

Production and Operation Management
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Lecture 35

Nature of Quality and Evolution of Quality Management 1 – (Product Quality Dimensions)

Welcome friends, in our this course of Production and Operations Management we have discussed some very important topics so far. We discussed in detail about forecasting inventory, material requirement planning and then in our last few sessions we discussed in detail about aggregate planning. Now we are going to start another very important area of operations management.

And this is such an important area that complete courses either under NPTEL or under other open course wares are available and that area is Quality Management. Quality is a very very important area and example of Japan is always taken in front of us that how using quality as a competitive weapon Japanese industries, Japanese automobile, Japanese electronics these two industries particularly gave good competition rather provided a very useful competitive edge to entire Japanese manufacturing system.

So quality how to build quality, what is the meaning of quality and what are the quality tools and techniques which operation manager can adopt? And this is one such area in our discussions of operations management which is equally applicable for manufacturing as well as services. We have service quality management and the scales like SERVQUAL are very-very popular to define the quality of services.

Similarly quality of products, the physical products which we use that is also very important. So quality is a very-very important area and continuously lot of developments are taking place in the quality management field. Now before we start the discussions on various aspects of quality because there are multiple dimensions in our discussions, right from the meaning of quality to implementation of quality in the organization.

And what are the latest development in the field of quality management, what are the future directions of the quality management, all these will be the subject matter of our interest in next few sessions. So in this particular session today we are going to discuss the nature of quality and the evolution of quality management.

Because without understanding the historical perspective of quality management, we may not be able to do justice about the future of quality management that how it has evolved over a period of time.

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Quality and its dimensions

- Quality is the ability of a product or service to consistently meet or exceed customer expectations.
- Customer expectations can be broken down into a number of categories, or dimensions.
- Product quality is often judged on eight dimensions of quality.
- The dimensions of product quality don't adequately describe service quality. Instead, service quality is often described using other dimensions.

Handwritten notes on the slide:

- A box around the first bullet point.
- A vertical line separating 'Goods' on the left and 'Services' on the right.
- 'User' written above 'Relative'.
- 'Quality' written above a horizontal line.
- 'Producer' written to the right of the horizontal line.

Logos for Synergy and other institutions are visible at the bottom left of the slide.

Now when we are talking of quality and its dimensions the nature of quality we are trying to discuss, so when we are trying to discuss, quality there are two perspectives which come to our mind primarily. You can define quality from a products point of view that means quality, there are two important angles in this, one who is going to use our product? So one angle is from users point of view because when I am using a product I have some expectation from that product, I want some kind of service from the product. So whether product is able to deliver as per my expectation or not that defines quality from the users point of view.

Then there is a producer of the product, manufacture of a product, now manufacturer produces a product on the basis of design specifications, whatever is the dimensions given to you for this particular pen, you make this pen with respect to those dimensions. So for you the quality is if you are able to meet the specifications, so your meaning of quality is how closely you are able to meet the standards, how closely you are able to meet the specifications, that is the meaning of quality for a producers point of view, a manufacturers point of view.

So there are these two broad you can say dimensions these are the two broad perspectives for defining the quality, one is the user centric and another is the producer centric. From the

producers point of view, quality is meeting specification, if you are meeting the specification, if you are meeting the standards, then it is a quality product.

From the users point of view, user does not understand specification, user does not know what is the specification, user only know that whether this product is fulfilling my expectation or not. And if it is fulfilling my expectation I say it is a quality product. If it is not fulfilling my expectation, my work is not done with the product then however good your product may be as per the manufacturer it is not a quality product for me.

So this is the first important thing from the discussion of quality nature that it has two views, user view and the producer view. Because user, you are a user I am also a user you use a mobile phone I am also using a mobile phone. Now for you there are different types of expectations from the mobile phone. You want that your mobile phone should capture very good quality of pictures, my expectation is that the battery of my mobile phone should last very long.

So you have a different expectation, I have a different expectation from the mobile phone, product is same but we both have different expectations. Now what is going to happen, because we have different expectations so from the user point of view quality becomes a relative term, it is a relative term because for you if it is giving 8 hours of battery then it is a okay kind of product, good quality product.

But for me I want at least 24 hours because I may not be able to recharge my mobile phone up to next 24 hours, so I want a phone for which battery can last for 24 hours. So if I have that phone of 8 hours of battery recharge it is not a quality product for me. So from the users point of view, quality becomes a highly relative term, for you it may be a quality product for me it may not be a quality product.

You like white T-shirt, I like red T-shirt, so why T-shirt is a quality product for you, red T-shirt is quality product for me. So we have so many examples, a movie, you like the movie, I do not like that movie, so that is a quality product for you, it is not a quality product for me. So from the users point of view because it depends the on the ability to fulfill your expectations and we all have different label of expectation therefore quality becomes a very relative kind of word a very relative concept from the users point of view.

So same product may be of different quality for different customers but it is more standardized from the producer's point of view, because from the producer's point of view we are talking of a standard product which is able to fulfill the standards which is able to meet the specification, so from the producer point of view it is more objective, from the customers point of view it is more subjective from the producers point of view it is more subjective.

So it is in a broad way I explained you the basic nature of quality sometime we have to understand the customers view, sometime we have to follow the producers view and a good quality management, a good quality management program in any organization is that where we can involve both these dimensions simultaneously.

We need to have user interest and at the same time we have to make some standards so that our all the workers, supervisors, engineers can follow those standards, so those standards must come from the customers expectation, so we need to transfer the customers expectation into our product specification, so that is a very important activity if we are not able to do this transfer of customer expectation into product specification we will not be able to produce a quality product. So that is the fundamental essence of the entire quality management exercise.

Now let us see some other important discussion in this particular case of quality and its dimension, so as we have just discussed that quality is the ability of a product or service to consistently meet or exceed customer expectation. So this is the customer perspective that customer has some kind of expectation some kind of desires from a particular product, I am wearing the shoes sometime I wear shoe when I am going for morning walk.

Then I wear a shoe when I am come into my office, now when I am going to evening party I have a different expectation from the shoes because at that time my shoe must show my status. When I am going into the morning walk in the morning, I want to have that my shoe should give the comfort of walking and when I am in the office all through the days I have a different expectation from the shoes that it should show some kind of formal appearance and at the same time it should be comfortable for my legs.

So different time of day I have different expectations from the shoes and if my different pairs of shoes are able to meet these requirements or exceeds these requirements I will say that these are the quality products. Then customer expectations can be broken down into a number of

categories or dimensions. So you can divide the customer expectations into various categories we will see that what are those different categories in which we can divide the customer expectations.

So different authors there are different type of philosophers who have given various discussions with respect to quality, one very popular discussion with respect to dimensions of quality that says that customers' expectations can be divided into 8 dimensions, so we will see that what are those different 8 dimensions over which we can divide the expectations of the customer and then the dimension of product quality do not adequately describe service quality.

We know that two types of products are there, goods and services, so now-a-days when we are talking of quality I just told you that it is important to have quality in goods, it is important to have quality in services. So there are some dimensions of quality which are applicable in services but there may be some additional dimensions which are required in the service quality also for an example just to give you an idea that how things are different in case of product quality and service quality.

Service we all know, cannot be stored, service can only be delivered when a customer is there, so there is a direct contact when service is delivered. For an example you are going to a haircut, now in that haircut service is only possible when a customer is there and then you are taking a haircut. Now in this case the behavior of the person who is providing the service becomes very important in your satisfaction label.

Though he may provide you excellent haircut but if his behaviour is rude you will have lesser satisfaction. So if his behaviour is good, if his face is smiling you feel good. So that is a very important attribute in the service quality, the etiquettes, the behavior, the ambience where the service is provided all these things play important role.

Probably these things may not be so important, these things may not be, these things are important but may not be so important in case of product quality. So therefore when you are going to purchase a computer, when you are going to purchase a mobile phone, you are more concern with the quality of the product, you are not that much concerned with the behaviour of the person who is selling that mobile phone or computer to you.

But in this particular case of service, you are equally concerned with the ambience, with the behaviour, with the etiquettes the kind of lighting arrangement there the kind of music, the kind of fragrance available in that room all these things play important role in the service quality. So we will see in our discussion that what are the important dimensions of service quality and what are the important dimensions of product quality. Now as we just discussed that the product quality can be described in the form of some dimensions and let us see that what are those dimensions which help us in defining a product quality.

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Dimensions of Product Quality	
Dimensions	Description
Performance ✓	Major characteristics of the product
Aesthetics ✓	Appearance, feel or taste
Special features ✓	Extra characteristics
Conformance ✓	how well a product corresponds to design specifications
Reliability →	dependable performance
Durability →	ability to perform over time
Perceived quality	indirect evaluation of quality (e.g., reputation).
Serviceability	handling of complaints or repairs.

Now the important dimensions are, first is the performance, the performance is the basic characteristic of a product, for which the product is known. For example, if I am purchasing a laser printer, so if the laser printer has the performance characteristic of printing 12 pages per minute, the other printer has characteristic of 18 pages per minute, then other printer has 30 pages per minute. So if I am going for my domestic use I will like to have 12 pages per minute.

I am going for my commercial use, I my like to have 30 pages per minute, so the basic characteristic of the product is the performance. So in all your products whatever you are purchasing you have some basic expectation from the product that is known as the performance dimension of the product. Then the other dimension is aesthetics, the appearance how it is looking.

So you know the machinery part of that printer is there is a feeder that feeder feeds the paper into the roller and that roller puts the paper into the drum and at the drum you have the printing of the paper and then there is a drier which dries the ink on the paper and the paper comes out. Now this is the complete process which is taking place in the printing of a paper in a laser printer. But this mechanism is packaged in a very beautiful casing.

So that it looks a beautiful appearance, it gives you an aesthetic appearance. You have different types of automobiles; you have so many variants of cars available in the market. Most of the cars have similar engines, but that engine is packaged in a beautiful appearance and most of us those who are not aware of thermodynamics those who are not so much aware about the automobile engineering.

We purchase products just based on that appearance, so appearance is also a very important attribute, every important aspect of quality. So how product is looking many a times we purchase product because of its looks. Then the special features, that is also become a very important part of these days, now what is this special feature, is the extra characteristics. Your printer is printing 12 pages per minute or 18 pages per minute.

But can it print double side printing? That is a kind of extra feature, if it can print double side printing automatically without manual putting up paper again in the tray it is an extra feature, so sometime your extra feature also attracts. Particularly when we are purchasing mobile phones, when we are purchasing our cars, the extra feature plays a very important role. Even if you can see when we are going to a hotel in that hotel room the extra feature is like complimentary breakfast.

The complementary use of WIFI, these are example because in a hotel you are going for taking rest in night but the complementary features add some additional weightage on your decisions, so that special feature, the extra characteristics of the product sometime become important part of your decision making and that may give you extra satisfaction that how many extra features are there.

You are going to purchase a car, now that car has a very good music system available in that, car has a Bluetooth connectivity with our mobile phone, that your mobile phone will automatically get connected to that speaker. So these are the extra features which are now a days becoming a

very important reason of your high level of satisfaction. Then conformance, for a particular customer the meaning of conformance is that how well a product is fulfilling the requirement.

Whether it is fit to use, but the conformance means how well a product is fulfilling the specification. So whatever is the specification, if product is able to meet then only you can have the concept of interchangeability, if the specifications are not properly met then interchangeability will not be possible. Because each company is following the standard and they all are meeting those standards perfectly.

Then only you can put different types of bulbs in different types of holders. Otherwise you can only put bulbs of A company in the holder of A company but now what is possible the bulb may be of A company, holder may be of M company and you can very easily put the bulbs of A into the holder of M but if proper specifications are not followed then this type of interchangeability is not possible.

And that will bring down our satisfaction level, so conformance meeting specification is very important so that we all can enjoy interchangeability, we can enjoy standardization of the components. Then the reliability, this is also very important but how dependable is the performance of your product.

Whenever you require a product, whether the product is able to perform up to the expectation or not that is the reliability. You have a generator and you use this generator whenever power is not there and tomorrow morning when you got up power is not there and you went to switch on the generator but at that time generator is also not working, so that means the reliability of this generator is low.

When you require it, product is not working. So whenever you require product should be able to perform up to the standard that is the reliability. Durability, that product is able to perform over a long period of time, how long? The product is able to work with you, that is the durability, longer the durability, more satisfaction you are going to have. So durability is also a important thing.

Then with durability another important parameter is serviceability, that serviceability is also known as maintainability. Whenever a product fails, how quickly you are able to repair it, if you

take lot of time if a product fails on Monday and by next Sunday you are not able to repair so it may incur into lot of losses also. And obviously when a failed product is there you will not be able to use it.

The reliability will also go down, so therefore you want to have low maintainability whenever a product is failing you should be able to quickly repair it, so we want very high degree of serviceability high degree of maintainability. This depends on two aspects, one is what is your after sale service network. So if you have a good service network you can reduce the serviceability time.

Because wherever you are you can have one service centre available to product nearby and that nearby service centre will help you in faster recovery of the products. The second thing is the design of the product itself, if the product is designed in such a way that it has very low maintenance time that also helps you in improving the dimension of serviceability.

And then the last one is perceived quality, that is the sum total of all these dimensions of quality, that you are going to have some kind of understanding you make some kind of perception about the quality of a product, so some of the brands like Mercedes, so if you here this name Mercedes, so you give always a very high recognition to the quality of that product.

When you hear brands like Toyota, you give very high degree of perception to the quality of those products, so the perceived quality is the sum total that how customer is perceiving the quality of those products, so there are the phenomena which we discuss in the marketing classes that some brands, some particular companies have created that kind of perception that the products coming from those organizations are of superior quality.

So that also gives you a satisfaction that I am using a product of Toyota, I am using a product Mercedes, I am using a product of Audi, so these names gives me a satisfaction level which is above to normal level because these are related to the reputation, these are related to the status of the product. So these are the different dimensions which are commonly considered to define the quality of a product.

Now depending upon customer to customer for me aesthetics may be more important for you performance may be more important. So for each customer the relative weightage of these

dimensions may vary, for some customer the perceived quality, the reputation, the status may be more important. And therefore they will like to wear all branded shoes, branded T-shirts, branded watches et cetera thing.

But for some other the performance factor is more important, whether it is of high reputation no matter but if it is able to perform up to the mark that is more important and therefore some of us buy branded products, some of us buy branded computers and some of us buy assembled computers, so assembled computers are low in cost but depending upon my requirement they can perform up to the mark.

And those who purchase the branded products for them the perceived quality is more important than other things. So what we are trying to understand that these dimensions of quality which we have just discussed are very generic in nature. Depending upon customer to customer which particular dimension are more important that we vary.

So we discussed this whole issue with the help of this laser printer example, you can take any product of your choice and then you can mention in our discussion forums that how that particular dimension you are able to see that particular product may be you can take an example of mobile phone, you can take an example of shoes, you can take an example of some 2BHK flat, you can take an example of a hospital.

So all these different types of examples you can take and do a discussion in the forum, so that we can understand that if I am talking of a hospital so what do we mean by performance, what do we mean by special feature, what do we mean by conformance, what do we mean by reliability, what do we mean by durability, what do we mean by serviceability, so let us see that how these different dimensions are meaning in different types of products.

So that we will do in our discussion forum and you come up with more and more example and that will help us in good peer learning. Similarly in the discussion we can have dimensions for service quality also. Now in the service quality you see the dimensions are slightly different and why these dimensions are slightly different because of the nature of services which is very much different from the products.

In the product the dimension is depending upon the end product because the end product is coming in the hands of the customer. In case of service the involvement of customer is there right from the beginning. The customer is involved in the development of the service, a service can only be produced when a customer is there, when a patient goes to a doctor then only a doctor can write prescription.

When a customer is going to barber then only a barber can produce haircut, when students are there in the class then only a teacher can give a lecture. So, all these services require very active participation of customer as well as service provider. Therefore, the dimensions of service quality are different than the dimensions of quality for a physical products, a goods.

It is also important to know that even from physical products goods we expect some kind of service, I am not interested in keeping any physical product which is not able to perform which is not able to deliver the desired service. I have a mobile phone and I keep mobile phone for the service of SMS, I keep mobile phone for the service of emails, I keep mobile phone for service of taking pictures I have mobile phone for the service of communication.

So all these are the services which I expect from my mobile phone, I have glasses so that I can see clearly for improving my vision that is the service which I expect from these glasses. I have watch, I have shoes, so I have so many products and I expect some kind of service from these different products. If these services are not delivered why will I use these products, so whether goods are there or services are there, we finally expect some service, some benefits out of those products.

But in the case of products we only come to the service to have that product when the product is completely ready and you go to the retail outlet and you purchase it. But in case of service it is not so, you are involved right from the beginning of the production of these service without customer service is not possible. So in our next session we will discuss in detail about the various dimensions of service quality and few more important issues with respect to service quality and other parts of dimensions of quality of the products. So for this thank you very much.