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Lecture - 05 Margin of Safety

[FL]. In our last two sessions, we were discussing about CVP or BEP analysis. I hope you have understood the basic concepts now relating to first about variable cost, fixed cost, then the contribution margin, and then about the calculation of BEP. We will just have a look at what is PV ratio, because it is a very important calculation for any business, for any product or for any particular plan. So, this is a relationship between the profit margin or a contribution margin as a percentage to revenue.

So, we relate the sales price to variable cost, we get the contribution margin, and we divide it by selling price. So, we known as a percentage suppose your sale of 10 lakhs, what is a gross margin or what is a contribution margin you are earning that is the PV ratio. If sales go up from 10 lakhs to 11 lakhs, on the extra 1 lakh of sales, what is the extra profit which you will earn that you get from PV ratio or contribution margin ratio.

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Now, the calculation is done like this. The basic formula was profit is equal to sales minus total cost, but we divide the total cost into variable and fixed. And the contribution margin is a comparison between revenue and variable costs.

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| Sales -Variable Cost Contribution -Fixed Cost Profit | XX (XX) XX (XX) XX | |
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| Profit | XX | |
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To calculate the profit now sales minus variable cost you get contribution. From contribution we can deduct fixed cost to know the profit. Now, the upper part that is from sales variable cost and contribution can be converted on per unit basis, because all these three components change as the number of units or the level of activity changes.

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Now, this formula for profit is like this now S minus V into Q is minus FC is profit, or you can use it to calculate Q that is projected quantity or the target quantity for certain

level of profit. So now, FC plus expected profit is in the numerator divided by S minus VC getting it?

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Then we also discuss the BEP analysis, I am just keeping its uses etcetera. We will go to formulae. Now, for calculating BEP in unit terms, our target is to earn fixed cost. So, fixed cost is kept in the numerator, we divide it by contribution per unit. If you want to make a short form you can say FC upon quantity per unit, always keep in mind that fixed cost is not per unit, fixed cost is in total. There is no sense to have fixed cost on a unit basis; it is a total fixed cost to be recovered from certain number of units.

So, we divide it by contribution per unit, so that we know that how many units you need to sell to recover that much of fixed cost which is nothing but a break even. Now, many times it is difficult to have per unit data of contribution. So, instead of contribution per unit, we divide it by PV ratio formula. Now, what is the formula of PV ratio? It is contribution upon sales. So, as a percentage what is our margin is our PV ratio we divide fixed cost by PV ratio to get BEP in sales value.

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Now, this is the CVP - Cost Volume Profit graph, it is also called as breakeven chart. Have a look at it carefully, it is very important and I think all concepts will become clear; if you just look at it for few seconds, getting it. So, you have got fixed cost which is a horizontal line not starting from 0, starting from certain level about 1 lakh in this example. Then from there itself emerges a line going up which is a total cost line, because total cost is never 0, it is 0 at 0 units it is equal to fixed cost, and then its slowly goes up in the proportion in which variable costs are increasing.

Then this red line is known as total sales sometimes called as TR or other the total revenue line, it starts with 0 and it goes up at a particular point it crosses the TC or the other total cost line. This point is nothing but breakeven point, because at this point you are able to cover all your costs and earn more revenue than your cost. Every company always wants to above this level of sales. Below this level is what is known as loss area, because now your costs are more than sales. Above this level, your sales are more than costs. So, you are in the profit area.

Once you cross breakeven every extra contribution you earn is all your profit because fixed costs are now covered. So, as the number of units increased, the profit area can go on increasing and increasing, but the loss area is actually limited maximum loss is equal to fixed cost at 0 point, because fixed cost are the costs which we incur irrespective of sales. So, at 0 you have incurred all your fixed costs the revenue is 0. So, fixed cost is a

maximum loss from there the loss goes on decreasing it comes to 0 at breakeven point; and above this you have got profit that is why BEP is a very interesting and important calculation for most of the companies or for plants, because they want to at least break even getting it.

Then we had discussed one illustration. Now, taking from this we will take or we will discuss one more concept I hope you remember this illustration. Now, suppose just have a look at this illustration once again.

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Their estimated sales were given as 12000 bikes at which level they had earned a profit of 5 lakhs.

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Now, based on these there is a concept called as MOS or Margin Of Safety. We know that company at 12000 units is above breakeven point how much above it is nothing but margin of safety. So, we had calculated breakeven point to be in terms of units at 11400.

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The estimated sales are 12000, that means, 12 minus 11400, 600 bikes more than breakeven that is called as margin of safety in units.

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It can also be calculated in sales terms or it can be calculated as a percentage. So, you are able to sell 12000 units; that means, you have a margin of 600. So, 600 upon 12000 this how MOS is calculated as a percentage; I will just show you the formula.

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Getting it? Margin of safety is equal to actual sales minus breakeven sales either in units you can do or you can in rupees you can do. Another way of showing it is MOS as a percentage: sales minus BEP that is your MOS is in bracket divided by actual sales. Just keep in mind that do not divide it by BEP some students mistake they calculator MOS divide it by BEP that will also give you some answer, but that is not a margin of safety as a percentage, getting it. Now, this represents the safety available to business at current level of sales because everybody wants to avoid losses. So, to avoid losses, you are above certain level of sales how much you are above is the margin of safety. Now, let us try to do one simple illustration.

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So, Prabha Devi Ornaments, they have sales of 5000 units, sale price is 50, variable cost is 30, fixed cost is 35000. Now, compute BEP quantity amount as well as MOS as a percentage. So, do this calculation. So, how will you proceed? Firstly, you have to compare 50 and 30 because that is a primary profit you are earning. What that is known as 50 minus 30? I hope you remember that is called as a contribution per unit. So, one calculation you will do in the beginning is compute the contribution per unit.

So, one unit you sell gives you 20 rupees. How much you have to earn minimum? Minimum you have to earn enough to cover your 35000 because that is your fixed cost. So, 35000 upon 20 is a BEP quantity. You can convert the quantity into amount by multiplying it by 50 or you divide this 35000 by PV ratio. So, how much is PV ratio? 50 minus 30, 20 is a contribution divided by 50, 20 by 50. So, 40 percent is a PV ratio. Now, if you divide fixed cost by 40 percent you will get BEP amount. Now, having calculated quantity and amount go for calculation of MOS.

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I will show you the calculations. I hope it is clear to you 35000 divided by 20, that means, 1750 units is a breakeven point. You need to sell 1750 units to recover 35000. Now, in terms of sales value you will have to first calculate PV ratio which is 20 by 50; that means, 40 percent 35000 by 40 percent gives you 87500 rupees that is BEP in terms of rupees.

So, first two calculations we have done. Now, next is MOS; they have given a sales of 5000. So, compute MOS percentage. Now, 5000 is their sales level and what you require is only 1750. So, difference between 5000 minus 1750 is their MOS and then convert it into percentage ok.

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So, margin of safety 5000 minus 1750 divided by their current sales of which is 5000. So, you get 65 percent. What it means is suppose their sale of 5000 starts falling let us say by 10 percent, 20 percent, 30 percent, 40 percent, they are still not in losses. They will have to worry because sales are dropping, but it can go up to 65 percent before which they will not go in losses, that is why they have a margin of safety of 65 percent. Are you getting me? So, these were the simple illustrations.

Now, let us go to the cases which have been shared with you. I hope you have got the printout. If not please take the printout, you can stop this video here, take the printout and let us try to solve those cases together ok. So, you have been shared with five cases. Let us go one by one.

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| Q.1 Ganesh Ltd is sellin cost and selling prices a | g three products ire as under: | in the brand n | ames A, B ar | nd C. The details regarding unit | |
| | A (Rs.) | B (Rs.) | C (Rs.) | | |
| Direct Materials | 8 | 14 | 20 | | |
| Direct Labour | 8 | 8 | 20 | | |
| Variable Overheads | 9 | 20 | 14 | | |
| Selling Price | 36 | 54 | 58 | | |
| The monthly fixed cost is | s Rs.480000. Sa | les volume for | the month of | July and August are as follows: | |
| | A | В | С | | |
| July | 20000 | 20000 | 20000 | 1 | |
| August | 35000 | 16000 | 5000 | | |
| (A) Find out the mont | hly profits and if | our computat | ion brings out | that higher profit was earned in | |
| the month having lower | sales volume, kir | ndly justify the | finding with r | easons. | |
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Let us start with Ganesh [FL]. So, Ganesh limited is selling three products in brand names A, B and C. And these are the details of their cost structures. So, you know the direct material labour and variable overheads which is 8, 8, 9 for product a selling price is 35, same way for B and C. The monthly fixed cost is 480000. Now, they have given the sales volume for 2 months July and August. So, two sales mixes of given in July it is same 20, 20 and 20000 for A, B, C. And in August, it is something different.

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| just are as follows: |
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| profit was earned in Break Even point |
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Now, we have to do two things first find the monthly profits. So, for both the months July and August, calculate the profits of the company. And if your calculations bring out that higher profit are earned in the month of lower volume kindly justify. So, think over why it is possible, is it possible, that lesser sales and more profits. And second in part B, if sales mix of each month is considered as two sales mixes say mix X 1 and mix X 2, compute the breakeven point for each mix and which of the two mix do you recommend.

So, these two months are treated as two sales plans, and then we have to calculate which plan do you recommend. Ok, I hope you are getting it. So now, how will you go ahead, just think over. I think most of you know by now that the first step is calculating the contribution per unit.

We know sales price; we know the variable costs. So, compute the contribution. Based on contribution you can also compute the PV ratio for all the three products. Now, you know the number of units sold in the month of July. So, contribution per number of units will give you total contribution for July and for August separately, from that deduct the fixed costs.

Contribution minus fixed costs gives you the proper in part a we have been asked to calculate monthly profits, so that is the first thing you do it. And then we will discuss as to which month has more profits you can just see that in the month of July their total sales are 20 plus 20 plus 20 means 60000. And in the month of August their sales have slightly gone down. So, let us see which month gives you more profits.

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| Contributio | on pu and PV Rati | D | | | | | | | | | | | | | | | |
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| DM | 8 | 14 | 20 | | | | | | | | | | | | | | |
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| V OH | 9 | 20 | 14 | | | | | | | | | | | | | | |
| VC PU | 25 | 42 | 54 | | | | | | | | | | | | | | |
| Contr pu | 11 | 12 | 4 | | | 0 | | | | | | | | | | | |
| PV Ratio | 0.306 | 0.222 | 0.069 | | | ~ | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | |
| Monthly P | rofitability Statem | ent | | | | | | | | | | | | | | | |
| July | | | | | | | | | | | | | | | | | |
| 5 | A | В | с | Total | | | | | | | | | | | | | |
| SP | 36 | 54 | 58 | | 1 | | | | | | | | | | | | |
| SALES | 720000 | 1080000 | 1160000 | 2960000 | | | | | | | | | | | | | |
| Contr pu | 11 | . 12 | 4 | | | | | | | | | | | | | | |
| A A B | 2000 | 20000 | 20000 | 60000 | | | | Def | | | | | | | | | |

So, I am trying to show it in the excel. But you try to do it in your own note book. These are the 3 months. Firstly, make a statement of contribution, and for PV ratio. So, please make four columns particulars A, B, C. We start with sale price which is 36, 55 and 58 from that deduct variable cost per unit for each of the three products. I hope you are doing it with me. So, please write down the elements of variable cost, which is the DM, DL and variable overheads, which gives us variable cost per unit. So, you have got 8, 8 and 9.

So, take these figures here. Fine, you are getting it? So, 8 plus 8 plus 9 means variable cost per unit is 25. Selling price is 36; variable cost is 25, so contribution per unit is 11. So, from one unit of a company is able to make contribution margin of 11. And as a percentage it is 0.306. So, 11 upon 36 will give you this ratio known as PV ratio.

Now, in the same manner, take the data for product B which is 14, 8 and 20, please compute the variable costs the total variable cost contribution and PV ratio. So, how much have you got, are you getting a contribution of 12? Just have a look at the solution total VC is 42, 54 minus 42 means twelve rupees is a contribution and PV ratio is 0.22 got it.

Now, do it for product C. I think I do not have to show the solution. You can do it for C. Are you getting contribution of 4 rupees? And 0.06 is the PV ratio. Please keep in mind for any case involving CVP analysis of marginal costing the starting point will be

calculation of contribution per unit. Sometimes you know for unit, if you do not know you calculate the PV ratio for that type of units or for that line of activity, what is a margin companies able to earn, this calculation is a starting point. This is the first compulsory calculation.



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Now, based on this let us make the calculation of monthly profits. So, please make a profitability statement for July now. We know the selling price; we know the number of units. So, you can easily calculate the sales. You know the contribution per unit also from the contribution chart. Apply those data and calculate the profit from each of the three products that will become the total profit for the month of July. Are you able to do it?

So, 11 is a profit or contribution per unit into 20000 that means, 2 lakh sorry 20 yeah 220000 is a contribution. Now, there is no point in deducting fixed cost because you do not know separately fixed cost for A, but if you complete it for the whole company so 220 here, 440 for B, and 80000 for C that means for a company as a whole, they are able to earn a contribution of 540000 from a sale of 2960000. From this deduct fixed cost of 480000, now 540 minus 480; you get a profit of 60000. Are you getting it? Ok, I hope you have calculated the profit for July.

Now continue the same process calculate the profitability for August. Again you know the selling price and contribution actually you do not have to calculate the total sales, they do not play much role. What we really want is called total contribution and deduct it from fixed cost fixed cost is not going to change. So, what is really going to change profit is a contribution earned in the month of August. So, please compute the contribution 11 per unit into 35000 units.



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So, 385000 for A, getting it; 192 for B, and 20000 for C; so, total is 597. So, you can compare in the month of July it was 540. Now, the contribution has increased to 597. Deduct fixed cost of 480; you can see that the profit is now 117000. So, the first part of question was make a monthly profitability statement and compute the profit of July and August. All are able to do it?

Now, you will be surprised that profit has almost doubled from 60000 to 119, but the number of units have gone down from 60000 to 56000, but profit as double. How was this magic possible? This magic was possible because they have change the sales mix earlier sales mix was one is to one is to one between A, B, C.

Now, they have emphasized much more on A, it is 35000, 16000 to 5000, and they were available to double the profit. The question was fine monthly profits and if your calculations brings out higher profits, kindly justify the findings. So, how will you be able to justify it can you give any reasoning for more profits in August. Yes, the reason is because of better sales mix in the month of August.

Why this sales mix is superior to sales mix of July? Because, if you compare the three products product, A is much better than B or C and they have increased the sales of A while have cut down the sale of C, that is how they have increased their contribution. Fixed cost anyway does not change which is 480. So, any incremental contribution directly goes to profit. So, they could nearly double their profit. Are you getting it?

So, next time, we will continue with the second part of the question. [FL].