

Financial Accounting
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Lecture – 114
8.8 Visualizing the Break Even Point

In this video we are going to use graphical representation to depict the Break Even Point. As they say, a picture is worth a thousand words, maybe that will help us understand the break even analysis more intuitively, more deeply.

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Visualizing the Break Even Point

• Amit operates a taxi between a residential area and the Mall. He borrows the taxi from a fleet owner to whom he has to pay INR 3,000 per month regardless of the number of trips that he makes. Petrol expenses per trip are INR 10. The fare has been standardised by the local authorities at INR 40 per trip. Amit can make 10 trips a day at the most. How many days in the month does Amit have to work ensure he does not lose money?

✓ Trips per day 10
✓ P 40

VC	10
FC	3000

The slide also features the logos of the Indian Institute of Technology Mandi and NPTEL, and a small video inset of the lecturer, Dr. Puran Singh, wearing a white cap and glasses.

On the screen you have a practice problem. You can pause it and read it; we have to figure out the number of days in a month that Amit has to work to ensure that he does not lose money.


When do you lose money? You lose money when you operate below the break even point, again we have to figure out the break even point only. The maximum trips that he can make in a day is 10. So, trips per day are 10 and the price given per trip is 40, this is also defined by the authorities you cannot charge more and of course, you would not want to charge less.

The petrol expenses per trip, the variable cost per trip is 10 and you have a monthly rent that you have to pay, this is fixed cost 3,000. That is it. So, using this information we have to work out the number of days in a month that this person should drive the taxi in order to not lose money. So, I am going to do a bit of scenario analysis here.

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Visualization of Break Even Point

Days	5	10	15	20	25	30
Trips Q	50	100	150	200	250	300
Total Revenue P=40	2000	4000	6000	8000	10000	12000
Total Cost	3500	4000	4500	5000	5500	6000
Fixed Cost	3000	3000	3000	3000	3000	3000
Variable Cost VC=10	500	1000	1500	2000	2500	3000
Profit/Loss	-1500	0	1500	3000	4500	6000

$$100 = \frac{2000}{20} = \frac{FC}{CN}$$


And I am going to say what happens if I work 5 days a month, 10 days a month and so on. So, let us say if you work 5 days, 10 days, 15, 20, 25 and 30 days; there are different scenarios and what is going to happen to your revenue, cost and so on.

So, 10 trips a day means you would make 50 trips, 100 trips, 250 and 300 trips; these are the number of trips that you will be able to make as you increase the number of days. Total revenue is going to be based upon the per trip price which is 40. So, total revenue based upon P of 40. So, you multiply 40 by 50. So, this comes out to be 2,000. And then you have a 40 into 100 so this is 4,000, then you have 6,000. So, likewise we see a slope, it is going up by 2,000 with every scenario. So, 10,000 and you have 12,000. This is the total revenue that Amit will be able to make if he works on different if he works for different number of days.

What is the cost going to be? The cost is going to be dependent upon the two factors which are fixed cost and variable cost, the fixed cost is 3,000. So, if he works for 5 days 3,000 has to be paid, if he works for 30 days 3,000 has to be paid. So, it does not matter, this cost is going to be the same.

Variable cost on the other hand is 10 this, these are petrol expenses. So, 10 per unit is the variable cost. So, the variable cost per unit is 10 and depending upon the trips this is going to change. So, you have 500 here, 1000, 1500, 2000, 2500 and 3000. Therefore, the total cost comes out to be 3500, 4000, 4500, 5000, 5500, and you have 6000.

So, you have all the numbers that are worked out. So, now, we are interested in figuring out total revenue total cost, now we have to figure out the profit or loss. Let me just draw the line here and these are working notes here. Here you have a cost which is higher than your revenue. So, this is 1,500 and this is a negative number and then you have no profit no loss.

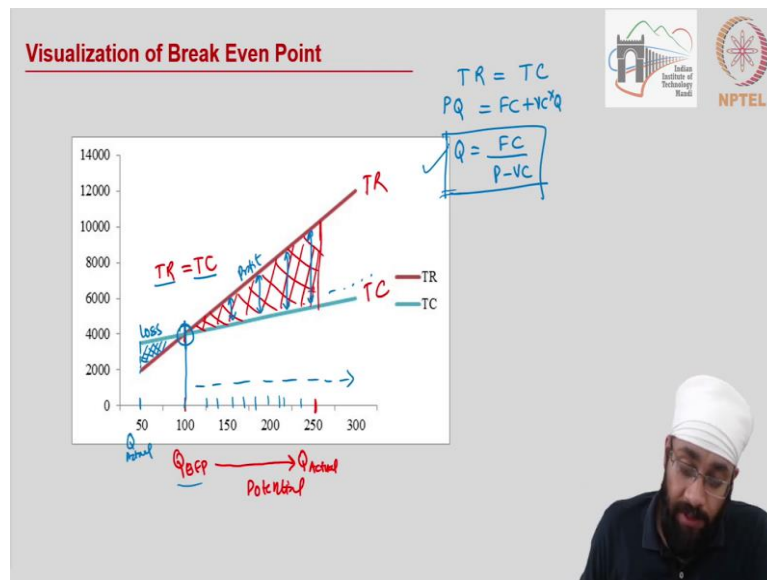
So, here is the break even and you have this 1500, then you make 3000, then you make 4500 and then you make 6000: this is how your profit or loss situation is changing. Now, clearly, we see that 10 days a month, one third of the month is how much this person needs to work in order to start making money. So, on the 11th day he will start making money actually and the number of trips are 100. So, 10 trips a day which means 100 trips; 100 trips in a span of 10 days. Now how do we show all of this and before we go forward ,we can also do the algebraic calculation.

So, fixed cost divided by the contribution per unit, we can do that as well. Fixed cost is 3,000 and contribution per unit will be P minus VC . So, 40 minus this so, 30, this gives you 100 trips. So, you know, mathematically sorted as well. You do not have to worry about the accuracy of this, it has been confirmed. Now, what I am going to do is I am going to use these numbers to project a graph.

And on the graph, I am going to show the quantity, which is going to be the number of trips that you make and on the Y axis I am going to show revenue and the total cost, fixed cost, variable cost these numbers. And, at this point, at the break even point we have total revenue and total cost which are equal to each other.

Before this break even point you have total revenue which is less than the cost, after this you have total revenue higher than the cost and here you have total expenses and total revenue total cost equal. So, how does it look on a graph?

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On the next slide I have only the total revenue and total cost curves drawn out for you. So, this is total revenue and this is total cost. Just to make things clearer, this is the break even point and you have 100 units, 100 trips, this is the quantity at the break even point.

Now, at this point in time you have total revenue equal to total cost. Imagine that you are operating at let us say 250 units a month which means you are working more days. So, this is the quantity which is the actual quantity. So, the actual number of trips that you do, if you do this then this is the straight line which depicts this actual quantity, actual level of operations.

Now, you are operating above, you are operating above the break even point and I am going to the profitability potential of the business. The higher I go more profit I earn, all of this, if you are mathematically inclined to think about such things, then this is the area, if you figure out the area of this triangle that gives you the profit.

So, let me write profit. This is the profit, the area of this triangle represents the profit earned. Similarly, if you are operating on the other side, let us say you are operating at 50 units, this is Q which is actually the actual level of operations. This represents the loss that you are making.

So, where do you want to be? Of course, you want to be on the right hand side of the break even level. So, visually it helps you think more intuitively when we say what should be the scale of operations, at what level do you want to operate, well I certainly want to operate to the right hand side, that is how you should think about it.

And where is that point? That point is the intersection point. So, you could simply do an excel sheet and prepare a graph and then keep on changing numbers and we will do that in the case analysis that we will do shortly. And you could do this scenario analysis very well.

So, this is the profit and loss region. The other thing that I want to point to is the higher up you are, you keep on going further with every new step that you take, with every quantity that you add the profitability keeps increasing, see the profitability keeps increasing. So, you want to be as far on the right hand side of the break even point as possible.

And the same is true for the loss region, you do not want to be far away, the farther you are, the higher losses you are making. Also mathematically speaking, if you have this equation representing this intersection point of total revenue and total cost and you have to figure out what is the value of the Q, then you could simply figure out the intersection point. Say total revenue is equal to total cost and total revenue is P times Q, total cost is fixed cost plus variable cost times the Q and you solve for you Q and you have fixed cost divided by P minus VC. And, this is the equation that we have learnt in the beginning of the discussion about break even point.

So, again, if like to think about things mathematically then simply you draw out these curves and you figure out the intersection point using this formula. That is the visual representation of break even point.

I will see you in the next video.