. The latest internationally agreed recommendations and guidelines on their measurement are contained in the Resolutions and Guidelines adopted by the International Conference of Labor Statisticians (ICLS). The latest statistical definitions for some of the core topics in labor statistics are presented in this section.

Labor statistics cover a wide range of topics related to the world of work. They include statistics about different forms of work as well as statistics about labor markets.

Work statistics

Work statistics relate to the productive activities of people. That is, activities performed by persons, regardless of their sex or age, to produce goods or provide services for use by others or for their own use. These activities include different forms of work, such as:

- Employment i.e. work for pay or profit
- Own-use production work i.e. work performed for own final use by the household or family
- Volunteer work i.e. non-compulsory work performed for others without pay
- Unpaid trainee work i.e. work performed for others without pay to acquire workplace experience or skills

Labor market statistics –

Labor market statistics focus, in particular, on various aspects of labor markets and how these change over time. They comprise statistics about labor demand and about labor supply.

Statistics about labor demand include information about the number and characteristics of enterprises, jobs, the costs of hiring labor (i.e. labor costs) and the demand for labor (vacancies).

Statistics about labor supply describe the size, structure, characteristics and attachment to the labor market of the working age population. This includes information about people in employment, unemployment; the labor force and people not in the labor force but with an unmet need for employment.

For users with a particular interest in information about the degree of access to and integration in labor markets by different groups of the population, there are a variety of indicators of labor that include:

- Unemployed persons
- Persons in time-related underemployment and the
- Potential labor force

From an economic perspective, labor market statistics are useful to analyze, evaluate and monitor the way the economy is performing and the effectiveness of current and longer term economic policies in generating employment. From a social perspective, they are useful to support the achievement of decent work, through policies and programmes for job creation, job training and retraining schemes, work-life balance, and assistance for vulnerable groups,

²<https://www.emathzone.com/tutorials/basic-statistics/importance-of-statistics-in-different-fields.html>

including the young, the aged, women, etc., in finding and securing decent employment.

To provide a more comprehensive picture of the world of work, labor statistics, in addition, cover information on important characteristics related to the jobs and other work activities of the population and the establishments or economic units in which they work, including such aspects as:

- Working time
- Status in employment
- Occupation
- Formal/informal nature
- Industry or branch of economic activity
- Type of economic unit
- Institutional sector
- Income
- Social dialogue (e.g. participation in strikes and lockouts, union membership, collective bargaining)
- Occupational injuries and diseases resulting from exposure to risk factors at work
- Social security coverage

Linked very closely to labor statistics because of their importance for assessing household living conditions and for determining minimum wages and real wages and incomes are statistics on household income and expenditure and the consumer price index, which measures the changes over time in the general level of prices of the goods and services that the population purchases for consumption.³

Conclusion

Here are three kinds of lies: lies, damned lies, and statistics."

I'm sure you've heard this most vile expression, which was popularized by Mark Twain among others. This dastardly phrase impugns the reputation of statistics. The implication is that statistics can bolster a weak argument, or that statistics can be used to prove anything.

I've had enough of this expression, and here's the rebuttal! In fact, I'll make the case that statistics is not the problem, but the solution!

³<http://www.ilo.org/global/statistics-and-databases/statistics-overview-and-topics/lang--en/index.htm>

Mistakes Can Happen

First, let's stipulate that an unscrupulous person *can* intentionally manipulate the results to favor unwarranted conclusions. Further, honest analysts can make honest mistakes because statistics can be tricky.

However, that does not mean that the field of statistics is to blame!

An analogy is in order here. If a surgeon does not follow best practices, intentionally or not, we don't blame the entire field of medicine. In fact, when a mistake happens, we call on medical experts to understand what went wrong and to fix it. The same should be true with statistics. If an analyst presents unreliable conclusions, there is no one better qualified than a statistician to identify the problem and fix it!

So, what is the field of statistics, and why is it so important?

The Field of Statistics

The field of statistics is the science of learning from data. Statisticians offer essential insight in determining which data and conclusions are trustworthy. Statisticians know how to solve scientific mysteries and how to avoid traps that can trip up investigators.

When statistical principles are correctly applied, statistical analyses tend to produce accurate results. What's more, the analyses even account for real-world uncertainty in order to calculate the probability of being incorrect.

To produce conclusions that you can trust, statisticians must ensure that *all* stages of a study are correct. Statisticians know how to:

- Design studies that can answer the question at hand
- Collect trustworthy data
- Analyze data appropriately and check assumptions
- Draw reliable conclusions

The Many Ways to Produce Misleading Conclusions

Statistician should be a study's guide through a minefield of potential pitfalls, any of which could produce misleading conclusions. The list below is but a small sample of these pitfalls.

Biased samples: A non-random sample can bias the results from the beginning. For example, if a study uses volunteers, the volunteers collectively may be different than non-volunteers in a way that affects the results.

Overgeneralization: The results from one population may not apply to another population. A study that involves one gender or age group, may not apply to other groups. Statistical inferences are always limited and you need to understand the limitations.

Causality: How do you know when X causes a change in Y? Statisticians require tight criteria in order to assume causality. However, people in general accept causality more easily. If A precedes B, and A is correlated with B, and you know several people who say that A affects B, most people would assume, incorrectly, that data show a causal connection. Statisticians know better!

Incorrect analysis choices: Is the model too simple or too complex? Does it adequately capture any curvature that is present? Are the predictors confounded or overly correlated? Do you need to transform your data? Are you analyzing the mean when the median may be a better measure? There are many ways you can perform analyses, but not all of them are correct.

Violation of the assumptions for an analysis: Most statistical analyses have assumptions. These assumptions are often requirements about the type of sample, the type of data, and how the data (or residuals) are distributed. If you perform an analysis without checking the assumptions, you cannot trust the results even if you've taken all the measures necessary to collect the data properly.

Data mining: Even if everything passes muster, an analyst can find significant results simply by looking at the dataset for too long. If a large number of tests are performed, a few will be significant by chance. Fastidious statisticians keep track of all the tests that are performed in order to put the results in the proper context.

Statistics to the Rescue

In short, there are many ways to screw up and produce misleading conclusions. Once again, you have to get *all* of the stages correct or you can't trust the conclusions.

If you want to use data to learn how the world works, you must have this statistical knowledge in order to trust your data and your results. There's just no way around it. Even if you are not performing the study, understanding statistical principles can help you assess the quality of other studies and the validity of their conclusions. Statistical knowledge can even help reduce your vulnerability to manipulative conclusions from projects that have an agenda.

The world today produces more data than ever before. This includes all branches of science, quality improvement, manufacturing, service industry, government, public health, and public policy among many other settings. There will be many analyses of these data. Some analyses are straight up for science and others are more partisan in nature. Are you ready? Will you know which conclusions to trust and which studies to doubt?

In addition to resources like this blog, Minitab offers an e-learning course called Quality Trainer that can help you learn statistical principles, particularly as they relate to quality improvement. If you'd like to learn more about analyzing data, it's a great investment at just \$30 per month, or possibly less if your organization uses Minitab Statistical Software.⁴

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