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INTRODUCTION

In your day-to-day life you must have heard statements like "India's population is increasing at the rate of 2.2% per annum. The profits of A.B.C., Co.Ltd. increased from Rs.5 lakh in 1977 to Rs.6.Lakh in 1978", etc. Such statements are very common in class room lectures, daily newspapers, speeches or on radio. They contain facts and figures. They are very convenient forms of communications as well as very clear, precise and meaningful. Analysis of such statements helps one in arriving at certain conclusions. For example, 146 students have passed B.Com. with 1st class Honour from colleges under Utkal University and there is provision for 80 students to be admitted to M.Com class in 1979. It is evident from the statement that the rest of the boys are deprived of higher education.

DEFINITIONS

There are many definitions of the term 'Statistics'. Some authors have defined statistics 'as sense. statistical A few data as used in plural sense whereas other as statistical methods used in singular well recognized definition are analyzed below:- As Statistical Data : - in Webster defined statistics as "the classified facts representing the condition of the people a state - especially those facts which can be stated in numbers or in tables of numbers or in any tabular or classified arrangement'. If we analyse this definition, it cannot be regarded as the one most commonly used because it is very narrow. It confines the scope of statistics to only such facts and figures which relate to the conditions of the people in a state, In fact, statistics at present relate to all aspects of human activities. This definition does not suit modern conditions. Value and Kendall defined statistics as, "By Statistics we mean quantitative data affected to a marked extent by multiplicity of causes". The definition also is very narrow because it does not include many important features of statistics as used in statistical data. Harac Secrilsts defined statistics as "By Statistics we mean aggregates of facts effected to a marked extent by multiplicity of causes, numerically expressed, enumerated or estimated according to reasonable standards of 'accuracy, enumerated or estimated according to reasonable standards of accuracy, collected in a systematic manner, for per-determined purpose and placed in relation to each other".

IMPORTANCE OF STATISTICS

Statistical methods have become useful tools in the world of affairs. Economy and a high useful degree of flexibility are the important qualities of statistical methods that render them especially to businessmen, economists, scientists, government, research scholars etc.

1. Importance in Economic and Social Studies -

Prof. Alfred Marshall observed "Statistics are the straw out of which I like every other economist, have to make bricks". This proves the significance of statistics in economics. In the field of economics it is almost impossible to find problem, which does not require an extensive use of statistical data. Economics is concerned with the production and distribution of wealth as well as consumption, saving and investment income. Statistical data and statistical method are of immense help in proper understanding of the economic problems and in the formulations of economic problems and in the formulation of economic policies. That to produce, how to

produce and for whom to produce -these are the questions that need a lot of statistical data in the absence of which it is not possible to arrive at correct conclusion. Statistics of production help in adjusting the supply to demand. Statistics of consumption enable us to find out the way in which people of different sections of society spend their income. Such statistics are very helpful to know the standard of living and taxable capacity of the people. In reducing disparities in the distribution of income and wealth statistics are of immense help. Similarly in solving problems of rising prices, growing population, unemployment, poverty etc., one has to depend upon statistics. Statistical methods help not only in formulating appropriate economic policies but also in evaluating their effect. For example in order to check the over-growing population emphasis has been placed on the family planning methods, one can ascertain statistically the efficiency of such methods in attaining the desired goal. In recent years economics as which comprised the application in statistical methods to the theoretical economic methods is widely used in economic research. Statistical methods of sampling are useful for collecting the basic data of economic studies. The demand function, production function, cost functions and consumption functions present many difficult problems in the analysis of which statistical tools are of immense use. Economists now utilize statistical data in building a sound factual foundation for their reasoning specially in the following fields . In Measuring Gross National Product and input-output analysis; (i) Utilization of financial statistics in the fields of money and banking, short-term credit consumer finance and Public finance. (ii) In studying facts in the study of competition, oligopoly and monopoly by comparing market prices, cost and profits of individual firms. (iii) In studying the theories of prices, pricing policy and price trends and their relationship to the general problem of inflation, (iv) In operational studies of public utilities which require statistics and legal tools of analysis. (v) In analyzing population and economics and economic geography and in many other fields. Mathematics and its main offspring, statistics and accounting are the powerful instruments which the modern economist has at his disposal and of which business through the development of research agencies and methods is making constantly great use. A sociologist may attempt to demonstrate with the help of statistical data the relationship between sales of liquor and crime or between suicide and poverty etc.

2. Statistics and the State -

Since times the ruling kings and chiefs have relied much on statistics in framing suitable military and fiscal policies. Most of the statistics such as that of crimes, military strength, population taxes etc., which were collected by them were the byproduct of administrative activity. In case 7 years the functions of the state have increased tremendously The concept of a state has changed from that of the simply maintaining law and order to that of a welfare state, Statistics and statistical data are indispensable in these days for a clearer appreciation of any problem affecting the all are of mankind Problems relation to poverty unemployment food shortage, protectiveness uneconomic agricultural holdings etc cannot be full weighed without statistical data Statistics to-day are not exclusively by-product of administrative activity The State collects statistics on several problems. Such statistics help in framing suitable policies and studying their effects. All ministers and departments of the government whether they be finance, transfer defence, railways, food, commerce post and telegraph or agriculture depend much on factual data for their efficient functioning. For example, the transport department cannot solve the problem of transport in Bhubaneswar, Cuttack or Rourkela unless it knows how many buses are operating at present, what is the total requirement in these places and many

additional buses are to be added to the existing ones. Not only during peace times, but during days of war also statistics are indispensable. It is impossible to fight a war successfully in the absence of factual data about the strength of the enemy. Statistics are so significant to the state that the government in most countries is the biggest collector and user of statistical data. Such data are of immense help to many institutions who further process them and arrive at useful conclusions, which help in decision-making. Official statistics occupy a very important place in almost all countries.

3. Need in Planning Economic activities are more closely directed to the production of such goods and the provision of such services, as the government may decide from time to time to be most urgently required. Our future is being planned and such planning to be successful must be soundly based on the correct analysis of complex statistical data. Planning cannot be imagined without statistics. If you study the economic plans implemented in various countries in recent times you will find that all of them are statistical study of the economic resources of the respective countries, and they suggest possible ways and means of utilizing these resources in the best possible manner. Various plans that have been prepared for the economic development of India have also made use of the statistical data available about various economic problems. One of the reasons of failure of Indian plans is what we have insufficient or incorrect data. National Sample Survey Scheme was primarily started to collect data for the use in planning in India. The success failure of plans and the progress report bear witness to it. Thus one finds that in the field of economic planning the use of statistical data and methods is indispensable.

4. Statistics Discloses Causal Relationship Between Related Facts Food prices are low when new harvest arrives in the market and they rise in the off-season. A clever buyer buys his annual requirements at the harvest time. Such causal studies are at the bottom of all sound human endeavour, Statistics is the light bearer that enlightens the way to adventure.

5. Usefulness in Business and Commerce - With the growing size and ever increasing competition, the problems of business enterprises are becoming complex and they are using more and more statistics in decision-making. Many business problems are now solved, through statistical data and method used in interpretation. An owner of a small firm, in the past, acted as the storekeeper, manager, accountant, salesman, purchaser etc. It was possible for him to make personal contacts with the customers and know exactly what they wanted. With the growth in size, business problems have become very complex, and it is impossible for the owners to have personal contacts with thousands of customers, Management has become a specialized job and a manager has to plan, organize, supervise and control the operations of the business house. Most of the production these days is in anticipation of demand and therefore unless very careful study of the market product and consumer is made the firm may not be able to make profits. Trial and error method of taking a decision no more holds good. To-day the businessman succeeds or fails accordingly as his forecasts prove to be accurate or wrong. Business now runs on estimates and probabilities. If the estimates or forecasting of the business man is correct, there will be high degree of accuracy and it will result in profits to the business, otherwise there may be a loss, In recent years statistics and statistical methods have provided the businessman with one of his most valuable tools for decision-making.

Business activities can broadly be grouped under the following :

1-Production, 2-Sale, 3- Purchase, 4-Finance 5-Personnel, 6-Accounting 7-Market and Product Research and 8-Quality Control. For better or worse the modern business executive is largely dependent on Statistical data and method of analysis for essential information. Statistical information is needed from the time the business is launched till the time it comes to an end. At the time of flotation of the concern, facts are required for the purposes of drawing up the financial plan of the proposed unit, With the help of statistical methods in respect of any of the above categories, much quantitative information can be obtained which can be of immense use in formulating suitable policies. For example, a manufacturer must know in advance how much is to be produced, how many workers and how many raw material will be needed to be produce that estimated quantity, and what quantity type, size, colour or grade of the product is to be manufactured. He must, therefore, have a sound production plan which cannot be prepared without Statistical analysis of the past and present data. Statistical methods of analysis are helpful in the marketing function of an enterprise through its help in market research, advertisement campaigns in comparing the sales performances. Statistics also directs attention towards the effective use of advertising funds. Similarly, in settling 9 with labour the disputes; competitive in having a sound financial structure, in purchasing quality materials or products price etc. statistical data and methods are valuable in business and business surveys with a considerable saving in time and money. These techniques are now commerce. The theory and technique of sampling can be used in connection with the various being extensively used in test checking of accounts. Statistical industry for establishing quality standards for quality control is being used in products for maintaining the requisite quality, and for assuring that the individual lots sold are of a given standard of acceptance. The scientific management movement in India has emphasized the need for collecting facts and interpreting there fore movement in commerce. Operators cesarean helpful the main in the offspring of scientific management, has been statistical in its approach and is very filed of business and commerce. Thus you see that statistics are the life-blood of successful commerce. Though statistical methods are extremely useful in taking decisions they are not perfect substitute for common sense. A practitioner of business statistics must, therefore, combine the knowledge of he business environment in which he operates and its technological characteristics with a heavy dose of commonsense and ability to interpret statistical methods to non-statisticians.

6. Utility to Bankers, brokers, Insurance Companies, Underwriters, Investors in Insecurities, Railways etc. - Bankers, brokers of stock exchanges, investors in insurance companies or corporations and public utility concerns make extensive use of statistical data. A banker has to make a statistical study of business cycles to forecast a probably boom or a depression and has to study in detail the seasonal variations in the demand for call money form its depositors. On the basis of such demand, bankers usually keep a reserve. Stock-exchange brokers, speculators and investors use statistical data in for-casting the demand for shares, stocks etc. They collect information about interest rates fluctuation of investment market to have a definite idea about the situation to gain maximum profit. They also collect information about money rates at different center and study their future trends. Insurance corporations and companies have to depend upon mortality tables, vita statistics and they have to collect facts lie and incidents, which had taken place in the past. Theory of probability works out fully in the field of insurance. Premium rates in life insurance have to be fixed on the basis of mortality rates in different age groups.

Sickness or unemployment insurance also depends on statistical data. Public utility concerns like railways, electric supply companies, water supply companies, gas supply companies etc, also make extensive use of statistics. A railway operating over a 10 wide area has many sources of possible wasteful expenditure, Statistical data and methods help the railways and other public utility concern to avoid wastage of all kind and work efficiently and economically.

7. Desirability in Research - Statistics is indispensable in any research work. Most of the advancement in knowledge has taken place because of experiments conducted with the help of statistical methods. For example experiments about crop yields and different types of fertilizers and soils or the growth of animals under different diets and environments are mostly designed and analyzed with the help statistical methods. Statistical methods also affect research in medicine and public health. In market research, quantity control etc, statistical data are not useful but necessary. In fact, there is hardly any research work to-day where research worker does not make extensive use of statistical data. It is also impossible to understand the meaning and implications of most of the findings of research in different fields without statistical facts and methods. Limitations of the Science of Statistics From the discussions on importance and indispensability of statistics you might by thinking statistics are like magical devices, which always provide the correct solution to problems. But actually it is not so. Unless the data are properly collected and critically interpreted there is every likelihood of drawing wrong conclusions. Statistical techniques cannot be made to answer all our queries.

Therefore, It is necessary to know the limitations and the science of statistics:-

1. Does not Study Qualitative Phenomena - Statistics can be applied only to those phenomena and the problems, which are capable of quantitative expressions. Such characteristics, which cannot be expressed in figures have very little use of statistical methods. In a study of honesty, statistical method cannot be of much help. Health, culture, character, friendship skill, poverty, cruelty, pessimism etc. cannot be quantitatively expressed. In studying any such phenomenon the statistical aspect is assumed to be subsidiary to other considerations. These subjective concepts can be related in an indirect fashion to numerical data. For example, we may study the intelligence of students on the basis of the marks obtained by them in an examination. Honesty itself may not be capable of quantitative analysis but many factors, which are related to this phenomenon, are capable of being expressed in figures and as such can throw some light on the study of the problem. A study of the number of thefts or cases of cheating or swindling can indirectly tell us something of the problem under study, Similarly, health of the people is judged by a study of its death rate, longevity of life and the prevalence of any disease. Again, the crime in different countries can be measured indirectly in terms of men and women who go to prison and if the number of such persons is decreasing, we can say that there is a better enforcement of the law and crime in the country. All these figures in which people in the two countries live, the value they attach to principles of right conduct, the Outlying directly relate to the real problem. They are subsidiary to other information like the manner type of work they perform, the food they take and so on.

2. Does not Reveal the Entire Story of a Problem - analysis, it is not always possible to examine a problem in all its manifestations only by a statistical approach. Since many problems are affected by such factors, which are incapable of statistical Statistician possible to examine a per methods of studying a problem Helps in has been behaving questionable conclusions Many provides studying the trends, in framing an idea of the probabilities, in knowing how a given phenomenon have to be

examined in the background of a country's cultural, philosophy or religion. Statistical results should not always be treated as the sole determinants of the value of a group. Such results are more in the nature of estimates than exact statements. These may be approximately correct. If a statistical conclusion or inference is confirmed by other available evidences and methods

3. of study it can be taken as fairly reliable. Statistical Laws are True only on Average or in the Long run - Statistics as a science is not as accurate as many other sciences are and statistical methods are not very precise and correct. They are not like the exact laws of physical sciences, which are said to hold true in every individual case that is subject to them. Laws of statistics are not universally true like the laws of Physics or astronomy. Statistics deals with such phenomena, which are affected by a multiplicity of causes and it is not possible to study the effects of each of these factors separately as is done under experimental methods. Due to this limitation in the tendencies, statistical methods Hence the the conclusions same arrived at are not perfectly accurate but they show approximate conclusions cannot be arrived at under similar conditions at all times.

4. Does not Study Individuals - aggregates Statistical methods have no place for an individual item of a series. Statistics deals with a given group. or mass phenomena and as such, throws light on the characteristics of the whole of single figures. A Of statistical course, for purposes of analysis these aggregate are very often reduced to series is condensed into an average for purpose of comparison (this recognition. will made clear If to you in another lesson) though an individual item of the series has no specific the total population only 100 of persons die of starvation in India and if the percentage of these deaths to this fact does not the country is negligible, statistically we will be justified in ignoring it. But something very reduce the torture of death for these 100 people. From this point view is any important and material but in statistical analysis such a problem does not occupy defect significant in many place. investigations. This type of apathy individual items of a series is a serious limitation or 12 You can understand this aspect still better with the following example. If the per ca-pita income(on an average) has been rising for the last twenty years, it will be presumed that income of people has risen. It may so happen that, only rich persons have become richer, and very poor persons, the lower middle class people, these individuals in no way have more incomes. In fact, the per ca-pita income will not reveal the extent of their miseries.

5. Statistics is Liable to be Misused and Abused - The greatest limitation of statistics is that only one who has an expert knowledge of statistical methods can scientifically handle statistical data. Statistics, like medicines in the hands of quacks, are capable of being easily misused by the in experts. One might interpret statistics according to his convenience and make the worse appear to be the better case. Many people, therefore, look at statistics with an eye of suspicion. Statistics is a delicate tool and should be used with caution. Misuses are as common as valid uses of statistical uses of statistics. The misuse of statistics may arise due to several reasons. For example, if statistical conclusions are based on incomplete information, one may arrive at fallacious conclusions. The statement that the incidents of death among sick persons is higher in hospitals than at home due to lack of proper treatment and care. But this conclusion turns out to be completely erroneous if it is borne in mind that in India only seriously ailing persons are hospitalized. Similarly, due to change initiation, inaccurate measurement and classification, inappropriate comparison, defective method in selecting cases etc. statistical conclusions are likely to be misused and abused. Statistics are like clay and they can be molded in any manner so as to establish right

or wrong conclusions. In this context, W.I.King pointed out "One of the shortcoming of statistics is that they do not bear on their face the label of their quality". It requires experience and skill to draw sensible conclusions from the data; otherwise, there is every likelihood of wrong interpretations. The very fact that statistics may lead to wrong conclusions in the hands on in experts and inexperienced people limits the possibility of mass popularity of such a useful science. Statistics also cannot be used to full advantage in the absence of proper understanding of the subject to which it is applied.