Total Quality Management - I
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Lecture - 01
Quality and its Dimensions

A very Good afternoon, Good morning and welcome my friends. I am Raghunandan Sengupta from IME department IIT Kanpur. So, this is a series of lectures of 20 hours and each being a for half an hour, and as you know that this courses would be such that we will have a 8 week schedule for this class, and what is the details I am going to come to that very soon. And this 8 weeks would basically have the concepts covered in details with problems with concepts, and which some theoretical work also and as per the norm we will have an assignments given after each week, so there would be 8 assignments and there would be one and semester examination based on whatever has been talked.

Now, what is the actual area which I am going to discuss? So, the title of the course if you see it mentioned it is Total Quality Management Quality Management Philosophies on the concept.

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So, this is a series of lectures as I said of 20 hours it would be about 40 lectures in the total covering on in depth the concept of what we mean by quality, quality circles, concept of quality, what are the different concepts of statistical process control, what are

the different about distributions which are used, what is back and concept of sampling how sampling is done for quality control for quality tests.

What are the different type of charts, we have the pi charts the art charts the x bar charts, and how these charts can be utilized to have a detailed look about the quality concepts. We will also go into in quite depth about the producers risk, consumer risk, the qc curves, and I am basically how when a vendor, and a supplier are transporting different services. Services, can be actual products which are being delivered from the server to the customer it can be actually services.

So, how one can take control and utilize different concepts of quality concepts and try to improve the quality being rendered to the customer from the vendors end. So, we will consider that in detail means we will definitely go into depth about what are the different concepts from the mathematical point of view along with problem solving, and interesting part of this lecture would be we will also consider series of lecture, will be v in between we will consider about 15-20 minutes detailed about r the statistical package, in not in depth, but in general size that 1 can utilize r and its library functions, and download r, and utilize r to basic resolve simple problems in qc, and how to draw the qc curves.

How to draw the distribution sampling curves, depending on sample size how many number of samples you are going to do, and what is the level of confidence of alpha and beta, what is alpha and beta I am going to come to that later on, and all this things would be considered. Then we will go also go in to the concepts of quality like fishbone diagram, the concepts of how qualitative things can be brought in the picture for quality, house of quality, what are the philosophies of quality control, we will also consider the ISO concepts and so on and so forth.

So, what I mentioned was in very brief, and as we go through those on the lectures the slide the assignments, we will see that the concepts of quality total quality management will become much more clearer to the people who are going to take this subject, which is part 1 as their online course. Now obviously, there would be a second part about which I am going to just mentioned as the name would imply, the quality total quality management part 2 which will consider in depth, the concept of design of experiments

and how those concept can be utilized for quality control and statistical process control and so on and so forth.

So, to give be brief background about from where to read, so that is the obviously, near in the next question. So, generally I have utilize the book which is introduction to statistical process controlled by Douglas C Montgomery, which is required a classic book, and I have heavily utilized that to bring in the concept to basically bring in different type of very innovative problems which are there in the exercise and to solve them.

And I would strongly urge the students that they can definitely use this book, by Montgomery to get a very good understanding about the concepts which I will discuss. And obviously, there are seminar hand books by Uran, seminar very interesting writers by Deming, and then people definitely would understand and read the work which has been done at Toh Tarzan, and what work is being done, different manufacturing companies, in India like Sundaram fasteners, like TATA motors also tries to use this quality concepts in a quiet depth.

So, I will just flittingly mention them, but generally the main book would be considering would be the Montgomery's book, and people who can buy this book if very Indian versions are there or basically get the book from the library can definitely utilize that because this is a quite a good reading, slow and steady raining, but it will definitely build up the concepts and required.
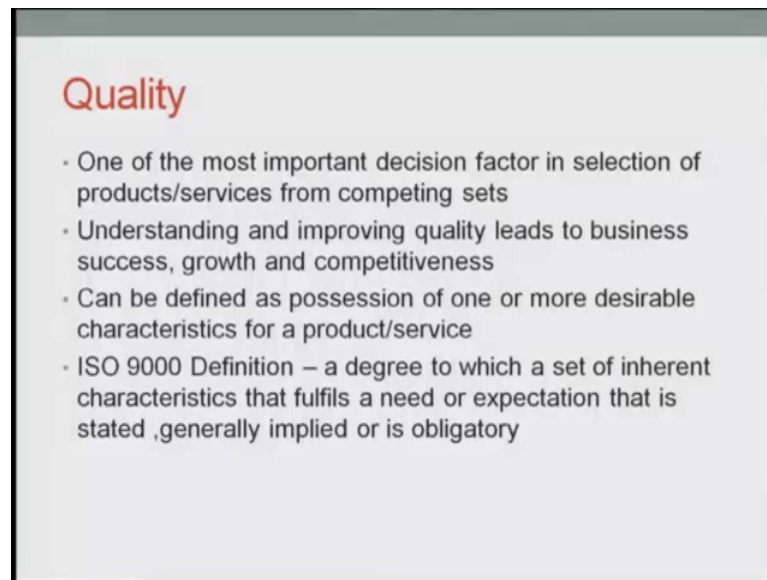
So, we will start off very slow by considering what is quality, what we mean by the concept of quality, and generally how quality can be brought into the things, but before I start of the course or start the lectures, I would like to emphasize the fact that quality what I will teach, and what is generally meant would basically be in depth. In the sense that quality whenever once one mentions quality; quality, does not mean that bringing quality in say for example, and trying to basically improve the manufacturing process or trying to basically improve the services which you are rendering to the customer. It basically means much more philosophically, in the sense that you are trying to improve your quality of teaching it may improve that how you are trying to improve your quality of life.

How you are trying to improve your quality time utilized, or you are going to improve the overall infrastructure of a company, of a infrastructure of the country. So, all these things which basically would mean, that there is a concept of quality basically which means, increase of improvement of the level of services, in whatever since you are want to render to yourself and to the other people who are associated with you in such a way, that it give some value positive value in the overall the things which are going to give to your customer.

It may be say for example, you want to teach a very good course so; obviously, you want to improve the quality of the slides, you may improve the quality of the problems, you are going to solve it we improve, the quality of the type of concepts you are gone to in utilize, it may also be dependent on the type of examples, you want to give soon and then since sense you want to improve the quality; quality, maybe say for example, you want to start the meeting on time, or you want to basically have a very good agenda, you want to be basically finish the meeting on time, or you want to basically do the work based on the meeting on time.

So, all these things would basically mean in a various general sense that what actually quality is. Quality is a very broad aspect obviously, I would not be able to do just (Refer Time: 08:19) aspect I will try to basically discuss from the mathematical point of view what actually we mean my quality, and how quality can be brought into existence in few of their for the discussions which we will do.

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Quality

- One of the most important decision factor in selection of products/services from competing sets
- Understanding and improving quality leads to business success, growth and competitiveness
- Can be defined as possession of one or more desirable characteristics for a product/service
- ISO 9000 Definition – a degree to which a set of inherent characteristics that fulfils a need or expectation that is stated ,generally implied or is obligatory

So, as I said the quality is one of the most important decision factors in selection of product and services, it can be product and it can be a services also.

Product can be say for example, you are manufacturing a car, you are manufacturing a leith machine, manufacturing a chair, you are manufacturer a table, you are mad men manufacturing say for example, different type of chemical, so obviously, quality will come into the manufacturing process, it can be services also so, like you are serving food, you are serving some services like that, you are delivery packages like Indian postal service, may try to basically improve their quality, where their main emphasis would be to basically give the best services.

It may be say for example there is a bank, and it wants to give the best quality of services to each customers so; obviously, it would be the concept of emphasizing the concept of quality for this bank, and this post office, or say for example, the airlines, or say for example, the food industries, or you may say for example, the hospital, and all these things would basically emphasize on the services from the point of view of quality and try to improve the overall services they render to the to its customers.

Customers can be as I mentioned for the hospital can be patience the family members of the patient, for the airline can be say for example, the people who are flying or travelling in the airlines say for example, for the postal service's it maybe people who have their pensions, who have their postal insurance, who basically deliver, who wants products or

packages to be delivered from one place to another. So, all these things related to services with the customer wants to have from the supplier. Supplier as I mentioned are these like things, are the government, for the Indian postal service for the government, being the Indian air lines, for the food industry, for the restaurant industry, and for the fashion industry, and all these things.

Quality would also mean understanding and improving the quality leads to business successes, because one should remember that if you are able to deliver quality, good products, good services, at a lower cost or at the same cost people would definitely be willing to take your products take your services and obviously, it would mean that your business service sector, manufacturing sector, govern sector, whatever it is; you increase your confidence increase your market share increase your overall value to the customers increase, your overall value to the society, may not be on the on the monetary fund it will basically can be on the front that you are able to give a better life to your citizen as a government, or you are able to give a better services to a customer's if you are a doctor, or it maybe say for example, your town planner, considered Jamshedpur as a city in Jharkhand.

So, if you have the improvement in the quality infrastructure of the city obviously, you are able to give a better services to your citizens, or it maybe say for example, you are able to give a good services to the citizens from the point if they police or the law and forcefully agency.

So obviously, it will give a better feel of life, both conceptually another wise to the customers who are getting your services, you are means the basically the vendor on whatever account what I am talking about. So, quality can be defined as a position of one or more desirable characteristics of a product or services so obviously, this characteristics maybe tangible intangible. So, for example, if I am able to deliver a very good product, which is very considered a laptop if I am able to deliver a laptop which is really very highly efficient. Efficient in the sense the processing part is very high, the ram is very good, the cooling capacity cooling phenomena of the laptop very good, or at the battery life is very good even if it is not working on electricity.

So, if I am able to do that so, these are services which are rendered to my customer on the other hand so these are maybe tangible one, but where I can see I can feel like light

weight of a laptop means, I can feel it if the cooling capacity is very good; that means, I can use it at a very high temperature or high humidity's when the ac is not working or say for example, if I am seeing the battery life for the laptop which I am talking about is very long, which means I can utilize that for my overall working when the electricity is not there.

So, this is those are the funds where I can at least have a tangible benefits or now intangible benefits maybe say for example, if I visit a doctor again coming back to the doctor example of the hospital example, if the patient is cured with a lot of positive benefit obviously I feel that the nursing home is good or say for example, the doctor is talking with very positive sense, or if I think the overall expenses are very low, and still I am getting the best services, obviously these are some intangible benefits which a customer would like to have which can be translated on our concept of quality from the vendors or the supplier side or the person who is basically giving you the services of the product or the intangible goods.

So, quality of which would be define on the concept of statistical process control how different type of statistical tools are used, how different type of distributions are used, how different type of greedings are utilized, and they mapped onto the different type of distribution, and you take corrective action based on the different type of charts which you studies as I mentioned they can be x bar charts, r charts, p charts, so and so forth.

So obviously, there are some definitions which we will see in the ISO 9000 series, so how quality is basically considered and where it can be quantified in a very simple terms as that the person who is going to trying to implement that, take those ISO 9000 concepts into considerations such that you can at least be able to propagate those information's or those tangible intangible benefits to your customers such that the people can judge, at yes company one is doing better in then companies 2 with respect to say for example, finances, maybe with respect to market share, may be say for example, respect to the quality of the products; quality of the products, as I said for the laptops.

So, those were the different type of tangible few examples which I gave, so it may mean that say for example, I am getting the services from one of the online suppliers much faster or where if a product is not delivered properly on time, or if the product is bad. So, if I am basically complain, my over all re dressal system of the complain is such that

those during the complains are taken care by the vendor or the E-commerce supplier to the maximum possible extent very fast such that the customers are happy, so these are the concepts, and if they can be converted into a concept of ISO 9000 definitions, so obviously it makes a level playing field in trying to compare different product suppliers along with each other such that you can take a much more judicious decision that what is their level of quality of one company with respect to the other.

So, coming back to the 4 th point, so ISO 9000 definition gives a degree to which a set of inherent characteristics that fulfills earn need or expectation of the customer, that is has been stated or is that is stated in some very clear terms, generally such that it is implied or is obligatory for the cost for the customer to understand that the vendor would be willing to supply those levels of competence based on the services of the products which the vendor is feeling to supply to the customer.

So, those are different set of rules, we will consider at the fag end of this course the concept of ISO 9000 series and what are the actual terms which are generally utilized in industry, but obviously that would be in the later part not before. So, there would be 4 different dimensions of quality, so to obviously when I am talking about quality or you are talking about quality of when you are trying to you as say for example, the CEO of a company or general manager of a company, or government official, or say for example, the prime minister, chief minister, who ever is rendering services, to the citizens, of the country, to the customers, to the suppliers, who ever it is or the vendors, or say for example, the patients who come and visit your say for example, people who come into your bank to open your account.

So, you have to basically have concept of quality rather than that being a very weak term it should basically have some dimensions or measures matrix based on which you can make a judgment whether that is quality or not.

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Dimensions of Quality

- Performance – Will the product do the intended job
- Reliability – How often does the product fail
- Durability – How long does the product last
- Serviceability – How easy it is to repair the product

So, the points are it basically quality would have some performance metric. So, the question would be will the product do the intended job, so say for example, if I have a car, or say for example, if I have a cycle, or say for example, if I have a bike, so my main focus would be I am giving a very broad example so main focus would be whether the car would be running as per the norm stated by the car manufacturer, and whether he is able to fulfill the obligation for which the product has been made.

Say for example, if I want to buy some frying pan and or say for example, I want to buy say for example, from pressure cooker; obviously, an intended the usage of that product would be either to fry or basically to cook some vegetables cook some food and use that pressure cooker to cook either mutton, or chicken, or some other products, or say for example, boil the potatoes so; obviously, it would mean that it is able to render the services or give me the benefits for which I have basically purchase that product.

So, quality would also mean that it has a second dimension which is reliability so, how often does the product failed is the product very reliable that means, if I keep using this product I am I able to get the same level or services from time after time; obviously, there would be depreciation, there would be wear and tear. So, leaving a side those concepts of depreciation and made it obviously, I will ask myself each and every time again whether the product has the stated level of reliability, such that I can utilize it without any concern and meet the actual requirement for which the product has been developed.

We will also considered the third dimension of quality as durability, and find out how long does the product lasts. So, which means? So, there are two things in general to make a very fine distinction or try to basically make it a little bit more clear, so reliability would be that if I keep using it, time after time that what is the performance of the product and whether it will basically continue to work each time and I used that product, and durability would be basically if I try to utilize at once how long would that basically product continue.

Consider this if I say for example, I have a heater; a heater, which has technically used in winter countries, or if it used in northern part of India during the winters. So, basically the fan is blowing and there is a coil which gets heated up and the air is blowned.

You see for example, if the thermostat is not right, and if basically and even if the coil is working fine it means happen that the working of the heater does not happen for a long time it basically trips very often so; obviously, I have be concerned about the durability of the product, or if say for example the coil is not of good quality, so if the coil may get heated up and it may snap, or if the connection may get disconnected.

So; obviously, those points would be considers as a third metric that how you are going to measure quality. Serviceability would be the fact that how easy is it to repair the products, say for I am using a very big machine, and there are vacuum circuit breakers. So, vacuum circuit breakers means those type of trip switch or fuse which basically will trip if say for example, there is huge amount of fluctuation in the voltage of the electricity of for that product, when electricity being utilized as the running concept to run that machine.

Now, say for example, if it fails the product fails; obviously, we will try to replace that so, if it depressing that the serviceability is absolutely zero then, obviously it means that how would even the great the product is and even if it is cheap obviously it means if I cannot service, it if I cannot replace it, or basically it cannot replace that small part which has needs to be replaced it, means that the total amount of money which I have basically invested to get the services to get that product goes to waste.

Service it means that I will be trying to basically buy the product again, which is a huge amount maybe huge amount cost for me, maybe huge amount of installation charges for me, such that the concept of serviceability comes in such a way that it can be considered

as a fourth dimension based on which we can basically measure quality. So, to recap this slide which I had just discussed, so dimensions on the matrix for quality would be performance that means, how will the product do its intended job second would be the reliability. So, how often does the production fail, third one would be durability, that means, how long does the product, last and the fourth one fourth and the last one would be serviced abilities; that means, it will mean that how easy is it to repair the product.

Product means clinins it may also come these dimensions may also be used, in the terms of serviceability and services also. So we will consider the dimension which are mentioned are not only for tangible products it can be for intangible services and intangible products also.

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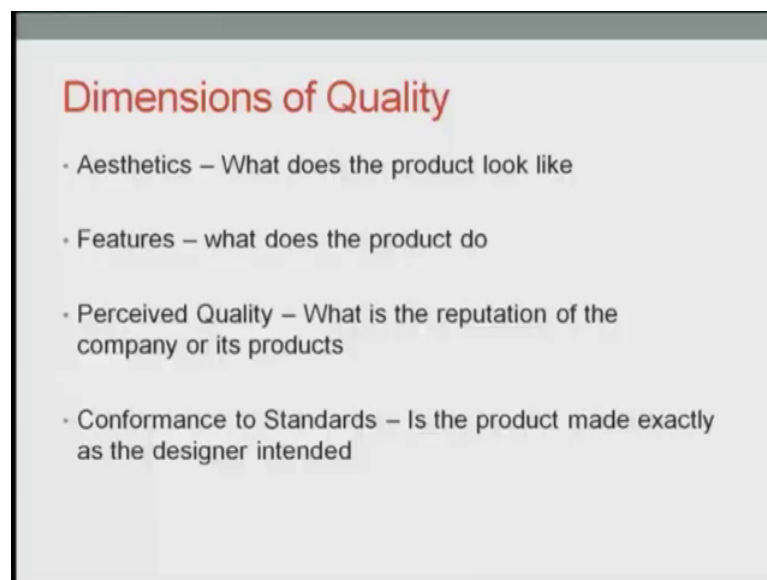
To further consider the dimensions of the quality of obviously there would be aesthetics which would mean that how does the product look like. So, say for example, if I am using as going back to the example of the laptop, if the laptop is very heavy obviously, it would not mean that carrying that laptop becomes difficult. So, it maybe that laptop works fine. So, it does not get heated up or say for example, it is able to do all the calculations for intensive computing which for which I have purchased that laptops, so that is working fine or say for example, I have purchase that laptop to do my word processing or say for example, to do the different type of financial calculations or, say for example, to do my design in the sense if I am a interior design, and I may be able to store

a lot of different type of design material concepts, or different type of pictures, or different type of dress material design for which I am working I am able to store that.

But say for example, it is very heavy so obviously, it does not serve my purpose or and in that case the product, it does not look if it looks very heavy, it can cannot be across utilized or say for example, in order to reduce the level of or the weight ages of the laptop if say for example, somebody designs it very crudely so obviously, in that sense the aesthetic sense may go for a toss, then I would definitely not consider that is a very good quality metrics based on which I can judge how good or the bad the product, or say for example, I have designed a product which may be a shirt, or a pant, or say for example, a dress material and the is the quality of the this material may be fantastic it is maybe say for example, very good in the summer or maybe very good in the winters very warm for the winters.

But say for example, it has not been designed very athletically or it does not basically follow the norm of esthetics which people basically would like to have then, obviously it means that on that dimension the quality level, characteristics which based on which you are going to judge that product would fail, it may also mean that what are the different type of features which they are, and what does the product say for example, you have purchased an ac again coming back to the concept of the ac and consider that a place where you stay the temperature of fluctuation is very high.

So, you like to basically utilized that ac both as during the summers to cool, your room to cool, your office to cool, your then the house where you stay and maybe say for example, during the winters you would like to utilize that ac and that heater. So, if it is a dual purpose machine; obviously, we will try to see whether the features for which it has been designed is being met or may say for example, you have say for example, a washing machine, and the place where you stay there it is cut it rains continuously or say for example, the amount of the sun which you want to have for drying your clothes I am talking about Indian example is not met.

So obviously, you would want a washing machine which is able to actually properly dry your clothes, such that the amount of time the clothes would be required to be put outside to basically actually make them dry would be much less. So, in those examples you will try to basically considered whether the washing machine is able to watch as well as a

dried to the level of satisfaction which you want so, obviously those features would should be in built such that you will try to analyze their product based on the features for which it has been designed.

So, apart from that there would be the other quality dimension would be perceived qualities, so it means that what is the reputation on the company or its products. So, consider this example say for example, I just in and around world war 2 Japanese products were not at all considered very good, but today we see that the level of confidence, or the level of sophistication which the Japanese products have throughout the world is very high or say for example, whenever you consider any product of the German build, we always say the German products are of very high quality because they are very robust and their actual service stability need not be there because the product survive year after year or say for example, if somebody considers the Godrej fridge which was initially were there in each and every household in India in the 1970s or little bit after that.

So, the products were such that the perceive quality level of the products was very high. so; obviously, once if you purchased a Godrej fridge you are assured that the product would not fail and you can utilize year after year or say for example, the product quality of the Bajaj scooter was also considered to be a high level because, their people considered that if you purchased a Bajaj product or a scooter obviously, you got the best quality, but obviously leave aside the dirth of products with respect to Godrej say for example, they were no such products which were available, as a refrigerator along with Godrej obviously all win was there, so in the 1970s or say for example, no scooters were available, but leaving aside those points, if somebody consists the perceived level of quality, so for these two examples we will see that the perceived level of competence of quality was very high.

And obviously, quality will mean that what is the level of confirmation of 2 standards. So, to what level the product may exactly be utilized as the designer has intended, say for example, if I am using shaving machine, and then my main criteria would be the whether it is able to meet the criteria for which has been designed or say for example, if say for example, I have a vacuum cleaner.

So, I will try to basically see that the overall features based on which the machine has been denied designed is able to meet the overall level of quality and the services or the product of the services of the intangible goods for which I have basically purchase that product, with that I will close the first lecture amongst these 40 lecture series which is there for the twenty hours for total quality management.

So, as I said that the first few lectures would be more quality (Refer Time: 28:45) nature and then later on depending on how we have picked up, I will basically fasten up the phase, such that we can cover the different type of quantitative concepts of quality in merge depth, and utilize the concept which I am basically discussing throughout the lectures in such a way that they would basically make a sense that how the qualitative concept we are studying.

How the quality concept which is she see on the sharp floor, on the services, which are being rendered to me or the services which I am basically giving to my customers, there I can utilize the different types of quantity concept which I learn, or which we learn through the overall course such that they would make sense, that how quality can be brought into the picture in a everyday life to improve the overall life and overall quality of the services of the products which we either deliver or which we purchase from different type of vendors, thank you and with that I will close this first lecture, and then I will start with a second lecture depending on the other concepts which are to be covered.

Thank you, have a nice day.