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**MS**

**Q1**

**Nominal scale;-**

Simply we defined nominal scale is the scale of measurement scale in which numbers serve as ‘labels’ ‘tags’ only to identify or classify an object. A nominal scale measurement normally deals only with non numeric variables or where numbers have no value.

**EXAMPLE**

We have the example of nominal scale is as below

Which fruit do you like?

1. Banana
2. Mango
3. Apple
4. Pineapple

In this particular example 1= Banana 2,= Mango, 3=apple, 4=pineapple. Here the numbers are simply used as tags and have no value.

Nominal scale possesses only the description characteristics which means it posses unique labels to identify or delegate values to the items. When nominal scale is used for the purpose of identification there is a strict one to one correlation between an object and the numerical value assigned to it. For example numbers are written on cars in a racing track. The numbers are there merely to identify the driver associated with the car, it has nothing to do with characteristics of the car.

But nominal scale is used for the purpose of classification, then the numbers assigned to the object serve as tags to categorize or arrange objects in class. For example in the case of gender scale an individual can be categorized either as male or female in this case all objects in class in the category will have the same number, for example all males can be no 1 and all female can be no 2 simply nominal is purely used for counting purpose.

**Ordinal scale;-**

Ordinal scale is the second level of measurement that reports the ranking and ordering of the data without actually establishing the degree of variation between them. Ordinal level of measurement is the second of the four measurement scales.

Ordinal indicates “orders” ordinal data is quantitative data which have naturally occurring orders and the difference between is unknown. It can be named grouped and also ranked.

|  |  |
| --- | --- |
| How satisfied are you with our products ?* 1-totally satisfied
* 2- satisfied
* 3- dissatisfied
* 4-totally disatified
 | * 1-very unhappy
* 2-Unhappy
* 3-neutral
* 4-Unhappy
* 5-very happy
 |

Survey respondents will choose between these options of satisfaction but the answer to “how much”? will remain unanswered. The understanding of various scales helps statistician and researchers so that the use of data analysis techniques can be applied accordingly.

Thus an ordinal scale is used as a comparison parameter to understand whether the variables are greater or lesser than one another using sorting. The central tender the ordinal scale is median.

The intensity of difference between these options can’t be related to specific values as the difference value between totally satisfied and totally dissatisfied will be much larger than the difference between satisfied and neutral. If someone loves Mercedes Benz cars and is asked “How likely are you to recommend Mercedes Benz to your friends and family?” will be troubled to choose between Extremely likely and Likely. Thus, an ordinal scale is used when the order of options is to be deduced and not when the interval difference is also to be established.

**EXAMPLE**

Ranking of high school students 1st, 3rd, 4th,10th ,……nth. A student scoring 99/100 would be the 1st rank another student scoring 92/100 would be 3rd and so on and so forth.

**Interval scale;-**

The interval scale is a quantitative measurement scale where there is the order the difference between the two variables is meaningful and equal and the presence of zero is arbitrary. It measure variables that exist along a common scale at equal interval. The measures used to calculate the distance between the variables are highly reliable.

The interval scale is the third level of measurement after the nominal scale and the ordinal scale. Understanding the first two levels will help you differentiate interval measurements. A nominal scale is used when variable do not have a natural order or ranking you can includes numbered or unnumbered variables but common survey.

Example are gender, location, political party, pet and so on.

**Example**

Interval scale are commonly used question type in research studies. To received answers in the form of interval data, you need to limit feedback options to variables that can be assigned a numerical value where the difference between the two variables is equal.

**Ratio scale;-**

Ratio scale is a type of variable measurement scale which is quantitative in nature, ratio scale allows any researcher to computer the interval or differences. Ratio scale is the 4th level of measurement and possesses a zero point or character of origin. This is a unique feature of ratio scale. For example the temperature outside is 0 degree Celsius 0 degree does not mean its not hot or cold it is a value.

**Example**

Select the age bracket do you fall in?

* 21-30 year
* 31-40 year
* 41-5- year
* 50 year and above

Ratio scale has most of the characterastics of the other three variable measurement scale ie nominal ordinal and interval. Nominal variables are used to “name” or label a series of value. Ordinal scales provide a sufficiently good amount of information about the order of choices. Such as one would be able to understand from using a customer satisfaction survey interval scale give us the order of values and also about the quantify the difference between each one. Ratio scale helps us to understand the ultimate order, interval , and the true zero characteristics is an essential factor in calculating ratios.

**Quantitative variable ;-**

Quantitative variables are the variables which are measured on a numeric or quantitative scale. We have ordinal and ratio scales are the quantitative scale.

**Examples**

We have the examples of quantitative variables examples are a country population, a person shoe size, or a car speed.

We have other examples like

* How many cousins you have eg 3 4 5 6
* The amount in your pocket eg 34$ 56$ 88$
* School grades points average eg 4,0,5,7

 Qualitative variables are the variables which are not numerical it describes data that first into categories. Quantitative variable is also called categorical variable.

**Example**

Simple examples of qualitative variables are

* States ( variable includes; Washington,New jersey, florida)
* Eye colors (variable includes; blue, green, brown, hazel)

These are all qualitative variables as they have no natural order on the other hand quantitative variables have a value and they can be added subtracted divided or multiplied.

As a general rule, if you can apply some kind of math (like addition), it’s a [quantitative variable](https://www.statisticshowto.com/what-are-quantitative-variables-and-quantitative-data/). Otherwise, it’s qualitative. For example, you can’t add blue+green (unless you’re in an art class — even then you “mix” them, you don’t add them!).

**Numbers are sometimes assigned to qualitative variables** for [data analysis](http://www.hindawi.com/journals/jqre/2010/849043/), but they are still classified as qualitative variables despite the numerical classification. For example, a study may assign the number “1” to males and “2” to females.

**Regression;-**

This type of technique that dis often used in these circumstances is regression which involves estimating the best straight line to summarise the association.

**Correlation ;-**

The word correlation is used in everyday life to donate some form of association. We might say that we have noticed a correlation between foggy days and attack of wheeziness however in statistical terms we use correlation to donate association between two quantitative variables we also assume that the association is linear that one variable increase or decreases a ficed amount for a unit increase or decrease in the other.

**Q 2**

**Methodology of quantitative techniques;**

Quantitative techniques are the techniques of measurement and the statistical mathematical or numerical analysis of data collected though polls questionnaires, and survey or by manipulating pre existing statistical data using computational.

Quantitative research is a strategy which involves the collection of numerical data a deductive view of the relationship between theory and research a preference for a natural science approach and objectivist conception of social reality.

Quantitative techniques are needed to process the information needed for effective planning, leading organizing and controlling. Qualitative and quantitative methods are productive tools in solving organizational problems. They are behavioral and mathematical techniques respectively that can provide a diversity of knowledge. Quantitative analysis concentrates on facts, data and numerical aspects associated with the problem.

**Steps of quantitative techniques ;-**

**1 Formulating the problem**

Formulating the problem is the 1st step of quantitative techniques it is necessary to clearly understand the problem situation it is important to know how it is characterized and what is required to be determined.

**2 Defining the decision variables and constraints**

Defining the decision variables and constraints are the important key variables identifying these variables helps us to develop the model for example consider a manufacturer who is manufacturing three products A B and C using two machines 1 and 2 each unit of product A takes 2 min on machine 1 and 5 min on machine 2 product B 1 min on machine 1 and 3 min on machine 2.

Similarly product C takes 4 min and 6 min on machine 1 and machine 2 respectively the total available time on machine 1 and 2 are 100 hours and 120 hours respectively each unit of A yield a profit of RS 300 yield RS 400 and C yield 500 what should be level of production of products A B C that should be manufacted by the company as to macimize the profit.

**3 The decision variables, objective and constraints are identified from the problem.**

The company is manufacturing three products A, B and C. Let A be x1, B be x2 and C be x3. x1, x2 and x3 are the three decision variables in the problem. The objective is to maximize the profits. Therefore, the problem is to maximize the profit, i.e., to know how many units of x1, x2 and x3 are to be manufactured. There are two machines available, machine I and machine II with total machine hours available as 100 hours and 120 hours. The machine hours are the resource constraints, i.e., the machines cannot be used more than the given number of hours.

**4 Developing a suitable model**

A model is a mathematical representation of a problem situation. The mathematical model is in the form of expressions and equations that replicate the problem. For example, the total profit from a given number of products sold can be determined by subtracting selling price and cost price and multiplying the number of units sold. Assuming selling price, sp as Rs. 40 and cost price, cp as Rs. 20, the following mathematical model expresses the total profit, tp earned by selling number of unit x.

T P = (SP – CP) x
= (40 – 20) x
T P = 20 x

Now, this mathematical model enables us to identify the real situation by understanding the model. The models can be used to maximize the profits or to minimize the costs. The applications of models are wide, such as:

* Linear Programming Model
* Integer Programming
* Sensitivity Analysis
* Goal Programming
* Dynamic Programming
* Non Linear Programming
* Queuing Theory
* Inventory Management Techniques
* PERT/CPM (Network Analysis)
* Decision Theory
* Games Theory
* Transportation and Assignment Models.

**5 Acquiring the input data**

Acquiring accurate data for input values are essential even though the model is a perfect representation of reality improper data will result in misleading results, collecting accurate data can be one of the most difficult steps in performing quantitative analysis.

**6 Solving the model**

Solving the model involves manipulating the model to arrive at the optimal solution in some cases this requires that equation be solved for the best decision in other cases you can use a trial and error method trying various approaches and picking the one that result in the best solution.

**7 Validating the model**

A validation model is a complete test of the model to confirm that it provides an accurate representation of the real problem this help us in determining how good and realistic the solution is during the model validation process inaccuracies can be rectified by taking corrective actions until the model is found to be fit.

**8 Implementing the result**

The final step is to implement the results. This is the process of incorporating the solution into the company. Even if the solution is optimal and will result in millions of dollars in additional profits, if managers resist the new solution, all of the efforts of the analysis are of no value.

After the solution has been implemented, it should be closely monitored. Over time, there may be numerous changes that call for modifications of the original solution. A changing economy, fluctuating demand and model enhancements requested by managers and decision makers are only a few examples of changes that might require the analysis to be modified.

**Q3**

 **Measure of variability ;-**

A measure of variability is a summary statistic that represent the amount of dispersion in a dataset. How spread out the values while a measure of centra tendency describes the typical value measure of variability define how far away data points tend to fall from the center.

We talk about variability in the context of a distribution of values. A low dispersion indicates that the data points tend to be clustered tightly around the center. High dispersion signifies that they tend to fall further away.

**RANGE**:

: The range is the different between the largest and smallest observations

RANGE=Maximum-Minimum

or in other words the maximum minus the minimum consider this sample of four observation this first value we will call X1 second one x2 third one x3 and four one x4 and rang is maximum value is the 68 minus the minimum value 45 which work out to 23 and the range it is very easy to calculate and interpret but it’s not great measure of variability the rang doesn’t tell us anything about the spread of the value between maximum and the minimum.

**STANDARD DEVIATION**

The standard deviation is the square root of the variance: and standard deviation is a statistical measure that represent the rate of divergence from the mean in data set and is used a lot in trading. A small standard deviation means that the values appear to come similar to the fixed mean while a large standard deviation implies that the values are distributed across a larger spectrum.

**VARIANCE:**

The variance is the mean average of the square differences. First, measure the difference between every point and the mean to evaluate the variance; then, square and combine the effect.

**RELATIVE STANDING:**

Following are the points that falls in this category

1. Z-Score:

A Z-score is a numerical measurement that describes a value's relationship to the mean of a group of values. Z-score is measured in terms of [standard deviations](https://www.investopedia.com/terms/s/standarddeviation.asp) from the mean. If a Z-score is 0, it indicates that the data point's score is identical to the mean score. A Z-score of 1.0 would indicate a value that is one standard deviation from the mean. Z-scores may be positive or negative, with a positive value indicating the score is above the mean and a negative score indicating it is below the mean.

A positive z-score says the data point is above average.

* A negative z-score says the data point is below average.
* A z-score close to 000 says the data point is close to average.
* A data point can be considered unusual if its z-score is above 333 or below -3−3minus, 3.

**Q 4**

**Scope of quantitative technique**

The scope of statistics was primarily limited in the sense that the ruling kings used to collect data so as to frame suitable military and fiscal policies only. Hence they heavily depended upon statistics. As time went on, statistics came to be regarded as a method of handling and analyzing the numerical facts and figures.

In recent years, the activities of the state have increased tremendously. Statistical facts and figures are of immense help in promoting human welfare. Today, the scope of statistics is so vast and ever expanding. It influences everybody’s life. Even an entry into the world and exit are systematically recorded.

There is no branch of human activity that can escape the attention of statistics. It is a tool of all sciences. It is indispensable for research and intelligent judgment. It has become a recognized discipline in its own right. A few specific areas of application are mentioned below.

* **Finance and accounting**

Cash flow analysis capital budgeting dividend and portfolio management financial planning

* **Marketing management**

 Selection of product mix sales resources allocation and assigments.

* **Production management**

Facilities planning manufacturing aggregate planning inventory control quality control work scheduling.

* **Personal management**

Manpower planning, Resource allocation, Staffing, Scheduling of training programs.

* **General management**

Decision Support System and Management of Information Systems, MIS, Organizational design and control, Software Process Management and Knowledge Management.

From the various definitions of Quantitative Technique it is clear that scientific management technique can be used to solve any problem, simple or complicated. In this head we shall try to find the scope of M.S. by seeing its application in various fields of everyday lift that includes define operation too.

The advantages of mathematical modeling are many:

1. This model are exactly represent the real problem situation.
2. Model help managers to take decesions faster and more accurately.
3. They typically offer convenience and cost advantages over other means of obtaining the required information on reality.
4. Large and complex problems can be solved with ease.
5. Models acts as communicators to other by providing information and impact in changing condition.