Financial Accounting
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Lecture – 111
8.5 Break Even Point

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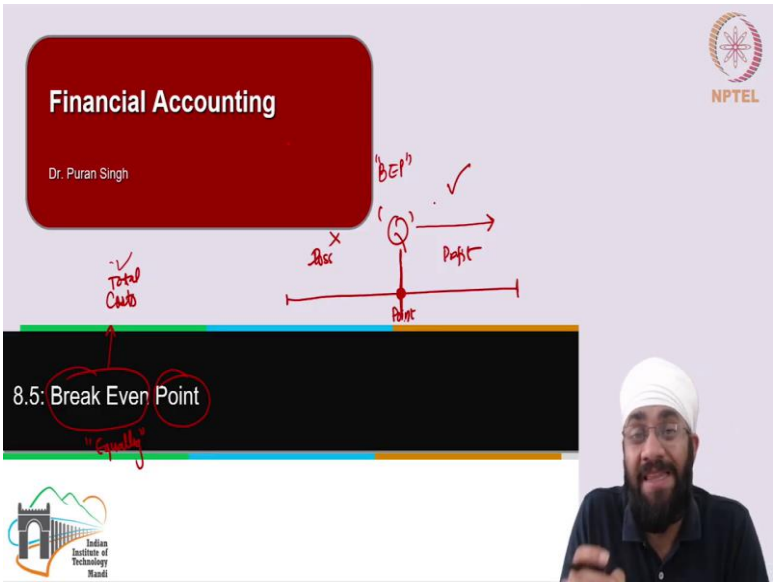

In this video, we are going to talk about the Break Even Point which is the topic of discussion. We will make use of the concepts of price per unit, contribution margin per unit, variable cost per unit, and the fixed cost. The first point of discussion is what is break even, what do we mean by a breaking even? And the second is what is this point that we are talking about?

The break even here refers to this point of break even. You are breaking even with the costs of the business, the total cost of a project, or of a business, or of any new initiative. What is breaking even? Breaking even means equalling. So, you are basically saying that now we have matched the cost; now, we have covered the costs involved, and that is what is called breaking even. You are breaking that barrier; the barrier is the total cost, you have covered all the costs.

What is ahead? What is after this barrier? After this barrier, you start making profit. So, does it mean that you are not making profits before this point? Yes. And what is this point that you are talking about? So, let me take this illustration here. So, if this is the point, then after this point is your profit; and before this point is the loss. Now, the point here, and as we have

discussed before, the point is Q – the quantity, how many units should we sell? What is the scale of the business at which we should operate so that we start making profit?

You want to be in this region, not in this region, that is the discussion on break even point. So, if this is the point, if this is the Q where you start making profit, and if this is a continuum, then at this point which is the break even point, you are making no profit no loss.

You are just transitioning from the losses side to the profits side. So, right at this point, you will not make any profit; and right after this you produce one more unit, you sell one more unit, and you are making some profit, this is what is a break even point.

Let me delve into it little bit using some algebra now. So, if we are agreeing that the break even point is the point where profit is 0, you are just moving from losses to the profits. And you are at a point when there is 0 loss, 0 profit. There is no profit, no loss.

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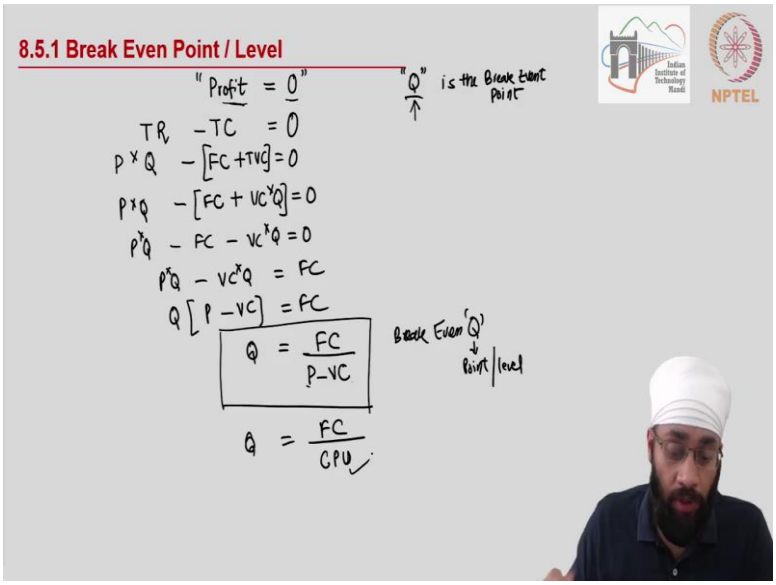

So, we are in a situation where profit is equal to 0. This is the point. So, the quantity at this point is the break even quantity. So, this is the break even point. How do you calculate profit? The profit is simply the difference between the total revenue of the business and the total cost of the business. And this difference is 0 at the break even point, the point is Q. So, I have to bring in some Qs into the equation.

How do we calculate total revenue? Total revenue is calculated by multiplying revenue per unit with the quantity that has been sold. I am bringing in Q. The revenue per unit is called price.

Price multiplied by the quantity and Q comes in, gives me the total revenue. I take out from this the total cost. What is the total cost? Total cost has fixed cost and the total variable cost, these are the two components, and this has to be equal to 0 alright.

I need to bring in a little bit more Q into this equation. So, this gives me P times Q minus the fixed cost. Fixed cost does not depend upon Q. So, I cannot break this term fixed cost into any term with Q. However, total variable cost is equal to, total variable cost is the variable cost per unit multiplied by Q. I have got another Q here, equals 0.

So, now we can solve for Q. And we can figure out the Q such as the profit is nil and that Q will be the break even point. So, I am going to bring all, let me open the brackets, basic arithmetic now, minus VC times the Q, this is 0, and then I use Q terms with the Q on this side, and bring the fixed cost to the other side. I have Q taken out P minus VC and this is fixed cost. Therefore, the Q is equal to fixed cost divided by P minus VC which is the variable cost.

This Q right here is the break even Q, is the break even quantity, is the break even point that is how you figure out a break even point for the business, break even Q. And this Q is the point, or this Q is the level at which the total revenues are breaking even with the total costs. There is no profit, no loss at this point.

Now, let me further improve this equation and say Q equals fixed cost divided by P minus VC. What is P minus VC? P minus VC is contribution per unit. You already know this, so that is how contribution plays a part. So, rather than using the whole formula if you only have the information about P minus VC and fixed cost, you can just do back of the envelope calculations and figure out what is the break even point.

So, here is the role of contribution in calculating the quantity of break even point. Let me talk about break even in terms of break even sales. So, break even point is the point of the quantity of the production. What is break even sales or break even revenue?

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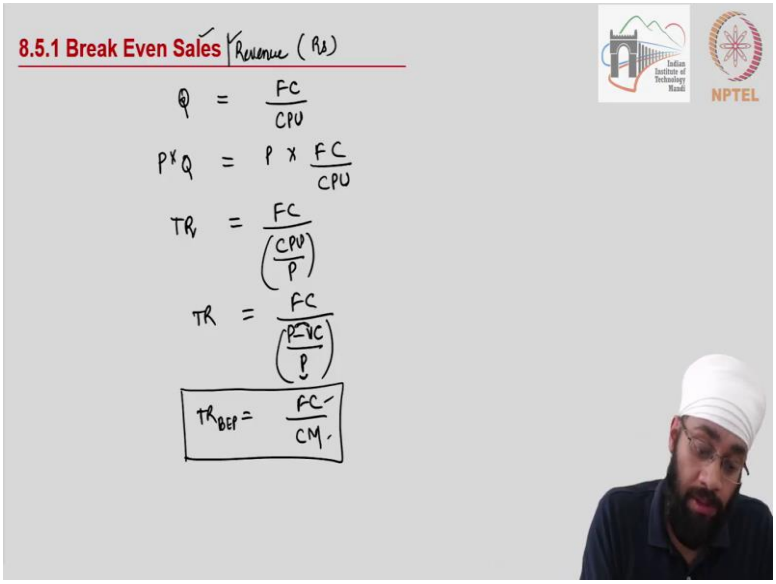

So, the break even point is equal to fixed cost divided by the contribution per unit this is what we figured out in the last slide. And now if we have to convert this break even point into sales, into rupees, how much revenue should we make? How do we do that? Well, simply you multiply both sides by P. So, this becomes P times Q, and this becomes P times fixed cost over the contribution per unit.

Now, if you solve for it a little bit more, this becomes total revenue, and this becomes fixed cost divided by contribution per unit divided by P using basic maths. And this expression is equal to contribution per unit is P minus VC variable cost divided by P. Remember this. What is this expression? This expression is nothing but contribution margin expressed. This is the contribution per unit expressed as a percentage of the price per unit, this is the contribution margin.

So, if you want to figure out the total revenue at break even point, total revenue at break even point is equal to fixed cost divided by contribution margin. And the contribution margin is typically in percentage terms, that is how you figure out break even sales. In the last slide, we figured out break even point which give us a quantity of break even point quantity. And now we have break even point revenue that is it.

Now, there is also discussion on at what capacity are you going to break even. What does that mean? Now, a manufacturing facility lets us say a factory has a capacity of producing 1000 units right; at best it can produce 1000 units. If you want to increase the production, you have

to get another factory, or you have to add more machinery to this factory, more people and so on. So, the fixed cost will go up.

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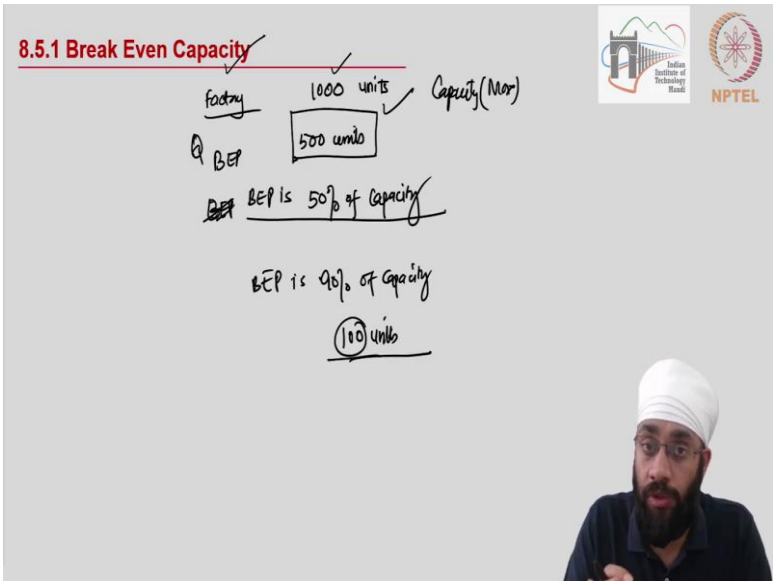

So, right now we are saying given the level of the fixed cost without increasing the fixed cost the maximum that you can produce is 1000, and this is the capacity. This is the maximum production that you can do.

Now, imagine your break even quantity at break even point is 500 units. In order to break even, you will have to produce 500 units. This means what? This means 50 percent of the operating capacity. So, the break even point is 50 percent of the capacity meaning that another 50 percent capacity available for you to now make profit. This is also very useful information when planning when doing business planning, when preparing and deciding whether to invest in a new project. Let us say if the break even point is at 90 percent capacity, then you do not have much profit potential. You can only increase if you know 100 more units and sell them and make profit, which is possibly very small profit, because you have to produce 900 units first to only break even, and after that, you will not be able to capitalize on it. When it comes to making profit, you will make profit on 100 units and then that is it, you cannot do anything else. Now, again you have to add capacity. So, the fixed cost will go up, then you will have to cover that. So, you have to then decide that to get into this business I do not want to set up a factory with 1000 units. I have to ensure that my capacity is more than 1000 units.

Now, how much more is something very subjective, depends upon what is the price per unit, variable cost and other things. But I wanted to convey to you that the capacity of the production is also an important point while deciding on such decisions whether or not a project should be taken, so capacity is also important.

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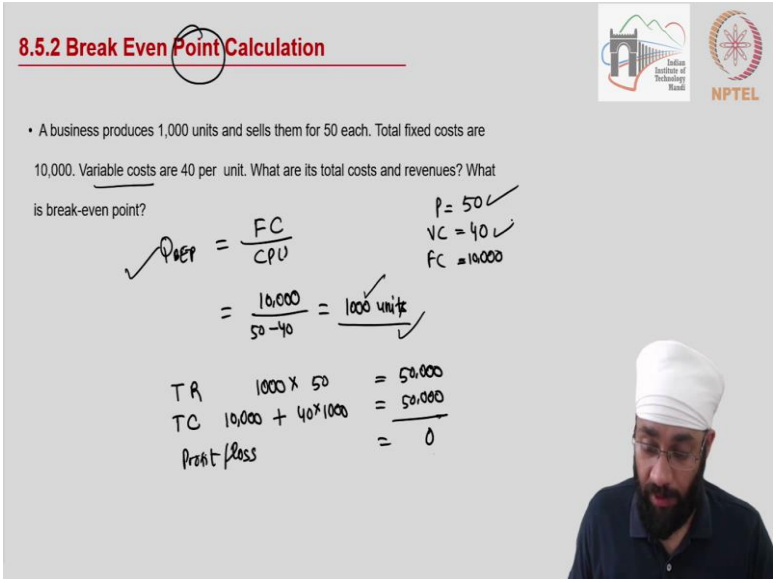

Next let us look at an example and use this data to calculate a break even point. So, you can pause and read the question for a bit. The price here is 50 per unit, the variable cost is 40 per unit, and fixed cost is 10,000. These are the key numbers given. And the quantity of break even point can be calculated by dividing fixed cost by contribution per unit. Fixed cost is 10,000 and contribution per unit is 50 minus 40= 10 which gives me 1000 units as the break even point. Simple as that.

So, without looking at too many numbers if I know specifically what is the variable cost, what is the price and what is a fixed cost, I can easily figure out the quantity of break even sales; at what level of production will I be breaking even. So, this is 1,000 units. Now, let us just confirm whether this is true, whether at 1,000 units you have your total revenues equal to total cost is that correct or not. Now, total revenue is going to be 1,000 units multiplied by the price which is 50.

So, 50,000 is your revenue at break even point. What is the total cost? Total cost is fixed cost which is 10,000 plus the variable cost which is 40,000 times the number of units which is 1,000. This also comes out to be 50,000. So, profit in this case is equal to 0, no profit, no loss. So, at

this point which is 1,000 units, this is the break even point at this scale, at this level of production, we have no profit, no loss.

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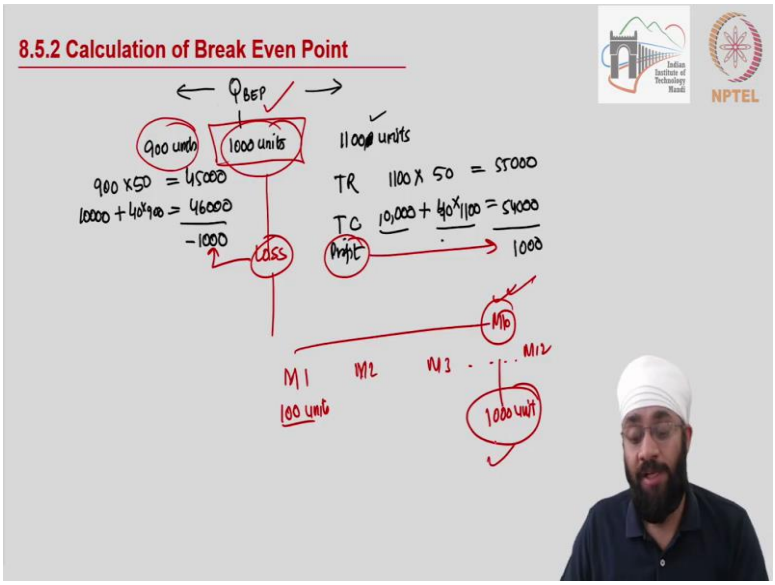

Earlier I said beyond this point you have profit. What is beyond this point? So, the quantity at break even point is 1000 units. What is beyond this point? Beyond this point is 1,100 units, and below this point is 900 units. And you could also do 999 and 1001 units. The results will still be the same. So, at 1100 units, what are my total revenues and what are my total costs and same for the 900 units.

So, at 1100 units, my revenue is going to be this much. So, this is 1100 into 50; 50 is the price per unit. So, my total revenue is going to be 55,000. And total cost is going to be the fixed cost which is still going to be 10,000 plus we have variable cost 40 per unit. So, 40 multiplied by 1100 units which are now being produced. So, 10,000 plus this comes out to be 44 and 54000. So, you have a profit of 1000.

On the other hand, if you are operating at 900 units, then your revenue is going to be equal to 45,000. And your total cost is going to be equal to the fixed cost, still 1,0000 does not matter what is the operational level, how many units the cost is 40 times 900. And this comes out to be 46,000.

So, you have a profit or a loss here of 1000. So, this is the profit. Let me use another ink here. Profit on this side; on the hand, on the other hand, you have loss on the other side. So, this 1000

unit, this one, this 1000 units are the break even units. This is the level of operation at which your profits are nil; your revenues are equal to your costs.

So, the questions that I stated in the beginning of this topic, I said you want to know when is it that you are going to recover your investment in the business, that was the first question. So, you are going to recover your investment when you sell 1000 units. Now, it is possible that if you do month-on-month basis, month 1, month 2, month 3, and month 12, and every month the maximum capacity that you have is of production of 100 units because to produce time also has to lapse. So, it means that it is going to be the month 10 when you will cover, when you will be able to produce 1000 units and sell that, this is where you are going to break even. So, the first question is when are you going to recover your investment? Well, month 10. When are you going to make profits? Well, after month 10. So, this is how the break even analysis is going to help in various decision makings.

If you had an order for only 900 units, would you produce, would you start this business? You should certainly not. Because if the customer only wants 900 or the market potential is only 900 units, then you will never gain profit. So, should you take this business? Depends upon what is the market potential, and when am I going to break even, when can be in terms of time, can be in terms of number of units. So, we will have more discussion on break even point in the following videos.