Managerial Economics
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Lecture - 5

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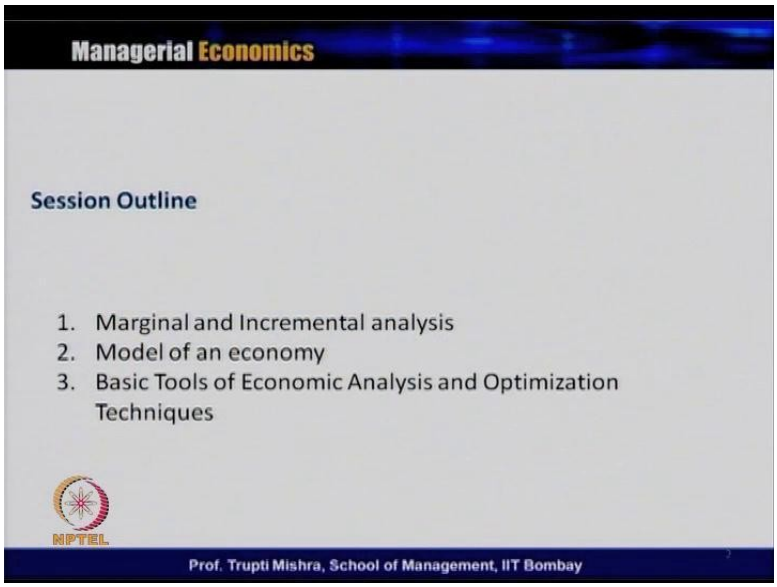

So, welcome to the third session of managerial economics. We are in the first module of managerial economics, which deals with the introduction and fundamentals to the managerial economics.

So, if you remember in the last class, we just started our discussion about the marginal analysis. So, in today's class, we will talk about the marginal and incremental analysis first, then we will talk about a model of any typical economy, how it works, what are the different sectors, how the flows works between two different sectors. And then we will focus on the basic tools of economic analysis and optimization techniques.

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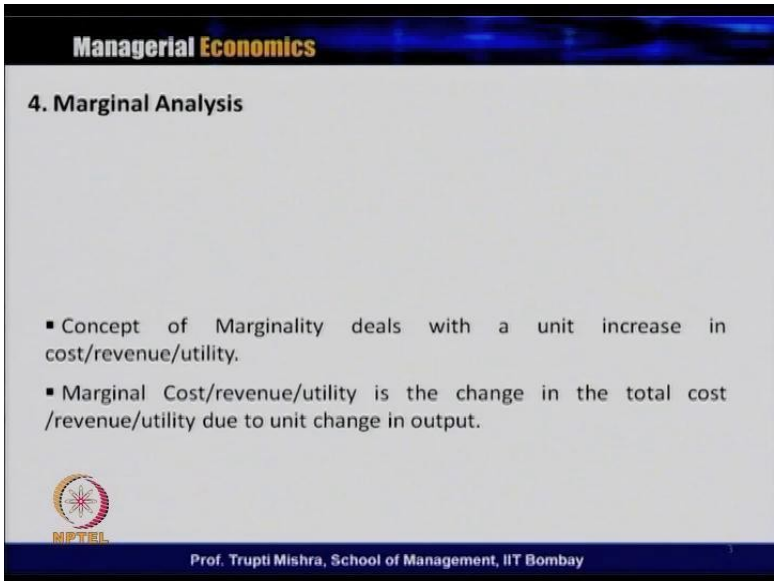

So, coming to the marginal analysis, as we discussed in the last class, marginal is always a unit change in any of this variable, whether the variable is cost, whether the variable is revenue, whether the variable is utility. Whenever there is a change in the output, what is the corresponding change in the cost, what is the corresponding change in the revenue or what is the corresponding change in the utility. That is the marginal cost, marginal revenue and marginal utility.

So, marginal cost is the change in the total cost, because there is a change in the output. Marginal revenue is the change in the total revenue because there is a change in the output. Output leads to revenue. Marginal utility is the change in the utility because the consumer consumes one more unit of the output or one more unit of the product.

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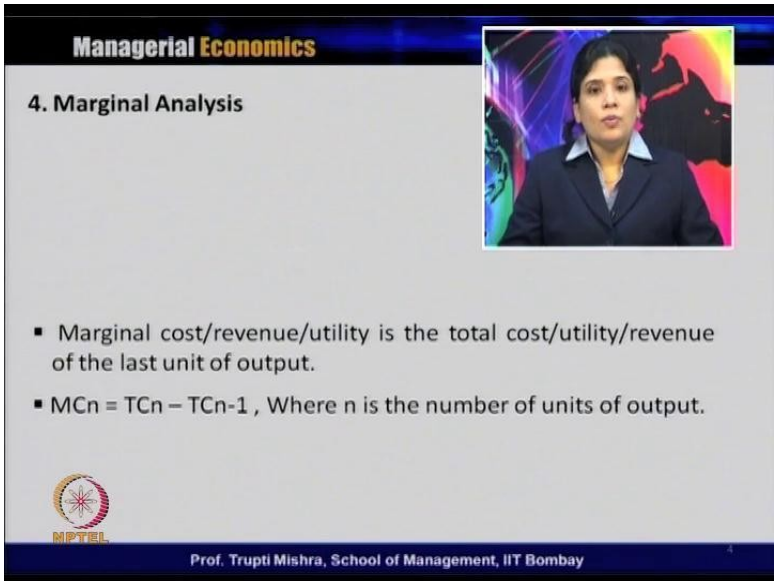

So, marginal cost or marginal revenue or marginal utility is the total cost utility revenue of the last unit of output. Whatever is the total cost or whatever is the total utility or whatever is the total revenue of the last unit of output, that is the marginal cost, or marginal revenue or marginal utility of the corresponding unit.

So, if you need to identify what is the marginal cost of n unit, then it is the total cost of n unit minus total cost of n minus 1 unit, where n is the number of units of output. So, this marginal cost of n unit is nothing but the total cost whatever comes in the last unit of the output.

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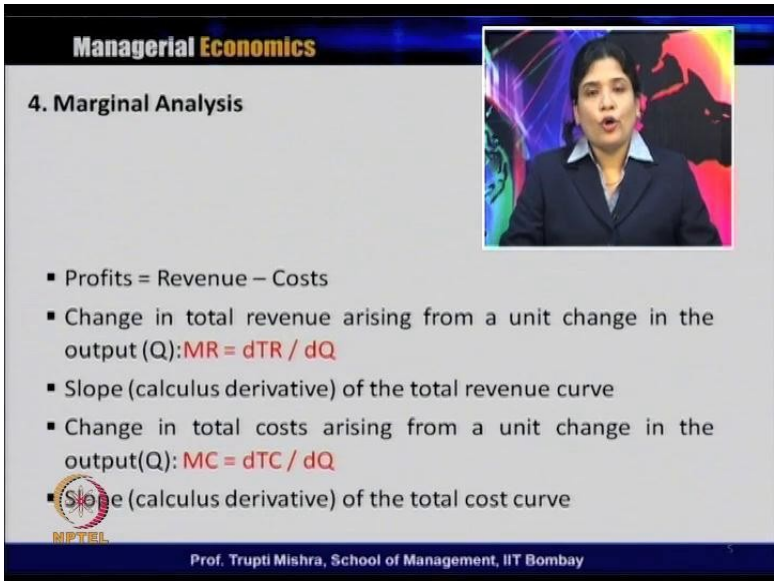

So, we know that profit is the difference between the revenue and the cost. Whenever there is a change in the total revenue due to unit change in the output, that we get that as the marginal revenue. So mathematically, we can find this by taking the first order derivative of total revenue function with respect to Q, that is output and geometrically this is the slope of the total revenue curve.

Similarly, change in the total cost coming from the unit change in the output gives us the marginal cost. Mathematically, we find marginal cost by change in the total cost with respect to change in the Q or that is output. So similarly, geometrically the slope of the total cost curves gives us the marginal cost curve.

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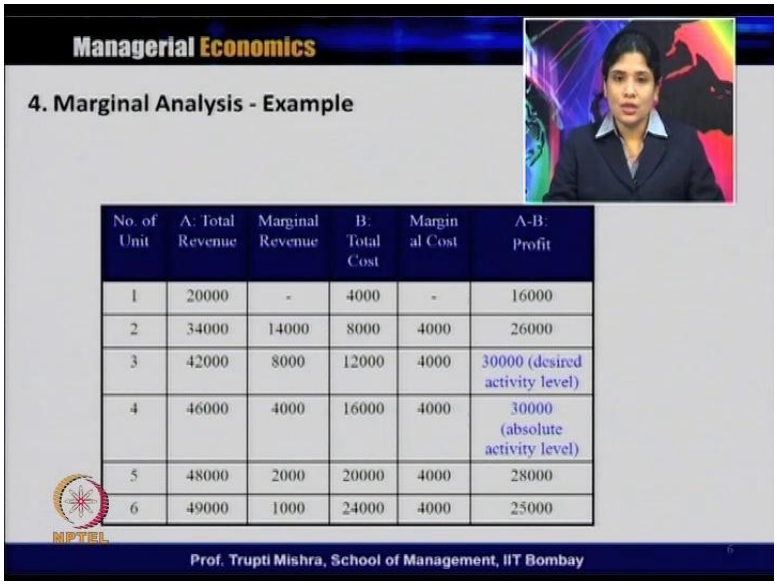

No. of Unit	A: Total Revenue	Marginal Revenue	B: Total Cost	Marginal Cost	A-B: Profit
1	20000	-	4000	-	16000
2	34000	14000	8000	4000	26000
3	42000	8000	12000	4000	30000 (desired activity level)
4	46000	4000	16000	4000	30000 (absolute activity level)
5	48000	2000	20000	4000	28000
6	49000	1000	24000	4000	25000

We will take an example to understand all these concept, particularly with respect to marginal analysis. So, if you look at in the table, this is a hypothetical table. So, this information is not relevant to the real world. So, there are 6 units of output that is 1 2 3 4 5 6. The second column gives us the total revenue, the third column gives us the marginal revenue, the fourth column gives us the total cost, the fifth column gives us the marginal cost and the last column gives us the profit.

As we know, total revenue is equal to sorry total profit is equal to total revenue minus total cost. So, if you look at it, when there is 1 unit of output, the total revenue is 20000 and total cost is 4000. So, the profit comes to 16000. Since there is only 1 unit, there is no marginal revenue associated with this unit of output.

When there are 2 units of output, the total revenue is 34000 and marginal revenue is 14000. Now, how this marginal revenue comes? This marginal revenue is the difference between the second unit and the first unit. Similarly, what is the total cost? Total cost is 8000. Here, the cost is fixed because for 1 unit, if it is 4000 and for the second unit it is 2 units, it is 8000 and then the cost remains constant. So, if you look at it, we will get a constant marginal cost because the per unit cost remains constant.

So, in this case, total cost is 8000 for 2 units and marginal cost is 4000. Now, how we get this marginal cost is 4000? That is the difference between the cost associated with the second unit of output and cost associated with the first unit of output. So, this is 8000 minus 4000. So,

marginal cost comes to 4000. In this case, how we will find out the profit? The profit is, total revenue is 34000 and total cost is 8000. So, 34000 minus 8000 gives us 26000 as the profit for second unit or 2 units of the output.

Similarly, for the third unit of output, total revenue is 42000 and marginal revenue is Ra.8000. How do we get the marginal revenue here? the difference between the third unit of the total revenue and second unit of the total revenue. So, 42000 minus 34000, that gives us 8000 as marginal revenue for the third unit of the output or for 3 units of the output.

Now, what is the cost over here? Considering unit cost remains constant for 3 units, it should be 12000. So, if it is for 1 unit, it is 4000 and for the third unit, it is 12000, where there are 3 units of output. Marginal cost is same because it is the difference between the third unit of the total cost and second unit of the total cost. So, 12000 minus 8000 and that gives us 4000. Now, what is the profit over here? Total revenue minus total cost. So, that comes to 30000, that is 42000 minus 12000, that 30000 is the desired activity level. I will talk about the desired activity level a bit later once we understand the table.

Now, for the fourth unit, total revenue is 46000. How we will find out what is the marginal revenue associated with the fourth unit? That is the difference between the total revenue of fourth unit and the third unit. So, total revenue of fourth unit is 46000 and total revenue of third unit is 42000. So, 46000 minus 42000, that gives us 4000, which is the marginal revenue associated with the fourth unit of output. Total cost is 16000 and for 1 unit it is 4000. Considering this as a fixed cost for the fourth unit, this is 16000. Marginal cost is 4000, that is the difference between the cost associated with the fourth unit and the third unit. So, marginal cost is 4000 and marginal revenue is 4000.

Coming to fifth unit, the total revenue is 42000 and total cost is 20000 for fifth unit. For one unit, is 4000. So, 5 units total cost is 20000. Now, what is the marginal revenue and marginal cost? Marginal revenue is the difference between the fifth unit of total revenue and fourth unit of total revenue. So, this is 48000 minus 46000. So, that comes to 2000. What is the marginal cost? It is constant. It is the difference between the cost associated with the fifth unit of output and fourth unit of output. So, marginal cost comes to 4000 for fifth unit.

Then, it comes to sixth unit. For the sixth unit, the total revenue is 49000. How to find out the marginal revenue? Again, it is the difference between the sixth unit and the fifth unit. So, in that case, if you look at , there is a difference of 1000 over here as the marginal revenue. Cost is Rs24000 given, 4000 as the per unit cost. We are using six units. So, this becomes 24000. So, the marginal cost is the difference between the cost associated with the sixth unit and fifth unit. So, that comes to 4000. Now, what is the profit in the case of fifth unit and sixth unit? Profit is 28000 in case of fifth unit, that is 48000 minus 20000. For sixth unit, it is the difference between the total revenue of 49000 and the total cost 24000, where the profit is 25000.

So, this is a hypothetical scenario, where we are getting whatever the number of units of output, we are getting total revenue and we are getting total cost, we are getting marginal revenue and we are getting marginal cost. From the difference between the total revenue and total cost, we are getting the profit.

Now, for any producer, what should be the desire activity level and what should be the absolute activity level. Now, what is the difference between the desire activity level and absolute activity level? That is on the basis of the profit and on the basis of the what is the value of marginal revenue and marginal cost. So, if you look at the cost, it remains constant. Marginal cost remains constant and marginal revenue is going on decreasing. It started with 14000 and it reached to 1000. And marginal cost remains constant because the per unit total cost remains constant and that is at 4000.

So, in the first case, the producer is getting profit as 16000 and in the second case, it is 26000 and in the third case, it is 30000, In the fourth case, it is 30000. Now, between the third unit and the fourth unit, one is desire activity level and second one is the absolute activity level. Now, why this is a desire activity level? If you look at in the third unit, still the marginal revenue is greater than the marginal cost. It means the per unit revenue by the third unit is more than the per unit cost associated with the third unit. So, still it is profitable for the producer to go further because by producing one more unit, he is getting the profit the same level of profit. But the marginal revenue is still greater than the marginal cost.

So, when he is operating in the fourth unit, the marginal revenue is 4000 and marginal cost is also 4000. So, this is the point where the marginal revenue is equal to the marginal cost. If the producer is going beyond the fourth unit, then the revenue is decreasing and cost remains constant. So, the marginal revenue is less than the marginal cost. What does it imply? It

implies that whatever the last unit revenue by producing one more unit of the output whatever the revenue generated at the last unit that becomes less as compared to whatever is the cost incurred by the last unit.

So, marginal revenue is less than marginal cost. Now, what happens in case of second unit or third unit? In case of second unit and third unit, the marginal revenue is greater than the marginal cost. It means, still there is a scope for the producer to produce more because the per unit revenue generated in the last unit is more than the per unit cost associated with the last unit. So, unit four is the point where the marginal cost is equal to marginal revenue. Any unit above this, the marginal revenue is greater than marginal cost, any unit below this, the marginal cost is greater than marginal revenue. So, the choice is between whether the producer is to operate in the third unit or whether in the fourth unit.

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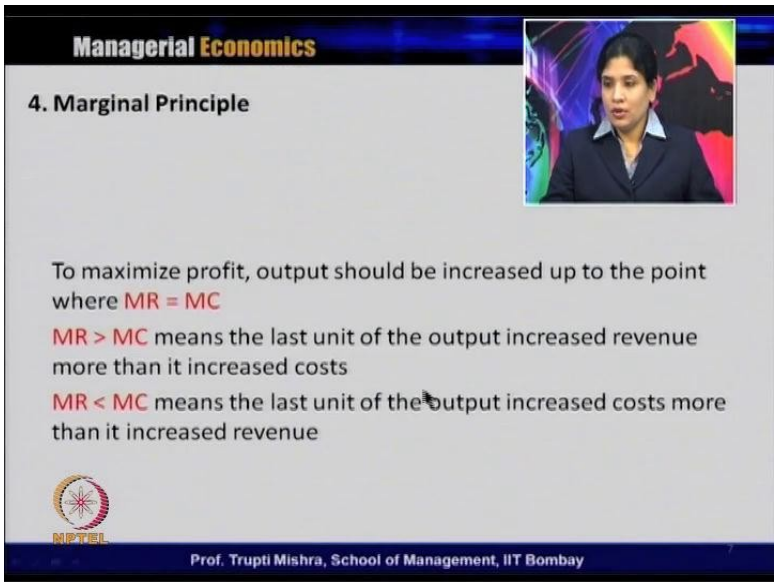

So, using marginal list principle, we will see which one is the ideal level, whether it is third unit or whether it is the fourth unit. So, to maximize the profit, output should be increased up to the point where marginal revenue is equal to marginal cost. So, if you are going by this policy or this rule, this marginal revenue equal to marginal cost, that is at the fourth unit, where the marginal revenue is equal to 4000 and the marginal cost is equal to 4000. So, at this point, marginal revenue is equal to marginal cost.

So, even if the profit remains same between unit three and unit four, the revenue is more in case of fourth unit. And going by the marginal list principle, in order to maximize the profit, the output should be increased up to the point where marginal revenue is equal to marginal cost.

So, in this case, fourth unit is that level of output what the producer should produce to maximize the profit. So, one possibility when marginal revenue is equal to marginal cost. There are two other possibilities, where we are getting that at some point or at any level of output, either marginal revenue is greater than marginal cost or the marginal cost is greater than the marginal revenue.

Now, we will check when we are encountering the position or when we are encountering the possibility where marginal revenue is greater than MC and when the marginal revenue is less than MC. What does it imply when marginal revenue is greater than MC? It means, the last unit of output increased the revenue more than the increased cost. So, this is profitable for the producer to produce more because the last unit of output is generating more revenue than the cost.

Now, what is the other possibility? Marginal revenue is less than marginal cost. It means, the last unit of the output increased cost more than the increased in revenue. So, the cost incurred in the last unit is more than the revenue generated. So, it may not be the profitable for the producer to go beyond this or produce at this level because they are not generating extra revenue. Rather, they are generating extra cost and whatever is the extra revenue they are generating, that is less than the extra cost. So, marginal list principle is always marginal revenue is equal to marginal cost. And this is the profit maximization principle. This we are going to follow in case of managerial economics, in order to maximize the profit there should be equality between the marginal revenue and the marginal cost.

So, in the last few minutes, we were discussing about the marginal analysis. So, what is the basic understanding about the marginal analysis? What is the change in the revenue, what is the change in the cost or what is the change in the utility? It is total revenue, total cost and total unit, when there is a per unit change in the output. So, basically marginal analysis deals with per unit change in the variable.

When you take this to a real life example, may be we get some situations, we get some examples where per unit change is not possible. The change is not per unit but the change is chunk. If it is a per unit change, sometimes there is a difficulty in evaluating and estimating. So, particularly in those time periods, the change is not per unit but change is in a chunk.

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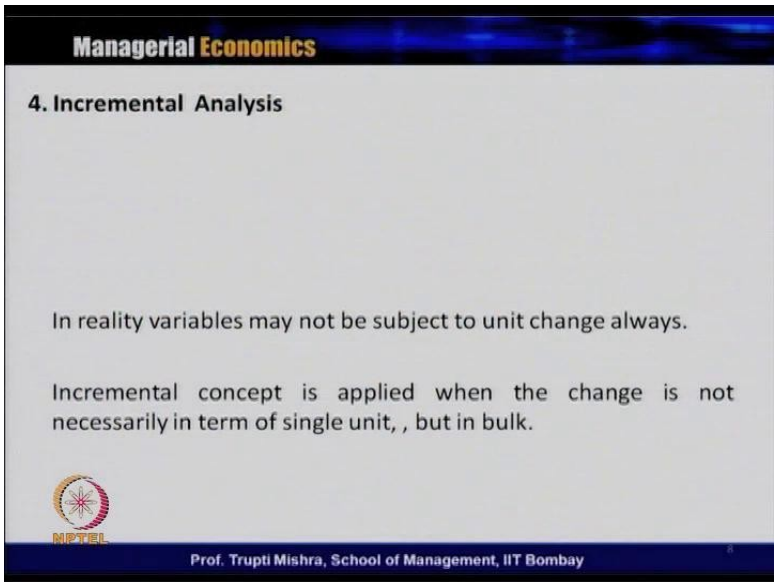

So, in reality, variable may not be subject to unit change always. Specifically at those situations, we need the incremental concept in order to analyze whatever is the change and how it affects the other variables due to this change.

So, incremental concept is applied when change is not necessarily in terms of single unit but in a bulk unit. So, marginal is specifically per unit change. When there is no per unit change, in this case, we use the term incremental concept for the change in bulk and not change in the single unit.

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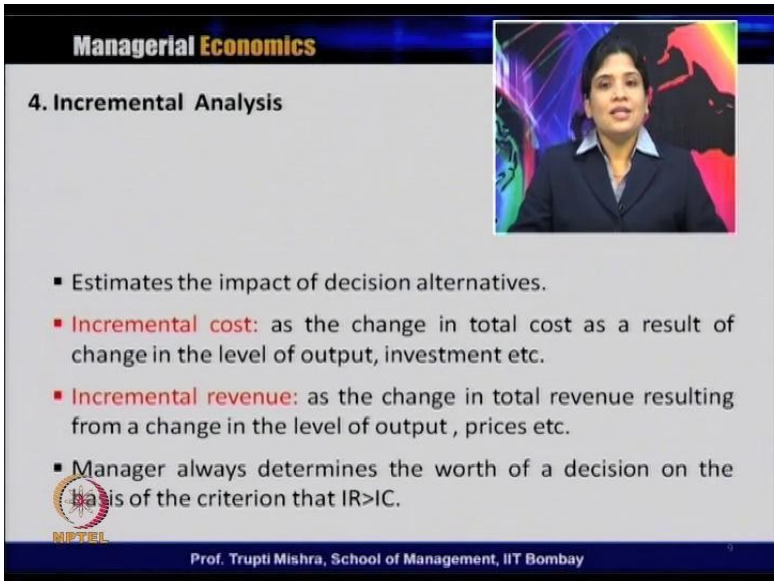

Now, it estimates the impact of decision alternatives. Sometimes, some decisions may not lead to per unit change. The change is in terms of bulk. So, in that respect, incremental analysis estimates the impact of the decision alternatives.

Now, we will check what incremental cost is and what incremental revenue is. Incremental cost is the change in the total cost as a result of change in the level of output or investment, whatever may be the variable. What is incremental revenue this is the change in the total revenue resulting from a change in the level of output or the price. So, when there is a change in the level of output or when there is a change in the level of price, what is the change in the revenue? That is incremental revenue. what is incremental cost is when there is a change in the total cost as a result of change in the level of output or the investment. The manager decides like the marginal list principle. The profit maximization rule is marginal cost is equal to marginal revenue.

Similarly, in case of incremental analysis, how the managers decide whether the decision is profitable or whether the decision is not profitable? Managers always determine the worth of a decision on the basis of the criteria, and that is incremental revenue is incremental cost. So, whatever the decision taken, the outcome should be that incremental revenue should be greater than the incremental cost because of this typical decision or because of this change.

So, if you look at marginal, it also deals with change. Incremental also deals with change. Marginal analysis deals with change for one unit and incremental analysis deals with the unit change in the bulk and not the single unit. So, we will take an example in order to understand the incremental analysis.

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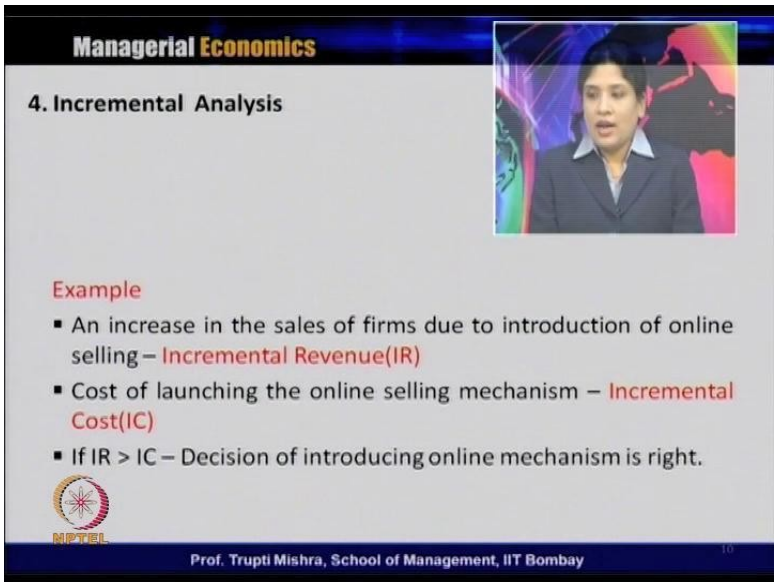

Suppose, the firm decides that they will go for online selling. They feel that if they adopt a strategy, that if they are going for online selling, it will be profitable for their firm. So, this is one kind of decision taken by the firm. That is, they are going for online selling in order to increase the revenue or in order to increase the sales, which will increase the revenue.

So, after going for online selling, there is an increase in the sales of the firm. Now, what is incremental revenue here? Incremental revenue is that there is an increase in the sales of the firm due to the introduction of online selling. Online selling is the decision. Due to online selling, there is an increase in the sales of firm that leads to increase in the revenue. So, increase in the total revenue due to increase in the sales of firm, and that is incremental revenue.

Now, what is cost here? Cost is launching the online selling mechanism. When they have taken the decision for introduction of online selling, it involves some amount of cost that increases the total cost of product. So, cost of launching the online selling mechanism is the incremental cost. Increase in the revenue due to increase in the sales of firm is the incremental revenue.

So, if incremental revenue is greater than the incremental cost, decision of introducing the online mechanism is right. Now, the manager, on what basis he will take the call if he should go/continue with the online marketing/selling or he should stop it. For him, the decision criteria is that, till that time the incremental revenue is greater than incremental cost, the decision of introducing online mechanism is right and the manager will continue with this decision.

If it is not, then if the incremental revenue is not greater than incremental cost, then the decision is not bringing any profit to the firm and hence, the manger will discontinue this online selling. So, in incremental analysis, the decision rule is incremental revenue should be greater than then incremental cost in order to bring the whatever the decision taken by the firm to be profitable.

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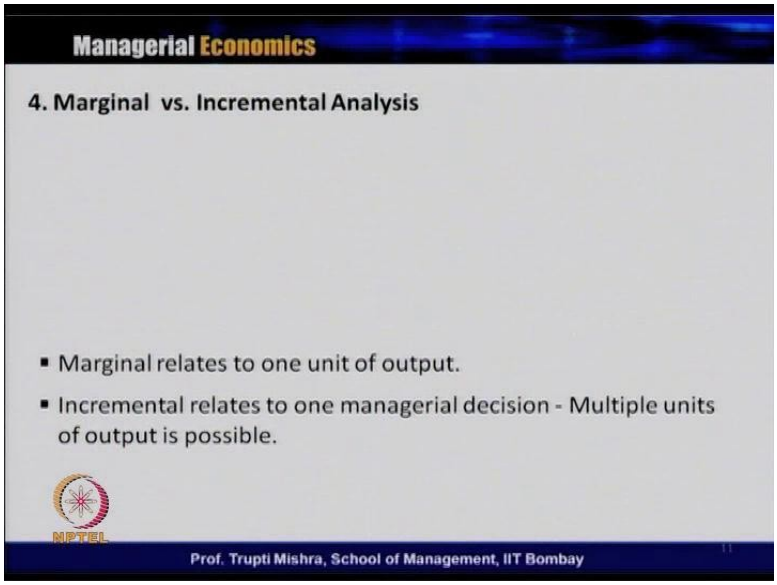

So, as we discussed, if you compare between the marginal versus incremental analysis, always the marginal analysis relates to one unit of output. Incremental analysis relates to one managerial decision. It may involve multiple units of output. So, marginal strictly deals with one unit of output and incremental always deals with the decision, which involves more than one unit of output.

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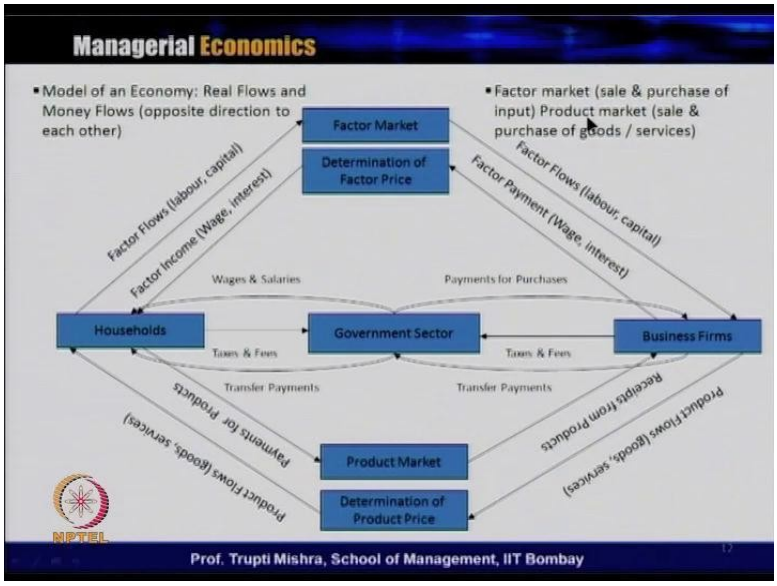

Then, we will come to take a typical model of an economy and we will see the different sectors here and how it works or what is the money flow, what is the real flow for each sector and how generally a typical economy works here.

So, if you look at in a typical economy, there are four sectors. One is factor market, second is product market, third is household, fourth one is business firm and fifth one is government sector. So, if you look at it, if you are not considering market as the sector, there are typically three sectors. One is household, second one is government and third one is business firm.

So, household sector basically deals with providing manpower to the business firm and in return of that they get goods and services produced by the firm what they purchase. Government sector does a transfer payment to both the household sector and the business firm and in return of that they get tax and fees from both the household firm and the business firm.

So, let us first analyze the flows between two sectors, that is household and the government sector. Now, household provides manpower to the government sector and in return of it they get wages and the salaries. Now, what the government sector gets out of it the government sector gets taxes and fees. what is the revenue of the government sector what they gets from the household sector.

Now, the sector is business firm. Now, what is the relationship between the government sector and the business firm? Business firm gives a transfer payment to the government and the government's pays for their purchases of goods and services produced by the business firm. Also, the business firm gives tax and fees to the government sector, which is their revenue.

Now, what is the relationship between the household sector and the business firm? Households provide the input in terms of manpower to the business firm to produce the goods and services, in return of that, they get wages and salary. What is the outcome of the business firm or what is the output of the business firm? They produce goods and services, they sell it in the open market and they get payments for the purchases from the household sector and from the government sector.

So, if you simplify it, household sector and business sector, how they are related? If you are considering its a two economy, there is only household sector and the business sector. In case of household sector, they provide the manpower to produce goods and services by the business sector and in return, they get wages and salaries from them.

Business sector use the manpower from the household sector and they utilize that for the production of goods and services that they sell to the household sector and in return, they get a payment for their purchases of the goods and services. How household sector and government sector are dependent? Household sector again provides manpower to the government sector and in return, they get wages and the salaries.

They pay tax and fees to the government, which is revenue for the government and government sector provides transfer payment to the household in terms of pension and different types of payments benefit. Now, in order to facilitate the sales of goods and services of business firm to the household and the government sector, that is the product market. So, business firm, after producing the product, they send it to the product market in order to sell those goods and services. So, there is a product flow from the business firm to the product market.

Product market determines the product price, which is consumed by the household. So, household buys the product from the product market. There is a product flow of goods and services from the product market to the household. In return of that, household gives the payment to the product market, which goes finally to the business firm, who are the producer

of the goods and services. Now, in order to facilitate the input market, like in order to produce the product, the business firm needs certain factors of production or certain inputs, that he gets through to the factor market, rather than getting directly from the household.

So, household provides labour and capital to the factor market, which gets used by the business firm in order to produce the product. Now, the factor market determines the factor price. Since household is providing factors to the business firm, they are getting a factor income, which is in terms of wage and interest. So, wage is the payment for labour and interest is the payment for the capital.

Now, after using the factors, labour and capital, the business firm gives back the wage and interest to the factor market, which finally goes to the household as the factor income. So, how factor market and business firm are related? Factor market is facilitating the factor requirement for the business firm, getting it from the household and providing it to the business firm. Business firm using the factor provided by the household, produce the product and give it to the product market. Product market is sending this to the household, what the household buys from the product market and gets a payment for it, and that finally goes to the business firm.

So, if you look at it, apart from the government sector, there are two major sectors. One is household and second one is business firm. Household provides the factor input to the business firm; business firm produces the product. The household again buys it from the product market and gives back the price of the product as the income of the business firm. Similarly, what is the income of the household? The income of the household is that, whatever the factors they are providing to the business firm, the payment made for that, such as, if they are providing labour, it is wage and if it is providing capital, then it is interest.

So, if you look at it, the income of the household become expenses of the business firm and the income of the business firm becomes the expenses of the household. So, all the sectors are interrelated with each other when it comes to the economic activity of the economy. Government sector is there and it is interlinked with both the household sector and the business firm. They provide transfer payment to household sector and get the transfer payment from the business firm. They do purchases from the business firm and make a

payment for it. They take the help of the manpower to operate the government sector and in return, they pay wages and salaries to the household.

What is the revenue of the government sector? Whatever tax and fees they get from the household sector and the business firm becomes the income of the government sector. So, basically there are three sectors. One is household sector, second one is business firm sector and third one is the government sector and all the three firms are related with each other.

There are two markets. One is factor market that deals with sales and purchase of the input. The second market is product market its deals with sales and purchase of the goods and services. So, business firm sell their products through the product market and get their factors through the factor market. Household sell their factors through the factor market and buy their product from the product market.

Now, there are two kinds of flows here. One is real flows; that is the real transfer of goods and services from product market to household and the real transfer of labour and capital as factor flow from the factor market to business firm. And second kind of flow is money flows. It is the real transfer of income from factor market to household in terms of factor income and real transfer of income from product market to business firm, that is from the payment of the product made by the household sector.

So, there is inter linkages between all these three sectors. The two markets which facilitates the transaction, one is factor market and second one is product market. So, whatever we discuss in the last class and this marginal analysis, few opportunity costs, few other concepts, and this marginal and incremental analysis, these are the session references.