

Operations Management
Dr. Inderdeep Singh
Department of Mechanical & Industrial Engineering
Indian Institute of Technology, Roorkee

Lecture – 03
Operations Management: Functions and Scope

[FL] Friends, welcome to session 3 in our course on Operations Management. We are currently in week one of our discussion in the course and we have 12 weeks of discussion in which every week we will have half an hour 5 sessions or 5 sessions of half an hour each.

So, total the course will be for 30 hour duration divided into 12 weeks, each week divided into 5 sessions of half an hour each. As I have explained in the introductory part also and the last session also emphasized on this point, within first week our focus is to understand the basic aspects of operations management. And we are trying to figure out that what is the importance of this course for engineers? And in the last class if you remember we have seen that what are the objectives?

So, to summarise what are the objectives? The objectives are that we must be able to convert our resources that is; raw materials into the final product effectively and efficiently; that means, we must be able to produce the right quality of the product in right quantity at required time and with acceptable cost.

So, there are four parameters that we can say are the major objective that we need to meet. That is we must be able to produce the product of the best quality that is available. Then the quantity required, we must know that what is the quantity required? What is the demand in the market? And accordingly we must be able to produce that quantity. Then the time when the demand is there we must have that product in the market; it may so, happen that we may have to face the loss of sales because there is demand, but the product is not available.

So, we have to ensure that the product is available at the right time when the customer has a requirement of that product or he needs that product or he wants that product; the product should be available. And then the cost justification is also very very important that if the product is of the reasonable cost; the customer will definitely buy it that is the

value of that product to the customer must be worth the money he is spending or she is spending; then only he will try or he will love to buy that product.

So, basically the main objective of the course on operations management is to ensure quality, to ensure quantity, to ensure timely delivery of the product as well as the cost effectiveness of the product; so, these are the overall objective. So, what operations management usually do is it converts the raw materials or the resources that can be men, material, machine, money, equipment, infrastructure; into a final product; now the product can be a tangible product or it can be a service.

How it converts? That is a transformation as we have seen in the previous session and we have to manage this whole system in order to meet our objective; objectives I have already highlighted right quality, right quantity, right time and at right cost. So, we have to run this system in such a way that all these four important points are met. It may so, happen that we are using our resources most efficiently and effectively, but the cost of our product is very high.

So, we are not maybe entirely meeting the objectives of operations management means; we are not managing the things properly why? Because the cost is exorbitantly high and as per competition our product is not doing that well; so, we have to figure out that how to objectively meet all these four requirements of quality, quantity, time and costs so, that the customer is more than willing to buy our product.

So, those were the major objectives of operations management that, how to manage our operations in order to meet these requirements or objectives? That was what we have covered in the previous session, the summary of what we have covered. Now our focus in today's session is that what are the functions and scope of operations management.

Now, functions is that what is expected what are the deliverables, but we expect or what are the things that operations management must exercise it is control over. So, that we are able to meet our objectives what must the operations management team do in order to meet the objectives.

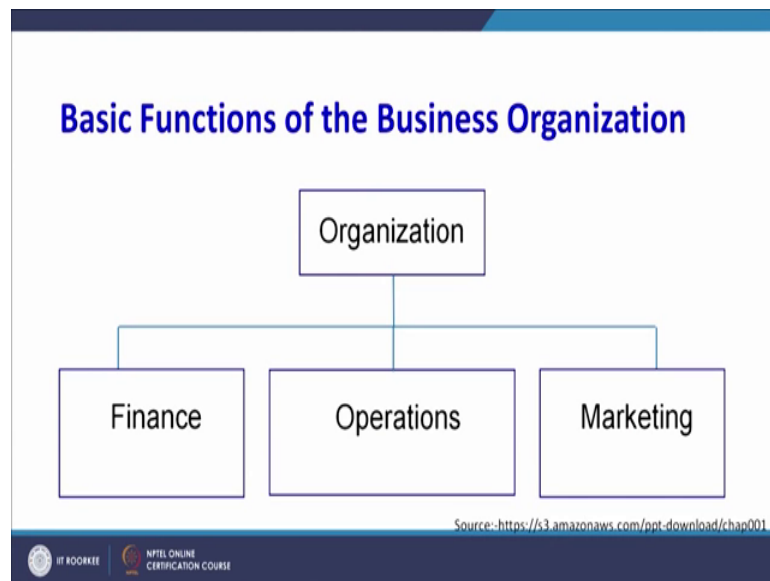
So, in the overall hierarchy or in the overall organisation of the complete operations how where do the operations fit in or how do the operations manage or how do the operations are managed in the whole process of the organisational structure that we will try to

understand today, that what are the major functions and we will see that what is the scope, where all operations management team has a role to play and how they are able to manage or what are the specific areas where the team or the operations team must focus in order to deliver the objectives or in order to meet the objectives.

So, we will see today that what are the functions and where are the focus area or what is the scope of operations of the operations management team or the scope of functioning of the operations management team, we will try to see that there are 5 p's where of operations team must focus in order to meet the objective.

So, let us start our discussion for today the title for today's course is operations management, focus area is functions and scope.

(Refer Slide Time: 06:55)



Now this diagram we have seen in the previous session also if you remember there was organisational chart in which on the top of the organisation there was the CEO. And then there were Vice Presidents 3 Vice President, Vice President Finance, Vice President of Operations and Vice President of Marketing.

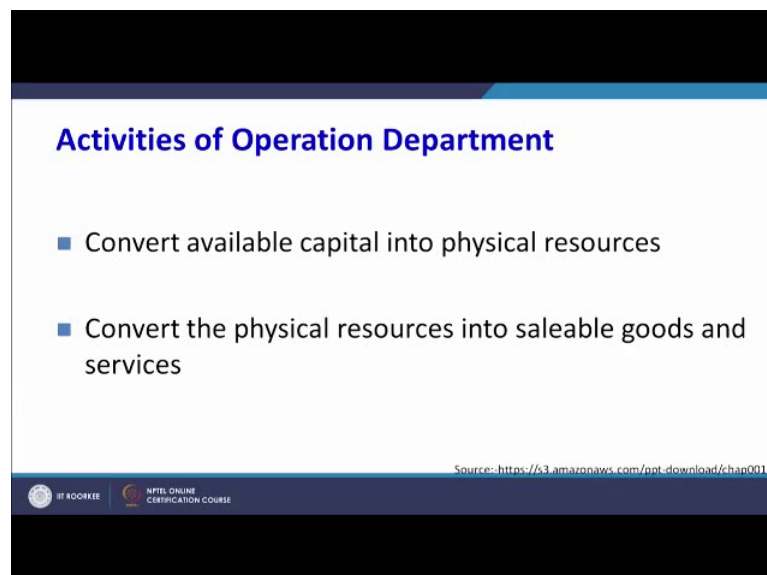
So, there I have explained that our focus area in this course is the operations. So, we have seen that what the vice president of operations is expected to do. So, we have seen that he is responsible he is accountable for ensuring that, whatever raw materials are being purchased or whatever raw materials are coming into the factory your coming into

the organisations are converted, into the products or services in the most effective and the cost efficient manner optimal utilisation of resources we can also say that whatever resources are at his disposal.

Now, resources can be in terms of man power resources is can be in terms of the premises or the factory resources can be in terms of the infrastructure resources can be in terms of machines, resources can be number of other, resources maybe outsourcing resources. So, whatever are the resources available with the operations team they have to ensure that those resources are optimally utilised that best possible uses of those and resources is ensured. So, the operations team has to focus on converting the raw material into the products or the services.

So, in our course also in the overall organisational hierarchy for the overall organisational structure of any company our focus would be on managing the operation. So, although if you cannot independently maybe managed we have to see or collaborate or coordinate or corporate with marketing and finance department also, but the major focus would be on managing the operations. So, the course is designed in contest of operations and their management.

(Refer Slide Time: 09:28)



Activities of Operation Department

- Convert available capital into physical resources
- Convert the physical resources into saleable goods and services

Source: <https://s3.amazonaws.com/pot-download/chan001>

IIT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

Now, activities of operations department they convert the available capital into physical resources convert the physical resources into saleable goods and services. So, that is what is expected in the last session we have seen one diagram where a production system

was shown that you have a transformation stage in which your raw materials are converted into the products or the services activities of operation department.

(Refer Slide Time: 09:58)

Activities of Operation Department

Additional activities required to fulfill the previous activities

- Production of goods at the right time and sufficient quantity to meet the demand
- Production of goods at minimum cost
- Production of goods of acceptable quality

Source: <https://s3.amazonaws.com/not-download/chap001>

IT ROORKEE | NPTEL ONLINE CERTIFICATION COURSE

So, we need to understand that what the operation department do in order to understand that where is the scope of operations management, that what all they must control, what all they must focus on in order to meet the objectives that we have covered in the previous session.

So, the additional activities required to fulfil the previous activities now previous activities were very generic in nature very general in nature that you have to convert the raw materials into the final product so very general things, but the additional how to do that. So, we have to ensure that production of goods at the right time and sufficient quantity to meet the demand.

So, that is what operations department has to ensure that right time goods are available goods are produced and at right quality also production of goods at minimum cost also I have highlighted in the discussion production of goods of acceptable quality. So, all these 4 points are again coming in to picture that operations department operations management has to ensure that we are producing the product of right quality, in right quantity, of right cost and at right time. So, these 4 things I think all of us must remember as learners of this course that 4 keywords are very very important and these keywords are quality, quantity, time and cost Q Q T C.

So, we may remember it as Q Q T C or whatever you can your frame your own method of remembering these four words, because any question related to why you are studying operations management or why do you study operation management, you all will be able to answer if you remember this 4 keywords that we have to ensure the products of right quality in right quantity within the price limit or at right cost and it right time.

So, if you remember this four words you will be very easily able to answer the basic fundamental questions related to the subject of operations management and all this has to be ensured by the operations management department and therefore, this lies under the functions of operations management.

Now, what are the functions of operations management or operations personal forecasting the demand for the products definitely we are going to cover this in our course all of you know and we have discussed it also in the session one or the first session of this course that what all we are going to cover in this course. So, one thing that we are definitely going to cover is the forecasting the demand for the products we will see that what are the qualitative methods are forecasting, what are the quantitative methods of forecasting, within qualitative estimate survey method Delphi method will in quantitative we main focus on simple average moving average weighted moving average exponential smoothing time series model for forecasting we will see what all we can cover.

But one of the important functions of operations management is to forecast the demand and this demand is definitely going to help us in the decision making process when we have to decide, what we have to decide, as an engineer we leave apart the production manager, as an engineer what I need to decide I need to decide that based on the demand, how I should procure the raw material, how I must plane my production that is time at what time what should be done, who are the people, who are responsible for making the product, how many people I should higher if the demand is less, who are the people who I can do away with.

So, basically once I know the demand it will help us or help me in making number of decisions related to managing my operation. So, one of the major functions of operations management is to forecast the demand then arranging for the procurement of required factors of productions. So, as I have already told once you know that this is going to be

my demand it will back calculation can be done that when I should procure the material what materials I should procure. So, all that can be done and is additional function of operations management.

(Refer Slide Time: 14:44)

Function of Operation personnel

- Forecasting the demand for the products
- Arranging for the procurement of required factors of production
- Arranging for the services such as maintenance, store keeping material handling, inspection and quality control etc.

Source: <https://s3.amazonaws.com/not-download/chap001>

IT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

Then arranging for the services such as maintenance store keeping, material handling, inspection and quality control; all these are functions of operations management. We have to ensure that we have check the quality also because one of the objective of operations management is to ensure the right quality of the product that we are producing. So, we have to check that is a function of the operations management that you have to check the quality, you have to plan for the production, we have to see that schedules are met.

So, when you have to compare the planned progress with the actual progress; definitely you are exercising control. So, control basically is what in hostels or in houses where we stay definitely there are some control procedures in hostel maybe the students may not be allowed to go out after 11 o'clock. So, that is the control on their; you can say freedom or we it is a control on their, we can say free will to roam around wherever they feel like.

So, whenever the system feels that the things are not going as per plan a control is exercised you check you check the things that for example, I have taken the similar example in the previous session also for example, that we have to produce 100 components in 100 days.

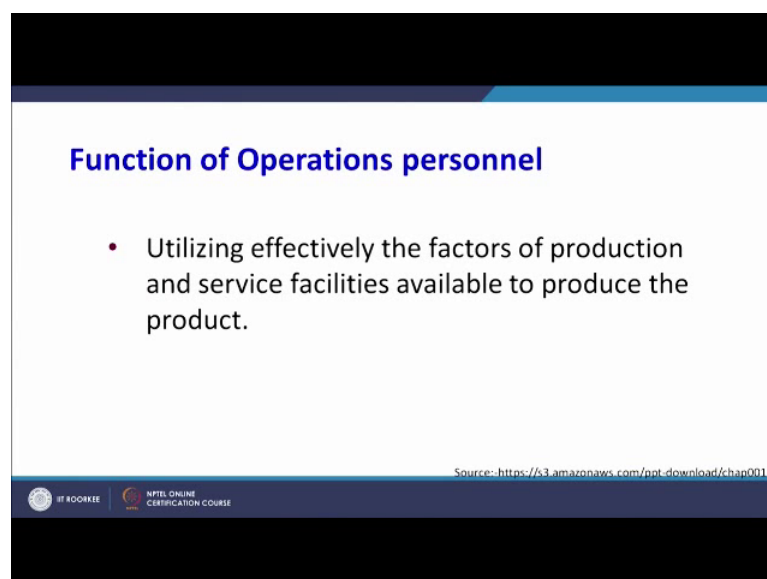
So, maybe 1 component per day, but after 50 days suppose we have produced only 25 components 100 components; 100 days 1 component per day after 50 days we find out that we have only produce 25 component, what does that mean? Our planning has not been successful, our plan was to produce 1 component per day, but we have produced only 25 in 50 days, it means we are lacking.

So, when we check this that we are lacking we have to exercise this is the process of exercising the control and then what we need to do? We know that in the remaining 50 days we have to produce 75 component; then we will speed up, we will rush up, we will expedite so that we are able to match up the overall target of 100 components in 100 days. So, that is basically the process of exercise in the control.

So, in the operations management we have to do the planning, we have to do the control, we have to do the evaluation and. So, that our overall objectives are met that at the end of the day or on the delivery date; we have a product of the right quality, right quantity time already I have told on the delivery date and the cost is also reasonable or competitive.

So, we have to see that we arrange the services such as maintenance store keeping material handling inspection and quality control in order to meet the objective. So, these are the functions of operations management or the personal involved in operations management.

(Refer Slide Time: 17:44)



Function of Operations personnel

- Utilizing effectively the factors of production and service facilities available to produce the product.

Source: <https://s3.amazonaws.com/nptl-download/chap001>

IIT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

Now, utilising effectively the factors of production and service facilities available to produce the product, now here you can see in any manufacturing facility you will have different types of infrastructural facilities available; you may have different types of machines available.

Let us take two examples an example of a maybe we can say automotive manufacturing manufacturing of cars you have a assembly line that is an example of a facility. So, you have assembly line and from one end you start assembling the car and on the other end or at the end of the assembly line you get your completely assembled car number of stages are there number of processes are happening in the assembly line.

Now, as a major function of operations management we have to manage the overall facility that is the overall assembly line effectively and efficiently we must be able to meet our target if the target is maybe one car per minute overall. So, we must be able to meet that target we have to run our assembly line or we have to ensure it is our functions that we have to ensure the assembly line of rates with that speed that, we are able to produce one car per minute or per 10 minutes that depends on the efficiency of the assembly line, but the point is whatever is the target we have to run the system effectively and efficiently to meet that target. So, we have to take into account each individual process eat each individual operation in the overall assembly line to ensure the target to ensure that we meet the target.

Similarly, let us take an example of power production in case of coal based power project. So, when coal is being used for producing the power we have a target this much megawatt of power must be produced with this type of facility now the facility may include boilers it may include turbines.

So, the overall system we have to maintain effectively and efficiently. So, that the input that is coal it is coming and it is getting converted into power. Now conversion process of coal into power is this boilers and condensers and whatever is the overall system now this system has to be managed by the operations personal. So, that we are able to meet our target of production of power.

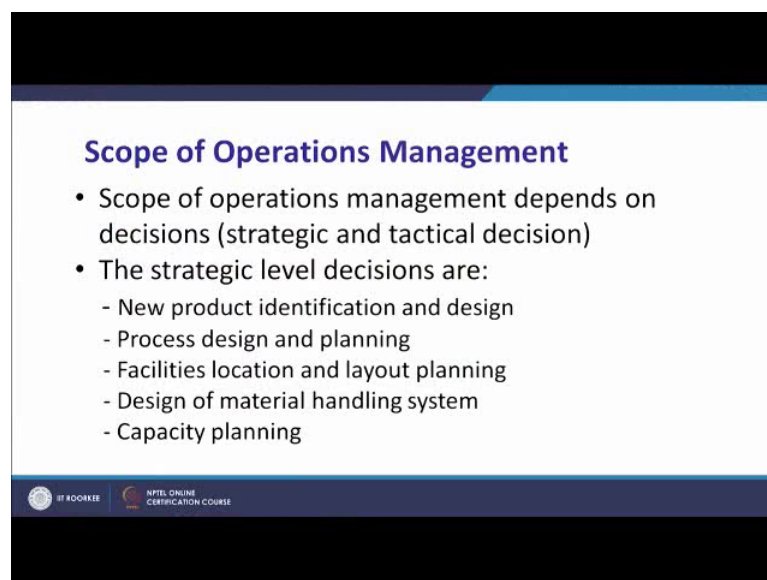
Similarly in hydropower also maybe we are using water as the input we are stopping the water making a dam and then using that water to produce the electricity. So, we have a target that this power plant hydro based power plant must be able to produce this much

of power, we have to run our turbine we have to manage our penstock we have to manage the overall system in such a way that the overall objective of production of power is managed.

So, that is; you can say point that is related to this function that is utilising effectively the factors of production and service facilities now facilities can be power plant facilities can be assembly line, which are available with us to produce the product. So, we have to effectively and efficiently manage our facilities to produce the product. So, these are the functions of operations personal.

Now, coming onto the second part of our discussion today, that is the scope of operations management.

(Refer Slide Time: 21:36)



Scope of Operations Management

- Scope of operations management depends on decisions (strategic and tactical decision)
- The strategic level decisions are:
 - New product identification and design
 - Process design and planning
 - Facilities location and layout planning
 - Design of material handling system
 - Capacity planning

IF ROOIKER NPTEL ONLINE CERTIFICATION COURSE

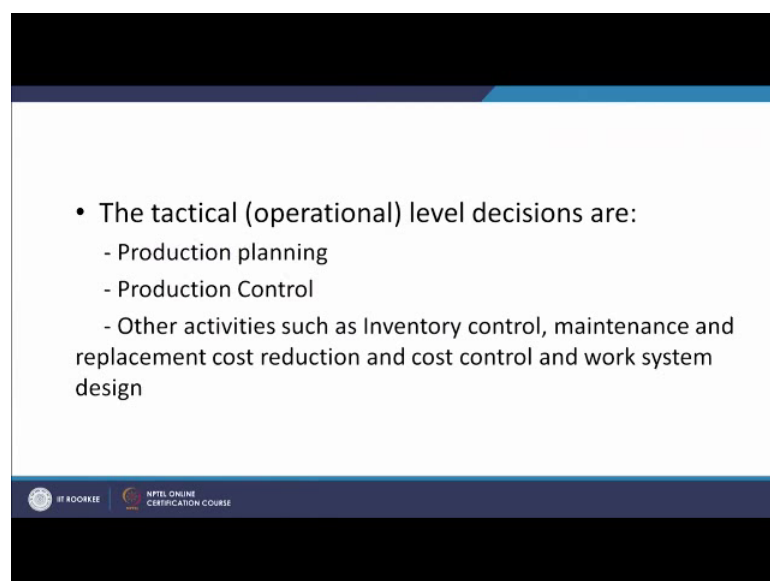
Now, scope means that where we have to functions we have already seen so there a thin line between functions and scope. Now scope of operations management depends on the decisions. So, we have to see that what all decisions we have to take or what are the areas where we have to take the decision. So, that we are able to meet our objective. Now the strategic level decisions are let us see what all decisions we have to take new product identification and design. If you remember session one we have seen that in week 2 of our course we will focus on product design and development. So, that is all that is well within that is well within the scope of this course of operations management.

So, the strategic level decisions are new product identification and design process design and planning or we can say production planning and control that also, we are going to cover in this course then facilities location and a layout planning that also is there being discussed or will be discussed in one week during our discussion design of material handling system I think that is also included in the course then capacity planning is also included in the course. So, these are the strategic level decisions that we need to take as operation managers in order to ensure that we meet our objectives successfully.

So, again I am reading it for you that what all is within the scope of operations management that is product design and development, process design and planning or production planning and control facilities location and layout planning design of material handling system capacity planning, we have to do I think lot of brain work in order to ensure that we come up with the operations system or we come up with a production system, which is highly effective and efficient and we are able to meet our target of a right quality product of right quantity at right time at minimum cost.

So, if you remember in the last session it is not only the strategic decisions that we have to take what are the other type of decisions just think over that if you can recollect in the previous session we have seen two types of decisions. So, one was strategic if you remember these are long term decisions then there was short range or short time spend decisions also which were the tactical decisions.

(Refer Slide Time: 24:15)



The slide features a white background with a blue header and footer. The main content is a bulleted list of tactical (operational) level decisions. The footer contains the logos for IIT Roorkee and NPTEL Online Certification Course.

- The tactical (operational) level decisions are:
 - Production planning
 - Production Control
 - Other activities such as Inventory control, maintenance and replacement cost reduction and cost control and work system design

So, let us see the tactical or operational level decisions are the production planning once we know, but we are going to produce we have the demand data available with us our product, what we want to produce is known to us the demand data is also available with us strategically, we know what technology we are going to use, we have fair amount of idea about our capacity, what we need to do then is that we have to plan maybe on monthly basis or quarterly basis that how we are going to manage our production, how we are going to manage our operations. So, that we are able to satisfy the demand data that is available with us.

Similarly, we have to exercise the production control also that how much we are meeting or how close we are 2 hours planed progress. So, we in production planning we will make a plan. So, that it will be a futuristic plan that in the next 3 months this is the we can say targets or the shorter distance targets or the shorter time interval targets that we are going to meet. Maybe after every 15 days we have drawn a chart that after every 15 days this much this much would be your this much must be our progress, but maybe control will help us to draw another diagram where we will see that what is the actual progress.

So, we have to exercise a fair amount of control to be successful many times we see in our daily lives also we are not able to match up to the planned progress. For example, in recording this course or running this course we may. So, have planned that we must be able to complete this much percentage of recording by the end of July it May. So, happened that we are not able to meet the target than what is expected that we have to pull up our socks we have to rush through we have to put extra efforts to meet the overall target of completion of the recording process.

So, in tactical operations we can see that we have to do production planning. So, in the previous slide we have seen strategic decisions which are long term decision tactical will be short term. So, may be 3 months or may be 6 months we will plan and then we will exercise a control that whether we are meeting the planned progress or not or whether we are lacking behind or sometimes in rare cases it may also happens that we are ahead of the plan.

So, plan was to meet a particular target, but we have already met the target and we are already ahead of our planned progress that may also, happen other activities then in

strategic level we have seen there are 5 activities, but in technical we have to manage their other issues also like the inventory or the materials management, maintenance, replacement, cost reduction, cost control and work system design. So, we have to see that all these objectives all the objectives outlined in the previous session are met successfully and for that 2 or 3 or 4 we can say systems may not be able to help us to achieve the target.

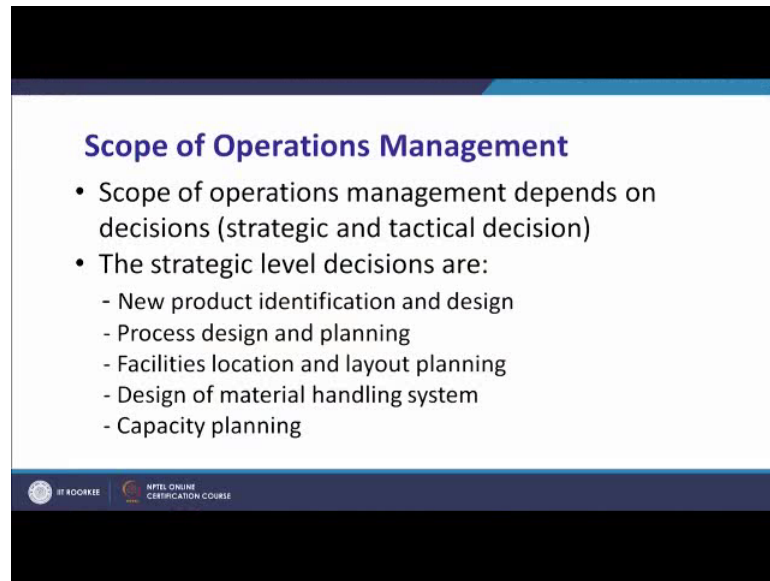
So, we have to in place of systems I think I must use the word components that 3 or 4 management of 3 or 4 components successfully may not ensure that we are able to meet all our targets or all our objectives of operations management there are majorly 4 or 5 objectives of operations management.

So, in order to meet those objectives we have to manage the complete gambit or the complete system of operations starting from the demand, then the forecasting, then the planning, then we have seen that the inventory, we have to manage, we have to manage the production plan, we have to manage the production control, we have to manage the maintenance, we have to manage the line or the assembly line.

We have to manage the facilities or the transformation process, that is converting the raw material into the final product, we have to manage the work system design where, we have to ensure that the workers are feeling comfortable while working for the organisation they are able to deliver the task or the jobs or the activities assigned to them in the most effective and efficient manner. So, it is the overall management of the complete operation system where wherein we have. So, many diverse areas of focus and then if we are able to manage all these areas.

Let me again maybe revise what we have to cover, because this is important because in order to meet the objectives we have to manage all these areas and if we manage them properly, we can become a good operations manager, we have to manage the product design, we have to manage the process planning, we have to manage the facilities.

(Refer Slide Time: 29:35)



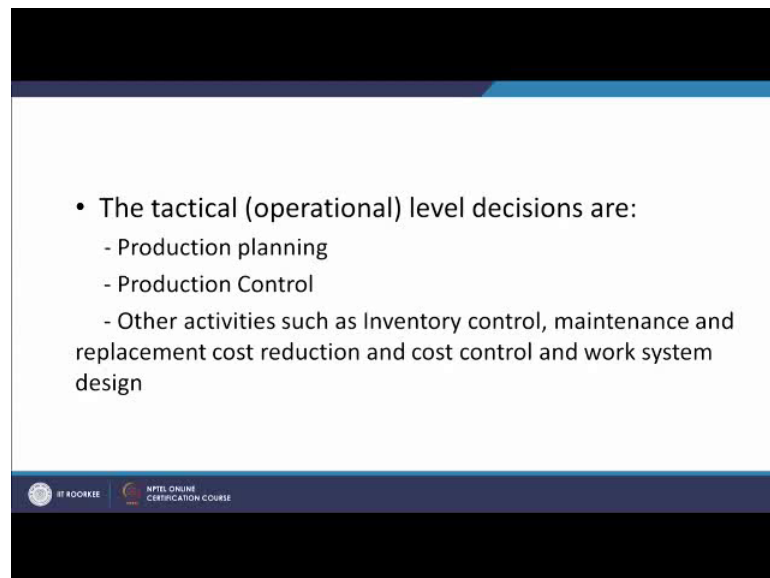
Scope of Operations Management

- Scope of operations management depends on decisions (strategic and tactical decision)
- The strategic level decisions are:
 - New product identification and design
 - Process design and planning
 - Facilities location and layout planning
 - Design of material handling system
 - Capacity planning

IT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

Layout and location we have to manage the material handling system, we have to manage the capacity or the capacity planning, we have to do production planning.

(Refer Slide Time: 29:41)



- The tactical (operational) level decisions are:
 - Production planning
 - Production Control
 - Other activities such as Inventory control, maintenance and replacement cost reduction and cost control and work system design


IT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

We have to ensure production control then the other activities like inventory control maintenance safety cost reduction cost control work system. So, you can yourself now imagine that this has got a wide scope or a large scope of work that comes under the overall umbrella of operations management.

So, to summarise we can club now some of you may be wondering there. So, many diff diverse things or so many things have come into picture how we will remember all these things as I have seen from product to process to control to materials to work system. So, many things have come into picture. So, we can very quickly see that operations management framework can be divided into 5 p's.

Now, these 5 p's are product plant as we have seen we have to do the facilities location and layout planning then the program which is related to the time finally, the processes that is related to the management of facilities and finally, people as we have seen in the last slide work system design.

(Refer Slide Time: 30:59)



Operations Management Frame Work

- Operations Management framework is divided into 5p's
 - **Product**
 - **Plant**
 - **Programme**
 - **Processes**
 - **People**

IT ROORKEE NPTEL ONLINE CERTIFICATION COURSE

We have to fit the job as per the person's capability. So, that the person is able to perform his task in the most effective and efficient manner without getting too much of fatigue and boredom. So, we have to ensure the working environment for the people.

So, with this I think I will stop the discussion or I will close the discussion for today and in next session we will try to have a brief round off maybe discussion on these 5 points and then we carry forward our discussion related to the basics other basics and fundamental aspects related to operations management as all of you are well aware that our week 1 of discussion is regarding the fundamentals of operations management.

Thank you.