Operations Management
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Lecture - 26
Production Planning and Control

[FL] friends. Welcome to session 26 in our course on Operations Management and today is a new day and we are starting our discussion for week 6. As you are well aware that we have divided the course into different weeks and the weekly discussion focus on a particular aspect of operations management. As we are well aware that it is a 12 week course and in every week our focus is on a specific area related to operations management.

If you remember in our previous 5 weeks we have covered the first week completely dedicated to the basic aspects of operations management, scope function objectives of operations management. Week 2, was focused on product design and development, week 3 on sales forecasting, week 4 on plant location, week 5 on plant layout and week 6 we are starting our discussion on production planning and control.

So, you can imagine that different weeks we are focusing on a very very broad topic, product design and development as I have already discussed can be covered in maybe one semester where we can have 40 lectures related to product design and development. Similarly, this production planning and control is also a very we can say exhaustive topic. Usually it is covered in the UG and the PG level and one complete course three credit or four credit course is dedicated for discussing topics related to production planning and control. And somewhere in some colleges, universities, institutes it is covered as a core course for mechanical engineering students. So, it will be difficult for us to cover all aspects of production planning and control, but certainly we would like to understand some basic tools which will help us to solve this problem of production planning as well as control.

So, basically if we go by the topic production planning and control you can see that there are majorly 3 words in this topic production, planning and control. So, let us treat these three words independently first and then we will combine the meaning of these three

words together or we will try to understand that what we are going to study what are the basic objectives of production planning and control.

So, first word is production in which we convert the raw material using any conversion process which can be a chemical physical or a mechanical process into a final product. For example, the chair on which we sit has a raw material it can be a wood or a metallic raw material then we there is a conversion process which can be may be cutting welding in case of metals or in case of wood it can be turning off wood or cutting off wood and then may be joints of wood can be made and then finally, we get our and or tangible product that is a chair. So, basically there is a raw material then there is a conversion process and finally, there is a product. So, that is basically the definition of production wherein we convert the raw materials using any conversion process into the final product.

The second is planning. So, planning word refers to decision making getting ourselves prepared for any future event that basically is a literal meaning of planning that I understand that we have to get ourselves prepared or we have to prepare ourselves our resources our manpower our machines for the impending manufacturing or production that we want to carry out. So, planning is usually done based on the demand in the market. And we have already covered one topic which is related to sales forecasting. So, once we have forecasted the demand we can do the planning activity accordingly. So, planning is basically a decision making process in which we prepare ourselves for the future events.

The third thing is the control now in production we know the process planning we have already done based on the demand and then we have to finally, exercise a control. That whatever we have planned whether the things or the activities or the jobs are being performed as per the plan or not, if we are digressing from the path that we have planned then there has to be certain control, if we are overproducing we have to slow down, if we are under producing maybe suppose 500 products are required in a week and we are producing only 300. So, what we need to do? We need to pull up our socks, we need to rush, we need to expedite the production so that we are able to meet the monthly target of suppose 200, sorry 2000 products. So, 500 products per week multiplied by 4 weeks in a month, so approximately 2000 we have to prepare.

So, if we are lacking in week 1, we have 3 more weeks to speed up and expedite and achieve our monthly target. So, that matching up of the planned progress and the actual progress is what we call as the control. So, the progress cannot be always in terms of number of products it can be in different aspects. We can exercise control over time also that whatever by that time suppose a particular activity must have been completed. For example, suppose we are making a house or constructing a house. So, we have planned that in 6 months this must be the progress that is the planning activity once we control we will see what is the actual progress in the 6 months if we are lacking behind we will try to expedite the construction activity. So, that we are able to make the house in a year or 9 months that we have planned.

So, I think I have been able to put across my thoughts related to production planning and control. Now, from operations management point of view our production already we know that from raw material to the end product we have to convert it using different processes that is production, planning, already all of you know control also you know from operations management point of view our focus will be to make optimal utilization of time resources, resources can be in terms of materials, in terms of manpower as well as the plant facilities as well as the different inputs that go into the operations. We have to optimally utilize these inputs in order to meet our target, our target in case of operations management is to achieve the desired quantity of material in desired quality at appropriate time and at appropriate or competitive cost.

So, these four words I have been using again and again quality, quantity, time and cost. So, our planning that will help us to achieve these four objectives that is high quality, adequate number of quantity, low price or maybe competitive cost as well as the right time. So, these 4 targets if we have to achieve we have to plan the things properly. Because sometimes we see let us take a lively example, or example related to our lives we go to a tailor and suppose we have given our clothes for stitching and he has given us one time that you that clothes will be delivered on 31st of August 2017. We go to him, he gives us the clothes, nicely stitched, we will be very happy with that tailor.

On the contrary if we go to another tailor who delays we can say delivery of our stitched clothes we will not be that happy with that tailor. So, there are two maybe production houses, with one we are very happy, with other one we are not happy as a customer we

want to be delivered or we want to be serviced in the time that has been contracted between us and the vendor.

Now, the problem is at the back end. Ex-vendor may have got maybe number of orders, but he has planned his manufacturing or in this case stitching in such a way that all orders are delivered on time. On the other hand the planning activity is not that well planned or we can say well managed and therefore, he is maybe delaying or sometimes there are other issues related to that. So, the planning will always help an organization to grow to get more customers and to get a brand value for itself. So, many times people say that planning is something which is related to common sense. So, there is no scientific tools which can help us in planning, but I as a maybe teacher of operations management or as a mechanical engineer I feel that if we make use of the tools that are available with us for the planning activity we are certainly going to be better than an organization which is not at all adopting the production planning and control.

So, with this introduction which is slightly longer than usually I give, but today is the starting point of the week that is going to focus on production planning and control. So, therefore, I have given a slightly longer introduction so that the basic concept of production planning and control is clear to all of you. So, we will cover different tools and techniques that are used for production planning and control, but in today's class our focus will be to understand that what are the functions and objectives of production planning and control. As well as we will see that what type of planning activity is done in any organization or what are the levels of planning that we are going to see in today's session. So, quickly let us see the definition of production planning and control.

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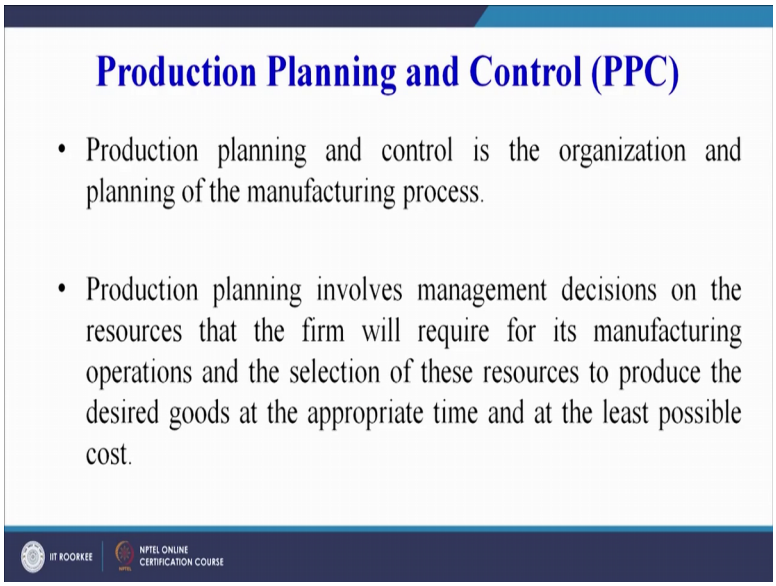

So, production planning and control is the organization and planning of the manufacturing process. So, as I have already told we have a word production in production planning and control. So, PPC usually is focused on the management aspects of our manufacturing activity.

Production planning involves management decisions on resources that the firm will require, for its manufacturing operations and the selection of these resources to produce the desired goods at the appropriate time and at the least possible cost. Already I have highlighted in the introduction these words that it is the judicious utilization of the resources in order to meet the desired quality standards in order to meet the quantity levels desired as well as to focus on the cost and the time aspects also.

So, basically all the 4 major objectives of operations management have to be considered when we are understanding or trying to do our production planning and control activity. So, the similar objectives are there for PPC also.

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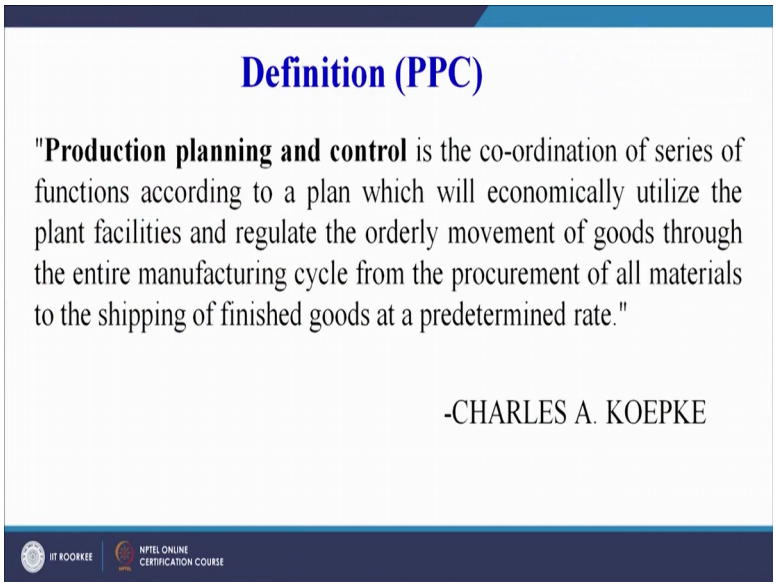

As per Charles A Koepke - Production planning and control is the co-ordination of series of functions according to a plan which will economically utilize the plant facilities and regulate the orderly movement of goods through the entire manufacturing cycle from the procurement of raw materials to the shipping of finished goods at a predetermined rate.

So, here again as per the definition we can see that it the production planning and control the major focus is the management of the operations starting from the procurement of the raw material to the dispatch of the finished product. So, we have to see that how the product will move in the organization, what will be the sequence of operations that will be followed and what how the materials will be procured, how the materials will be managed. So, all that we can say will fall under the broad umbrella of production planning and control.

Now, what are the objectives of PPC? So, maybe many objectives I have already explained one or two which may have been left in the discussion by now will be covered here. So, objectives of PPC include to determine the requirements of man material and equipment.

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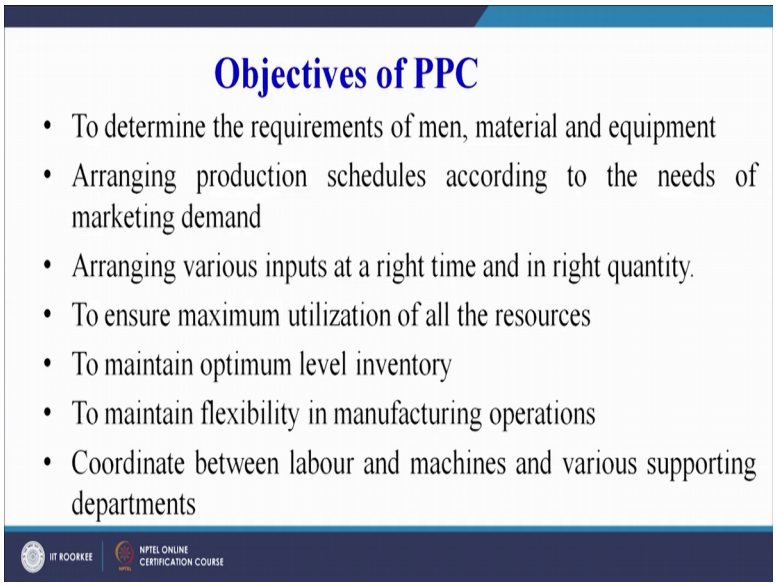

As I have already told based on the customers demand we have to do the planning activity. So, we will see that; what is the requirement of machines, what is the requirement of men, what is the requirement of materials, so all that decisions will be taken during the production planning and control activity. Arranging production schedules according to the needs of the market or the marketing demand.

So, there will be some demand. So, we have to do the back calculation. For example, the company has entered into a contract agreement with a customer that we will be able to supply x amount of products by 31st of December. So, 31st December now is the deadline and today we have entered into agreement. So, we will see that how many months are available with us, how we have to work out a schedule so that we are able to produce finish the production of the products by maybe 27th or 26th or maybe 25th of December.

So, we have to arrange the production schedule that also comes under the production planning activity only. Arranging various inputs at right time and in right quantity to ensure maximum utilization of all the resources, to maintain optimum level of inventory which is related to materials management, to maintain flexibility in manufacturing operations, coordinate between labor and machines and various supporting departments. So, overall, if you see the major objective is the best or maybe the most optimal planning of our resources in order to meet the customers demand. So, the focus area of production

planning and control is right from the procurement of the materials to the shipping or shipment of the final product. So, the complete management of the operations within maybe the premises of the organization or within the shop floor falls under the production planning and control.

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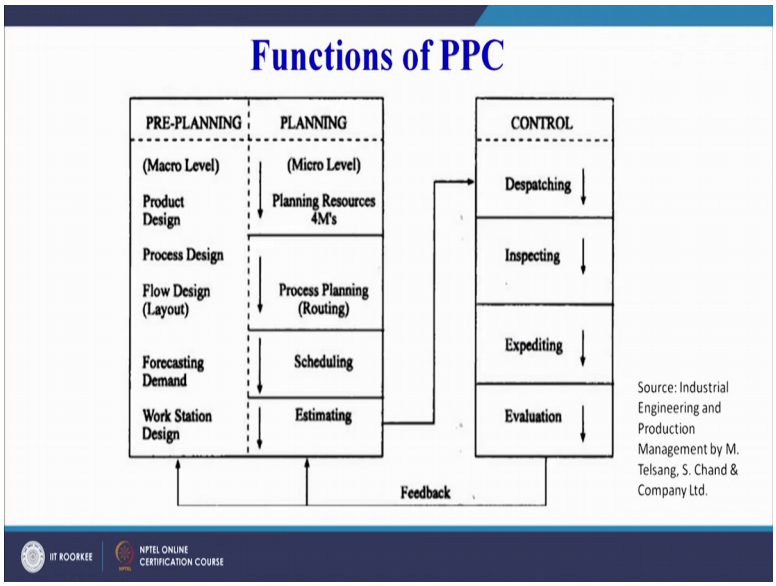

Now, functions of PPC is a very good diagram taken from a book by M Telsang. You can see there are a few pre planning activities which we have some of them we have already covered on your screen you can see product design. So, we have already covered one week discussion on product design then there is forecasting of demand that also we have already covered. Workstation design is something which is not maybe being covered in this course on operations management then process design we will be covering the process planning part, flow design also the layout part already we have covered in the last week.

So, pre planning activities already we have covered we have covered product design and development, we have covered sales forecasting, we have covered layout. So, we have covered maybe the work system design, we are not currently covering in this course. So, you have to do first pre planning which also falls under the PPC and then the planning activity. So, planning activity means planning for the 4 m's. So, m's basically can be man material, machine and money. So, you have planning the different resources then we

have to plan the routing that is the process planning in our next session our focus will be on process planning, that is may be the routing.

For example a product requires 6 different operations. So, we have to identify the route that how the product will flow and accordingly we have to see that what is the layout that we have planned. In the previous week you if you remember we have seen the various flow lines we can have a s flow line or a u flow line or a straight line [FL]. Depending upon the flow diagrams or flow lines we can see the process planning, we have to plan the route that is the sequence of operations for a particular product. Scheduling is related to time we have to schedule that at what time which machine will be working on which particular product. Similarly we have to estimate also, in estimating our focus will be to see how many people will be required how many machines will be required. So, all this is related to the planning activity.

Now, planning you can see if you see the pre planning and planning part if we have already covered certain things here. So, here currently what we have not covered is the planning of resources that is man material and 4 m's man material may be machine and the money. Then the process planning part we have not covered we will be covering in this week scheduling is related to time planning of the time and planning of time is very very important, scheduling is very very important because the end date is already fixed as per the contract agreement with the customer. So, we have to meet the time deadlines or the time domain or timescale. So, therefore, we have to plan or we have to schedule our activities, accordingly schedule our various jobs that are required to complete the product accordingly.

Similarly, we have to estimate based on the time schedule. Once we know the route that what is the sequence of operations, next is we know now each operation how much time it will take that will be covered under scheduling we have to schedule our operations. Finally, we have to estimate that in order to meet the deadlines how many such machines will be required do we need to put additional manpower, in order to meet the target so that estimation will be done based on the time calculations. So, once we are ready. So, the pre planning and planning part has made us ready for taking the production or for undertaking the production we know that we have done the product design, we have done the forecasting, we know the sequence of operations, we know the time required for each operation, we have estimated the number of manpower required or number of men

required to complete the operation. So, our time is fixed man is fixed machine is fixed. So, all our planning activity is now complete.

Then the basically control part comes into picture and the control is related to dispatching. So, all the plans in terms of maybe the route sheets or route cards and with all the details will be dispatched, they will be sent to the production department and finally, there will be inspection that is basically to match the actual progress with the planned progress and suppose we are lacking we need to expedite our work. So, that we are able to meet the time line.

And finally, we will evaluate once we have maybe submitted the product or the consignment to the customer we will try to evaluate that why do we need to expedite, what were the problems in the overall chain, where were the problems, how those problems can be tackled. So, that in the next production cycle we do not face the similar problem. So, there will be evaluation at the end of expediting. And finally, whatever problems are located in the evaluation stage feedback will be given to pre planning and the planning functions of production planning and control.

So, I think this diagram is very very important from the point of view of maybe putting the different beads that we are covering into the single thread and making a[FL] out of it. So, basically we have seen that all topics are interrelated, we have already covered product design, we have already covered forecasting. So, once all this is known to us we have already seen plant location and plant layout.

So, we know that what we want to produce, how much we want to produce, where it will be produced the layout has already been finalized. So, you know the factory has already been laid out and now you have to plan for the next stage that is man material machines and then you have to do the how the process will be designed, then you have to see how many number of people will be working on that, then you have to do the control that when the actual production is taking place how you are doing. Whether you are able to match up to the planned progress or you are lacking behind. If you are lacking behind you need to expedite, and if you need to expedite you need to evaluate that what are the problems with the planned progress or what are the problem, what is the problem with the planning activity and where do we need to plug the holes so that the expediting function need not be called for during our production process.

So, this is an important diagram and I believe that all learners must focus on this diagram and try to understand the various functions of production planning and control. So, where we can see I think everything I have already explained this is just for you. So, the planning is focused on materials, machines equipment methods, process planning, estimating, loading and scheduling and control is focused on dispatching expediting inspection, evaluating and inventory control, inventory control is again related to the control of the materials.

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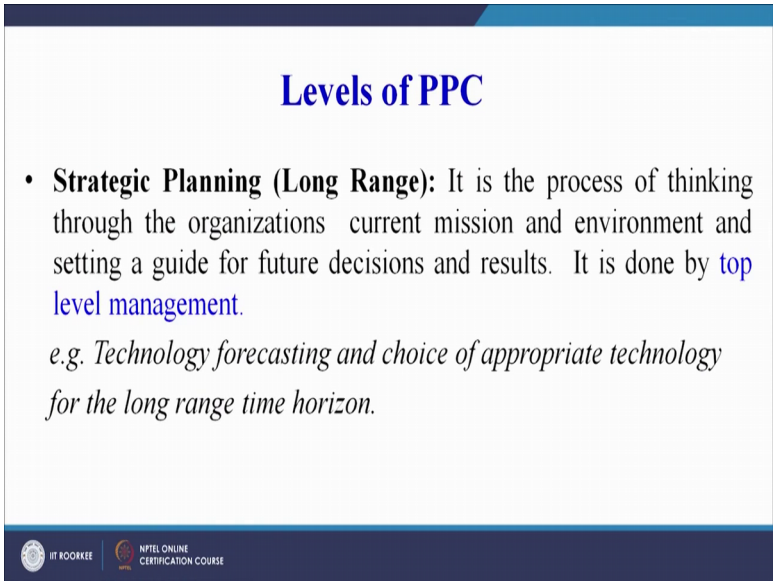

Now, coming on to the levels of production planning and control. Now, we know that we have to manage our operations at the shop floor starting from the procurement of the raw material to the final delivery of the finished product. So, there are different levels of planning. So, the topmost level of planning is the strategic planning which is also called the long range planning.

So, it is the process of thinking through the organizations current mission and environment and setting a guide for future decisions and results it is done by the top level management. So, strategic planning will focus on the long term maybe future of the organization it is not going to focus on day to day routine or the maybe operational level of planning, it will do the strategic planning that is a long range planning. So, they may be focusing on the what is going to be the new technology in the next 5 years or they will

like to see that which other product segments the company must focus on in the next maybe 5 to 10 years time.

So, the top level planning will be related to the procurement of some new technology or some new machines or the shift in the focus area of the organization. So, therefore, it is a long range planning it is not an immediate planning that today we have decided to change a machine and tomorrow will change the machine, it will focus on the development of technology which will help the organization to improve its productivity efficiency and effectiveness and it will focus on a long time horizon.

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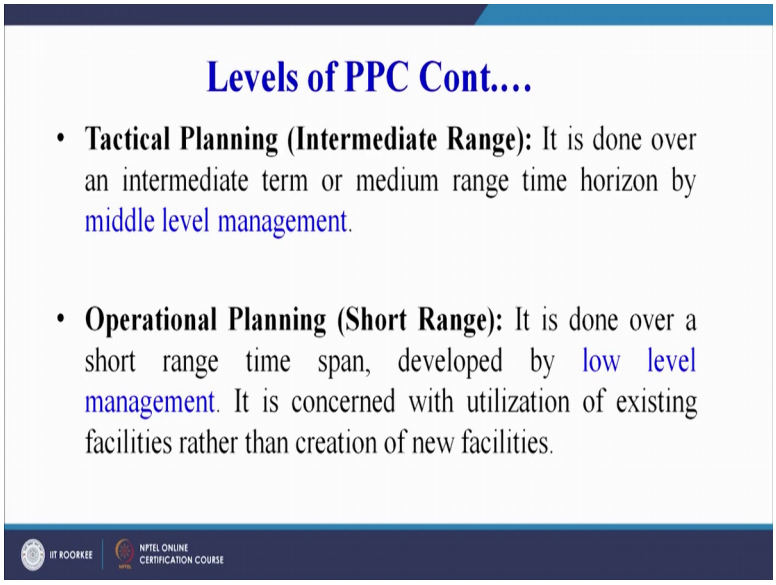

Second level of planning will be the tactical planning, and the tactical planning is the intermediate range planning. So, it is done over an intermediate term or medium range time horizon for middle level management.

Maybe there are other terms also used for tactical planning, some people call it as the corporate level planning also. So, the top level planning is the strategic planning which is a long term planning then you have a tactical planning which is a corporate level planning which is done for an intermediate period of time. Sometimes we call the mid middle range or medium range planning as the aggregate production planning, APP also, and we will discuss aggregate production planning in our maybe discussion during this week only.

So, the our focus then will be on 1 year or a 2 year basis and we will try to utilize our resources or our manufacturing resources in the best manner in the most optimal manner so that we are able to get more and more profit for our organization. So, we will see that what is the overall demand and then how to meet that demand in the best possible manner so that the overall profit of the organization increases. So, the middle level planning or the intermediate range planning that is for a year or 2 we will focus on the maybe the most optimal utilization of the resources. So, it will basically be executing the decisions which have already been taken by the top levels. The top level has taken a decision all other may be detailed or the detailing of those decisions will be done at the tactical or the corporate level.

And at the last level or the lowest level of planning is the operational planning or it is a short range planning. It is done over a short range time span it is developed by the low level management, it is concerned with utilization of existing facilities rather than creation of new facilities. Now, creation of new facilities will be taken care at the top level management only or at the strategic level. So, whatever are the existing facilities the lowest level of planning or the operational planning will focus on maybe 3 months to 6 months time and the focus will be to meet the targets that have been already fixed by the forecasting team or the marketing team of an organization. So, there will be the more action packed may be planning activity where you have to take maybe day to day decisions you have to adjust your schedules, you have to estimate the maybe manpower and the machine requirement on a weekly basis or a monthly basis to meet a quarterly target or a month or a 6 monthly target. So, the short level planning or the operational planning is the maybe lowest level of planning activity.

So, our production planning and control decision, making activity, may involve long range decisions, intermediate range decisions and low level decisions. But maybe I must say that all level of decision making is equally important from the point of view of the success of an organization and different people will be involved making decisions at different levels of the organization.

So, with this I think we conclude the today's session, and I think the session was very brief and we have been able to address two important points today that is the what are the functions of production planning and control, and what are the different levels of planning activity in production planning and control domain. And in next session or

maybe in this week our focus will be on certain tools and techniques that will help us that will equip us with the knowledge to solve the problems that may arise during the production planning or sorry during the manufacturing activity in our organization.

So, with this I end the today's session.

Thank you.