Managerial Accounting
Prof Dr Varadraj Bapat
School of Management
Indian Institute of Technology Bombay

Module - 13
Lecture - 27 & 27 B
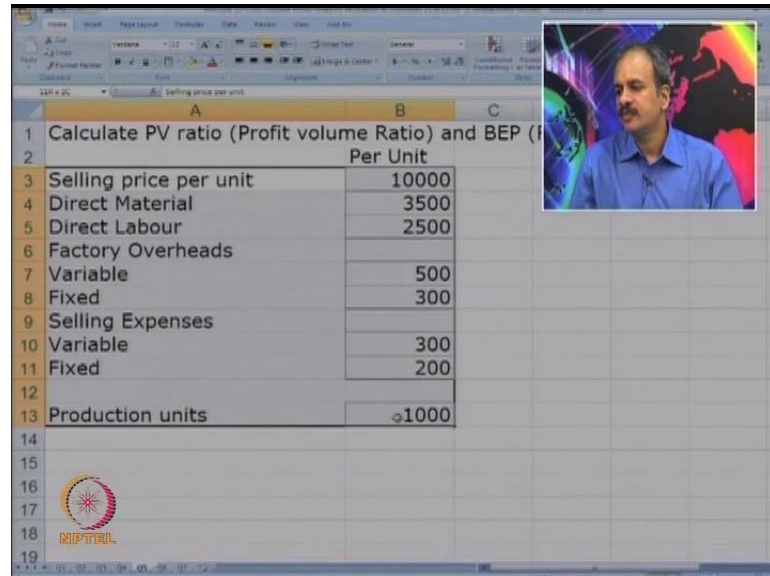**Relevant & Sunk Cost in Decision Making**

Dear students; in the last session, we have discussed about c v p analysis or cost volume profit analysis. Today's session; let us do a brief recap on it and we will also, solve some more cases on the same. As you know c v p analysis covers the relationship between cost volume; that is level of activity under profits. So, the first step we do is the total cost is divided into variable and fixed. I hope you remember what is variable cost? Variable cost is that component of cost which, changes with the level of activity in the same proportion. Fixed cost is that component of cost which, never changes with the level of activity. It just remains constant.

In c v p analysis, the first step is segregation of cost into two; fixed and variable. Once this segregation is done, we go to calculation of contribution margin. So, sale minus variable cost gives us the contribution. This is the primary profitability from which, fixed cost are incurred, and then the balance is our profit. So, we have seen that contribution margin is sale minus variable cost. Next level; we went for a ratio known as p v ratio, profit margin ratio. Sometimes, also known as contribution margin ratio. The formula is the sales contribution upon sales.

So, sale minus v c gives us contribution. With that, we divided by sales to get the p v ratio. Fourth; we have also learnt breakeven point. Breakeven point is that quantity at which, there is no profit, no loss. Since, no entity, no unit or a company wants to be in loss, v p plays a very important role. Every company wants to know level which, it needs to avoid losses. Here, we take fixed cost in the numerator; divide it by contribution per unit. So, know the number of units to be produced to come out of losses. So, there are two formulas. One is f c upon contribution per unit; other is f c upon p v ratio, when we calculate the breakeven point in terms of amount. Anyway, we are going to do some cases. I am just revising it fast for you and we, in the end, also discussed in the last session, margin of safety, which is nothing but sales minus breakeven point. I hope all the concepts are clear to you. Let us do, we have also done four cases last time. Let us do

one more case, and then we will go to one more new concept. Before that concept, let us try to understand the case.
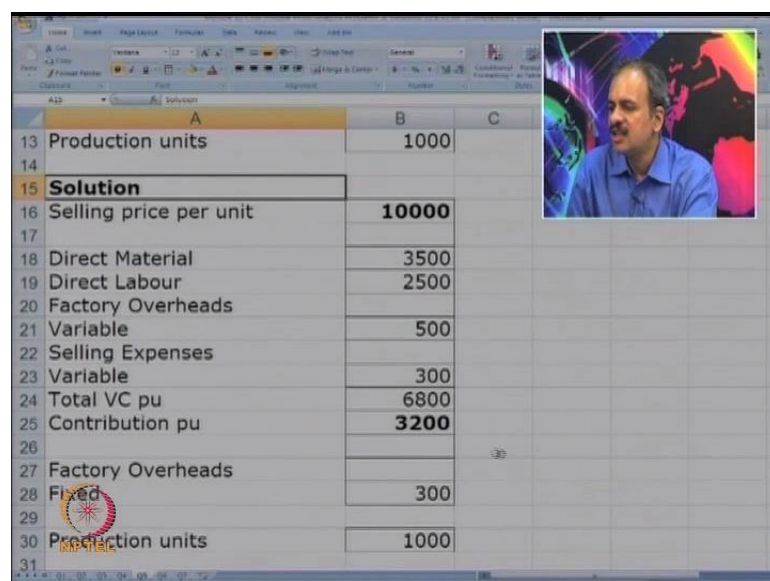
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Now, some information is given sale price, direct material, labour, then factory overheads, and its division into variable and fixed, also the selling expenses, production units. We have to calculate the p v ratio and also, the breakeven point. We will also try to know the profitability. Now, can you think of how to go ahead?

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Yes, you are right. First, we will try to calculate the total variable cost, and then divide it. Then, subtract it from selling price. Now, the current selling price is 10000. Direct material labour; both are variable, but the factory overheads has both the components, fixed and variable. So, variable fixed component, I will take down. Now, factory overheads variables are 500; selling overheads variables are 300. So, we are in a position now, to calculate the total variable cost per unit, which is 6800. So, 3200 is the contribution per unit. So, every unit sold at 10000, gives us a profitability, primary profitability or contribution margin of 3200. We know that the total unit sold currently, are 1000. They can be used to calculate the total profit.
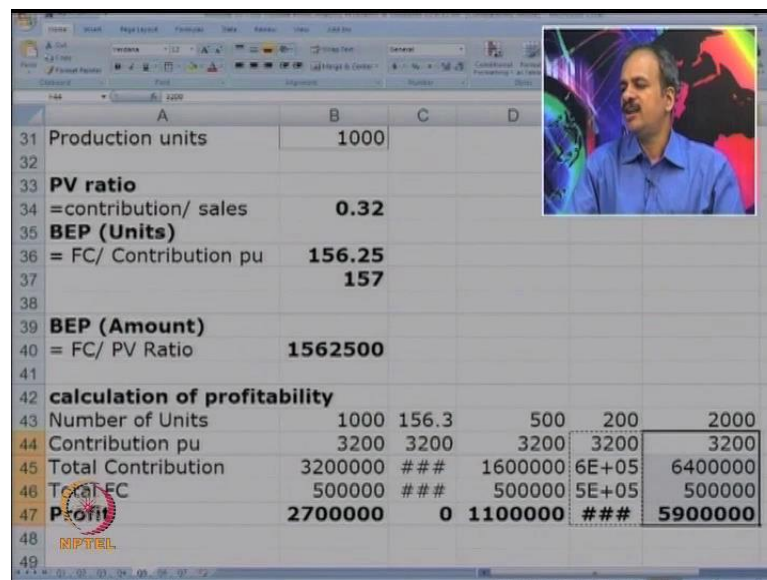
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3200 is a, let us first go for calculation of p v ratio. Yes, how to calculate p v ratio? What is the formula; anyone can tell? This is nothing but contribution divided by sales. You can either, do it on per unit basis or you can do it on total. So, 3200 divided by 10000; it gives us 0.32. We can multiply by 100, if you want, so that we get 32 percent. This is the p v ratio. The first thing, which was asked was, calculation of p v ratio or profit volume ratio. Then we have to also, calculate the breakeven point. We will try to calculate both BEP in units, as well as rupees. Yes, what is the formula for BEP? BEP is the level of activity; no profit no loss. So, we need to cover FC, fixed cost, and it is covered from contribution margin. So, it is fixed cost upon contribution per unit. We are yet to calculate actually, the total fixed cost. Fixed factory overheads; you know are 300. Fixed selling expenses are 200; this data, remember, is per unit. We cannot use it directly.

First of all, we have to convert it into total data. So, we will take total first, and you know that the number of units currently are 1000; so 200 into 1000. In case of fixed cost, per unit fixed cost is not of much use. What we are really, interested in knowing is the total fixed cost. So, the total fixed cost is 5 lakhs. For calculating BEP, it is fixed cost upon contribution per unit. So, it is 5 lakhs divided by 3200. So, we get 156.25; this is the breakeven point in units. In other words, we need to sell 156.25 units. It can be rounded off to 157 units.

Now, let us try to calculate the breakeven point in terms of amount or rupee sales. What is the formula; anyone remember? Here also, we are cover up our fixed cost, but instead of saying per unit, we want the total amount. So, we will divide fixed cost by p v ratio. So, fixed cost upon p v ratio; 9 lakhs divided by 0.32. So, we get 1562500; this is the BEP. Is it clear to you? So, as per the requirement, now we were asked to calculate the p v ratio and the BEP. We have calculated both the things. You can also try to calculate the current level of profit. Can you find it? We know that per unit, you are earning 3200. We also know that the production units are 100. So, this can be used for calculating the total profit.

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Let us try to calculate profitability. Profitability is essentially, driven by the level of activity. We know that current level of activity, 1000; that plays a very important role. Then, we have a contribution per unit of 3200; it gives us a total margin of 32 lakhs,

right. From this, we have to pay or cover up a fixed cost of 5 lakhs. So, profit is total contribution minus, total fixed cost; are you getting me? So, you can see that total profit is as high as 27 lakhs, because company is able to generate a very good contribution of 32 lakhs of which, only 5 lakhs is committed as fixed cost. Now, let us try to look at what will happen to breakeven level of activity, which is 156.25. We will just copy these figures there. You will realize that at 156 into 3200, which is contribution per unit; the total contribution is only 5 lakhs, exactly, equal to fixed cost. So, profit is 0. That is how we actually, define breakeven point. This is that level of activity which, gives us 0 profit or this is that level of activity where, contribution is equal to fixed cost.

We can also look for some other level of activity. Let us say, if sales become half; that is from 1000, it becomes 5000. Now, it is very simple; you have to just copy. So, at a 500 level, it is 11 lakhs. Is it clear to all? So, at 1000 level, it was 27 lakhs, but at 500 level, it is not half; it is much less than half. You can see, it is just 11 lakhs. Suppose sales for further; let us say sales become 200. Profitability will be as low as 140000. Is it clear, how the calculation of profitability is done? Now, I hope you are very clear about all these concepts that contribution margin, which is nothing but sale minus variable cost. Then, we have also seen p v ratio, which is contribution upon sales; BEP, which is FC upon contribution, and you can see how it can be used to calculate profitability at various levels.

Now, let us try to understand one more concept. This concept is known as operating leverage. Here, while calculating the profitability at various levels, you would have realized that the sale becoming half; profit decreases much more, or if the sale double, the profit will change; not by double, but much more by double. Can this relationship be identified? Yes, if it is identified, it is known as operating leverage. Here, we look at the percentage of change of profit for a certain percentage of change in sales. Now, let us see one more. Now, we have seen with a decrease. Let us try to also, see with an increase. Suppose, sale increases by up to 2000, what will be the new profitability? I hope it is visible to you all. I will just make this smaller. So, you can see now, the profit will become 59 lakhs with doubling of sales from 1000 to 2000; the profit has also increased.

Now, we will go for calculation of operating leverage. Here is one case. Two situations are given; a machine driven and a handmade; and we have to calculate the operating leverage for both the situations, and we have to also calculate breakeven point. First, let us start with calculation of breakeven point as we know it very well. Yes, this data is clear to you now. Please tell me how to calculate BEP. This is not a per unit data now. This is a total data. Can you tell me? Just think over, how will you proceed?

First of all, we need to know the contribution. What is the formula for contribution? It is nothing but sales minus v c. So, it is 16 lakhs minus 3 lakhs. So, 13 lakhs and in the next year, it is 7 lakhs. Next, I will try to calculate p v ratio. What is the formula? It is contribution, yes, you can add contribution upon p v ratio. We cannot use our formula; fixed cost upon contribution per unit, because we do not know per unit contribution. So, here, we are calculating p v ratio. So, it is contribution upon sales. When it comes to BEP, we will divide it by p v r. So, contribution upon sales; you know now, the contribution is 13 lakhs divided by sale of 16 lakhs.

So, machine made product has a very high contribution as high as 81 percent; is a p v ratio; whereas, for a handmade system, p v ratio is only 43 percent, because you can see, variable cost as a proportion of sales are high in case of a handmade system, but as against this, fixed cost are heavy in a machine made system. So, total cost is same 12 lakhs, but we are looking at a relationship. So, that p v ratio is high; that is 81 percent for machine made. It is only 43 percent for manmade. Now, we will try to calculate breakeven point. What is the formula? Breakeven point; you know we want to cover up the fixed cost. So, it is FC upon p v ratio; fixed cost is 9 lakhs divided by the p v ratio. So, we have 1107000 for a machine made system, but for handmade system, it is much less; it is only 687. I think you already knew how to calculate BEP. Let us go a step further and go for calculation of operating leverage.

In operating leverage, what happens is we need to calculate EBIT. This is how the calculation is done. We know that the sales are same for both the systems. Variable cost are given; contribution, fixed cost. So, we have calculated EBIT plus; EBIT, as you know that this contribution minus, fixed cost. Only difference is earlier, we had taken the full fixed cost. Fixed cost here, has an interest component of 1 lakh. So, we will ignore it, since, interest is a financial expense. So, we have taken operating fixed cost, which is 8 lakhs and 2 lakhs. EBIT is now contribution upon operating fixed cost. So, it is same 5 lakhs at both the levels. This is earning before profit, before interest and taxes. Now, this operating leverage; note the formula, we are doing for the first time; is contribution as a percentage of EBIT. So, for a machine made system, it is 2.60. For a manmade system, it is 1.40; is it right? What does it signify?

What it means is for a higher level of activity, machine made systems profitability will increase very fast. Operating leverage is 2.6; whereas, in a manmade system, it will

increase by 1.4. As against this, if level of activity falls, machine made system profits will also fall very fast. We will just calculate to see whether, it really happens. Now, this is a picture we know at a particular level. Now, let us try to look at some other level of activity.
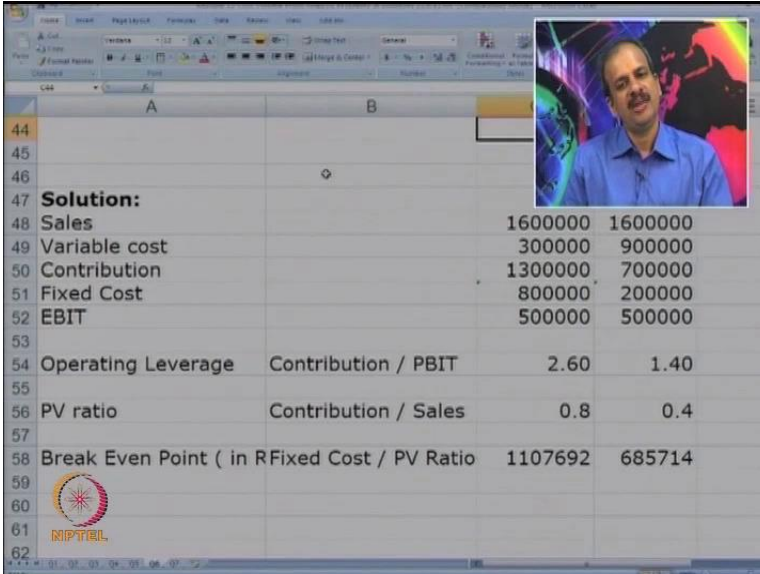
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Now, here, the sales are same 16 lakhs. Let us assume that sale level goes up to 18 lakhs or let us say, double it; make it 32 lakhs. Now, we know that the variable costs are bound to increase in the same proportion. So, they should also double. I will just take extra columns, so that, it is more clear to you. You know the situation 1. Let us try to go to situation 2. Situation 2 is a scenario where, we will take with double sales. So, instead of 16 lakhs, the sales have become 32 lakhs. What will be the new variable cost? They will also double. So, variable costs are now, 6 and 18. What will be the new fixed cost? Will they also double? No, because fixed cost never change, irrespective of the level of activity. So, the total cost now, becomes 15 lakhs and 21 lakhs each. They have an interest component of 1 lakh. So, anyway, but that does not matter. So, what will be the profit now?

You know that profit is sales minus, total cost. Situation 1; the profit was same for both; 4 lakhs, 4 lakhs. Now, you can see the profit is 17 lakhs and 11 lakhs. So, profitability of machine system has increased much more. Actually, this is something we were trying to find, but particularly, if you want to focus on profit before interest, we will go for

calculation of EBIT, which will also depict a similar position. EBIT will increase substantially, for a machine made system. Same scenario, if sales fall, the EBIT of a machine made system will fall substantially.
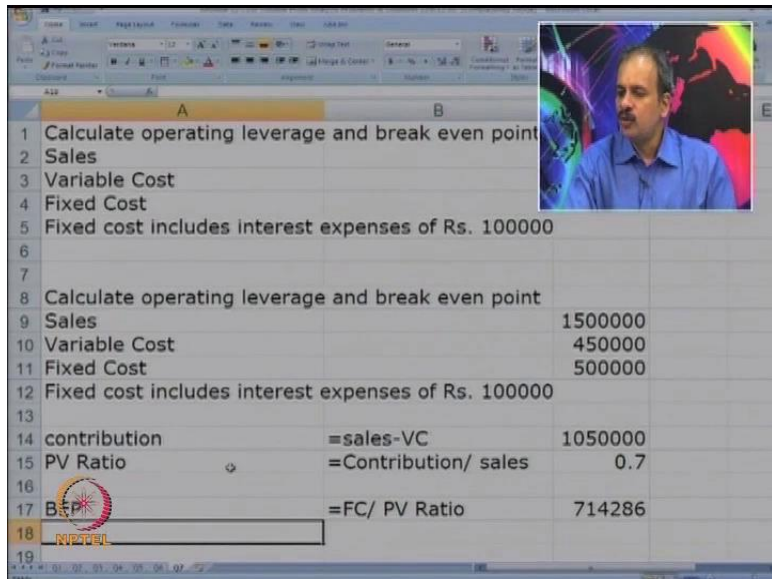
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This is what is calculated when we calculated what is known as operating leverage. So, note the formula; it is contribution upon EBIT; is it clear?
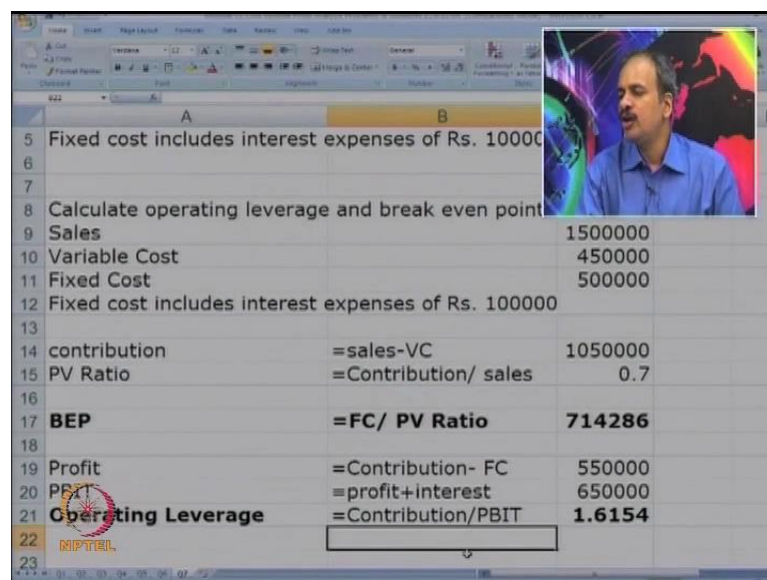
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Let us take one more case; the last case of this. Now here, we have to calculate again, the operating leverage, as well as BEP. The data is given on sale, variable cost and fixed cost. So, how to go about now? Now, it is very clear to you. You know how to calculate. First, we will try to calculate BEP. So, we need to know the contribution. What is the formula for contribution? Sales minus, v c. From contribution, go for p v ratio. PV ratio, you know is contribution upon, yes, contribution upon sales. So, contribution margin is in relation to sales, is 0.70 or 70 percent. Now, with this, we can easily find breakeven point. The formula is FC or fixed cost upon PV ratio. So, fixed cost is 5 lakhs, divided by 70 percent. So, it is 714286; this is the breakeven point, 714286.

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Now, let us try to calculate EBIT, because for calculating operating leverage, we need EBIT. Yes, what is the formula of operating leverage? Last sum, we had seen it; it is contribution upon PBIT. This is one answer we have. How much is PBIT; anyone can tell? We know that profit is contribution minus FC. So, we have contribution minus, fixed cost; 550000 is our total profit, but here, we want to know profit before interest. Anyway, the taxes are not given. So, we will take profit plus interest, which is 1 lakh; it is not given earlier; I will just enter it. I hope it is clear to all. So, you know that the contribution is 1050000. From that, if you deduct 5 lakhs fixed cost, you get a profit of 550000. We are adding back interest, because we want to know PBIT. We want to know profit before interest and tax. So, 550 plus interest, gives me 650000 and operating

leverage is nothing but contribution upon PBIT. So, it is 1050 upon 650; it is 1.6153; is it clear?

So, with the changes in sales, the estimated change in PBIT is going to be in the level of 1.61. Now, let us try, I think we are more or less clear with the c v p concepts. There are 4, 5 things, we have mainly studied. We have studied contribution, then p v ratio, then BEP, margin of safety and in today's session, we have learnt operating leverage. All these concepts are very much useful for decision making. We will continue to discuss how they impact decision making.

Now, having understood the concepts of c v p, that is marginal cost, variable cost, fixed cost, how they affect relationship with the profit. Then, we have also discussed about p v ratio, breakeven point and so on.

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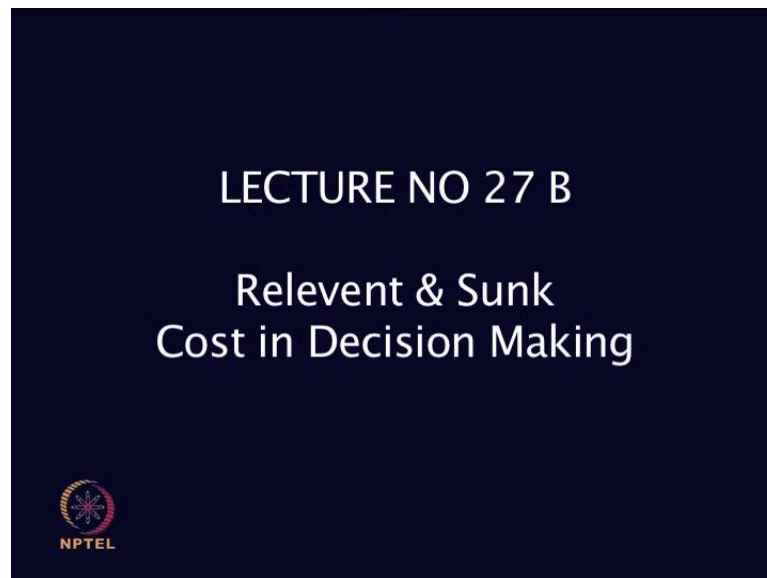
Now, let us continue to apply these concepts into decision making. For this, we will go into the next module, which is in continuation of the same concepts that is the treatment of relevant cost in decision making.

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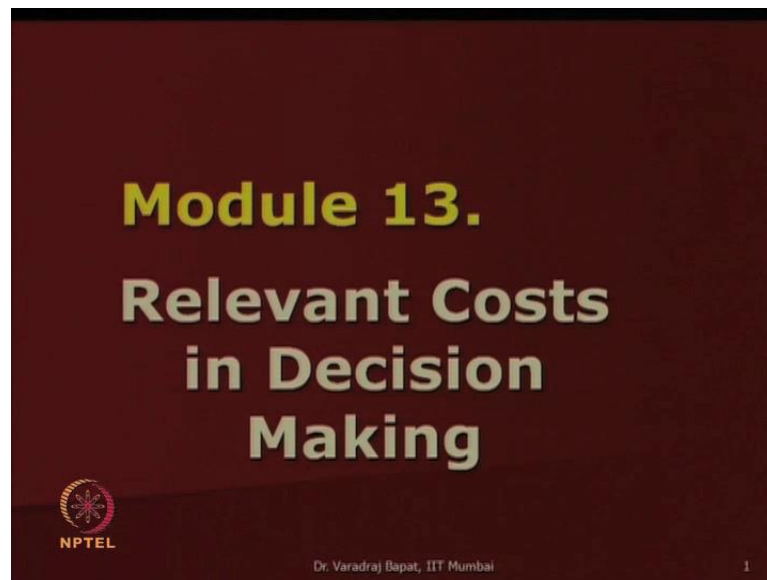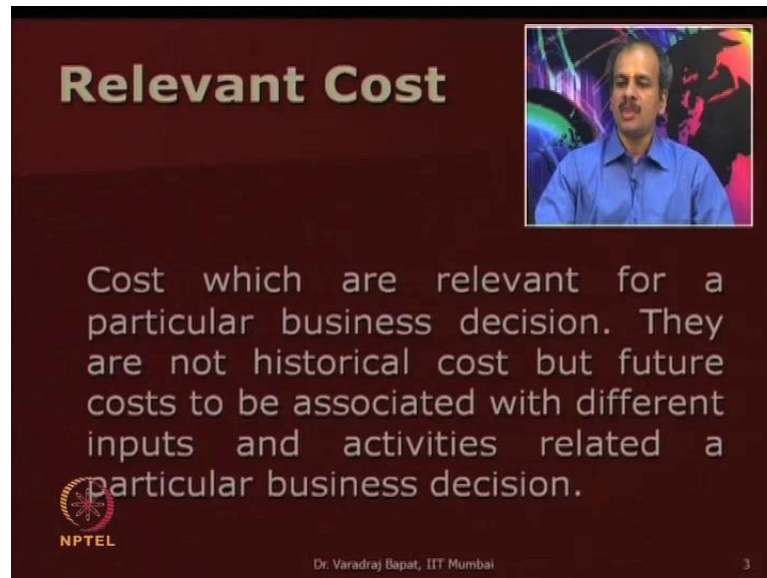
Now, the question is what do you mean by relevant cost.

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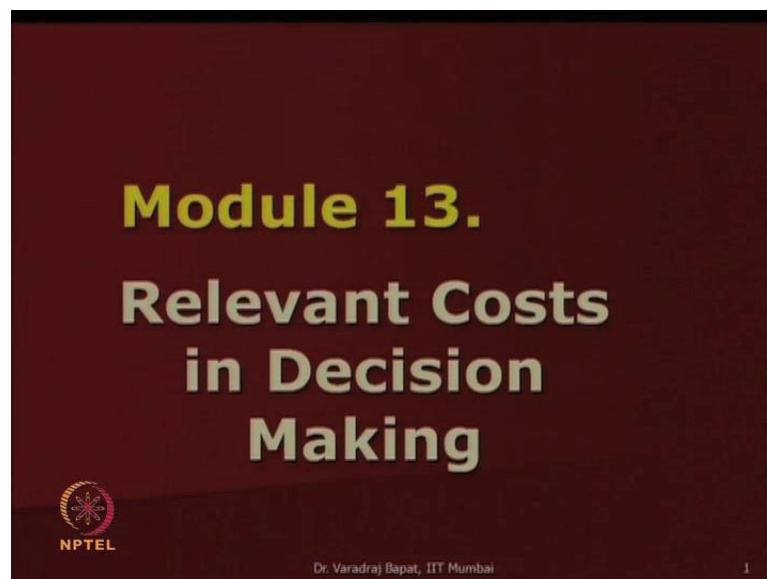
In this module 13, we are going to discuss about what is the relevant cost; the difference between the relevant and sunk cost; make or buy decision; shutdown cost, and then we will go into introduction of new products and also about joint products and cost allocation for joint products.

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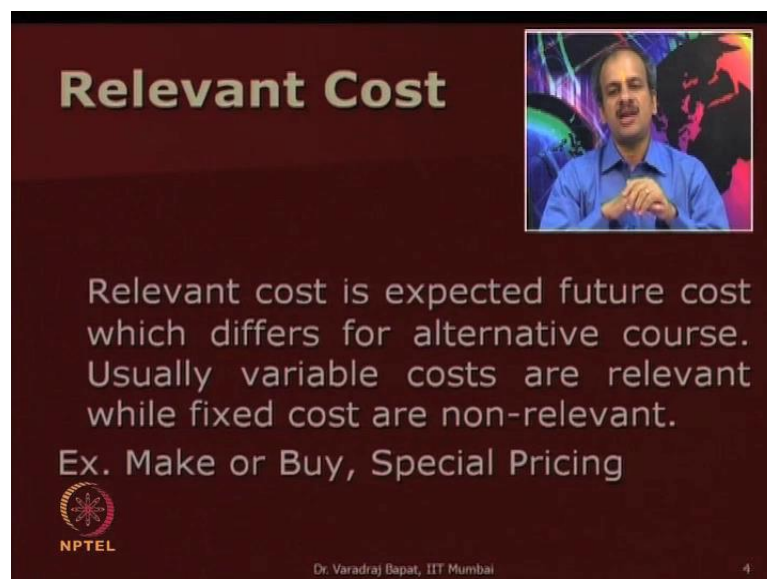
First about relevant cost; as the name suggests, those costs which are relevant are called as relevant cost, but this relevance is seen with respect to a particular decision. Most of the historical costs become irrelevant. Once we have already paid the amount or committed the amount, it may not have any impact on the decision. For a particular decision, what we have to look at is the future impact. What is likely to be the cost, which will arise out of that decision and what are likely to be the decisions for revenues, which come from the decision.

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In relevant cost, usually, we take a futuristic view. So, it can also be defined in this way that it is an expected future cost, which defers for alternative course. So, let us say, we have two options. We want to transfer the produce from our factory to sales shop. We can either, give it to a transportation agency A, or to transportation agency B. Now, for these decisions, it is irrelevant what is our production cost? It is also irrelevant what is our selling price. What is relevant is the transportation cost, charged by A and transportation cost charged by B. If the quality issues and the timing issues are same, we will go for the cost, the agency, which is less costing. So, we look at the future cost for a particular alternate course. Generally, variable cosst are relevant; whereas, fixed costs are not relevant. Let us try to understand with the example of make or buy decision. We are also going to discuss this in detail later, but to begin with, what is the make or buy decision?

Let us say, we have a factory. We are producing item A, but a supplier approaches us and tells us that he can supply item A to us which, we can use in our consumption or we can sell it. So, we have an option whether, to make item A or to buy item A. Suppose, the quality issues are same, how will we take the decision? Most logical way is we will look at the variable cost of production, and we will compare it with the variable cost of purchase plus, transportation. If we feel that purchase plus transport cost is less than what it takes to produce, it may be better to go for buying. Of course, we have to look at quality; we have to look at reliability; we have to also see the purpose, the background of the supplier and so on.
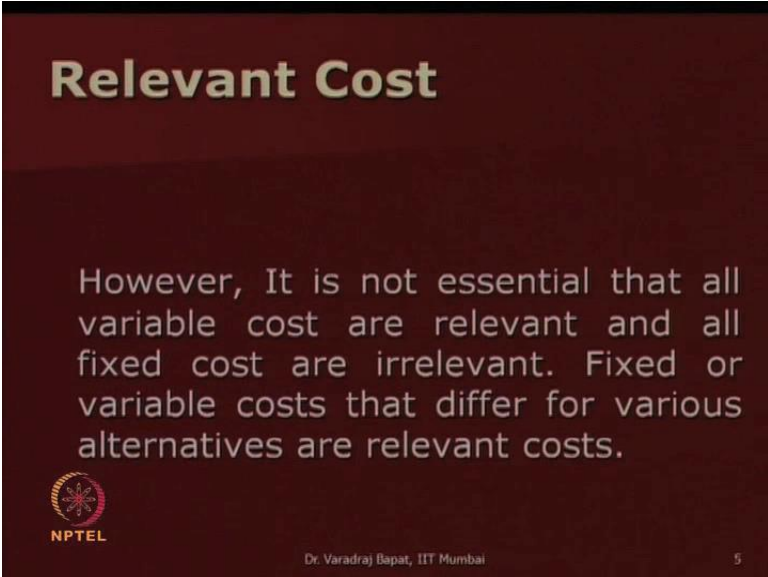
But generally, variable costs become relevant. Now suppose, there are cost like factory rent. There are costs of salaries of fixed permanent employees. Those costs are not relevant for this decision. We can also take an example of special pricing. Now suppose, we are producing, let us say, ball pens. The cost of ball pen for us, total cost is 8 rupees, fixed cost is 3 rupees, variable cost is 5 rupees. Usually, we sell in the market for 10 rupees. Again, I will repeat; variable cost 5; fixed cost 3; selling price 10. Now, we have received order from a special customer, who is not within our territory, say, from some country abroad. They want similar type of ball pens from us, and they are willing to pay, let us say, 9 rupees, instead of 10 rupees. Shall we accept the offer?

The answer will be yes, because our cost of production is 8. If we get 9 rupees, we are anyway, making a profit of 1 rupee. Even, if our domestic price is 10, we may be ready

to go in for a price of 9. Suppose, they are willing to give 8 rupees; shall we accept it or we should say no? Perhaps, most will say, go ahead. At least, we are entering a new market at 8 rupees. Now suppose, they are willing to go, give only 7 rupees; shall we accept? Answer appears to be no, because our cost of production is 8. Can we sell at 7 rupees? But the correct answer is yes, because our variable cost is only 5, fixed cost is 3. So, total cost is 8, but by selling at 7 rupees, we are fully recovering our variable cost of 5. Still, we have a surplus contribution of 2 rupees. Our fixed cost of 3 rupees per unit is anyway, not going to change with the number of units; it is fixed. By its very nature, it does not change with the units produced. So, we do not worry about this 3 rupees of fixed cost. What is relevant for special cost pricing decision is variable cost of 5 rupees.

Of course, here, I have assumed one thing that we have enough capacity. Suppose, we do not have enough capacity to produce or meet our existing demand, then we need not go for this special price, because then if we are able to sell at 10; why to sell at 7; that is a different issue, but suppose, we have enough capacity. Suppose, this is not going to affect our regular market. In such scenario, there is no problem; even, if we offer at 7 rupees. We can even, accept at 6 rupees, but anything at and below 5 rupees, we will not be ready, because we are not able to recover our variable cost. I think you would have understood that in this case, variable cost is a relevant cost.

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Relevant Cost

However, It is not essential that all variable cost are relevant and all fixed cost are irrelevant. Fixed or variable costs that differ for various alternatives are relevant costs.
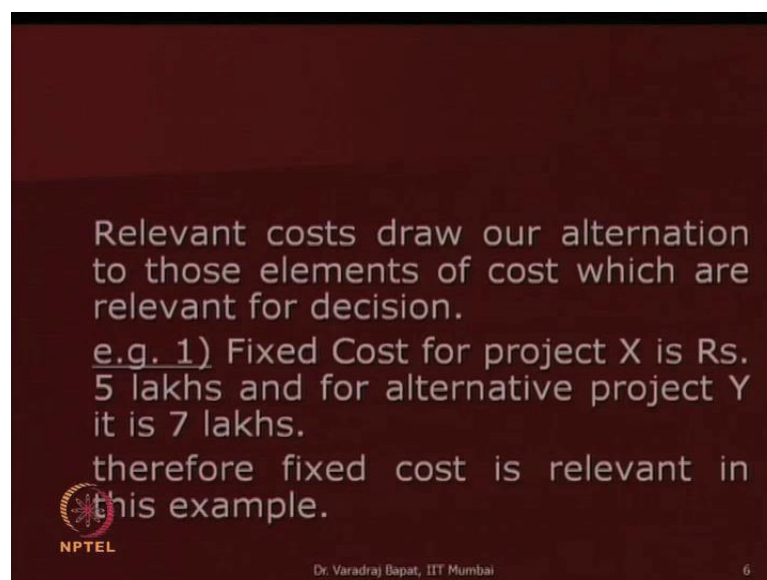
Dr. Varadraj Bapat, IIT Mumbai

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So, for any decision, we should look at the relevant cost and not some other cost, which do not have any impact. So, this is one more way of looking at it that generally, variable costs are relevant. However, it is not always necessary. Sometimes, even fixed cost may be relevant or some of the variable costs may not be relevant. Can you think of such example? If we continue our example of export of ball pens, our ball pens have variable cost of 5 rupees; fixed cost is 3 rupees; total cost is 8 rupees. There is a offer to buy ball pens at 7 rupees. So, we are looking at relevant cost and some of the fixed cost could also be relevant. we can also think of a situation where, variable cost is not relevant.

For example, in our earlier case, we were saying that we have two modes of transportation. We can either, go for transportation agency A or we can go for transportation agency B. A is charging us say, 10000 rupees; B is charging us 12000 rupees. Now, our variable cost of production is 50000, but in this case, variable cost of production is irrelevant. What is only relevant is 10000 and 12000; that is the transportation price cost, which is alone, relevant for taking a decision on transport. In this way, though, mostly variable costs are relevant, it is not always true. There could be situations where, variable costs are not relevant. There could also be situations where fixed costs are relevant.

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So, relevant costs draw our attention to those elements of cost, which are relevant to a particular decision. Here is one more example. Now, fixed cost for a particular project x

is 5 lakhs, and for alternative project y, it is 7 lakhs. If we assume that output is same, functionality of both the projects is same, it may be better for us to go for project, which has less fixed cost. So, we will perhaps, go for x, because it is better to have less fixed cost, if the functionality is anyway, same and in this case, fixed cost is relevant for our decision.

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There is another example; the direct material cost for alternative A is 150 per kg. For alternative B also, it is 150 kg. Whether, you choose A or B; direct material cost is going to remain same. That is why direct material cost remains irrelevant. This may happen that we may use machine 1 or we may use machine 2, which is alternative 1 and 2. Both the machines; direct cost is anyway, same. Production cost or convergent cost may be differing, but material cost is same. So, material cost becomes irrelevant to the decision. Even if it variable, it is not relevant to the decision.

Now, let us try to understand sunk cost. This is exactly, opposite of variable cost. Those costs, sorry, this is exactly, opposite of relevant costs. Relevant costs are those, which were having some impact on the decisions. Here, we have got sunk costs. These are all those costs, which are already incurred or committed in the past, which are not going to change, because of the decision. So, naturally, such costs should be considered for taking particular decision.

Here is one example; that cost incurred on research of a particular product. So, we might have incurred a lot of cost, done a very high quality research and come out with a particular product. Now, whether, to launch it or no; we have to decide. For such a decision, now, it is immaterial how much we have spent. Now, what is relevant is what is revenue we are likely to earn and what is the cost of production. So, it looks little odd that we have spent so much amount on research, but we may still, take a decision not to launch the product, because if the future revenues are not good enough, whatever, cost we have incurred on research, should not be considered for a decision.

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So, fixed costs have already incurred and they cannot be reversed. Historical cost becomes sunk cost and that is why they play no role in decision making.

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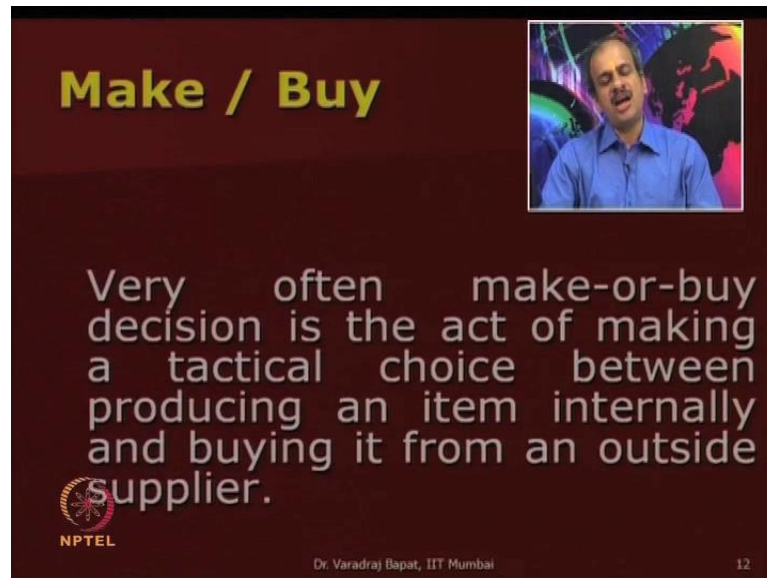
Now, fixed costs do not affect future cost; this is another way of putting at it and that is why there are irrelevant to the decision. Here is one more example that we have taken a decision to launch a product. We have spent a huge amount on advertising, but the product is not so hit. Now, we have to decide whether, we should continue the product or no. Now here, even if we have spent a really a large amount to launch the product on advertising, those cost are irrelevant for continuance decision. So, whether, to continue or no, will solely depend on what are likely to be revenues in future, and what are likely to be the incremental cost in future, irrespective of our initial spendings. This is how sunk costs do not have any impact on the decision making.

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Now, let us try to understand make or buy decision, little more in detail. Now, very often, make or buy decision is a short term decision where, we already have facilities. We are able to produce an item, but there is a supplier, who is also willing to sell us. So, we have to decide whether, we should make it or buy it.

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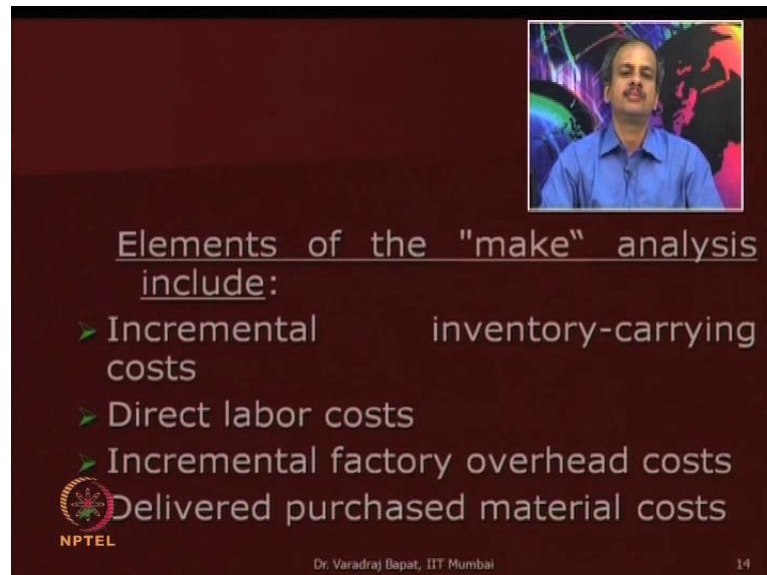
What are the relevant factors? Two factors become very relevant for our decision. One is whether, our capacity is surplus and what is the marginal cost of making the sale. If we do not have enough capacity, then buying option will always look better, but when we

have surplus capacity, we really have to look at our marginal cost of production, versus the lender cost of supply.
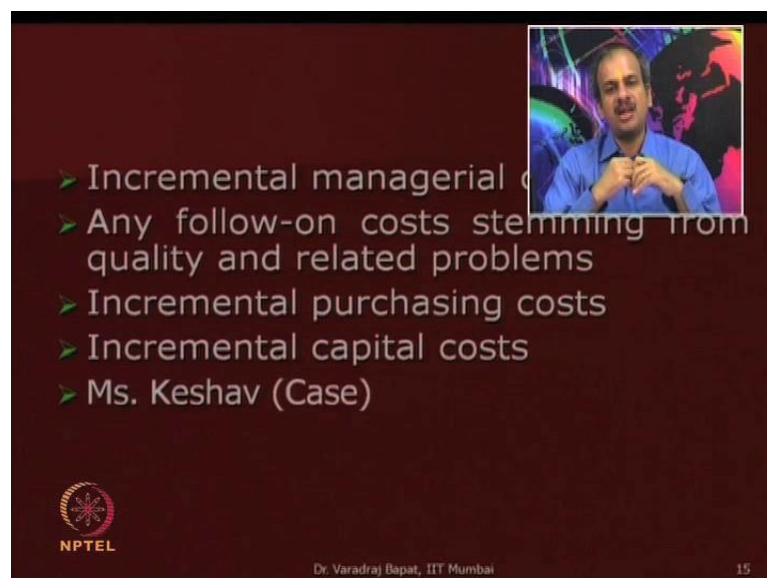
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Let us try to understand the relevant factors. Now, for make decision, what we look? We look at the inventory, carrying cost, which are incremental, direct labour cost, incremental factory overheads, delivered purchase cost.
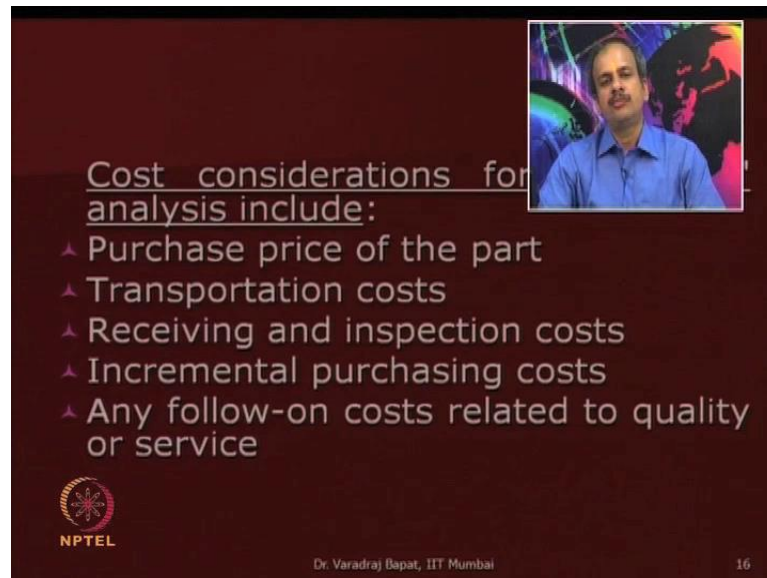
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We will look at incremental managerial cost, if there are any follow up cost on quality, incremental purchase cost, incremental capital cost, if any.
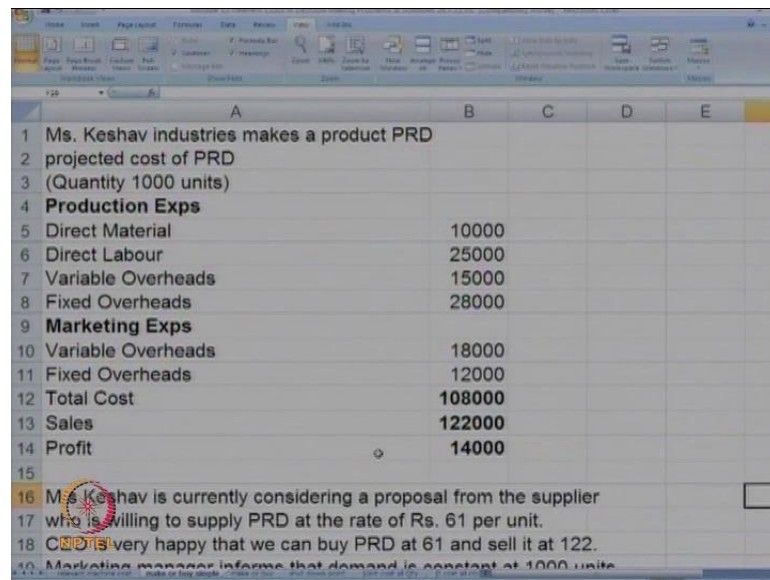
As against these, for buy decision, what is important? The purchase price of the part. If you are getting it from outside, the purchase price is the most important aspect. We also look at the transportation cost. We look at receiving an inspection cost. If there are any additional cost like quality control; we will look at it, or if we have to look for supplier, there may some purchasing cost and any follow up costs, like we have to remake item or we have to send it back for, let us say, replacement, because of some quality issues. These issues will be important for a make or buy decision. Now, let us try to look at some cases to understand it more thoroughly. Now, let us look at case of Keshav industries.
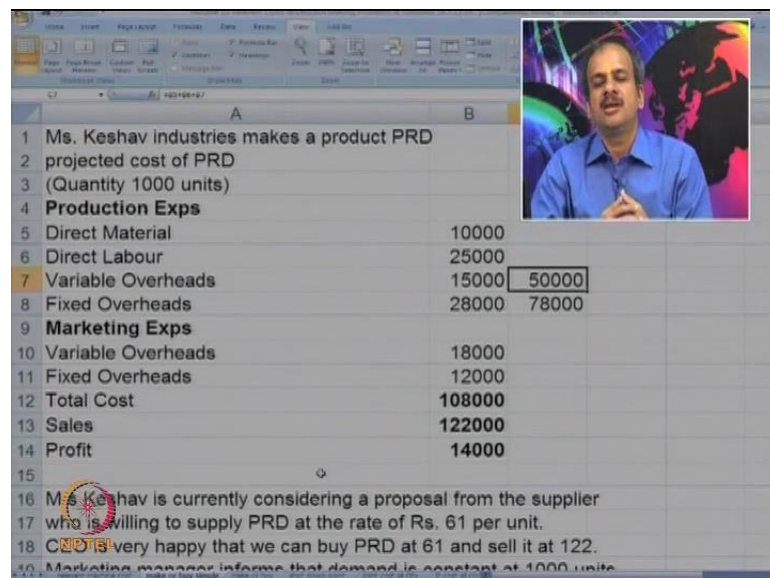
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Now, here, Keshav industries make a product p r d. The projected cost of p r d for a quantity of 1000; you can see here; direct material cost is 10000; direct labour is 25000; variable overheads is 15; fixed overheads is 28; some marketing cost again, variable is 18; fixed is12; the total cost is 108000; sales are 122000. So, it gives us a profit of 14000. Now, Ms. Keshav has got a proposal from a supplier, who is willing to supply p r d at 61 rupees.

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Cost and all are same. Now, you can see that the selling price is 122 for 1000 units. So, they are able to sell 1 unit at 122 rupees. So, naturally, CEO is very happy that while, we can buy p r d at 61, we are able to sell it at 122. So, there is a clear surplus, but marketing manager informs that demand cannot exceed 1000. So, currently anyway, we are making 1000. Same will remain even, if we decide to buy from outside. Production manager is not sure about the quality of the purchased items. So, advice whether we should purchase or we should continue making. Now, how will you take the decision? Just think over. What will be the relevant cost for this decision?

If you look at the cost structure, you will realize that even, if we buy from outside, marketing cost will remain constant. So, they are not relevant to the decision. What will change? What is relevant is our production cost, because when we buy from outside, the production cost gets saved. Material, labour and variables overheads; we will consider. We need not consider fixed overheads, because anyway, they are going to remain constant. So, if we take some of these three items; so we are going to look at 10. So, it is 10 plus, 25 plus, 15. So, what we incur is 50000 to make 1000 units. So, it is costing us 50 rupees to make; whereas, the supplier is willing to give us at 61 rupees. Shall we buy it?

The answer is clearly no. If you look at the total cost, you feel you should buy, because the total cost is 108; whereas, the supplier is giving it as 61. Even, if you look at the total cost of production still, you will feel like buying, because you can see the total cost of production is 50000 variable, plus 28000 fixed. So, it comes to 78; whereas, the supplier gives us at 61, but what we should remember is fixed overheads, which are 28, are anyway, going to remain fixed; they will not change. So, what is going to be relevant is only variable cost of 50 per unit. Outside supplier gives us at 61. So, on cost consideration, it is better to make, rather than, to buy, plus there are quality issues, because production manager is unsure about quality, but even on cost considerations, it is not good to buy. Is it clear to you now; that we should go for making, rather than, buying. We will stop here. In the next session, we will continue on more discussion on make or buy decision, relevant and irrelevant cost. We will also look at shut down point and then we will look at joint products.

Thank you so much.