

Project Management for Managers
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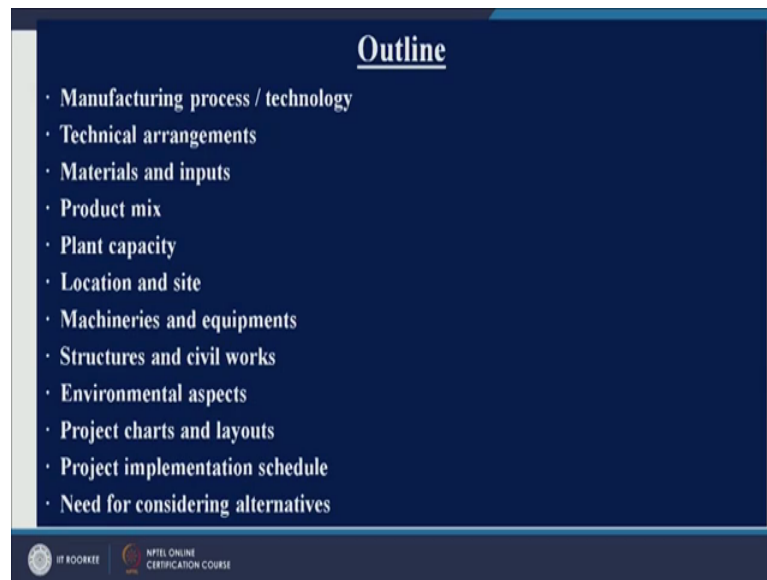
Lecture - 29
Technical Analysis

Good morning everyone. I welcome you all in this session. In this session we are going to discuss some of the points related to Technical Analysis of the project. As you are aware we need to scrutinize our projects on several criteria. Broadly we can say that we should analyze our projects on pestle analysis, and pestle analysis is nothing, but you have got political analysis, economic analysis, social-economic, social analysis, technological analysis, legal analysis, and environmental analysis.

So, we have seen couple of analysis and now we are going to see in this session technical analysis. What is technical analysis? Whenever you go for any project, let us say if you are going to construct a building now you need to look at several technical aspects. Let us say how many floors you want, what is the strength of the soil, how many beams are needed, how many columns are needed, what would be different forces, what are different stresses isn't it, what should be the dimension of steel, you know characteristics of cement and all those things. So, there are hundreds of technical parameters when you come off with a building.

Similarly, if you take any other project then also you will have to look at several technical aspects.

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So, in this session we are going to cover manufacturing processes which you should follow in your project. Technical arrangements: what are different technical arrangements needed. Materials and inputs: because, whatever technology you are going to use and you need to see what are different inputs, because inputs will play the use of appropriate technology. Product mix: product mix is something where in you need to decide; how many products you want, you cannot manufacture all the products required by customers because of several constraints so you need to decide on product mix.

What is your plant capacity right and plant capacity is related to technology. So, if you are using a better technology you will have a better plant capacity. Location and site selection, machineries and equipments, structures and civil works- these 2 are important aspects. Environmental aspects: you need to look at before starting a project, because you need to come up with let us say fluent plant isn't it. So, how you are disposing of your wastages which are coming out of processes. So, then you have got project charts and layouts: how to prepare these charts. Project implementation schedule and need for considering alternative.

So, these are couple of things which we are going to see in today's session.

(Refer Slide Time: 03:34)

Manufacturing Process/Technology

For manufacturing a product / service often two or more alternative technologies are available (Steel – Bessemer process or open hearth, Cement- Dry or wet, Soap – semi or fully boiled process).

Choice of Technology

The choice of technology is influenced by a variety of considerations:

- Plant capacity (relationship b/w capacity and technology???)
- Principal inputs: (quality of limestone – dry or wet process)
- Investment outlay and production cost (effect of alternative technologies on these two should be observed)
- Use by other units (how it is yielding profits)
- Product mix
- Latest developments (obsolescence should be minimized)
- Ease of absorption (high end tech may take long time and trained people)

So, most important point is manufacturing processes whenever you make a product you will most of the times have different methods of manufacturing a product in very few situations you will have only one manufacturing process to make a product for example, let us say if you are making steel. So, you can either go for Bessemer process or open hearth process right similarly let us say if you are having cement plant. So, how you are making cement either dry process or wet process. So, you can have multiple processes to make a product which one should be chosen that is. So, that is quite a critical decision.

So, look at your manufacturing processes and adopt appropriate technology then you have got choice of technology which technology you should prefer and there are again several factors which would decide what kind of technology you should choose plant capacity is one of the considerations you should take care of while choosing technology, because there is a relationship between plant capacity and technology. And do you think there is any relationship between plant capacity and technology? If there is any relationship is that positive or negative. Just think for a while is there any relationship between plant capacity and technology; yes, there is a positive relationship, if you have got a better technology then you will have more capacity.

So, they are directly proportional to each other. So, better technology will give you more plant capacity right principal inputs would decide what kind of technology you would like to choose; For example, if you are making cement then you can either go for dry

process are wet process then use appropriate technology for that for example, quality of limestone in cement plant will determine what kind of technology you are going to use are the technology will have certain requirements. So, if you are using let say technology a then you need to use input material a right if you are using let us say technology B then input material should be B right you cannot have a different input material for a technology which you are going to adopt.

So, there has to be one to one match between principal inputs and technology which you are choosing investment outland production cost because whenever you are going for any technology you need to invest in that technology and when you invest in technology you should look at different sources of funds right from where you are getting those funds.

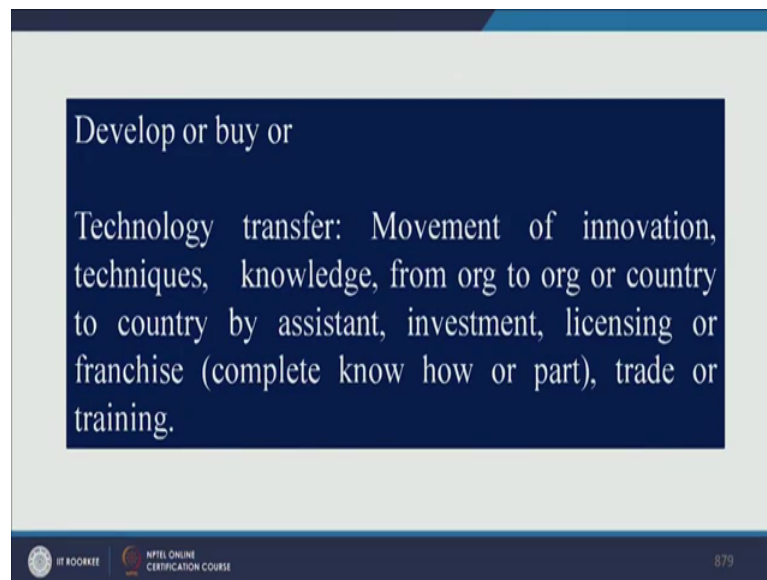
When you use when you choose a particular technology then that technology will either increase the cost or decrease the cost, but if you are using let us say a better technology right then generally the cost of the production would decrease. So, again there is a close relationship between investment production cost and technology which you are choosing right used by other units.

Now you should look at those technologies which are being used by let us say for example, your competitors how that technologies is is giving benefits to your competitor. So, you can look at those technologies whether those technologies are yielding profits or not right product mix as I have already said- since you are in a business you cannot make all the products required by customers. So, you need to have a combination of product mix right you can you cannot choose all the products which are needed by customers.

Let us developments we should take care of water latest developments taking place in the field of technology. So, you should try to use appropriate technology and you should see issues like obsolescence and try to minimize losses due to obsolescence of obsolescence is nothing, but the older technology is being replaced by newer technology right. So, ease of absorption how easily you can observe particular technologies again there are several issues generally high end technology may take long time and it requires trained people. So, choice of technology depends on several factors right these are couple of factors we have discussed.

Now, what are different sources of technology from where you can get technology just think over this about this question either you develop technology or you buy technology right. So, these are broadly 2 sources, but there are other sources as well, but broadly 2 sources either you develop or you buy wrong some other some other player.

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So, there is something called technology transfer technology transfer is nothing but how the knowledge how the techniques how the innovations are moving from one organization to another organization or between 2 countries right. So, this nothing, but technology transfer and it can happen in several ways for example, let us say through investment or through licensing are franchise in licensing are franchise either you completely get technical knowhow from let us say supplier or you are getting part of that technology from supplier right it can be through trade or it can be through training isn't it or it, it can be through assistance by 1 country to another country.

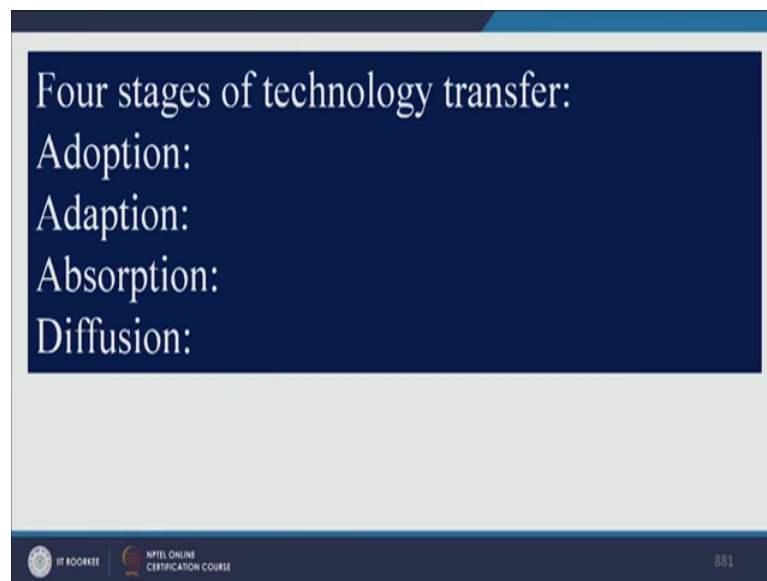
So, these are couple of ways in which technology transfer is possible now many times what happens let us say you are producing a hundred units per hour from a you using a machine and you want to increase your production. So, let us go for the new equipment now when you buy new equipment you will have a better technology in built into that equipment. So, you can get technology or technology transfer can be through equipment and machines also it can be there is something called turnkey projects turnkey projects

are those projects where in you get everything from let us say supplier of the technology you will be you will be getting equipment you will be getting process know how.

In fact, they would erect that machine for you in your plant they will do commissioning they will train your people. In fact, they will go for you know after sale services also. So, this is another way of technology transfer and of course, as joint venture is one of the ways of technology transfer. So, there are several companies in India which are working with foreign companies as a joint venture. So, you can have example of let us say Hero Honda. So, you have got an Indian company and you have got a foreign company. So, technology is coming through Japanese company that is Honda and we have got our own company hero. And you can think of several such examples.

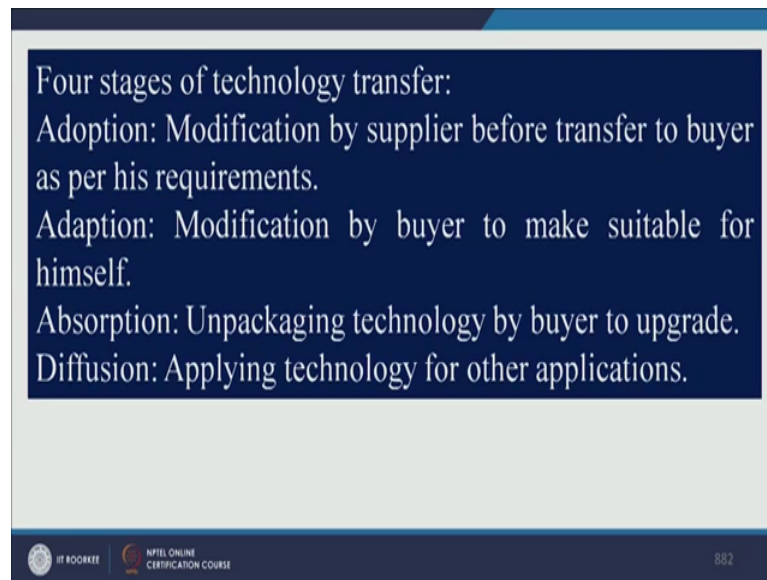
Now, there are different ways in which technology transfer is possible it can be through adoption it can be through adoption absorption or diffusion.

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So, we will see these four stages of technology transfer first of all we will see what is adoption.

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Four stages of technology transfer:

- Adoption: Modification by supplier before transfer to buyer as per his requirements.
- Adaption: Modification by buyer to make suitable for himself.
- Absorption: Unpackaging technology by buyer to upgrade.
- Diffusion: Applying technology for other applications.

882

Adoption is basically let us say if you are going to have a new technology for your plant and you have chosen a supplier. So, supplier will supply you only those technologies for which you have asked for because you have given a set of information to supplier and then accordingly he will modify his technologies and he will give to you right. So, that is nothing but adoption. So, you will not get entire technology from supplier you will get whatever you have demanded or whatever you have asked for. So, adoption there is the second stage is adoption now many times you get technology from supplier, but you being a user modify that technology.

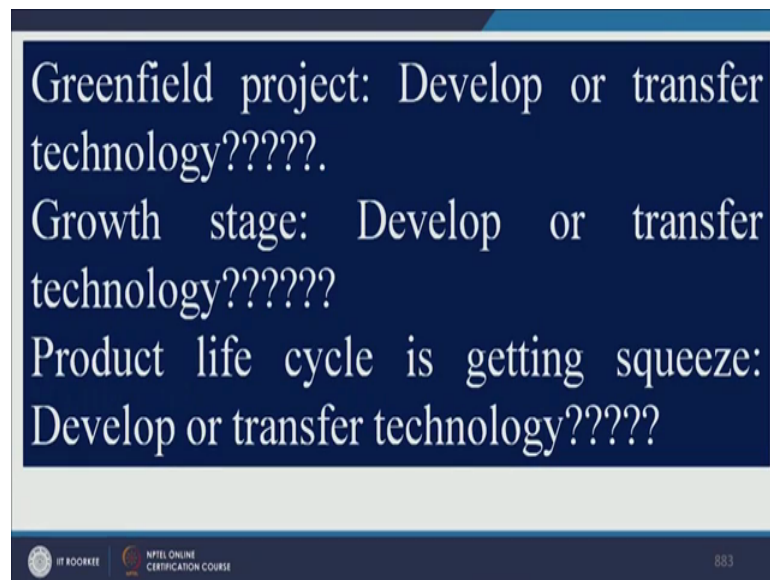
So, that you can you know. So, that it can be it can be used in an efficient manner at your end right. So, you are just modifying technology supplied by supplier the third one is absorption; absorption is basically method where in your unpacking technology by supplied by supplier and you are upgrading. So, you are not just using the technology given by supplier, but you are upgrading it by unpacking technology right and the fourth one is diffusion.

Let us say you have obtained a technology from supplier for let us say purpose if you are using that technology for other purposes also then it is called diffusion. And this is good way good example of using technology, but it again depends on terms and conditions between buyer and seller of technology right. So, let us say if I have got a technology for using for a particular purpose and if this if this supplier is ready to allow me to use it for

some other purposes then I only I can use it right otherwise I cannot them. So, diffusion is nothing, but applications technology for purpose other than for which has you got that technology. So, these are four stages of technology transfer.

Now, when you should as I said there are basically 2 sources of technology either you develop it or you buy it. So, let us say if you are coming up with a new project and it is a green field project. So, what kind of decision you should take you should develop technology or you should have transfer you should transfer technology or you should obtain through transfer what would be your decision in a green field project what is green field project green field project is a project which is a new project.

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It is not kind of expiation project right you are coming up with something; something new. Let us say something new start appripizes. So, what kinds of decision will you take, will you develop technology or the transfer root is better one? So, in cases like green filed project it is good to get technology from supplier right you do not develop isn't it because development of technology takes lots of time and lots of investment also right. So, it is good to get it through technology transfer root right.

Now, let us say if your project is in growth stage or growth phase and you need a technology what you should do should you develop a technology or you should get it through transfer route just think for a while growth stage. Now in growth stage also you should not develop technology you should obtain it from supplier of the technology why

because you need more focus in growth stage right and growth stage is a stage where you should not you should not be wasting time in development of technology right. So, it is good to obtain from supplier now.

Nowadays what is happening most of the products you would have seen that their life cycles are getting squeezed, isn't it. So, for example, let us say mobile phone. So, every 3 months or you know every 2 months you will getting a new mobile phone. So, should we develop new technology are you should get it through transfer root in this situation also you should also go for transfer of technology not for not for development of technology. So, these are couple of examples wherein which in which the transfer root is preferred.

Now, tell me; what are those areas where technology development would be a better choice rather than technology transfer. So, you should develop technology first of all you should have lots of time you have got lots of fund. So, you have got R and D resources you have got research and development sell then you should develop your technology right.

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Many times you can also have the second sources let us say cooperative or R and d. So, rather than one company going for R and D a group of companies can go for development of research and development the third one is contract research. In fact, let us say if your organization does not want to develop technology then it can that work can be given to some educational institution. So, that educational institution will develop

technology for your organization. In fact, what is happening in pharmaceutical industries these days contract research is taking place. So, you just give the contract of R and D to third party. So, these are couple of sources where technology development should be done.

Now, the question is what kind of technology you should use should you always use best of the best technology or should you use always high and technology or should we use low and technology what should be the answer the answer is no it is not necessary that you should be using always high and technology the technology should be appropriate for your product or for your project. So, appropriate technology should be used all the times and we have seen how to evaluate technology there are several factors we have already discussed sum of other factors are let us say whether the technology is utilizing local raw material is it helping to protect ecology ecological balance whether it is harmonious with social and cultural conditions. So, these are just 3 points as far as evolution of technologies concerned, but there are hundreds of points; right before selecting a particular technology.

So, let us look at what is the meaning of technical arrangements technical arrangements is nothing, but the terms and conditions between buyer and seller of technology. So, and again it depends on what kind of technology it is let us say if it is a new technology. So, you will have different terms and conditions between 2 countries isn't it? So, there are there are hundreds of terms and conditions which you should you should be having a between technology buyer and technology seller right let us look at some of the things.

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TECHNICAL ARRANGEMENTS

Satisfactory arrangements must be made to obtain the technical know-how needed for the proposed manufacturing process. When collaboration is sought, *inter alia*, the following aspects of the agreement must be worked out in detail.

- The nature of support to be provided by the collaborators during the designing of the project, selection and procurement of equipment, installation and erection of the plant, operation and maintenance of the plant, and training of project personnel
- Process and performance guarantees in terms of plant capacity, product quality, and consumption of raw materials and utilities.

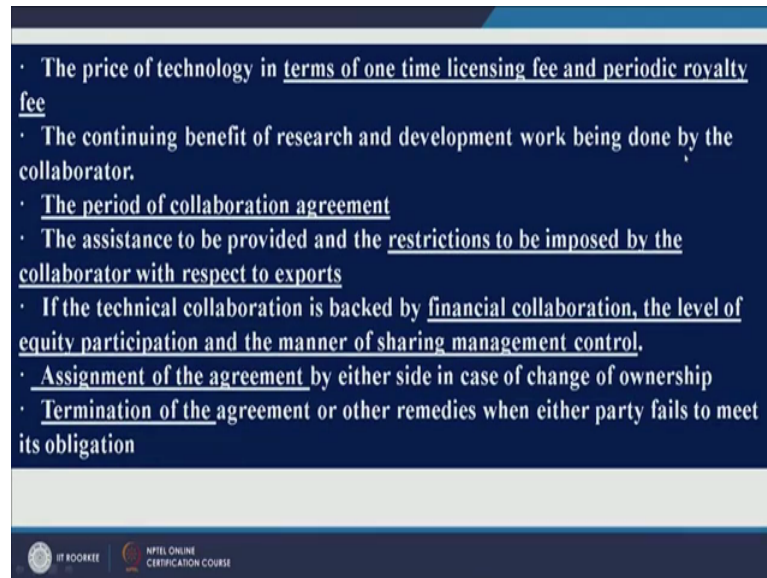
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So, the nature we will go from will go will go from this particular paragraph the nature of support to be provided by collaborator during designing the project. So, is he helping you in designing a new technology is he helping you is he means the supplier of the technology is he helping you in selecting and preparing equipment is he helping you installation direction of those machines and equipment is he ready to give new maintenance support is he ready to give you training support. So, all these things should be looked that whenever you are going for technical arrangements is the supplier of technology ready to give you guarantee in terms of plant capacity product quality and consumption of raw material and utilities.

So, all these things should be there in terms and conditions and not only that it should be there in terms and condition, but what if one of the parties do not agree to terms and condition then what will happen that that is a major problem. So, this that part is to be looked at seriously right otherwise matters will go in court of law or in arbitration right. So, these points should be taken care of what if one party does not fulfill the promises of agreement.

So, the price of technology should be should be there in terms in terms and conditions the continuing benefit research and development work being done by the collaborator.

(Refer Slide Time: 24:05)



Because, whenever some technology is being transferred from one organization to another then the benefits which would be ripped who would share that particular benefit know now the those benefits should be shared weather by the buyer or by seller and buyer both right. So, that point is taken care of what is the period of collaboration its whether it is for 5 years or ten years or whatever it is right.

Now, the assistance to be provided and restrictions to be imposed by the collaborator with respect to exports; so, this is important point let us say I am a buyer of technology and you are seller of technology you have sold my technology and I am using a for some purposes. Now can I sell that technology to third party now that is important issue? So, that point is to be written very carefully in terms and agreement.

If the technical collaboration is begged by financial collaboration the level of equity participation and the method manner of sharing management control; as I said whenever you buy technology from supplier of the technology then who would be getting the benefits and in what percentage sometimes technology supplier also gives you financial assistance when the fellow gives you financial assistant then he would like to have control over management of your organization. So, to what level that management control will be there these points should be discussed and deliberated carefully.

Let us say then termination of agreement or other remedies which when either party phase to meet its application what if something goes wrong between 2 parties then what

will happen how the contract will work if one of the parties do not fulfill the promises of agreements right. So, these points such points should be taken care of.

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Material Inputs and Utilities

An important aspect of technical analysis is concerned with defining the materials and utilities required, specifying their properties in some detail, and setting up their supply programme.

Materials and utilities may be classified into four broad categories:

- Raw materials (Agricultural products, mineral products, livestock or forest products, and marine product)
- Processed industrial materials and components (parts, components, sub-assemblies)
- Auxiliary materials and factory supplies (chemicals, packaging matl, oils, grease, paint, varnishes)
- Utilities (power, water, steam, fuel)

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So, let us look at something called material and input utilities because the technology which you are going to use will affect input material and utilities right are material inputs and utilities affect technology right. So, material and utilities may be classified into four broad categories it is not necessarily four, but broadly you can classify them into four categories. So, you have got raw materials and raw materials can be of 1000 or lakhs of types isn't it.

So, you can classify them let us say agricultural products. So, if you are in food processing industry then agricultural products would be raw materials right mineral products if you are in business of mining. So, mineral products right life stock or forest products. Let us say if you are running a paper mill. So, you are raw material would be forest products right marine products right, again food processing industry right. So, the second types of materials are processed industrial materials and components.

Now, you can have let us say assembly or sub assembly or parts or components or isn't it you can have an a B in a B c classification you can have c class items like nuts bolts washers and so on right. So, they are processed industrial materials and components you can have axillary materials and factory supplies auxiliary materials and factory supplies and you can have again materials like chemicals right packaging materials. So, whatever

let us say if you have got a manufacturing plant then you would be having several packaging materials right and whenever you get assemblies and sub assemblies from vendors then you will get those things in again different packages.

So, you then those assemblies and sub assemblies would be having different packaging materials right. So, it could be wooden or plastic or some aluminum or some other material right voice Greece paints and varnishes these are nothing, but auxiliary materials. And finally, you can have utilities can be water or power or steam or fuel and you can have some other utilities also. So, broadly we can say that materials are of 2 types 3 types right and the fourth one is utility. So, raw material purchased industrial materials auxiliary materials and the fourth one is utilities.

So, these things will play an important role in choosing technology are the technology should shoot these things. So, with this let me summaries what we have done in today's session we have seen technical analysis and how what are different sources of technology how to you know use a particular source of technology in which condition you should use which particular source what are different modes of technological transfer what are different stages of technology transfer and we have also seen material inputs and utilities.

So, in next session we will see some more points which would help you in deciding which kind of technology you should use.

Thank you very much.