An Introduction to Microeconomics
Prof. Vimal Kumar
Department of Economic Sciences
Indian Institute of Technology, Kanpur

Lecture - 73
Technology or Production Function

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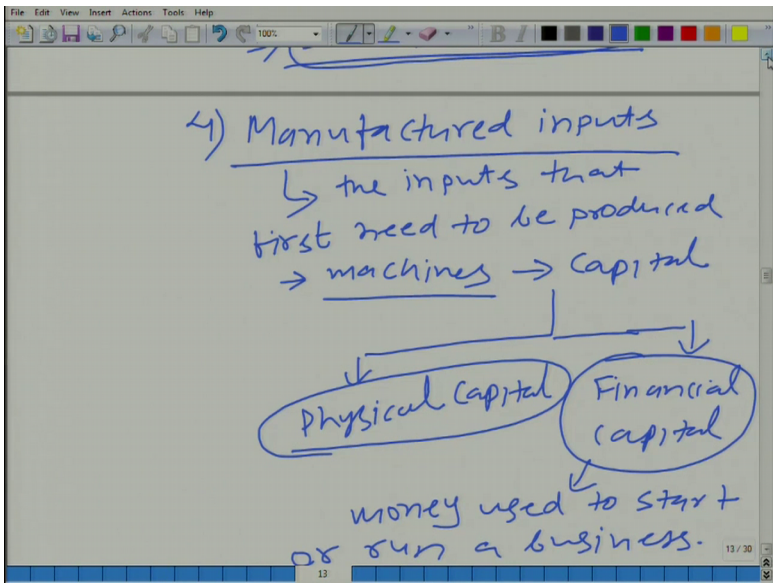

Now let us focus on the production or technology, how can we represent technology, because the way we are defining it, it is more ephemeral then real that it is the black box, that it is transforming, but what is it, how can we describe it and one, the simplest way to describe is to use something called production function

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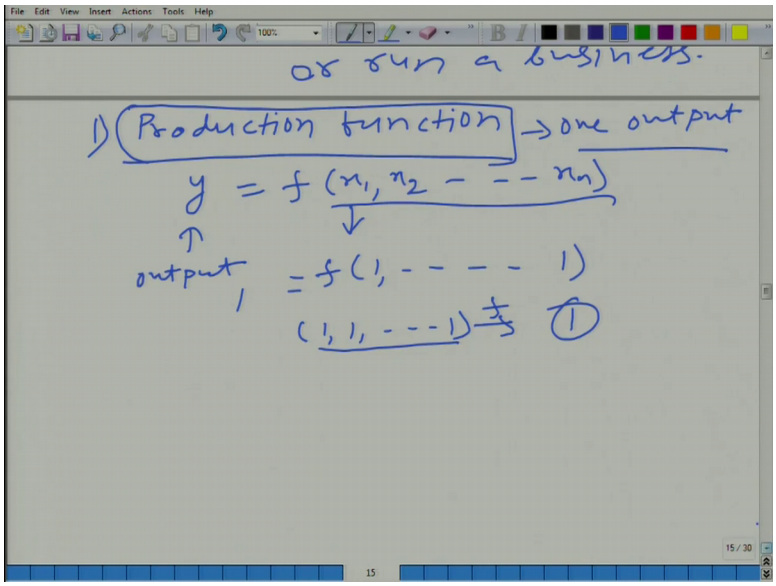

Student: (Refer Time: 00:48).

We can use something called production function. What is a production function?

Student: a function that gives maximum possible output (Refer Time: 00:59) by the ah by the given set of inputs (Refer Time: 01:04)

Choose different definition, I got one. He is talking about the maximum output that can be produced using given inputs

Student: Inputs0

And what you are saying is that, the production function is a relation between.

Student: Inputs.

Inputs and output what you are saying. He is saying the same thing and something more. So, you are not wrong production function is of course, the relation between

Student: Inputs.

Input and inputs and output, but more. So, it is, it gives the maximum amount of output that can be produced given the

Student: Inputs.

Given the amount of inputs. Fine ok. So, and it is represented as let us say typically, we say we reserved y to represent.

Student: Output.

Output. Of course, here I am assuming that this production process, whenever I talk about production function I assume that we have only one output that may not be true sometime ok. The production process may give more than one output

So, it should be clear to you. This is not the most general and the perfect way to describe the technology, but nevertheless this is very handy. Particularly when we have only one output and here we have x 1 x 2 and so on, and what it means x 1 is the amount of first input.

It means we should have list of all the inputs, not just the list, but an ordered list, saying that number 1 input is this particular kind, number 2 input is of this particular time an so on and then we can say that we can have one example, that function of 1 comma that 1 leads to, let us say 1 unit of output.

So, we can say that it leads to 1. If I use the mathematical notation, what it means that all inputs are being used here in 1 unit and it leads to 1 unit of output. Fine ok. I am not saying this is always true, this is just an example.

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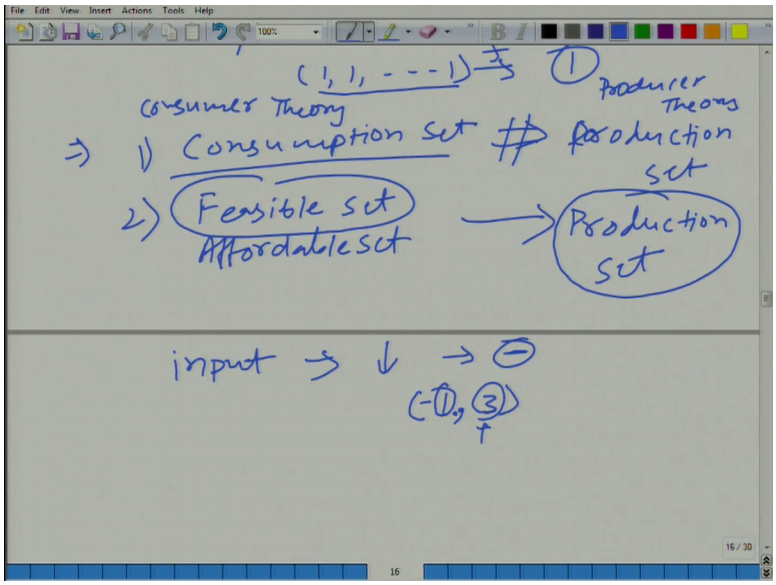

I go back a little bit and just compare it. What we are learning in context of producer and comparative with what we had learned in context of consumer

So, if you look at the consumption set. Typically we do not have anything to rep, anything like you know we have production set, but its not equivalent to consumption set ok. And of course, I am moving to the second way to describe the production process

So, what the second thing we had learned. The second building block that we had learnt was feasible set

Or affordable set. Remember in the set of consumer theory, here we have producer theory. And equivalent to this, here we have something that we call production set. Remember what did the feasible set gave, what did the feasible set give in the context of consumer theory that all the consumption bundle; that is

Student: Affordable.

Affordable, that is feasible. So, in the similar, since we are talking about all the combination of inputs and outputs

Student: They can be.

Those are feasible, those can be produced. Fine, but now we are bringing, we, if we use the set theory, we have to develop a way to represent inputs and outputs or we have to clearly list them in the different sets, that this is the set of input and this is another is the set of output, but one greater ways to represent all the inputs and outputs in the same

Student: Graph.

In the same. Not just in the same graph, in the same set

And how can we achieve that. Remember input is means that if we in the production process input will be consumed, input will be used. So, input will decrease. So, if you put minus sign minus, let us say if we take a set 1 minus 1 comma 3 by, just by looking at the minus sign, we can say in the production process input is decreasing by 1 unit. It means this production process is using 1 unit of this input and plus means, what does it mean ? That amount of this would, is going up how can it go up, because it has, it is being produced

Student: Produced.

In this production process. So, the plus sign will give the output.

Student: Output.

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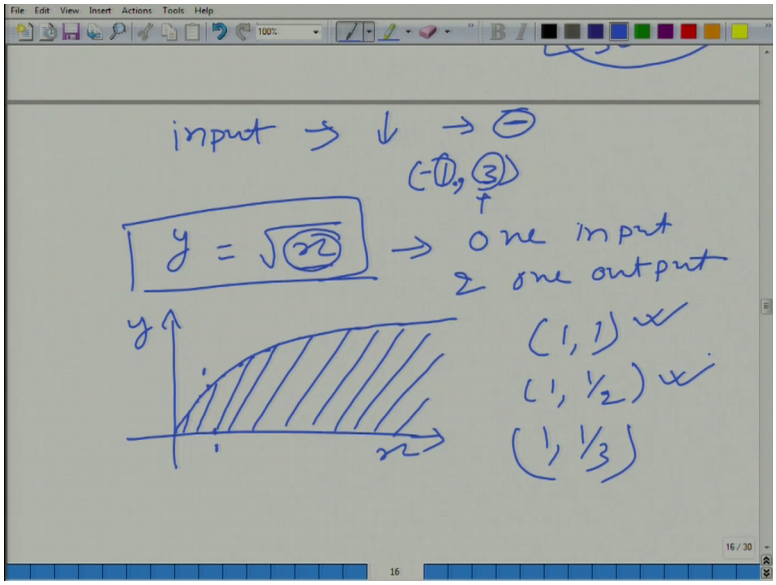

The output for example, let us let us take, you know I just want you to understand the relation between these two; the production function and the production set

Now, I am talking about the production set. So, let us say this can be a production function. What does it say, what does it mean that; of course, if we look at it and x is a scalar not a vector, it means only 1 input. So, what we mean is, 1 input and

Student: 1.

1

Student: Output.

Output how can we represent it.

Student: Minus.

No, I am just talking about production function. The production function can be represented here as.

Student: Sir I am graph this.

This like this.

Student: Yes.

This is fine and all the points here. Let us say we take here x is equal to 1, y is going to be equal to 1.

Student: No.

So, 1 comma 1 what does it mean that 1 unit of input leads to 1 unit of?

Student: Output.

Output and since it is a production process, production function, what it means is that 1 unit 1 unit of input cannot produce more than 1 unit of?

Student: Output.

Output this is the maximum you can.

Student: Produce.

Produce using 1 unit of input.

Now, let us look at, we can similarly say here itself here, here what we can say the production set we are talking about, all the feasible combination of inputs and outputs. So, what we can say before we bring the minus and positive sign what we can say that, if we can produce 1 unit of output using 1 unit of input, it means we can also produce half unit of output using 1 unit of input.

So, whatever we have here, again we will go into detail, we will talk about it little more. Although I did not name the property that we will do later on, but here that is what it means that everything here is feasible in graph it looks perfect. So, what I am saying if 1 comma 1 is on production function ok, then 1 comma half or 1 comma 1 by 3 is in the

Student: Production.

Production.

Student: Function.

Set.

Student: Set.

Ok, but if you look at the graph there is no confusion. Why is here its amount of output and here its amount of input.

But when you get here 1 comma 1 then its confusing, whether 1 is this or here 1 comma half, whether 1 is input or half is input ok. So, what we can do that we can put negative sign for the input used in the production process and put the positive sign or live. If we do not have to put the positive, positive sign for the output, but when we represent this back in the graph the graph cannot look like this.

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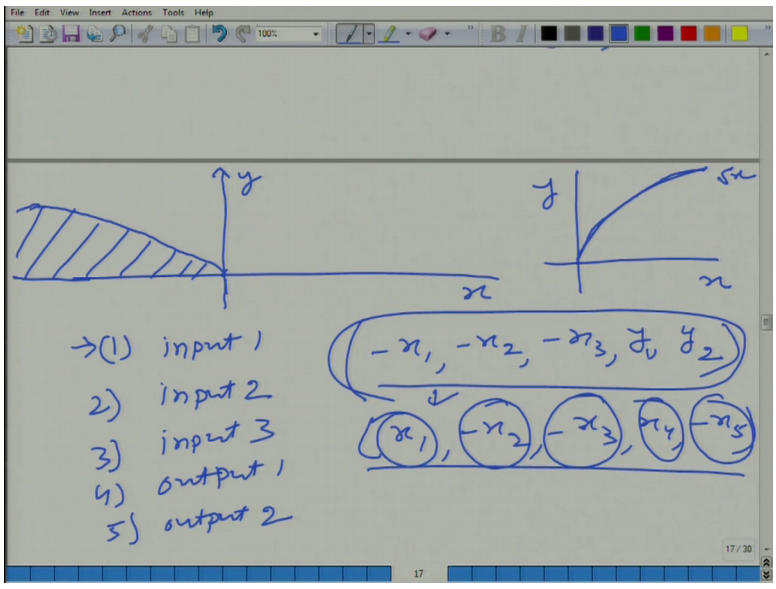

Because, now we cannot plot 1 comma 1, because this is not feasible ok. So, what we have to do. We have to account for the fact that some of these factors, some of these are inputs and some of these are outputs and of course, I am assuming that you may have more than 1 inputs and you may have more than 1 outputs. So, how can we represent in two dimensional graph when we have just 1 input and 1 output, it cannot be like this, it cannot be.

Because what it means is, that something is being produced without using any inputs. So, of course, one factor has to be negative. So, if this is output we will have it on the positive side and here it is input, it has to be on the negative side. So, the same production function can be represented like this and in this case this is the production set and this is the convention. When we describe the production set we take care of the signs, whether its input or output, but when we talk about production function. Of course, in that case we are talking about only one of, only one output production process

So, then we do not have to worry about. Whenever we talk about production function we will put it like this and there we are not talking about points inside here

We are only talking about, because these are not the maximum amount of output that you can produce using some amount of input

Student: (Refer Time: 11:27).

So, that those bundles are combinations, are represented by this curve. Fine, is it clear

Do you understand. So, production set although more general, because now notice what if you have a production process, where there are three inputs and 2 outputs. So, what you can do, you can have a list here that on first position you have input one, on the second position you have input 2. Third position you have input 3, fourth position you have output 1 and fifth position you have output

Student: 2

2 and you can write it like this. This is very general. It takes care of more than one output and also what if, because sometime it happens that you know that rather than, let us say for example, a company has bought, you know our a farmer has bought seed or better example would be a company a, a company has bought some electricity in the future. Its possible these days that you can buy some things to be used in the future and then that company figures out that it is better idea to sell that electricity in the market rather than using itself.

So if you think about, if you have this kind of representation, these scenario can be taken care of automatically minus and positive its possible, like for example, its possible in

this. Here you have x 1 minus x 2 minus x 3 x 4 and minus x 5. So, what does it mean, here that good 2 good 3 and good 5 these goods are being used as

Student: Inputs.

Inputs and good 1 and good 4 are.

Student: Output.

Output of this production process. Is it clear?

Student: Yes sir.

So, production set the, if we use production set to describe all the feasible combination that is more general than the production function. Is it clear?