Percentages

BASIC DEFINITION AND UTILITY OF PERCENTAGE

Percent literally, means 'for' every 100' and is derived from the French word 'cent',which is French for 100.

The basic utility of percentage arises from the fact that it is one of the most powerful tools for comparison of numerical data and information. It is also one of the simplest tools for comparison of data
In the context of business and economic performance, it is specifically useful for comparing data such as profits, growth rates, performance, magnitudes and so on.

IMPORTANCE OF BASE/ DENOMINATOR FOR PERCENTAGE CALCULATIONS

Mathematically, the percentage value can only be calculated for ratios that, by definition, must have a denominator. Hence, one of the most critical aspects of the percentage is the denominator, which in other words is also called the base value of the percentage. No percentage calculation is possible without knowing the base to which the percentage is to be calculated.

Concept of percentage change

Whenever the value of a measured quantity changes, the change can be captured through

(a) Absolute value change or
(b) Percentage change.

Both these measurements have their own advantages and disadvantage .

Absolute value change: it is the actual change in the measured quantity. For instance, if sales in year 1 is Rs. 2500 crore and the sales in year 2 is Rs. 2600 crore, then the absolute value of the change is Rs. 100 crore.

Percentages

Percentage change: It is the percentage got by the formula

Percentage change = absolute value change/Original quantity X 100

= 100/2500x100=4%

As seen earlier , this often gives us a better picture of the effect of the change

Difference between the percentage point change

The difference between the percentage point change and the percentage change is best illustrated through an example. Consider this:

The saving rate as a percentage of the GDP was 25% in the first year and 30% in the second year. Assume that there is no change in the GDP between the two years. Then:

Percentage point change in saving rate = 30% - 25% = 5 percentage points. Percentage change in saving rate = 30 – 25/25 x100 = 25%

Effect of a percent change in the Numerator on a Ratio's value

The numerator has a direct relationship with the ratio, that is, if the numerator increase the ratio increases. The percentage in the ratio is the same as the percentage increase in the numerator, if the denominator is constant.
Thus, 22/40 is exactly 10% more than 20/40. (in terms of percentage change)

Percentage change Graphic and its Applications

In mathematics there are many situations where one is required to work with percentage changes. In such situations the following though stricture (Something I call percentage Chang Graphic) is a very useful tool:
What I call percentage Change Graphic (PGC) is best illustrated through an example:

Suppose you have to increase the number 20 by 20%. Visualise

$$20 \frac{20\% \uparrow}{= +4} > 24$$

The PCG has 6 major application listed and explained below: PCG applied to:

1. Successive change

Percentages

2. Product change application
3. Product constancy application
4. A → B → A application
5. Denominator change to Ratio Change application
6. Use of PGC to calculate Ratio changes

Application 1: PCG applied to successive Change

This is a very common situation in most. Suppose you have to solve a question in which a number 30 has two successive percentage increases (20% and 10% respectively).

The situation is handled in the following way using PCG:

$$30 \xrightarrow[+6]{20\%\text{ increase}} 36 \qquad \xrightarrow[+3.6]{10\%\text{ increase}} 39.6$$

Application 3 of PCG: product Constancy Application (Inverse proportionality)

Suppose you have a situation wherein the price of a commodity has gone up by 25%. In cases you are required to keep the total expenditure on the commodity constant, you would obviously need to cut down on the consumption. By what percentage ? Well, PCG gives you the answer as follows:

$$100 \xrightarrow[+25]{25\ \%} 125 \xrightarrow[-25]{} 100$$

Price effect Consumption Effect

Hence, the percentage drop in consumption to offset the price increase is 20% I have it to the student to discover the percentage drop required in the second part of the product if one part increase by 50 percent.

Application 4 of PCG A → B → A.

Very often we are faced with a situation where we compare two numbers say A and B. In such cases, if we are given a relationship from A to B, then reverse relationship can be determined by using PCG in much the same way as the product constancy use shown above.

Percentages

Application 5 of PCG → Effect of change in Denominator on the value of ratio

The denominator has an inverse relationship with the value of a ratio.
Hence the process used for product constancy (and explained above) can be used for calculating percentage change in the denominator.
For instance, suppose you have to evaluate the difference between two ratios:

Ratio 1 : 10/20

Ratio 2 : 10/20

As is evident the denominator is increasing from 20 to 25 by 20%
If we calculate the value of the two ratios we will get:

Ratio 1 = 0.5, Ratio 2 = 0.4.

% change between the two ratios = 0.1/0.5 x 100 = 20% Drop This value can be got through PCG as:

100 → 125 → 100 Hance, 20% drop.