Six Sigma
Prof. Dr. T.P. Bagchi
Department of Management
Indian Institute of Technology, Kharagpur

Module No. # 01
Lecture No. # 25
Quality Function Deployment

Good afternoon, we resume our lecture on this series of lectures on Six Sigma. And the particular topic that I will be covering today, in this session here is called Quality Function Deployment.

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It is a key approach to try to design new products and new services. And this is quite different from the way the products or the services they were designed and offered in the marketplace conventionally. This is quite a radical departure, it takes you a lot closer to the user, it takes you a lot closer to the market place to the actual place of use. And it let's you interact a lot with the user, the potential user to try to make sure that, his requirements are understood and they are met by the final product or the service, that they are going to design.

It (( )) away with a lot of stuff that is bells and vessels on the product you know, this is a pen that is a writing medium. And really I do not have I do not have the need to have a

digital watch there for example, there is just no need for such a thing I perhaps, if it is an ink pen I do not want to have other kind of gadgets here, which is just not required.

At the same time, I want to make sure the requirements for example, when I put it in my pocket, then the clip stays the way it suppose to be; the pen does not fly off number one, the cap sticks it shuts with a clip and also it produces a air tight seal. So that, the pen does not get dry when it, when it is time for it to you just put away in a storage for example, and so on and so forth.

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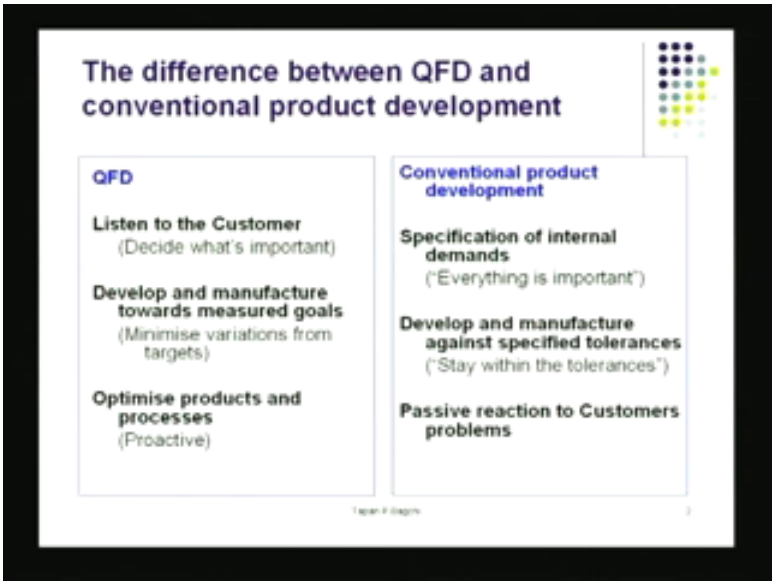

What exactly is QFD? QFD is a new approach. And let us take a look at some of the differences between the conventional approach to design a product and doing it the QFD way, QFD stands for Quality Function Deployment. And we will talk about this quite a lot in this session as you go along and you will really see, how we are deploying the quality delivering capability of the organization.

And trying to make sure, what we produce is a good fit in the marketplace in a hands of the user. How does QFD begin? The very first step in QFD is, listen to the customer, listen to the customer very carefully; it is very important for us to listen to the customer very carefully, this is very very important. You got to pick up every signal that is there, what exactly he is trying to convey to me, is very very important.

And perhaps, will be asking some special questions, so that we catch those small which catch those small things that he might mention only very casually, but there might be very important; when it comes to choosing a product and not choosing another one, for example. So, listing is very important and this is going to be also decide, what is going to be important for the customer.

Then, we move down to the step, when we develop and manufacture, what we really try to do is? Toward measured goals and these goals are going to be set by having listen to the customer. If I have listened to the customer carefully, I have set some concrete; these are quantified goals about the design of the final product, this is what I have done by listening carefully.

Then of course, the last stage in the QFD approach is, you optimize the product and the process. What are you trying to optimize there? There you might worry about cost, you might worry about manufacturing methods, you might worry about making sure the quality is there, quality assurance methods and so on.

All of those, they have to be taught through; they have to be walk through. If you have done that, if done away with the fact, anything that is not needed; you remove that. And your effort and your resources are going in exactly to fulfill, what the customer requires. And then, the place is going to be the the placement of the product is also going to be the best possible placement. What is the difference between that and the conventional approach?

Let us, look at the conventional approach to designing a product. You start with what we call specification. So, its if it is like a pen it is like a pen. What are the specifications of the pen? First of all, let us look at the two parts; we got the cap, the cap has a clip and if we look at a little closer the clip. Clip has a little tolerance there, so some numbers will have to be given there, this is a length of the clip there then, we come to the top of it; there is a certain curvature there, that gives it some perhaps an aesthetics then, you look inside; there is a hole there and the body has to go in there and that fit has to be air tight.

So, that the ink does not dry out, when the cap is on and also it should not be too loose, so that you know it should not fall off. For example, when you are walking (( )), there also should not happen. Then, you come to the body of it; there is this size and physical dimension.

Then of course, the actual writing media in fact, the ink the choice of the ink and the choice of the tip of the of the pen; all those things, they have to be specified. In the conventional case, all these specs they were given, they were given equal importance. Everything had to be specified exactly the same way, there was no such thing that, the clip is more important than the tip or the or this tail is as important as the tip and so on, so forth.

In the conventional approach to design products all specs, they were given equal importance. And who actually wrote those specs; those who are probably written by the draftsman in many cases. Sometimes by the engineer and at other times, it is also possible that worker from his experience he put down some tolerance there, that is there. So, it is not determined systematically, it will not determine scientifically. And that is like one big difference between the conventional approach to design a product and they doing it the QFD way.

Of course, then what we do is? Once we got the specs there, then we design our manufacturing system. In the conventional approach would then say well, now we have to coming perhaps, for the cap we will be doing injection molding, and the specs are given there for therefore, that is going to give us the size of the holes and everything else; when I design that little little die that is going to be casting these little plastic caps, that will come about only after I have given the specs for this.

Then of course, I have got very passive reaction to customers. People come back and say that, look your pens your pen seems to be slipping off the gap. I would not worry too much about it; also a few pens do do that. Really again, what I am doing is, I am not I have never really listen to the customer and I design things my own way. This is not a way; this is not a manner in which you would succeed in the market place.

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What are some of the uses of this new approach called QFD? In fact, it turns out that, you become better to make demands on the process capabilities that we have, the quality deployment capabilities that we have, the quality delivery capability that we have in the company. Your demands become sharper; you would become demands become more precise. You follow a systematic working method.

In fact, it provides you a direction that is well thought out that is what it does. When you are trying to develop a product using the QFD approach; your directions set for very clearly. You collect the appropriate knowledge, it is very important for us to realize, that we collect the appropriate knowledge. And we transfer the knowledge to the right person. Who is going to be using that knowledge to be able to do, it might require some training, but we will do that.

We also do systematic evaluation of existing product; this is sometimes not done in conventional approaches. In fact, what we are trying to do here is, we are learning from the mistakes and learning all those different ways by which the older products; they did not succeed in market place. Why did not people like the older products; we never bother finding that out actually in the conventional ways.

Then of course, the problem is we have design changes that take place, we have design changes that take place, but if I use the QFD approach; there are fewer design changes later on. Most of the changes take place early on in the designer stage later on of course;

I do not have that problem there. The total development time of taking a product from concept, all the way to the final not only prototyping, but field testing also, this total duration is reduced by 30, 40, 50 percent by the QFD approach.

And the needs of the customer that pick up the sharpest focus. And in fact, it turns out every activity that you then do in the design shop or you know trying to make sure your manufactured system also is able to deliver, what we are gaining up to do; the focus becomes really very sharp. These are some of the uses for for QFD for using QFD going the QFD round.

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What are some of causes by which designs may fail? Not enough basic knowledge on hand that is like one of the reasons. And read the other ones; corporate cooperate managements view is very simplistic. If they think of a new product, they just think well we have done something like this before, what should be the problem in trying to do it again.

Too little activity at the beginning of the project that is also this is also a big problem. It is very possible many times, that we do not do enough homework before we begin the project. There, maybe unspecified demands and constraints those also maybe imposed and that is why design designs may fail. There maybe non exciting specifications or there may be bad specification. There, may not be enough time to be thorough, this is very important.

And I may actually turn out with I may I may you know launch a product without without appropriate without realistic time frames, I may go ahead and do that. And also generally speaking, you do not have good cooperation between marketing people, the customer, the designers, the engineering people and the manufacturing people. You do not have do not have good good cooperation between them, if you do not have that your design is likely to be to fail.

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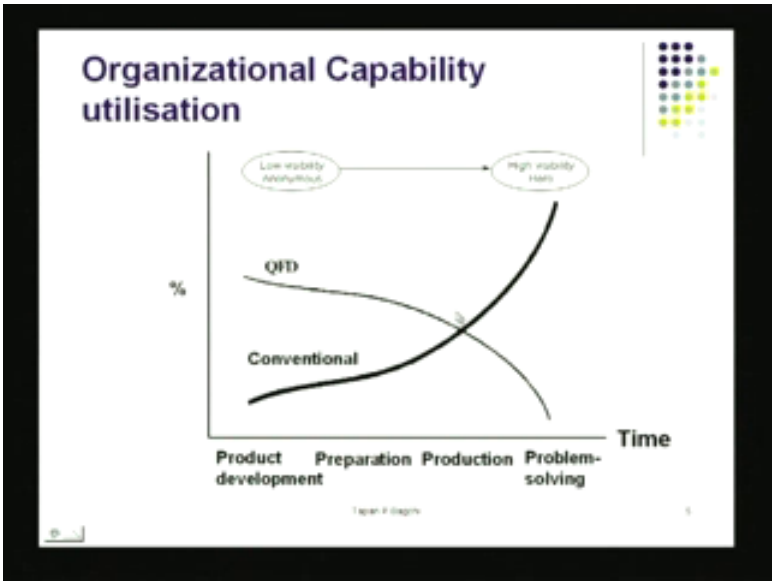

Let us, look at couple of couple of profiles and these are the profiles of utilization of the capability of the company of the organization. There are various capabilities involved; For example, product development that is a very major capability of a company. Preparation to move toward a new design and gear up your production facilities for that, then do actual production, then we do trouble shooting, problem solving, field service and so on, so forth. These are various types of capability that the company has.

In the conventional method not much of the early part of this work is done not much of the early part of this work is done. In fact, most of it piles of being problem solving toward the end towards the end of the project, that is where most of the activity tends to be pile up. And that turns out to be the, what is the activity that really picks up weight there? It is problem solving, because I have not done I have not done good work, I have not done enough work early on in the project.

As oppose to this, what QFD does? It spends a lot of resources and time right early on. In trying to develop the right design, understand specifications perhaps, do some prototyping, perhaps crosscheck with customers and so on, so forth. Prepare very well make sure production people are in gear with whatever is coming along. And the result is this there is hardly any problem solving issue left there is there are hardly any problem solving issues left, when you follow the QFD round.

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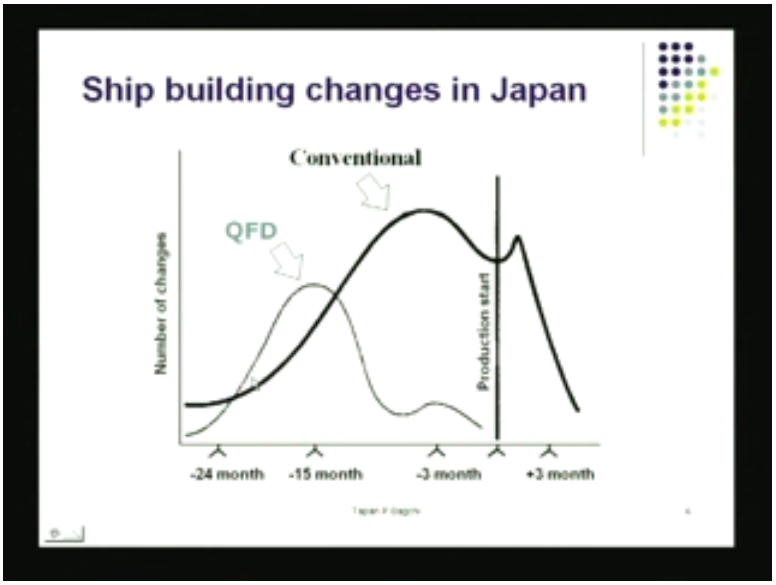

Again, if you look at the history looking in look into the history in Japan, QFD actually started in the shipping industry. There is a town in Japan called Kobe, some years back in the 80's Kobe had a huge earthquake, that is how many people heard of Kobe, but Kobe has a huge shipyard. And there they built these large ships; there convention was the convention was that, they produce almost a complete ship, then they will bring in the bars.

So, there ship was already standing in the in the shipyard. And then, they will bring in these bars and the bars would take a look at them. And the bars would probably say well I do not like the mass there, I do not like the you know that that placement of the anchor there, I do not like certain things. Why do not you make those changes then, I will take a look at the ship again. And then, perhaps I will make the big I probably say how much I want to pay for it and this ended up with a lot of changes that had to be made on that almost complete ship.

This is very costly, because the customer would not pay for all these things. They would just say, this is what we want, if you want to sell it to me give give me the product the way I want.

The difference between that and the new way of designing a ship that came by the QFD way was, involve the customer early on; making sure and we will be doing that with couple of examples could be doing that. And I will show you exactly, what is going to happen, you involve the customer early on, that is like you launched it. For example, the ship might take couple of years to build some about 2 years before that. As soon as, the the concepts start kicking off, you involve the customer and you start your activity right earlier on.

So, you put in a lot of work right at the beginning. And then, the other work they follow, they became much smoother. So, in fact if you look at the profile, they look at the resource requirements and the profile of the two approaches to design a ship in the conventional wisdom; a lot of work is done towards the end of the project. In QFD a lot of work is the done; front end of the project that is, when you are try to hammer out concepts and so on, so forth. And I show you exactly what is done at that stage of the thing.

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They slowly start getting into, what we call the cost of arriving late to the marketplace. Suppose, there are delays, suppose there are problems like this and the result is this is

going to be causing some delays in the reaching in the marketplace. Look some of the activities are continuing and they are going beyond the deadline. This was the committed deadline for shipping the product. And I am still continuing to work with it perhaps certain things the customer does not like or certain things do not do not work or the specs are wrong or something and I keep continue to work work on this. When I do this; the problem is I am late in reaching the market.

If I am late by 6 months in ship building; my profit goes down by 33 percent. If I am late by 5 months; one quarter of the profit is gone and so on, so forth. Even, if I am 1 month late; there is some profit loss. why should these be there. Why should these losses be there can something be done about it? yes if you change the convention if we, if you throw away, if you walk away from the convention practice and you go towards the QFD way; a lot of these cause would just disappear.

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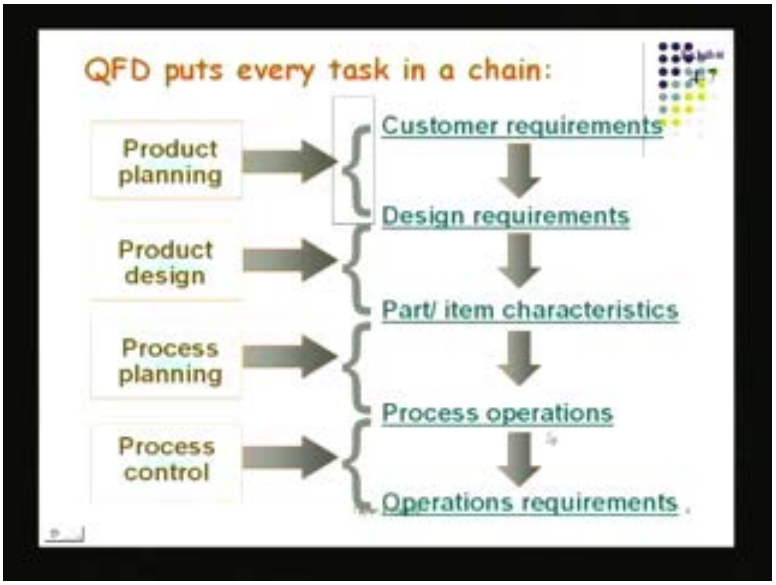

And let us see how that happens, QFD puts a task in a chain; every task is actually put in a chain. For example, when you do product planning; you are interacting with the customers and you are determining customer requirement. From that, you will come up with hard numbers, the design requirements. So, I find out customer requirement from that, I determine my hardware requirements, these numbers.

Then, I go into details of my product design and I come up with requirements for the parts and the items and the materials and so on. So, I start with my design requirement

and my product design will end up specifying the parts and the item characteristic, that is what happens there. Then, I do process planning; I have to produce these products, so I go into process planning. How am I going to be producing this final product will that those would start with the parts of the items that I need.

And the process operations that must be there, the features of process operations must and should that I am able to deliver these characteristics. And of course, once I have got my process operation specified; I going to process control; I say how am I going to be controlling that process. And I specify the operations requirement.

So, what have I done? I started with customer requirement from there; I determined my design requirements and you will see, how I do that. Then, I spell out parts and items that I realize I require. Then, I will come up with process operation. These are the process requirements that I have, in order for me to produce those parts and item. Then of course, I have got some operation control issue that that I have to settle after a specified, what are the different processes that, are going to be there.

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So, what is QFD? It is actually an optimization method; it goes from product concept all the way to production. So, we start with product concept and you rise gradually to the level of doing actual production, and you do it very systematically. Let us see, how we do it?

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We will start with QFD recognizing that, QFD is a tool. And QFD is actually quality tool; what is the quality tool? It is something that is going to raise the level of satisfaction that the customer is going to have with my product, that is going to be the role of QFD, that is going to be the character of QFD. It captures the voice of the customer.

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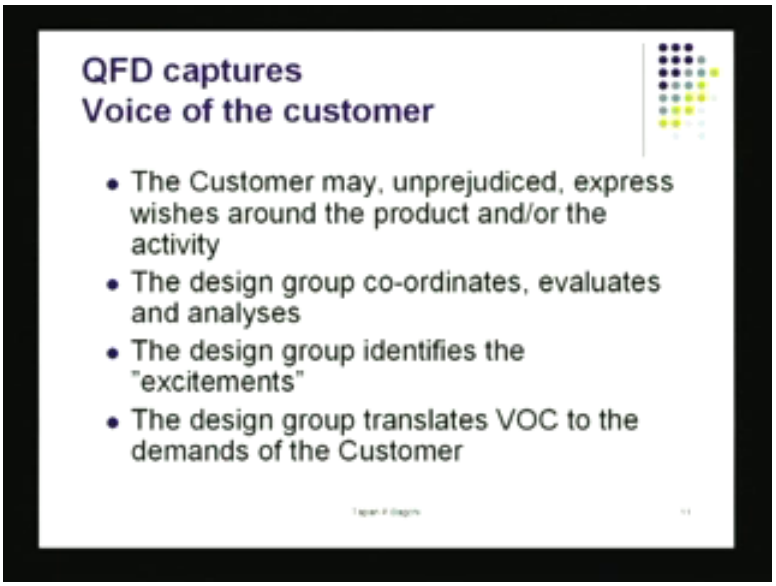

This is perhaps, the most important thing that QFD does. How does it do it? The customer may expresses wishes around a product or the activity. He may just say, I wish I had a product that did like this, like for example, we could do QFD even for a pen, for

example. And the customer probably say, I want something that I can hold in my hand that I should be able to write; it should produce you know scratch or a or a mark that is almost like it has come out of a of a regular regular pen. And it should not dry out very well, it should close very well; it should be portable; it should be sleek and so on and so forth.

So, the customer will come up with its her own requirement I do that. Then, what we do? We get the design group together. We say, well here is a customer he she spelled out these requirements, she spelled out these different requirement and having spelled those out; I now I now have an idea about, what she requires.

Now, let that creative people; the designers get together and see that, how am I going to deliver this requirements? I have to eventually produce something that is going to be a tangible hardware or perhaps a piece of service; I start with the requirements and I slowly convert those into this product.

And this part is creative. This part is, when the designer team is involved. And they do a lot of creative thinking to try to see, how I can take something that is as vague as some wishes. And I eventually I have to come up with specifications that are hard, that are like tangible hard codes or numbers and so on and so forth. These are going to be the starting point for me to do my actual physical design work.

So, the design group will then basically identify these things and they will come up with specification, they will come up with details and so on and so forth. I am going to give you an example, how this is done?

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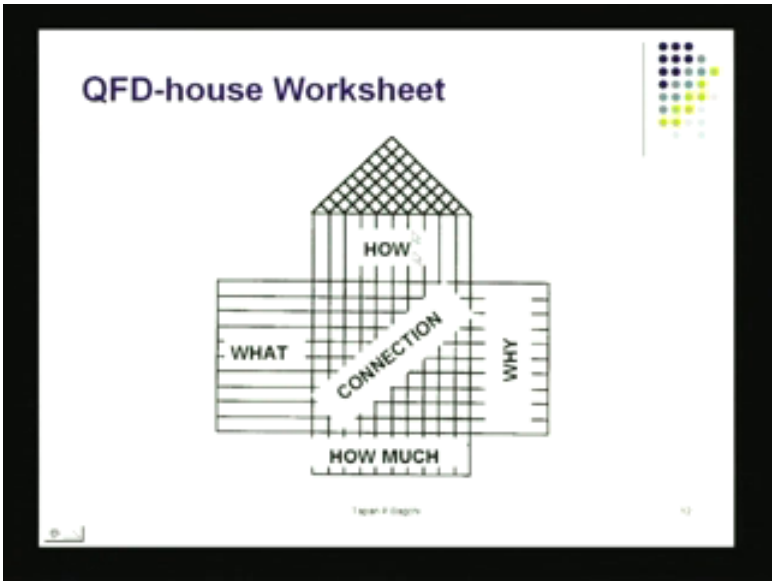

This total task by the way, the total task of QFD is organized in a worksheet. And the worksheet looks like a house as I show here. What does this house comprise? It is got a wall here, which is got the different requirements as spelled out by the customer, those are put out. So, the requirement customer requirements are put out here. Then, the engineering team gets together and they try to look at these and they try to say going to try to take care of those requirements I have to do, A, B, C, D; these are the various things I have to do. And to to make them as part of the product only then, I will be able to take care of these requirements. So, these are the how I am going to meet those requirements, and these ideas have come from the design team.

Now, why am I doing all this, well partly because there is competition. And partly because, I am going to be reaching a high level of satisfaction. The final product will have a high level of satisfaction, that is why I am doing this. The house are then, converted to how much, now these are quantified numbers, for each of these requirements. Now, these are customer requirement and these are going to be design specs; and design specs actually they end up being numbers. And of course, up here you got a correlation matrix there and also you got the correlation matrix there and these become a little more clear, when I go to the next slide.

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This is the next slide and let us say, I am trying to design a service facility that will produce dry clothes. It is a dry cleaning dry cleaning operation that I want to set up. There already are two, three other guys, who are doing who are in this business in the same area; it could be the IIT campus for example, somebody wants to set up a dry cleaning shop, what he does?

He does a survey of people, what are the different things customer require. And this is the left wall of that house there. And customer survey reveals that, people wants their shirts to be completely clean, they want the press to be complete, perfect press. They, do not want delays at the counter. They, want quick turnaround service. They, want friendly service. These are some of the requirements that customer have pulled of.

And when I talked to the customers a little bit more they say, as far as, I am concerned clean clothes are priority number 1, perfect press is priority number 2, quick turnaround is priority number 3, friendly service is 4 and no delays at the counter is 5 in order the priority. These are now the customer requirements and I have got the importance to the customer also pulled out here.

This is come by talking to the customer, this is exactly what the voice of the customer is. Then, I get my design team together. And these are the people who are knowledgeable about the operation of a dry cleaning shop. They have worked in similar areas, they have

probably run some shop. They, probably run some some machines, that do dry cleaning for example, and so on and so forth.

They come up with they say well to be able to deliver these things; we require a good training, we require a good dry cleaning fluid, we require good filters on the thing on in the in the system. There should be no rust in the in the in the different solvent lines; the press pads should be firm. And of course, equipment maintenance must be also top notch, if you do these things; you are going to be able to take care of these requirements.

So, notice here this did not comfort the customer, the customer just gave me these and these came from my own people that is the expert you know there there operators, there designers and so on. They they are familiar with the dry cleaning business, they are the ones; who say, if I have these things we should be able to do that. Then, of course, we got some important meanings here and that will come along.

And we quantify some of these (( )). For example, how much training should be there? The team resides that a good practice would be 4 hour of formal training 4 hours of formal training and two weeks of on the job training should really get, someone someone ready to be able to take take charge in the shop there.

Are the dry the cleanliness of the solvent should be checked visually and daily. And again, cleaning of the filter itself that also could be checked daily in a in a this thing. And of course, I have got no rust in the (( )) that also has to be checked visually. As far as, the presses are concerned; those pads could be changed monthly. And of course, good equipment perhaps; there should be a maintenance schedule, a monthly maintenance schedule that will take care of that.

Then, what we do is? We look at competition; this is the point, why is it that we have to design a super duper dry cleaner shop? The first thing is, we got to succeed. We want to succeed in this business in the market place, that is why he is putting all this effort about understanding, what the customer requires? And I got my team together to find out, how long it take care of those requirements there, these are the what is and these are the how.

And on this side now I do a comparison, I look at my competition; there are two competition, there is one competition A and competition B. And I rank on a scale of 1 to 5 I rank on a scale of 1 to 5, 5 is the best, 1 is the worst. Where are A and B in regard to

meeting this requirement there and for this I may have to do some spinning or I may have to actually produce some clothes to give them some dirty clothes. And see, how clean those shirts come out, how good is the press and so on.

And I do that, and I climbed up rank A and B both, businesses on the scale of 1 to 5 having done that. I also try to sort of find out I have got to set my own target. I have got a profile now for A and also I have got a profile for B; it turns out that I want to design my new shop in such a way, it is better than both A and B. Also, I want to design my shop in a way that is going to be better than A and B again, but A and B are at level 1 and 2, I need not go beyond 3.

As far as this factor is concerned; no delays at the counter. I am providing a lot of good service. So, there is really no need for me to try to overtake A and B. I could just be there and that will probably good enough for me I can change that later on, but at least initially it would be good enough for me to do that. Friendly service, well my service is probably not going to be totally friendly, because the other guys they do not do a good job in dry cleaning, but they have very friendly people there I will just start out with the people that we have right now.

Then, we will worry about a receptionist and everything else. And as far as, friendly service is concerned we want to be slightly better than the other one. So, I set these as my own targets then of course, I set my technical targets also targets also. So, here in the final specs of things the the once that I have marked x those are going to be my requirements. And what I have ended up with; I have ended up with the specs of a new dry cleaning business and I have done this very carefully. I have started with customer requirements then, I found out you know what what the means would be to try to take care of those requirements, then I looked at competition.

I tried to find out, how well they were meeting these existing these found these customer requirement that I have just found. Then, I decided based on the profile of my competition as to how I am going to set my own target, the specs for launching my own dry cleaning business I do that. This is now, much more systematic than just saying go into a business and set up the shop like anybody else, we are doing it much more precisely.

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Just an overview of QFD; the history is it started with ship building in the Kobe area and it was adapted then, later on by many western companies almost every western company. And certainly, automotive pump companies they are using this. And it turns out QFD is now an important step in I in the DMAIC procedure of six sigma. Some of these questions are still probably there. What is QFD? QFD is a way to convert customer's voice into product specs. Why you use QFD, you will end up with a better fit and you will reduce a lot of wasted work.

And what are the characteristics? Number 1 is very systematic, number 2 it involves people, number 3 it gets commitments all the way across. And people find out exactly very clearly, they find out what is going to be their role in making sure that, the customer has the highest satisfaction. And the companies resources, they are deployed in the best manner possible. And of course, I have got some more slides here that gave me some more background. And you can review them you the way you want, I want to really move up to something that is going to be another aspect of talking to the customer.

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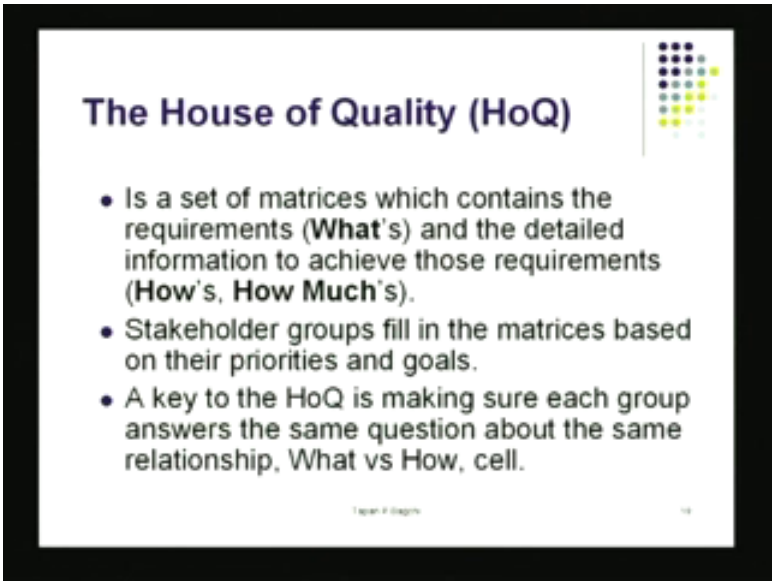

And that is going to be done by going away from the voice of the customer to the mind of the customer. And let us see, how we do that? As you go into the the design of the product itself; you have various various requirements that have been spelled out completely clean perfect press and so on, so forth. And all these requirement equally attractive to the customer.

Now, this was something that we did not do when we asked the customer, they we just asked them of what you consider to be important that is all. But, we did not really get into his mind and that is done by this new approach, called the Kano model of probing a little deeper into customer satisfaction.

And let me show you how that is done. And I am going to be doing that by going to I am just flipping through the slides, which are basically informative only. And I am going to be going to this Kano model slowly. And that is going to take you to the point, when you will know that it is important for me, not only to know what the customer requirements are, but what do they (( )) them.

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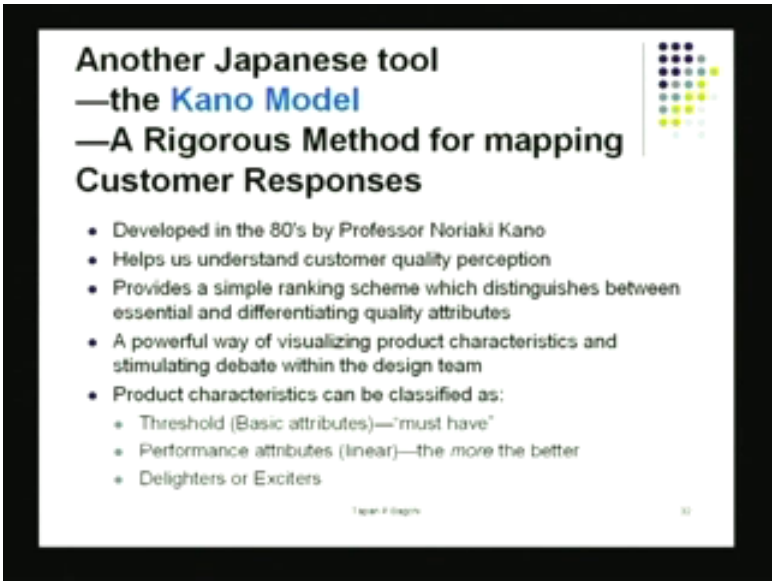

This approach this new Kano approach was created by professor Noriaki Kano also from Japan, like QFD that came from Japan; the Kano model has also come from Japan, what exactly is done here? It helps us understand the perception of quality, in the mind of the customer. How does he or she view a particular quality characteristic? what is the what is her perception and I have not said much about this yet, but let me just do that, by going going right to the bottom, which is there are certain quality characteristics that are basic requirements, these are the must have.

And I am going to give you some examples here. So, as far as dry cleaning goes; obviously, cleaning clean clothes are a must, firm firm press also is a must. This is something I cannot do alone, perhaps these are functional; perhaps the must is a good prize only, it must be of good prize. But, as far as functional characteristics go; as far as performances go; perhaps it is clean cloths and perhaps, it is firm press, these are going to be there.

So, I have got a must there, the must requirement is at least it should be, it should not costing more than what it cost me in the marketplace, that is my dry cleaning service. But as far as, functionality is concerned; and these are attributes, the more the better. So, cleaner is the clock, cleaner is my shirt; the better it is, the firmer is the press; the better it is that is a functional characteristic.

Then, there are other types of characteristics, which delight the customer. It could be for example, friendly service, it could be reminder that you your your shirts are ready for example. Perhaps an s m s, if I send an s m s on his cell phone is, sir or mam your clothes are ready; you can pick them up pick them up any time, that is going to be delighting factor.

So, let us go back again and let us try to find out, how Kano changes from QFD, how the Kano approach changes from QFD; In QFD basically you pulled out all the requirements and you have done that with very careful study of customer requirement. Once you have done that, you have a pretty descent idea to be able to go into this business. I know my customers, my my competition, my competitors you know, they are also offering some of these similar services.

I have got to make sure I provide better service than them for example. But, perhaps there are parts of it, that are viewed differently by customers; differently in sense you know, having clean clothes and getting an s m s that my clothing are ready. These are needs or rights, but one is sort of like a functional requirement. If I given for cleaning its got to be its got to be come back clean, it is got to have good press, that is a functional requirement.

The price has to be right, that is a basic requirement. If the price is not so good; I am going to be dissatisfied. As far as the functional satisfaction, functional requirement is concerned, they are more the better. But then, there is this s m s is a surprise factor, a complete surprise factor, that is something that delights you you will feel like doing more business with him. This is exactly, what is bought out by the Kano model. This was not there in old QFD, but by putting it by converting it to a Kano sort of framework; I am now distinguishing between different types of needs that are been spelled out by the customer.

Now, we are saying certain things are basic. I cannot really take chances with them, because that is the price by entering this business. I have got to make sure, the price is right otherwise, it is not going to come to me number 1. Number 2 to keep him there and to make sure that, my prime business continues I have got to provide the basic service not the basic nor the functions services, the way it should be. And further again, I went back to the different requirements and I found out and I figured out and this might

requires some interaction with the customer that, firm press and clean cloth. These are you know something that is right, the more the better.

So, these become function requirements different from the basic requirements, which is only price. Now, these are function requirements. Then, is the third factor. Suppose, these two are there these two already there what would make you to go back to a particular dry cleaner and not to other one, perhaps the guy, who sent you that s m s, sir your shirts are ready, that is going to be delighting factor.

So, this way we have gone beyond we have gone beyond basically just hearing the voice of the customer. Now, we have probed into his mind. And try to try to find out you know what really are his basic requirements that, really would get me into this business for example. Then, what are the things that he expects more of approx you can even pay bit more, because of this. And those are the function requirements and what are those extra things that, basically delight him; they are the surprises. And they are the ones that, we look out for whenever we have a purchasing experience for example, we do that.

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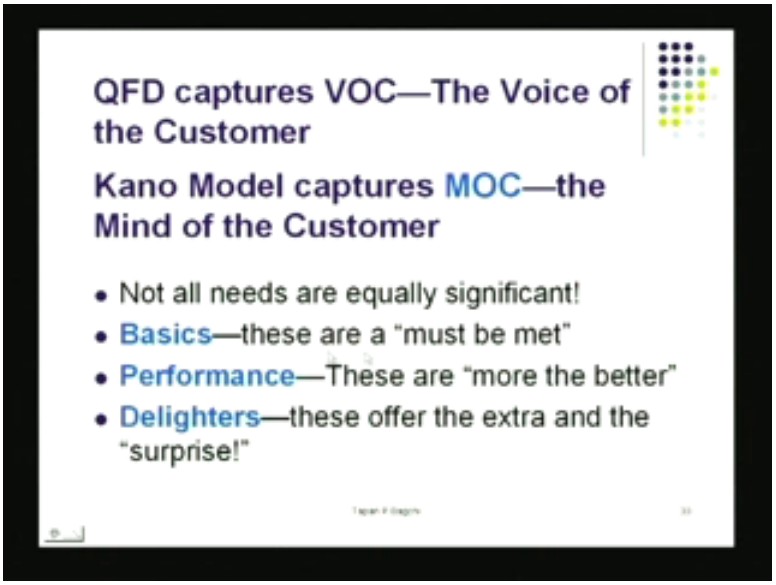

So, basically what we are talking about is the Kano model; captures the mind of the customer. The basic requirements must be met, there is no escape from this. The performance requirements the more the better. They clean up the shirt or the firmer the press the better for us we feel better. Then, these delighters just like that s m s that, arrives as soon as my shirt is ready, it is like a worry that has gone of my this thing.

Because, I am now trying I am returning from the office time is 6 p m and I do not want to make a call to that to that person there, it would be nice. If I could get the collect the shirts today, it would be really nice as I walk by his store you know its just a you know probably stopping for 2 minutes and picking up my packet that it that all it is.

And I would really like to do it. But, I do not want to make this phone call, because I am too busy anyhow, I do not who bothers about making a call to his dry cleaner for example. But, (( )) at 3:30 I get a s m s as says, sir your shirts are ready, that is a delight; that is a absolute delight my god you know these guys they really think of us, they really think of customers, that is going to be that delighted, this is the extra. And this is always there.

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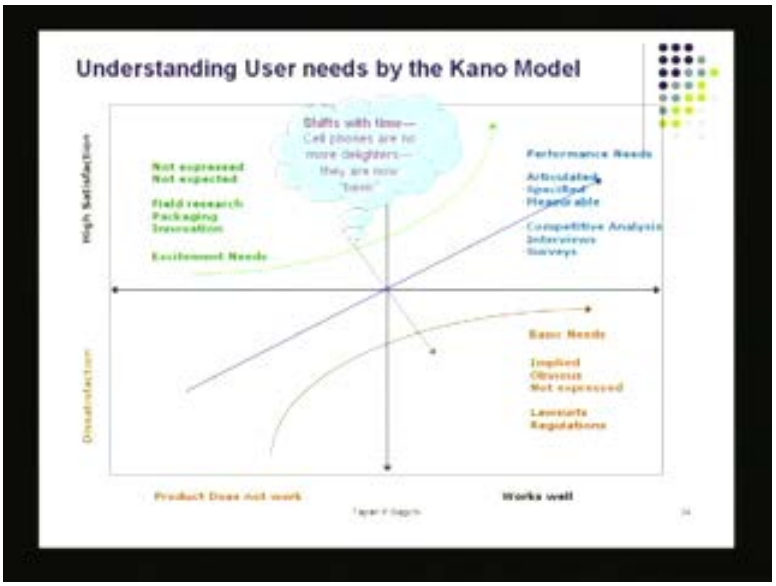

Let us, take a look at some of the pictures pictorial view of this Kano model there. There are two axis there are two axis there; there is horizontal axis that basically talks about the functional characteristic of the product. On this side the the midpoint is the neutral point; midpoint is just the beginning is the neutral point there. As you move toward the right; the product has a better and better job.

As you move to the left; the product does worst and worst type of job and you know down below here the product is not work at all, no clean shirts in this area and you really got medium cleanliness and over here, you got better cleanliness with that, there is something that we call, performance needs of going to a dry cleaner those are those arise

as you move toward this side, those rise the more the better. Those are performance needs, these are articulated, these are specified, these are measurable, these can be found by talking with a customer. And these are useful in comparative analysis and interviews.

In fact, the old QFD basically focused on this only; the old QFD. And this is about comes out in the voice of the customer. But, if you start probing into the mind of the customer, you discover two other aspect; one is these needs, these are called the basic needs. And the basic needs are such, if they are not there, if they are not delivered; dissatisfaction is high. So, in this lower part; dissatisfaction is high. But, you really do not get delighted, if your basic needs are met, you just rise to a certain level Plato and you stay there, it is not really become all that mode better.

For example, price could you know price you realize everybody realizes that, you get a shirt clean for example, it might cost 10 rupees as an example. In certain cities it will cost you 10 rupees in a store and that is kind of a basic price, you do not want offer 4 rupees or 2 rupees or 3 rupees, because it will be trash job then. So, (( )) services they are they are offered at 10 rupees. So, that is like your basic need, you do not want that price to be high. If it is like 20, 30, 40 rupees; obviously, is going to be hurting your basic need; your basic need is make the cleaning business affordable, make mainly make the dry cleaner of an affordable that is like basic need.

So, the basic needs beyond a point the dissatisfaction disappears, but you do not really get delighted or something like that, it kind of an levels of this point. Then, these are these other factors, these factors are of a different category. They different from the basic needs, they also different from performance needs.

These are the excitement needs we want to be thrilled once in a while, we want to thrilled and that would come like that s m s that comes you at 3 p m that, shirt yours sir your shirt is ready that, would come along this way. And here of course, the more the better. In fact, if there is a lot more affect; it delights us even more. And these are of course, these generally have an element of surprise also.

In fact, to win in the market place you got to make sure, your at this end of basic needs, you are near at this end of performance needs. And you are provide some elements of surprise, some element of this of what we call delight. Now that was, the basic Kano model (( )) Kano also came along and he said, this may be the picture today, but given

some time given some time, what we considered to be completely basic need you know things change with time. For example, something that delights you today, may not really delight you tomorrow; it may become a basic need.

For example, let me give you couple of examples. One example is you know cell phones with cameras; initially they were plain just cell phones. And cell phones themselves were delighted, since somebody had a cell phone I remembered 10 years ago a couple of friends of mine, who had cell phones, they could call up people in Newyork and anywhere else. Say, if they are out in a party or they were in a in a park somewhere, they were in a in they having particularly good time; they wanted to call up their dear and dear one's (( )) just go on there cell phone and make a call, the piece of delight.

Gradually as time went buy some you know 2, 3, 4 years are using that cell phone, those became basically your functional requirements, they became a functional requirement. So, they met a particular need and a pretty pretty pretty nice way they had they gave you portability and that also one of the was one of the functional requirements are telephone; which the land line did not meet. Therefore, what was delighting at one point in time, which is just having a cell phone; those became a vertically functional requirement.

As time went further on I am I will say probably today if you look at even 3, 4, 5 years ago, past 5 4 5 years; we take the cell phone to be something for granted it is a basic need. You cannot leave your home without a pen or your car keys or with a cell phone, it is like a its very basic need. If it is not there; you are dissatisfied. So, what is happening with time something that delighted you once became a functional requirement. And it has now become just a basic requirement.

The same thing for the camera on a cell phone. Initially, when a camera was built in; these cameras very poor cameras, they nothing like the digital cameras some 128 128 kilo bytes and so on, so forth. That is very (( )) very poor pictures you could bearly see the profile, even in a news paper prints so better than a picture that you took with with a cell phone camera, but they give you something extra.

Some kids who had the camera with a cell phone they; obviously, delighted all the people wanted to (( )), this is a factor that was delighted. Then, this capability started to improve and improve, and today it is become functional. And I am pretty sure, the time is not that far, when we will consider we will take it for granted that my god, if I if I get a

cell phone is got to have a its got have what we call cell phone, its got to have a little camera built in there.

Now, something that is not there probably in lot many telephone, it is a recording device. So, if I do have a conversation that I wish to tape, perhaps there could be a button there and I could tape my conversation, this would be delighting factor today. As time goes while those would gradually become functional, then they those might be basic needs.

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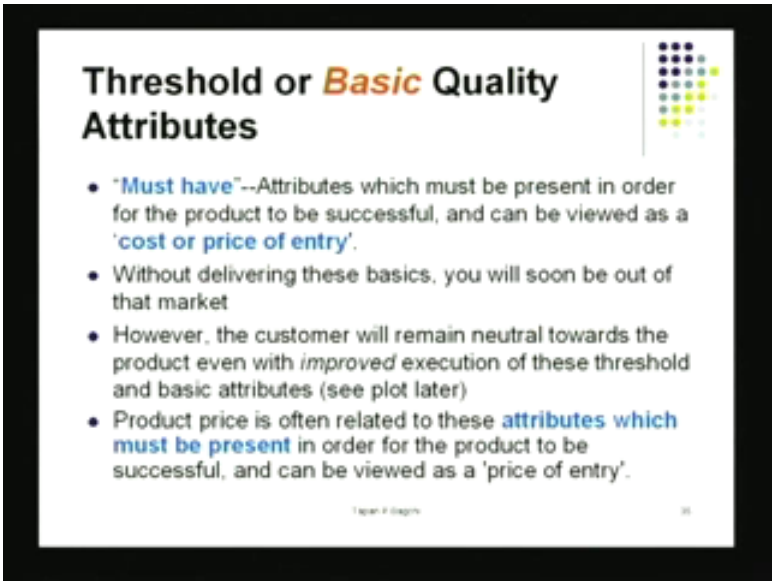

Now, going back again with the Kano model; we got the basic requirements and these have to be found out by interacting with the customer. And basic requirements are such, these are the price of entering that business. This is the cost of price of my entering the business, I got to meet, I got to take care of these. If these features are not there in the final product or the final service; the customer is going to be dissatisfied. Lot of examples are there for this (( )).

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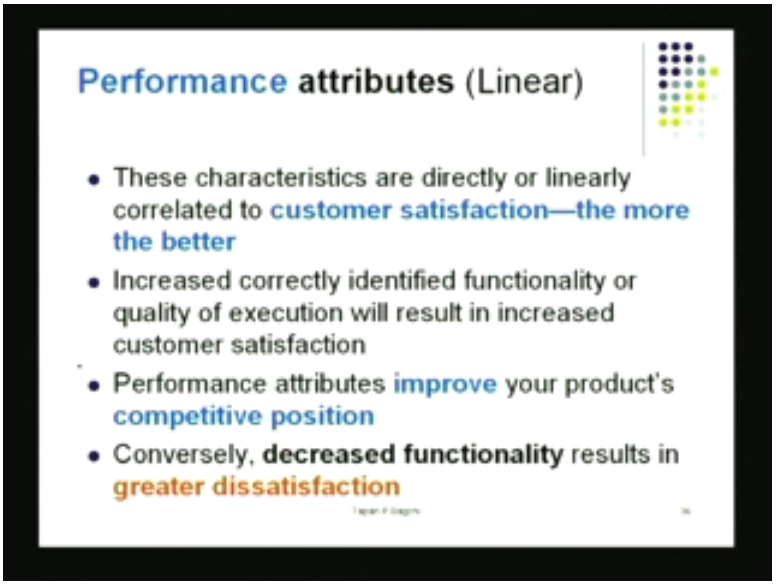

Then, we got performance attributes; performance attributes are those things were the more the better; customer satisfaction rises as a provide more more of these performance attribute.

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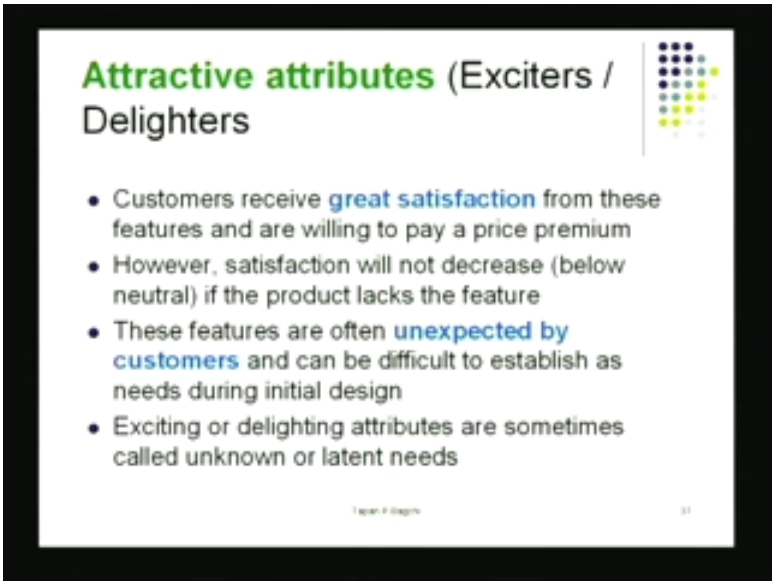

Then of course, what we what we have is the exciting factors. These are the once which are they generally come in with a with the with the pinch of surprise. And these offer the unexpected and these really offer sometimes great satisfaction and in the in the case of the of the dry cleaning service, for example.

We realize raise the price that the store is offering that its basically basic requirement. Function characteristic; which basically gets into your you know the cleaner the better or the form the press the better and so on. So, that is a functional requirement that is there. Then of course, because the delight factor and the delight factor you know this would require some in geniality.

Now, you are really trying to work with the upper levels; the upper levels of mind there, you are not looking at just the basic physical requirement. In fact, the older QFD focused mostly on functional requirement; it took the basic for granted; it took the basic requirement the basic needs for granted. It did want to make sure you did not leave out in a basic requirement, but it did focus a lot on meeting the functional requirements.

I did everything like we did for the for the case, when we are trying to design the dry cleaning shop will looked at cleaning fluid bla bla these things; those are all functional requirements. We did not put in the s m s requirement here, it is not even taught away, it was not even mentioned by the customer, but that is what we thought of, when we thought a little hard we said they are these are the guys, they are also offering offering, what we call dry cleaning service.

And what is going to delight the customer that is going to bring him back to my just an s m s. Of course, s m s of course can also be pretty tiring like I am pretty sure, every time I make a transaction on perhaps internet in your bank account, you probably get an s m s, who cares we get 17 s m s in a week. And even we forget, what the transactions had about and so on so forth. So, those are become virtually, because they are automated; they had become nuisance now. So, one has to think very hard you know what something offer, is it going to back fired form.

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So, what is the story in doing all these things. You got to make sure, you understand the customer, you got to interact with him, you got to make sure you take care of what we call initially the functional requirement that would come from QFD plain old QFD that would take care of that. QFD will help you transferred once you captured the voice of the customer, which are the different functional requirement that he requires, where the more is better is the is the good way.

How will you design the product and then, the process and the quality assurance system to make sure, the customer eventually gets what he wants. And he get that high level of satisfaction with that. Then of course, try to see if you could come back and offer the higher level of satisfaction, which is through the Kano model. If you are able to locate any of those delighters, if you are able to do that, you are bound to win.

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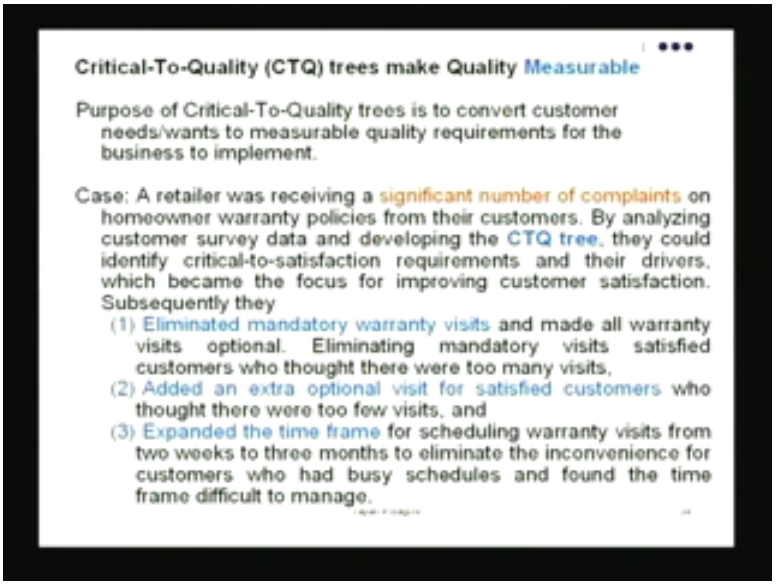

There is really going to be not much of an issue. If you done all three steps, something else you got to make sure is, if you do spell out something to be a quality characteristic please make sure, it has measurable. And this is called this is called CTQ, Critical to Quality.

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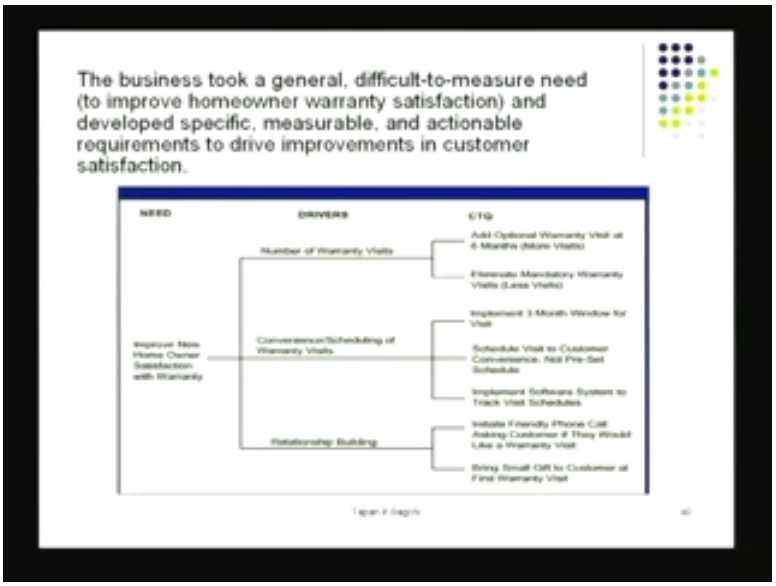

Some characteristic that you can measure; it becomes a CTQ, Critical To Quality. And of course, make sure there is a strong link between that and customer satisfaction. So, at the end of your design; you should clearly spell out those characteristics that are critical to

quality. And make sure your process is design to deliver them, your quality assurance system is design to measure them. If you done that, (( )) onward and upward for you and your business. We will continue with our lecture, thank you very very much thank you.