

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

Lecture - 01
Operations Management: Basics

[FL] Friends, welcome to session one in our course on operations management. So, today we are going to start our discussion on an important topic that is operations management. Now before starting this topic let us focus on the two words that is operations and the management.

Now in operations if we say this is not a new word, we are conducting operations may be for the last 200, 250, 300 years, the raw materials are being converted into the final products by transformation processes. Transformation can be a physical transformation, it can be a chemical transformation, it can be a thermal transformation. So, using any transformation process; we convert a raw material into the final product.

So, that is the basic fundamental definition of an operation, in which we convert a raw material into the final product using any transformation process. This is related to the tangible outputs in terms of products. In today's scenario, we have operations in terms of hospital industry, we have operations in term of aviation industry, we have operations in term of banking industry also, which we term as the service operations.

So, we can have mechanical operations, we can have service operations, we can have other type of operations also. So, basically first and foremost function that we need to understand is an operation in which the inputs are converted into outputs. In our first definition, where we talked about the physical transformation of the raw material; the raw material can be any product, it can be any physical thing. For example, it can be coal. So, coal you do a thermal transformation you can burn the coal you can convert water into steam. So, the input can be coal and water and then the output can be steam. So, you are using a thermal transformation.

So, another transformation can be, you take wood that is I think a better example. You take wood you cut the wood chisel the wood and then you can make a axe. So, you have a handle of a axe made up of wood and then you have a metallic piece which is used for

the cutting action. So, you have two inputs there, you do some transformation and you finally get a product.

So, those are the tangible products in which you convert the raw material into the final product. In services also, you have people as input, you have systems as input and then these people work on the systems to deliver you an output. For example, in hospital you go there with the ailment the people, the doctor, the nurses, the paramedical staff, with the help of instruments and equipment will work on you and will send you to your home hale and hearty or with happy faces.

So, basically the in case of any operations, we use inputs and we finally get the outputs. Now, first and foremost we must be able to understand the word operations that we are going to study today in our first session then comes the management. Now management means that we have to take care of these operations in the most effective and efficient manner. We must be able to utilise our resources.

We must be able to convert our inputs into the outputs, in the most efficient and effective manner. Now, how to ensure that efficiency and effectiveness, we will use we can use certain management principles which can help us to optimise the use of our resources and that will help us to get profit for the organisation or to bring the organisation into the competition with the existing organisations.

So, management will help direct guide coordinate. You can use number of adjectives to help the organization in order to convert the raw materials into the final product in the best possible manner. So, in operations management we our focus will primarily be to use the concepts of management in order to manage our operations.

In order to do our operations in the best possible manner, in order to conduct our operations in the best as well as most effective and efficient manner. So, we can have different types of management of different functions in which the management can be applied. Sometimes, we talk of industrial management; so, there we talk of management in terms of the industrial aspects.

So, we talk of behavioural aspects also, morale of the employees and different aspects are taken into account in wage and incentives that we pay to our employees; so, everything comes under industrial management. We can have a topic of time

management, in which our focus will be on time only; applying the principles of management for better management of our time, then we can have other forms of management also.

Sometimes, we read a book called change management; suppose you want to change from one particular situation to another particular situation or you want to change from one particular segment for to another particular segment, then you need to do the change management; you need to change from one place to another place change management comes handy. So, there we apply the principles of management for managing the change.

So, principles of management may have a particular skeleton of those we have to adopt and try to apply these guiding principles, rules, regulations, procedures into a particular function. So in operations management that important function are the operations; so operations, as I have already explained will help us to convert our inputs into the tangible outputs. And these management principles will be the guiding forces, which will help us to better manage our operations, to effectively efficiently transform our inputs into the output.

Now if we try to understand that what can be the major objectives of operations management; just to have a rough idea, that why do we need to do operations management? If I am running a company and we are producing a product what I will keep in my mind while doing this transformation in my factory, we are converting the raw material into the final product.

What will be the focus? The focus will primarily be on the quality of the product that I am producing. The focus will be on the quantity that I have promised to my customers. The focus will be on that timely delivery of this consignment that I have agreed upon with my customer. Then, I have to ensure that my prices are competitive my cost is competitive with that of the competitors' cost.

So, there are four important points that I have highlighted just now. First one is the quality, quantity, time and the cost. So, these four things are the guiding principles in case of operations management. So, when we are managing our operations when we are doing our business, we have to always keep in mind that our business should be such that we are able to meet these four objectives. We must be able to produce good quality, we must be able to satisfy the customer quantity wise that if he wants a particular amount of

our product, we must be able to deliver that in a timely manner as well as in a cost effective manner.

So, though these four words are very important and therefore, we need to apply the principles of management for managing our operations or for conducting our operations, so, that we remain in business we are competitive and the company further improves on the path of growth and progress.

So, basically our focus has to be on conducting the operations in such a way that we are competitive and we are successful and for that reason we are doing this course we are running this course. So, that after going through the course maybe this course as all of you may be knowing that this is the 30 hour course in which we will have 60 sessions of half an hour each and the course will be conducted in 12 weeks. So, all of you are aware of the basic you can say framework of the course.

So, the course is designed in such a way that after going through the course what are the learning outcomes or the learning objectives of this course. After conducting or after going through this course, you must be able to address various issues related to operations management. I must address here that you may not become an expert of each and every aspect of operations management, but you have you will have an overall idea that what are the important aspects what are the important topics or what are the important functional areas in which you must develop your understanding further. So, that you become a good operations manager.

Now, important topics can be starting from the conceptualization of the product you need to find out new and new products which are required in the market and for that you need to do need analysis, you need to work on product design and development, you need to conceptualize a product, you need to think of various aspects during the designing of the products. So first thing is, what the company must produce that answer will be found out after going through this course.

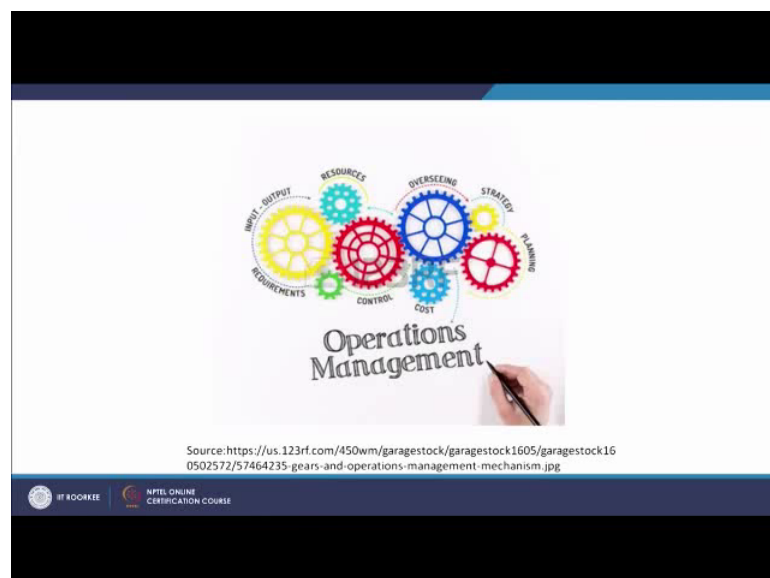
Then, how it has to be produced? In what quantity it has to be produced? How to do the production planning? How to check whether we are going with our plan or not or we are digressing from the paths that we have identified during the planning stage. So, all these answers we will be able to answer scientifically and logically after going through the course. So, then further you can make your understanding much more clearer, much

more advanced, after going through specific topics and then going into each topic in much more detail. But our focus will be that in these 30 hours, we have a overall picture of the subject and from academic point of view the learners who have registered for the course and they are doing the similar course in their college or university or in the institute, they will get adequate information.

So, that they are able to perform well in the exam that is related to operations management. So, the target of our team, for running this course is that all engineers, all managers have an idea about various tools and techniques that can be adopted for managing the operation. So, the overall objective I think I have tried to highlight in this brief discussion in the beginning of the course only.

Now, I will switch over to the presentation because every session will be of half an hour duration only. So, we will be focusing on the various aspects both in one to one discussion as well as with the help of a presentation, which can help you as notes that you can follow when you prepare for the assignments as well as for the examination. So, we will try to understand the basic definitions of operations management and try to understand that what all we are going to cover in this complete course of 30 hours duration.

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On your screen, you can see the Operations Management and the source is also highlighted. You can see in operations management there are lots and lots of things that intermingled with each other most of the topics are interrelated to each other.

So, you have as I have already explained input output. So, the input is converted into the output. So, you have input output relation. Then there are resources, so resources can be inputs that you convert into the output. So, resources can be, we can have raw material resources, sometimes our transformational resources will be there. We have specific set of machines equipment that we use for that.

We can use for converting our raw material into the final product. Then, there are requirements based on the demand we know 'how much we must produce'. Then, there is a control. We have to see that we have planned that we will be producing 500 cars per week. So, we have to check, whether in the last week, we have produced 500 cars or not. Suppose, we have produced 480 cars only; that means, that we are lacking by 20 cars. So, we have to expedite, we have to pull up our socks we have to speed up in the next week and we must ensure that in the next week we produce 520. So, that we are able to take the backlog of 20 into account.

So, that is what is related to control. We have planned something 500 cars per week, but in a particular week if we are lacking next week, we have to make it up, then supervision overseeing that is also important planning cost. All these are the catch words, key words that are very important in context of operations management, but here it is showing the inter-relationship that each parameter has to be taken into account in and you can say objective of managing our operations in our target of managing our operations.

So, each and every aspect we have to take into account and each one of these are interrelated to each other. But it is easier, when we have a structured discussion on the various topics. Although each and every topic is interrelated to one another, but then once we focus on each topic individually, we will be able to appreciate their relation amongst themselves.

For example, suppose we are able to study sales forecasting, we will be able to use that number in sales forecasting, what do we do? We use various techniques. There can be qualitative techniques, there can be quantitative techniques, so, forecasting and then we forecast a number, that in the next year this is the sales forecast. Now, how that forecast

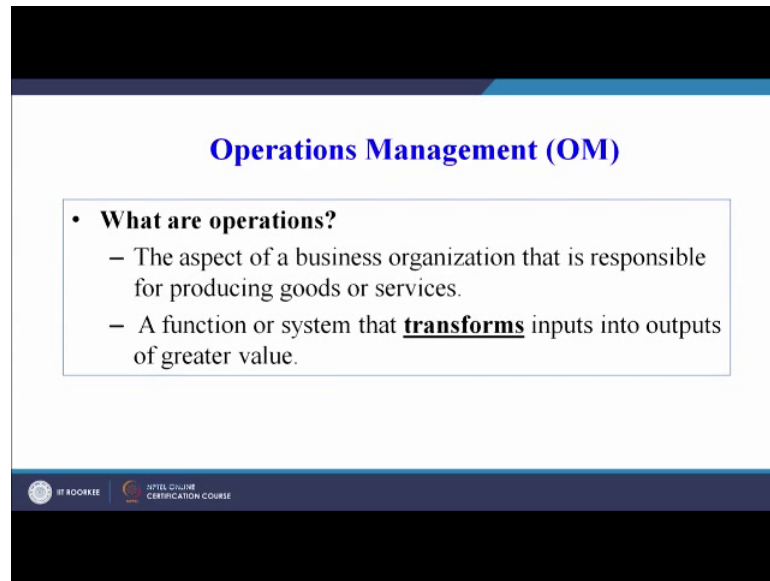
number can be used it will be used for aggregate production planning. It will be used for planning of our resources, it can be used for materials management. So, it can be used for materials requirement planning. So, it is related to the other aspects of operations management also.

So, sales forecasting, we will have a structured discussion that what are the various methods of sales forecasting the output of sales forecasting will be used at the next level of planning in which we will see that how we have to use our resources. So, all these aspects are interrelated. So, if we have a solution to one important topic or one important problem, it will help us to solve many other problems in the downstream or in the down line.

So, that is very, you can say important at the very first session only, to understand that each of the topics are not stand alone topics, they are interrelated their inter mixed and we need to understand the subject not learning the various topics individually, but learning them in context of the overall objective of Operations Management that is to ensure the good quality products are produced in right quantity at right time and at competitive cost. So, this overall objective always has to be kept in mind and each topic has to be studied in its context of other topics or in its reference to the other topics or in its relation to the other topics.

Now, what are operations? I think now, we will slightly speed up in today's presentation because whatever I wanted to explain, whatever is given in the presentation, I have already explained with certain examples.

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The slide features a white background with a blue header and footer. The title 'Operations Management (OM)' is centered in blue. Below it, a white box with a thin blue border contains a bulleted list. The footer includes the logos of IIT Roorkee and NPTEL Online Certification Course.

Operations Management (OM)

- **What are operations?**
 - The aspect of a business organization that is responsible for producing goods or services.
 - A function or system that **transforms** inputs into outputs of greater value.

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So, what are the operations the aspect of a business organisation that is responsible for producing goods and services, I have already highlighted with example of axe, with an example of a hospital. That, these operations are those aspect of business organisation that is responsible for producing goods or services. A function or a system that transforms inputs into outputs of greater value, so you have a wooden block or you have a wooden piece which has very less value, but when you transform it, you play in it your machine it you remove the wood you give it a particular shape and then it can be used as a handle for a axe, you are adding value to that log of wood.

So, now that wooden log has been converted into a handle of an axe by transforming it by removing certain material from the log of wood. So, this is a function or operations, is a function or a system that transforms inputs that is a log of wood into the output, that is a handle of an axe which is off greater value.

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Operations Management

Deals with :
The design and management of;

- Products
- Processes
- Services
- Supply chains

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Now, operation management deals with the design and management of products, processes, services and supply chains. So, we can see that different types of aspects are related in operations management. We have to look at products we have to look at processes, we have to look at services that we are rendering, or our operations are rendering to the customer and we have to look at the overall supply chains starting from the raw materials to the final delivery of the product to the customer at his doorstep.

So, that complete supply chain is also aspect that can be covered in operations management. So, here the focus will be on design and management of all these four important aspects starting from products to the final supply chain. So, as I have already told our focus will be on product design and development. Our focus will be on aggregate production planning, our focus will be on capacity planning. So, we will be focusing on these aspects by learning the various tools and techniques which can help us to manage these four aspects of operations management.

Now, what is operations management; just a very fundamental definition the business function responsible for.

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What is Operations Management?

The business function responsible for **planning, coordinating,** and **controlling** the **resources** needed to **produce products** and **services** for a company.

“The **Science** and the **Art** of ensuring, goods and services are created and delivered successfully to customers”

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Now, this is a business function which is responsible for planning, coordinating and controlling the resources. Now you can see, there are three important words written in blue planning, coordinating and controlling. What do we need to plan? What do we need to coordinate? What do we need to control the resources? Now we need to see, we need to plan that when we have to place an order for the raw materials. In how much quantity we need the raw material. Then what are the inspection procedure that we need to do on the raw material.

So, we need to plan for the materials, we need to plan for the workforce, how many people are required? When they are required? What are the skill sets that are required for these workers? Then, we need to plan for the money, that how much money will be required to make this many number of products, from where that money will come. How we need to generate our resources in terms of money? So, that we are able to satisfy the demand of the customer.

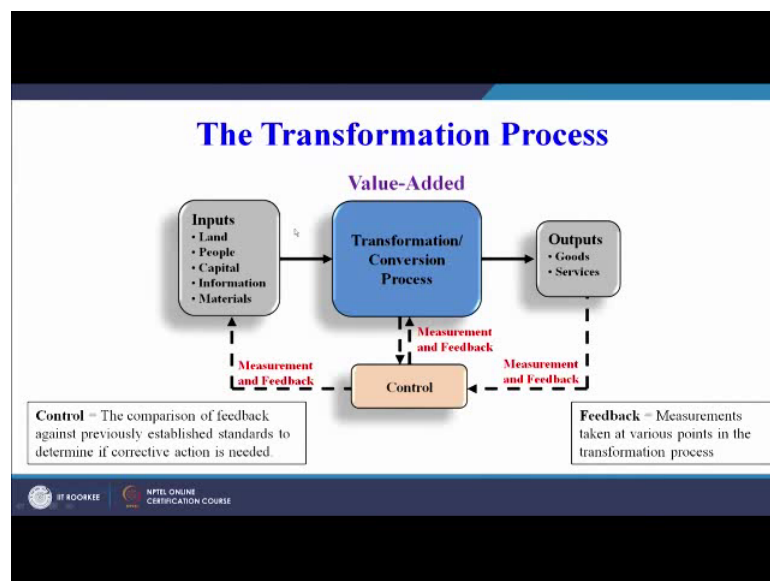
So, we need to plan, we need to coordinate, we need to control the various resources, why, because, these resources are needed to produce the products and services for the company. So, we need to check that we are able to meet our objective of satisfying the demand of the customers. So, once again I will read this, a very important definition of operations management that the business functions responsible for planning, coordinating and controlling the resources needed to produce products and services for a

company. The science and art of ensuring goods and services are created and delivered successfully to the customers. So, we need to ensure that goods and services are created, created means they are produced, they are fabricated, they are processed and delivered to the customer and important adjective that I have missed is, delivered successfully to the customer.

Now, for how to, we can say define the word successfully, how to understand the word successfully, now successfully we can say that if the quality of the products and services that we have produced, if the quantity that we have promised, if the cost is competitive, if we are able to ensure the timeliness of delivering our products and services. So, if we are able to focus on these four words.

That is the quality, quantity, time and cost only, then we can say that we have successfully rendered the products or services to our customer and that is the basic target of Operations Management that we are able to satisfy our customers. So that, they become loyal to the brand of our company and they feel satisfied and confident in buying the product from our company. So, the overall target of operations management is to be competitive and in order to satisfy or I must say be competitive by ensuring the satisfaction of the customers.

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Now, this is a transformation process, the slide looks slightly busy, but we can very easily understand the transformation process. There are inputs. The inputs can be land,

people, capital information, materials, then we have transformation process that is the transformation or conversion process. So, we can take any example, I have taken an example of an axe today in which we use wood as a raw material and then we convert it into and final product that is axe.

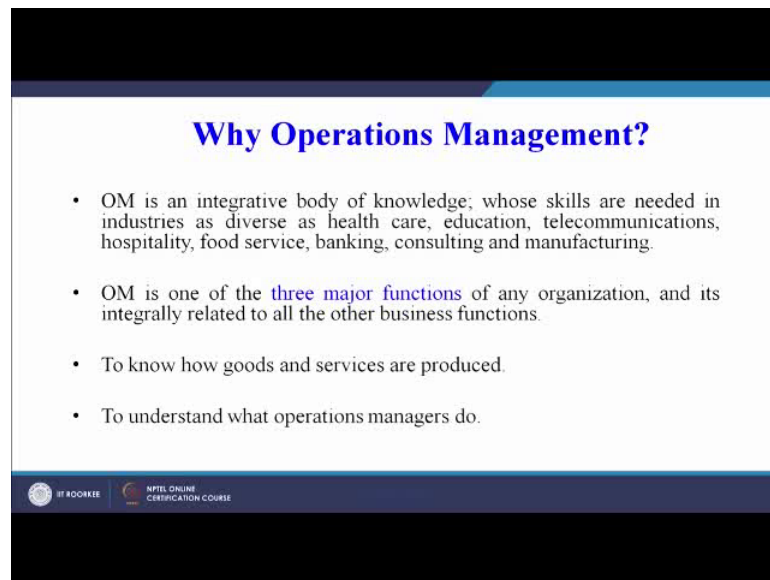
Then the outputs can be goods or services. So, basically the transformation process involves any change or value added change in the raw materials, in order to get the final product. So, that is the output, but in output, output can be of two types. Output can be, it can be acceptable output or it can be a non acceptable or faulty outputs if you do not get the output as per your requirement, so that we will check using our control function. So, we have a specific set of inputs there is a transformation process and then we get our output or the output in terms of products or services or goods.

Now, we already have planned, we know the specifications of our output. So, we will match these specifications we will match these characteristics that we look forward to in our product. If the characteristics are met we will say yes this is unacceptable product. But suppose the characteristics or specifications are not met the quantity is not met, we will say no, this is not satisfying the laid out criteria. Then there is a provision of sending a feedback there is a feedback mechanism.

Now we will measure we will try to control the output if we are out of control, we as per our measurement we will send a feedback and that controlling mechanism will help us to fine tune to relook at our inputs as well as the transformation process. So, that we are able to come back on track, we are able to rectify the problems or the issues that have a reason and that have led to not meeting the target or that have led to a faulty output and that faulty output has to be corrected with the help of a controlling mechanism or the feedback mechanism.

So, this is the broad gambit of operations management, we have to manage the inputs we have to manage the transformation process, we have to manage the output that we are producing. So, that we are able to justify we are able to provide a good quality product to our customer. Now, why do we need to study operations management. I think, this is going to be the last or the second last slide for today's discussion.

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Why Operations Management?

- OM is an integrative body of knowledge; whose skills are needed in industries as diverse as health care, education, telecommunications, hospitality, food service, banking, consulting and manufacturing.
- OM is one of the **three major functions** of any organization, and its integrally related to all the other business functions.
- To know how goods and services are produced.
- To understand what operations managers do.

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So, operations management is an integrative body of knowledge, whose skills are needed in industries as diverse as health care, education, telecommunication, hospitality, food, service, banking, consulting and as well as the last one, which is most relevant to us that is manufacturing.

So, this is important not only from manufacturing point of view, you can say that various service sector industry/industries also require the basic aspects of operations management. Now operations management is one of the three major functions, the other two being the marketing and the finance. So, there are for any business organisations, there will be three basic functions.

So, one will be the marketing, then the operations management and finally the finances and its integrally related to the other business functions also. So, from marketing we get what needs to be produced, how it maybe it is going to satisfy that demand raised by the customer. So, sales department, marketing team will have their own set of criteria for, from the feedback from the customers and operations means that we have to convert that feedback of customers into the product that is going to satisfy the demand in the market.

So, operations management will help us to know how goods and services are produced in the most efficient and effective manner. It will help us to understand what operations manager need to do in order to ensure a good quality product in right quantity at right

time and in competitive cost. So, operations management will answer number of questions that may be there with the management.

So, if you scientifically logically manage your operations, you will be able to success, be successful in the industry. Now this is probably the last slide today why this slide has been compiled. So, that in the very first session you get an idea that what all we are going to study in this course.

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Now, in this course we will see product design and development in which we will cover topics like ergonomics, rapid prototyping design for manufacturing and then we will be seeing the product life cycle. Different topics related to product design and development then we will switch our attention to sales forecasting, in which we will be covering quantitative and qualitative methods of forecasting then the facility planning and plant location we will be covering that, in which region of the country of the world we must set up our manufacturing facilities.

Now, once that has been identified we will focus our attention on how the various facilities, various machines, equipment, shops must be laid out within the factory then we will see the production planning aspects that how we need to optimally utilise our resources that is man, machine, equipment then we will see the scheduling that how to manage the time we will be seeing Critical Path Method, Program Evaluation and Review Technique that is C P M PERT techniques, then we will see scheduling and

sequencing that how we need to sequence of operations on the various machines within the factory.

Finally, we will see the output, once we have produced the things as per our plan, how to check the quality. For example, total quality management, total productive maintenance as a statistical quality control, 6 sigma we will be seeing and we will also be seeing the Materials Management topics such as the Inventory Control and Economic Quantity Model and Economic Quantity, than the production model we will see such as just in time, Kanban Materials Requirement Planning, Enterprise Resource Planning. So, all these aspects we will be covering in our course and since the course is 30 hour duration, we will be covering may be one or two sessions on each topic. So, that we have an overall view of the Operations Management concepts.

So, with this, we conclude the today's session and I sincerely believe that we have laid a strong foundation for what we are going to cover in this course because from next session our target will be to study the details related to the basics of Operations Management such as what are the scopes functions of Operations Management. What do we mean by operations strategy.

So, in first week, our focus will be to reinforce our knowledge related to Operations Management and then we will shift our attention to the product design and development in week 2 and sales forecasting in week 3 and subsequently, we will be covering all these topics mentioned on this slide and at the end of the course, it is expected that all learners must be able to understand or grasp the basic tools and techniques that can be used for efficient and effective management of operations.

Thank you.