Organizational Design Change and Transformation

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Module - 08
Lecture - 37
Technologies and Organizational Structure

Welcome to lecture 2 of week 8. In the previous lecture, we were just introducing the concept of Technology and how technology has a role in terms of you know how organizations to design their organizational structure. In today's lecture we are going to go much deeper from the basic understanding because we have discussed about what are the different technologies being used in an organizational setup.

Today, we are going to discuss how various technologies ranging from mass production technology to you know advanced technology where we are talking about you know innovations are coming up, computer assisted manufacturing technologies are happening. So, we are going to discuss ok what are the various type of technologies been effectively used and how does it going to have an impact on the structural changes in an organization.

And, we are also going to discuss about certain type of the basic principles of organizational structure given with the purview of what type of a technology we use in the organizational structure ok. Let us look at what are the contents we are going to discuss today.

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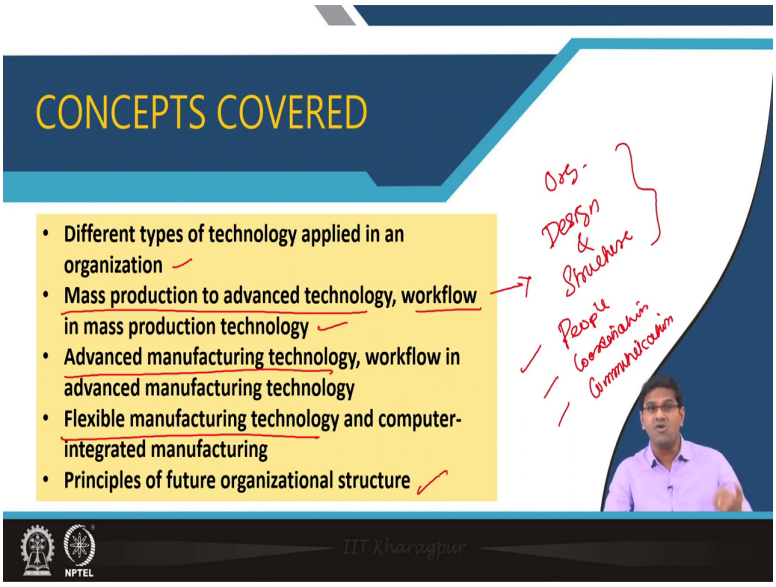

We are going to discuss about what are the different type of technology applied in an organizational setup. So, we will spend some time to understand. Our learners will have various background, somebody who are students and somebody who are already working in an organizations. So, we are going to provide certain insight on how different type of technologies are used in an organizational setup.

So, what we are going to draw is that we will try to you know understand much from a manufacturing and also I will touch upon the knowledge based industry wherein we are talking about IT based organizations, right. Where an IT based organization technology is the major four which the business operates. So, we are going to draw mostly from manufacturing, but also I will discuss the relation and application part of the technological component in the structural component for people who are working in non manufacturing context.

Then we are going to discuss about now mass production to advanced technology. So, what is the workflow in a mass production technology how the workflow happens? Because you need to understand the workflow is generally related to organizational design and structure, right. Because so, this organizational design and structure is very critical when we are talking about a workflow in a mass production because this will say talking about you know people how many people, right and also the coordination required how people have to be connected, who reports to whom and communication pattern.

So, all this is very critical. So, that we are going to understand ok what is a kind of a workflow happens in case of a mass production technology based organizations and we are also discuss about advanced manufacturing technology and we will try to understand, ok. How workflow will be different from mass production technology to advanced manufacturing technology and we will also discuss upon flexible manufacturing technology and computer integrated manufacturing technologies.

And, finally, we are going to discuss about principles of future organizational structure because in the first few weeks you would have discussed learnt about organizational structure and then a principles of organizational structure where we are going to talk about now, the technological disruption is inevitable where companies are you know whether willingly are probably because of the external factors and pressures and demands companies are you know adopting the technology.

So, for the benefit of the customers, internal stakeholders and also for the progress of the company now keeping in their perspective we are going to discuss about what will be the future of organizational structure, what organization has to prepare themselves to you know effectively function in a technology driven industries. Ok.

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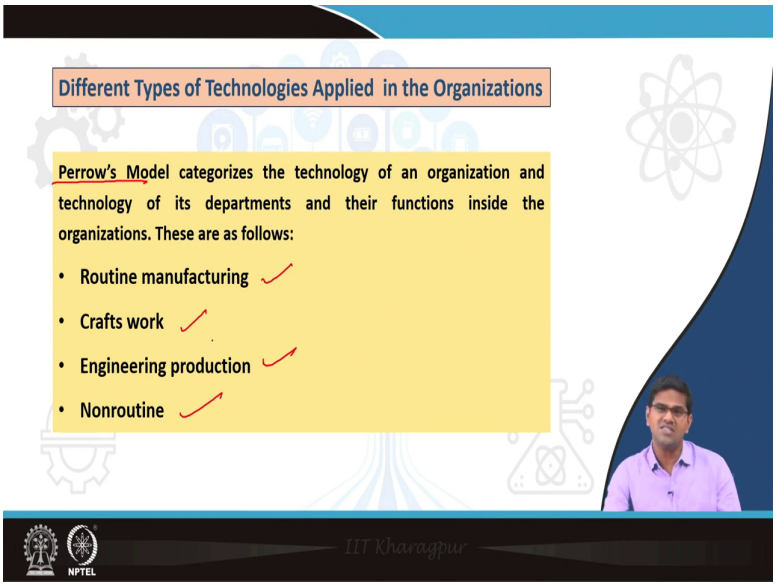

Now, to try to understand what are the different type of technologies we are going to you know learn from a Perrow's model he categorizes the technology of an organization and technology within the departments and their functions inside and inside the organization is trying to classify the technologies in certain categories.

Let us say there are routine manufacturing. So, we will learn about, what is this each of these categories are. So, one is a routine manufacturing, then comes a crafts work, then engineering production, then comes nonroutine manufacturing. So, let us try to understand what is this routine manufacturing is about.

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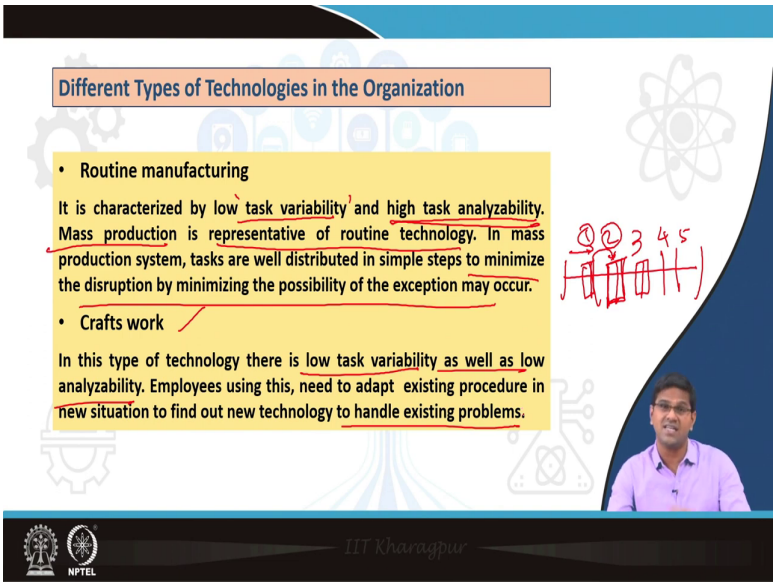

See routine manufacturings are characterized by the low task variability and high task analyzability. Naturally there will be a questions what are we talking about low task variability. The low task variability about you know in a working situations are you going to encounter or you know some exemptions, are you going to experience applying the similar type of work in a new situations or no.

So, in a routine setup it is generally low task variability meaning that the situation going to remain same meaning that let us say you are going to produce one particular product and day in and day out you are going to produce the same product, meaning there is there is less task variability you are going to repeat the same task that is where task variability. So, we are talking about a routine manufacturing.

Then comes high task analyzability where there is some search activities required to you know carry out the task. So, high task analyzability is required because you know you have to you know repeat the same task of the same let us say you know fitting a particular you know a component in a larger product. So, you are going to repeat the same task though this kind of coming a routine manufacturing technology.

And, now if you look at the routine manufacturing where there is a more scope of mass production because in a routine manufacturing we are able to use machineries to you know carry out this repeated activity. So, mass production is a one way of you know representative of a routine technology in mass productions system what generally happens task are well distributed in simple steps and why we are why do they do? To minimize a disruptions by minimizing the possibility of exceptions to occur.

So, because we know that these are routine things and there is a less task variability. So, in a mass production what do they do you try to you know distribute the simple steps to minimize the distributions. So, let us say you know in a shop floor you will find that you know there are set of activities are in sequence right 1, 2, 3, 4, 5 and you see there are small set of activities to be done at this each of these flow, then it moves to the next one.

So, now if you look at you know it is very simply defined and to minimize any possible disruptions because you are not going to have something new to be done in and in place of 1 and similarly, 2 the same activity will be done at you know point number 2. Similarly, the same activity will be done at point number 3 as and goes as on.

So, so now, this is what we are trying to understand ok routine manufacturing essentially talking about you know less task variability and high task analyzability where there is a repetitive of the task being done and where we are talking about application of mass production is possible in a routine manufacturing.

Now, comes cross work, crafts work here this crafts work is in the type of a technology where there is a low task variability, but at the same time low analyzability as well. So, what

happens in this kind of a technology? In this kind of employees using this need to adapt existing procedure in a new situation to find out how new technology how you can handle the new technology for existing problems.

So, here what has an actually happened? So, we are trying to use new technology for the existing problem. So, let us say you know you are doing a same activity, but now you have a new technology, how you are going to apply this new technology to carry out my existing set of activity. Here you are not you know the activities are same, but the technology we are going to use are different. That is where a crafts work is another categorization of a technology.

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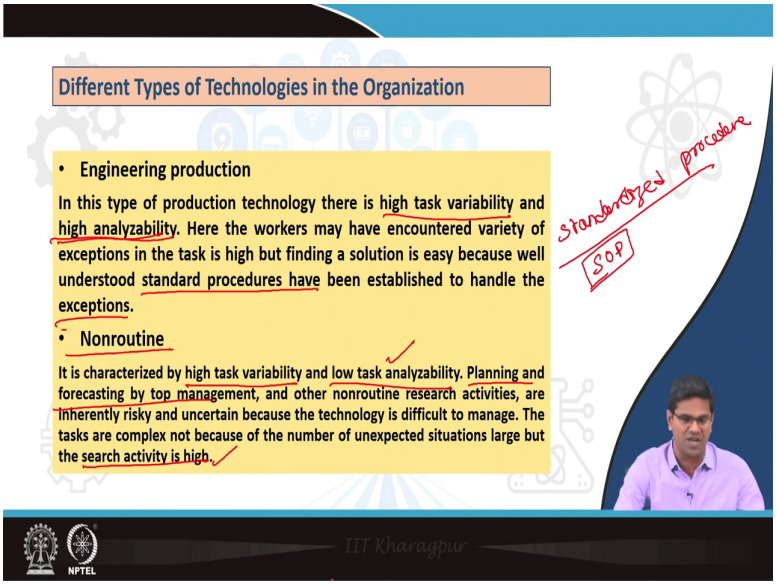

Now, comes a engineering productions in this type of production technology where there is a high task variability meaning that there is a likelihood of you know new situations to emerge

and at the same time high analyzability. So, here what does this employee does? So, employee will encounter variety of exemptions in a task is high.

So, as I was saying you know new situation somebody will encounter, but finding a solution is because it is well understood by the standard procedure because we are talking about high task analyzability. If you look at know this high task analyzability is also common factor in the mass production, mass manufacturing as well.

So, but of course, there are new situations and new exemptions you will find, but it is easy to handle because there are well established standard procedure to handle the you know exceptions. So, where we are talking about there are standardized procedures available. Ok. There is standardized procedure you have.

So, ok if you encounter a new situation there are standardized procedures you try to address that by following this already available standard operating procedures there are SOPs which are available that is called engineering production. Now, comes a non-routine which are one type of a categorization of technology, but it is absolutely different from other technology. How it is different?

Let us look at. There is high task variability meaning that you know there are new situations you are going to keep encountering and also low task analyzability where there is no already established procedure. You know it is going to be a new thing and you do not have existing way of handling things and there is no procedure available.

So, here planning and forecasting by top management and for example, the example is in a planning and forecasting by top management other non-routine research activities are inherently risky because an uncertain because technology is difficult to manage. Here the tasks are complex not because of the expected unexpected situations are large, but search activity is also high.

Because when a search activity is referred to talking about task analyzable. You know so, here the task analyzability where search activity is also required more because in a

non-routine activities where you do not know you are encountering a new situation and you do not know the pre-established procedure to handle it.

So, here becomes a highly complex situations and the uncertainties are high and you do not know how what is it going to happen, what are the things that are going to be harmful. These are the large level classification of a type of technology.

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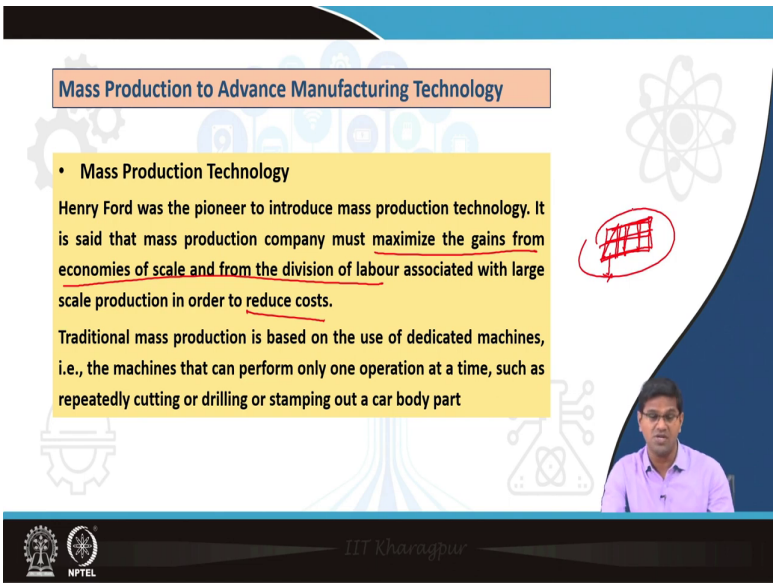

Now, what we are going to understand is that ok let us try to understand you know mass production technology because we are talking about there are lot of categorizations and now we are going deep into it now ok, what does this mass production technology is about and how this workflow in mass production technology generally takes place in an organizational setup.

Now, let us try to understand the mass production technology. See the mass production technology Henry Ford was the pioneer of this mass production technology. So, he introduced this mass production technology. So, it is said that mass production company actually what they are why they are going for a mass production? Because to maximize the gain from economies of scale and the division of labour with a large production to reduce costs.

Why do they go for mass production? Because you know that no you will be able to produce large quantity of the product and you know the division of labour meaning that I am dividing a task into multiple tasks. Let us say this is a task I am dividing into multiple tasks you know each task are you know divided a set of a specific task and these are a repetitive task to produce the final product. Let us say consider this as the final product and you are dividing multiple tasks.

So, now a division of labour because why we are trying to do because we want to reduce the cost and makes the maximize your gains by doing this going for a you know mass productions and also you know reduced cost, ok. The traditional mass production is generally based on you know dedicated machines the machine that can perform only one operation at a time and you know repeatedly doing the same operations.

So, typically people who have visited are who are already working in manufacturing or having a certain understanding about manufacturing technologies, manufacturing organizations you might be knowing that yeah you know manufacturing the shop floors if you look at the shop floors are designing such a way that there are machines were used.

And each machine will be carrying out a same set of activities and one specific activity has being done and the one you know shop the one point in a time in a shop floor. So, now this is a mass production technology is about. This is how the mass production happens.

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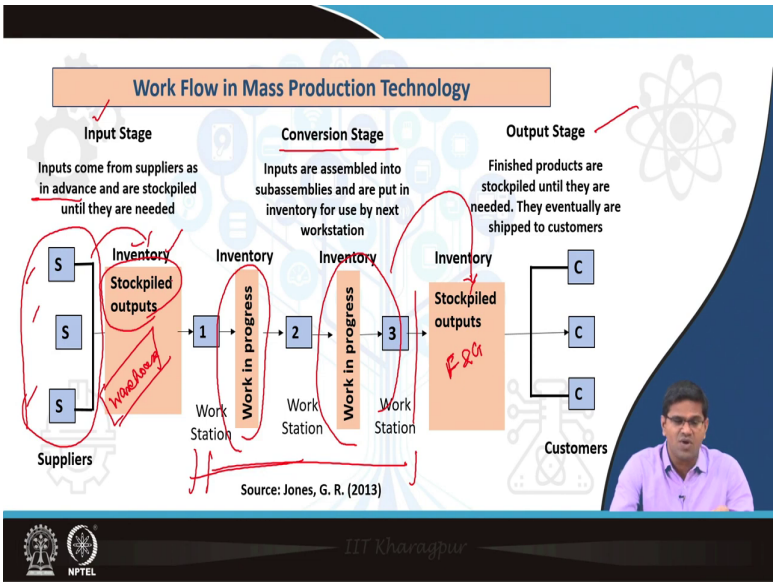

Now, let us try to understand how the workflow in mass production technology happens. In any production you will generally have this there is an input component, there comes the conversion then there is a output stage. Ok. So, the input is the material constant and the conversion is where whatever the product you create on a service you just create out of the inputs, then there is an output means and end products are ready.

And it has to be reached out to the consumer or a customer who are going to consume that particular product or a service. Now, let us look at this you know what is the workflow happens in a mass production technology. Here if you look at in a mass production technology S all stands for different supplies all suppliers you need lot of raw materials to produce a particular product.

Now, what do they do is that, so, the input comes from suppliers in advance. So, well in advance the raw materials will reach and if you look at stockpiled here in a inventory, now where we are talking about a warehouse. Let us say warehouse where you find that all the raw materials are well in advance are stored and piled stock piled in a inventory system.

Now, what happens here from to a you know workstation now the conversion stage what happens inputs are assembled in a sub assembly the first set is a sub assemblies where, input materials are sub assemblies there, then put into the inventory then it moves to the next stage of ok. The next workstations where the work the conversion stage is happening all these are a conversion phase ok.

Now, this is a conversion phase where the materials raw materials are taken to a you know conversion stage where the input materials are given that has been given into the production flow then it goes through each of the conversion phase. Now, you are producing a product. Now, what happens?

The produced product goes here and stockpiled as an output where it is called a finished goods F and G; let us say F and G stands for finished goods. So, now you have finished goods which are again you are keeping an inventory let us say I produced a product and I am keeping as an inventory. Now, this again on this finished products are shipped I eventually as and when the customer demands are coming.

So, now if you look at a mass production technologies, the estimate certain you know quantity of you know product is likely to sell and this is will be the demand from my general market based on that what do they do? Well in advance we produce this. So, they produce and keep it as an inventory and as there is a demand or an order being placed this are been dispatched. This is the workflow happens in a mass production technology ok.

So, if you look at know similar is the case where you know supplies also give lot of the raw materials because organization is not just you know preparing the or you know produce some product as and when the requirement comes where there is a well in advance they stockpiled

this you know raw materials, they produce the product and they also keep it in the finished goods inventory so, when the time they wanted to dispatch the material.

This is how the workflow in a mass production technology happens. Now, we are going to go to the next type of a technology to understand ok.

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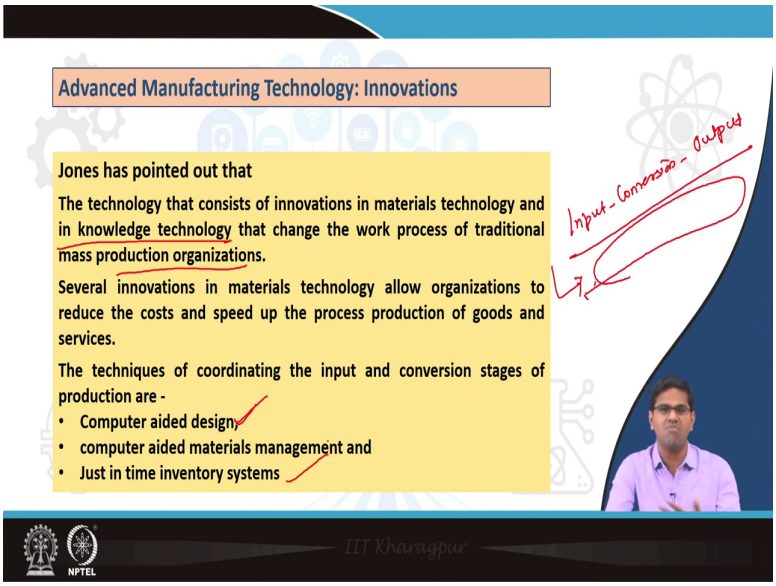

We are going to talk about advanced manufacturing technology which is here at essentially we are talking about innovations. So, this technology consists of innovations in material technology and in knowledge technology. So, whatever this advancement know we are talking about this innovations happens in materials technology all also in a knowledge technology.

Because when you talk about knowledge technology we are talking about you know IT organizations, where essentially it is a knowledge industry it is a knowledge based industry it is not producing a product rather it produces a service so, right. So, where that changes the work process of traditional mass production organizations. So, as and when you see there is an innovations in material technologies that is going to alter the work process how work has been carried out.

Now, we just saw the workflow in mass production technology, right. This is going to be you know altered as you see there is innovations in a material management technology is happening and as well as in a knowledge industries are also that there is going to be a absolutely a change in the workflow is going to happen.

Now, several innovations in you know material technology allow organization to save money right through to you know maximize profit I can you know go for you know large number of you know gains and also I can also reduce cost. So, this any innovations in a material technology it is going to reduce cost and of course obviously, it is going to you know accelerate the pace at which I am going to produce goods and services.

Because the innovations are obviously, going to help me to cut down the cost at the same time can I scale up my operations and I can I make a rapidly I can produce. So, so where you know speeding up of my production and goods and services so, any innovations obviously, going to impact in these ways.

Now, this technologies of coordinating input and conversion stage of the productions are computer aided. Now, when we are talking about advanced manufacturing technologies so, what generally happens? As we said input conversion and output are going to be the same in what other technology is used, but how it has been done is going to be you know the question when we are talking about how when the technology is being you know innovations are coming up?

This is going to alter the way in which this process the whole input conversion output process is going to happen. We are to going to talk about what are the different technologies were involved in this you know process of input conversions and output stage where, we are talking about know computer aided design, computer aided materials management and just in time inventory system. So, we will discuss in detail as we you know learn about it. Ok.

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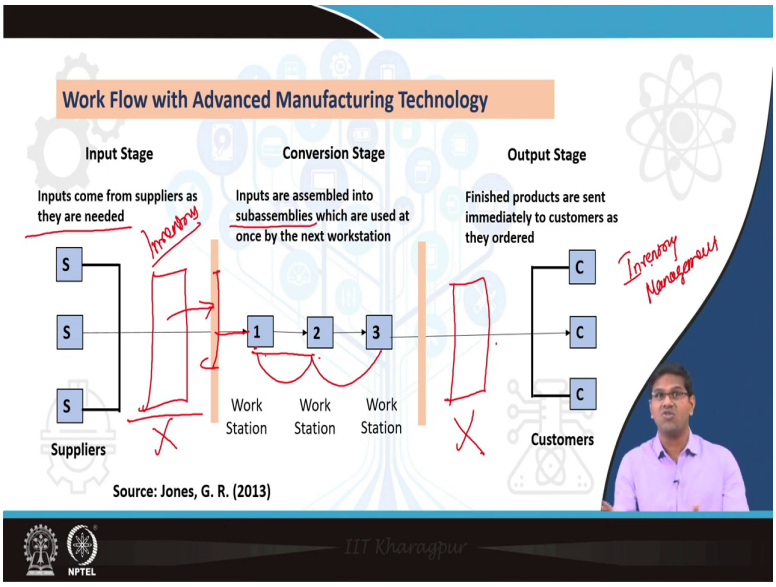

Now, let us you know look at the workflow with the advanced manufacturing technologies. So, now if you look at the previously where we talked about you know the mass production technology where they were actually stockpiling up the inventory. Now, if you look at here in this you know advanced manufacturing technologies. So, input comes from suppliers as they are needed.

Now, if you look at the difference you would have seen there was a stockpile up an inventory from the previous mass production technology. Now, you see it is not here. So, because the technology is the advance where I will be able to know use the technology to place an order quickly and then able to get these you know raw materials immediately as and when I require.

So, you know what I am doing in terms of I am reducing cost I am saving in a field called reducing cost. So, I am reducing cost in terms of you know stocking this raw materials that is also cost and also I have to house those raw materials. So, I am also you know incurring cost on the fixed cost I need an infrastructure I need people to manage those inventory. So, all that cost I am saving because of this technological you know developments and happening how I am using the technologies in my production process.

So, in now look at here in this process what generally happens? This raw materials are directly comes from supplies to this you know assembly units where there are inputs are assembled in sub-assemblies where, which are used once by the next function, it goes you know it. So, the materials comes here it is all assembled here and goes to the production process and it goes to as a flow, as one finishes the that product goes to the next level and finally, you have a finished product.

Now, this finished products are already ready. If you look at again this inventory and stock piling is not here, so, another type of a saving reducing the cost is happening and either you know immediately dispatched to the customer as they are ordered. Now, if you look at you know we are talking about know inventory systems are improving ok.

Inventory management where the technology has been effectively used to ensure the companies are able to reduce cost and speed up the process and you know effectively utilizing the technology. This is the work flow in a advanced manufacturing technologies and against the mass production technology.

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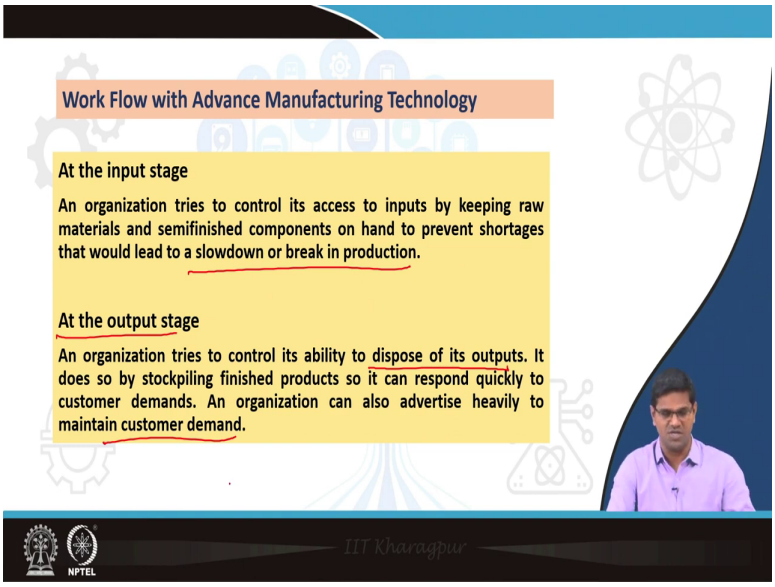

Ok. Now, what happens at the inputs stage? So, here organization tries to control it is access to inputs by keeping raw materials and semi-finished components on hand to prevent any shortages that would lead to slowdown or breakdown in productions. So, here see because you know there will naturally a question, right. So, what will happen in case there is a delay or raw materials have been you know not been you know delivered at the time, then how do I run the production process.

So, for that you know organization always try to control so, how keeping certain raw materials and semi-finished components are ready. So, that there is no slowdown or a breakdown in the production process. Now, at the output stage so, organization also tries to control its ability to dispose of its outputs. When I say dispose meaning that you know we are trying to show deliver or supply the you know produced product to the end consumers.

So, it does so, by stockpiling finished product. So, it can respond quickly to customer demands. So, organization can also have advertise heavily to maintain customer demand. So, they do you know lot of investment and advertisement, so that you know they will be able to you know increase the demand and then they will able to you know not unnecessarily spend money on keeping an inventory, as and when the product is ready I am just you know ok moving into the customer side.

That is why organization are looking at an input stage and then output stage to ensure other input stage I am I should ensure my production process is not halted or not slow it down because of the you know inefficient or insufficient raw materials. But, in the output I do not incur cost by just by piling up inventory of finished products rather I try to create more demand in the markets, so that my products as I produce I am just you know transferring or moving to the end consumers as I am trying to dispose of my all my produced goods to the consumers. Ok.

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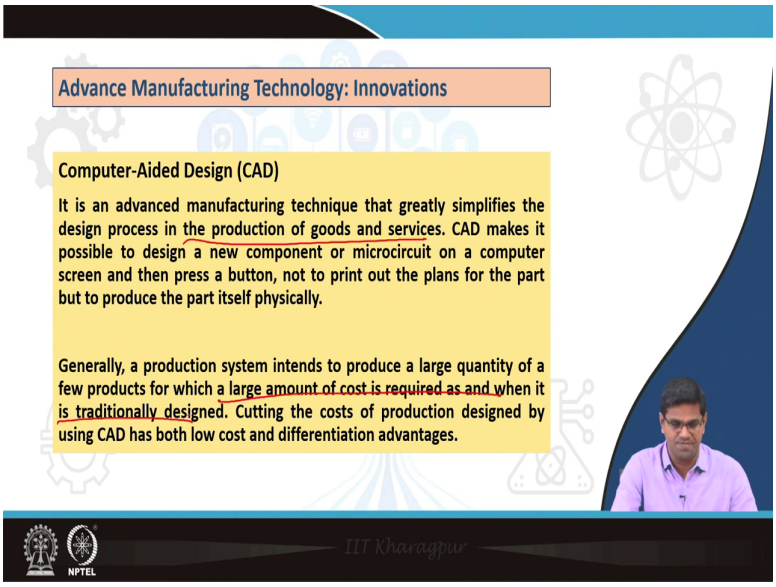

Now, we are also trying to look at you know Computer-Aided Design. So, what this computer aided design talks about? So, it is an advanced manufacturing techniques that simplifies the design process in a production of a goods and services. So, generally, you know this CAD it is not only about you know designing the product it is also not only about going to give you the what is the plan itself it is also trying to make you produce a similar product. Ok.

So, the production system intends to produce a large quantity of free products for which a large amount of cost is required as and when it is traditional design. Now in this CAD design where the cutting cost of production designed by the CAD which has both low cost and the differentiation advantages as well.

So, the CAD becomes you know computer aided design is being very helpful in terms of you know coming up with the new component, new designing of the product or goods. So, I am

able to quickly produce you know design it and also able to use this design to produce me product. It is not only about you know keeping a design assets ready and it also helps me in producing this particular new component or a new you know goods which I am trying to produce ok.

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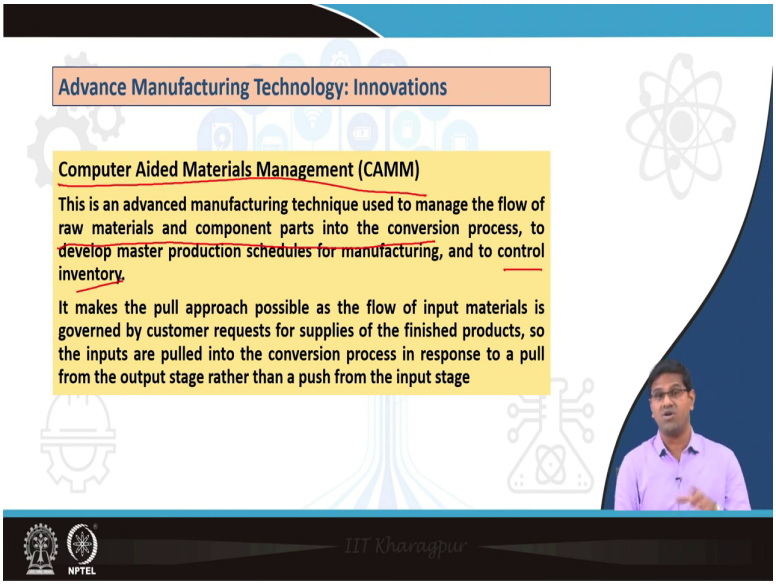

Now, we are also going to talk about a CAD now comes a computer aided materials management because this is also very important because when we say materials management where you are talking about you know raw materials you know supplies or inventory management where you know this advanced manufacturing techniques used to manage the flow of raw materials and component products for this conversion process because to develop you know master production schedules for manufacturing to control inventory.

So, now if you look at this computer aided materials management is actually helping in order to ensure that how I am going to you know place my order for raw material requirement and also to ensure that you know component parts are ready for the conversion process to produce my final goods where this actually helps in how do I schedule my manufacturing right, because this will tell you ok.

So, these are the ways in which we are going to manage how sooner we are going to get this raw materials it will also help you to schedule your manufacturing well planned and you are also able to know reduce cost and then control the inventory because you know now the holding of inventory is really a cost.

Because the market are so volatile, the prices are fluctuating and holding this inventory itself big expense for me and of course, you know I need an infrastructure as well to hold large quantity of inventory as against the traditional organization they used to stockpile large quantity of inventory.

Now, with a advanced you know a materials management system as and when there are automated system you know organization are coming up you know using those technologies, as and when my you know key raw materials are going down it automatically places in order to the suppliers and suppliers are ready to dispatch this required raw material to the you know producer on a manufacturer, ok.

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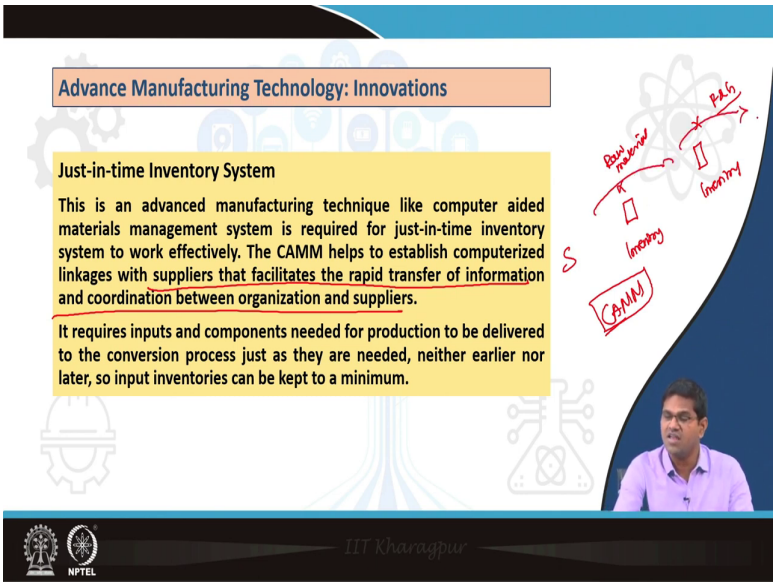

Now, we are trying to talk about this just in time inventory system. So, what is this just in time inventory system? This is an advanced manufacturing technique like you know computer aided materials management. So, it is required just in time inventory system to work effectively. Now, this computer aided material management helps to established computerized linkage with suppliers that facilitate a rapid transfer of information and coordination between organization and supplier.

So, what are we talking about? Just now I was explaining, right. So, let us say in a manufacturing I am trying to say that ok just in time I do not want to have this inventory, ok. So, inventory in both phases inventory at the input also at the output. I do not want to have inventory for raw materials.

So, ok similar is the case, I do not want for a finished goods. So, what do they do? You know now this computer you know aided materials management is actually you know facilitate between the supplier and then organizations it places an immediate as and when there is a requirement it places in order to the supplier and then supplier you know delivers the raw material then it has been produced and it goes through the conversion phase and it is immediately you know delivered.

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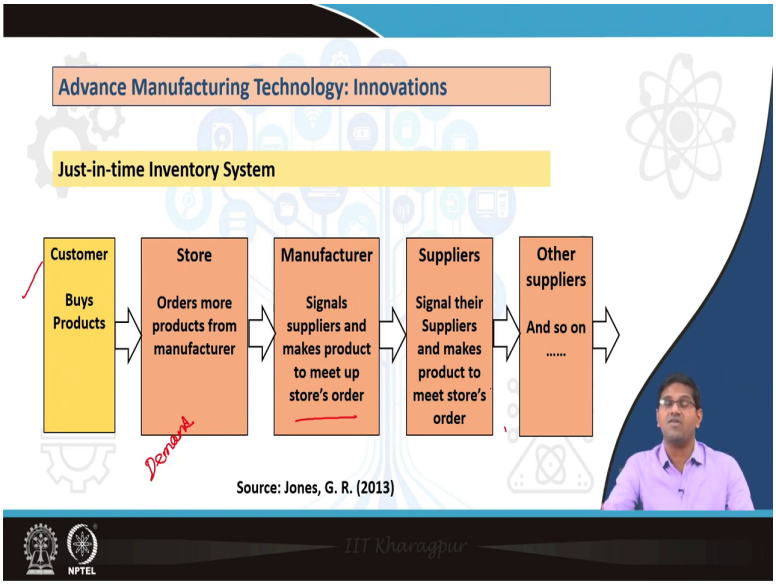

Now, we will look at this a flow. So, so that you will be able to understand how this you know inventory system works you know it is other way round you know it comes from a customer. So, as a customer buys the product. Now, what do they do? Stores order more from the manufacturer because it goes back right.

So, when a customer buys I try to understand the demand, right. The store will understand the demand ok the demand ok how many products are been sold based on that what do they do? Ok, the store will order a products from the manufacturer. So, this signals the suppliers and makes the product to meet up the stores order, ok.

So, because the supplier signals the suppliers and it goes on right because you say the suppliers the you know customer buys it goes to a store, store places in order to manufacturer, manufacturer places in order to the supplier, supplier sends the raw materials and there may be a supplies might have a sub suppliers then the sequence goes on.

So, now this is how the just in time inventory system works wherein it is basically depends on the demand of a you know consumer that drives how these supplies has to be managed how the manufacturing how what is the manufacturing to be what is the quantity to be produced accordingly the order for raw materials are placed ok.

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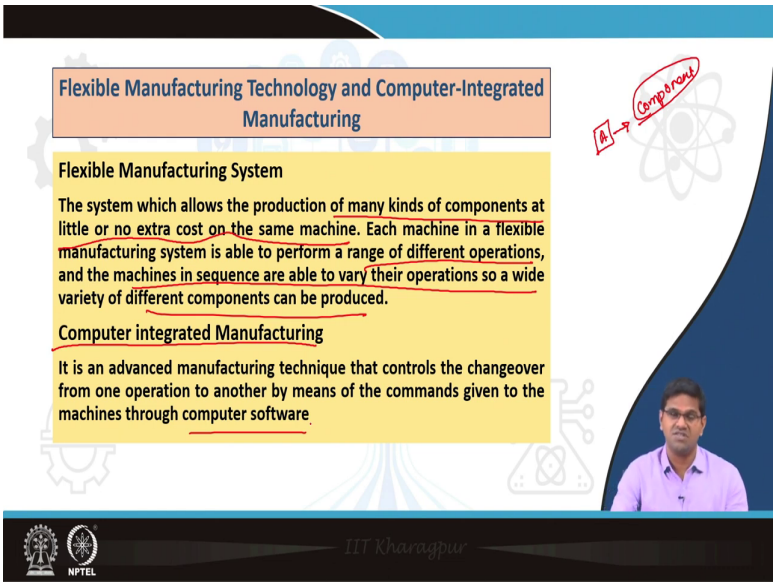

Now, let us look at so far we discussed about mass production technology and we also looked at you know advanced manufacturing technology wherein we specifically talked about you know how this CAMM you know Computer Aided Materials Management just in time inventory and we also talked about how computer aided design also helps.

Now, we are looking at flexible manufacturing system. What is this flexible manufacturing system? This system generally allows the production of many kinds of component at a little or no extra cost on the same machine. If you look at go back to the mass production technology wherein we are talking about each machine.

Let us say this is a machine number A it is only produce one particular component, right. So, now it does not produce any other component and it cannot be you cannot customized whereas, in a flexible manufacturing system where you will be able to produce various

components at a very less cost or even at the no cost from the same machine that becomes a flexible manufacturing system.

So, you know each machine is flexible in a manufacturing system is able to perform range of different operations and machines in sequence are able to vary their operations to a wide variety of different components can be produced. Now, here I am trying to create a flexible manufacturing system because I might be able to produce at different type of components, I may be able to produce a different type of a products.

Now, if you look at some decades ago where you see that no there are organizations which only produce you know they say we will only produce at this size of the product, we cannot go for a smaller size product because our machines only can there you know handle only size that only this size of the product.

Now, if you look at this flexible manufacturing system gives me more you know flexibility or more avenue for my business you know my system, my machines are flexible enough to produce various different kinds of a product irrespective of now we are not restricting to only this type of a products or a components will be produced.

So, the flexible manufacturing allows you to produce various kind of components at a lesser cost or even at the no cost because it increases more you know availability for your business. Now, computer integrated manufacturing. So, it is an advanced manufacturing technique that actually controls the changeover from one operation to another by means of a commands given to machines through a computer software.

You just through you know computer technologies are with an assistance of a computer you are able to you know manage the manufacturing activities itself. So, that is why we are talking about you know computer integrated manufacturing ok.

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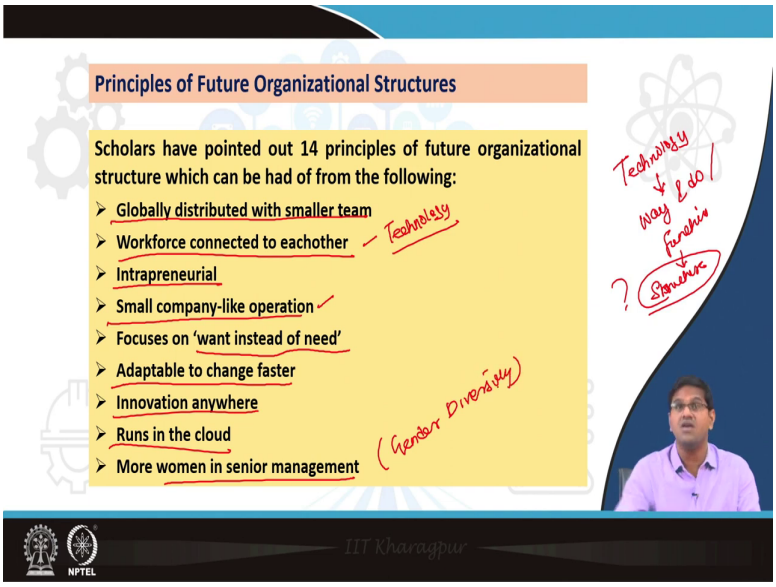

Now, so far we discussed about different type of technology you know mass production technology, we understood how the workflow happens and we also understood the how the workflow happens in an advanced manufacturing technology, then we also looked at the process flow or in a just in time inventory.

Now, if you looking at it is very evident that things are changing and it is evolving. So, technology becomes a disruption. So, once the technology is become a disrupter, so, my organization also have to observe and respond effectively through my design part and a structural component because let us say my technology is changing or evolving. When I say technology is changing the way I do business the way I do or the way I function is changing.

So, when the moment you are the way you do business, the way you conduct an activity is changing invariably it has to alter your structure and the way you function the design

component. So, this comes a question of ok what is the future organizational structure? So, the scholars have pointed out 14 principles of future organizations.

So, what are these certain principle for a future organizational structure? Now, first is a globally distributed with a smaller teams. So, you should be globally distributed with a smaller teams because now you are virtually connected. Workforce are connected to each other.

Now, you see workforce are connected to each other because now you say a technology is being used effectively to connect people from various my workers my employees from every other places because I have a platforms, I have an internet over the internet, over the you know technology, I am able to connect with my each other workers.

Then it should be intrapreneurial where each of the work stations and unit has to be an entrepreneurial opportunity where they have to have all different functions within the organizational setup and you should keep your operational small company-like operations.

Why do we talk about a small company like operations? The decision is made quicker and everybody knows everything and it is already flatter and then they are very quick in responding. So, every organization has to operate like a small company-like operations and, focuses on want instead of need.

What do you want instead of focusing on a need of a consumers and adaptable to change faster because the disruptions are very faster probably because of the technological disruptions or very recently we have encountered COVID where organizations are seen a huge transformations are the way business are functioning. So, you need to be adapting so faster and quickly.

Then innovations anywhere you should keep innovating then runs in a cloud. Now, you see everything based on a cloud you do not run to physical infrastructure, you do not you can go for a cloud, bind the cloud space you know keep everything happens through a cloud. Now, the more women in senior management more diversity we are talking about gender diversity.

So, promoting gender diversity is also one way to you know responding to the you know changing world.

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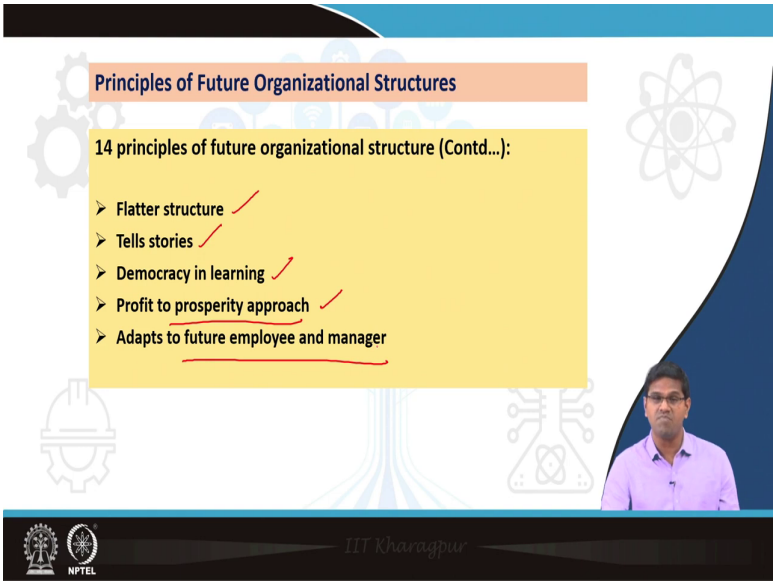

And, you know flatter structure do not have a very tall structure it requires you know higher level of hierarchical structure, bureaucratic structure. It do not allow you to or a function so quickly. Go for a flatter structure tell stories you know transform people, then democracy in learning try to keep the learning democracy that is also one way of the future organization should look at.

And, profit to prosperity approach – do not only look at the profit you look at the prosperity approach and adapt to a future employee and manager. You need to as an organization you adapt to what are the demand in the requirements of my future in my employee and manager.

These are the 14 principles the new you know are the future organizational structure demands work ok.

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So, with this we are concluding this lecture in today's lecture very interestingly we looked at various type of technology and you know we you know and try to understand mass production technology, work flow in mass production technology and we also discussed about how the workflow happens in advanced manufacturing technology.

And, obviously, we also discussed about you know just in time inventory system and how this technologies having an impact on structure and what are the you know principles that has to be followed in the future of organizational structure. So, we are going to discuss more on the you know technology and then the complexities of technologies in an organizational design

and how it is going to impact or change the you know structure of organization in the subsequent lectures.

Thank you. See you in the next lecture.