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

Lecture No. # 12
QS 9000 and Awards

Good afternoon, we resume our lecture again what we will be discussing in this particular session is there are some advantages in going to good practices.

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And if you remember right, I had mentioned to you that in one of the earlier lectures, there are certain national awards available; one of them is called the Baldrige award; the other is called the Deming award; then there is the European quality award, and of course, in India we have this award called the Rajiv Gandhi quality award. Now, there are certain advantages in winning these awards; first of all, it lifts your practices up to a certain level, when it becomes world class in a certain area that is a pretty good, pretty big advantages not only to know that you have a PhD or you have a masters or something like that, not only for that purpose that of course, has it is benefit your process begins to benefit your customers begin to benefit and so on so forth ,and it is also a huge marketing tool plus you get recognized as a benchmark company. And that is a pretty high gain it is an intangible gain, it is a pretty high gain in terms of the standing of the company in industry for example.

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I will be giving you some examples, what are some of these awards; we start out by saying the key US award, which is called the balding award, this is Malcolm balding he was one of the (( )) in the US. And he that at some point in time he decided that he wanted to set a benchmark; and he came up with this award called the balding award; he had a committee to work with him and so on, and that award was instituted in the US. And many US companies they you know, they want to be audited for this; and if the auditors feel, then they will award this award.

Then of course, there is the Japanese award which is called Deming award. The Baldrige award is based mostly on TQM practices; it tries to find out how close your operation is to what we call TQM, what is recognized to be the full gamut of TQM. The Deming award is quite different; the Deming award focuses on statistical methods.

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And I am going to giving you some of the examples and you will notice at that point that there is a difference actually in either going for the Deming award or for the balding award. The Deming award actually was the first major award that was put together and that is an international award any company can apply for it and get it. And there are some Indian companies also TVS Suzuki, for example; they have won the Deming award.

And the Baldrige award is established by the US congress, and it is again recognition for good practices. There are many statewide awards and these are like European awards, India certain awards and some of the other countries also they have their own national awards and that provide recognition. But this should not be the primary goal of the company; the goal really should be the path to improve quality, path toward improved quality.

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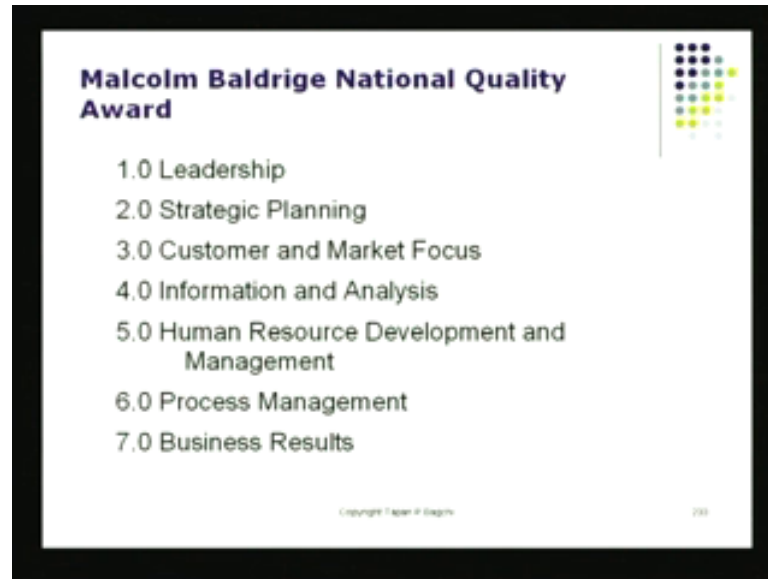
And if we look at the balding award the criteria basically is summarizing TQM. And there are certain aspects that are looked at once somebody goes for the Baldridge award; leadership is one criteria that someone looks at strategic planning is something that the auditor looks at customer focus, and market focus, information and analysis, how information utilize. Human resource development one of the initiative taken by the company to toward going this way; and also process management how good the company is toward process management and business results. Of course, notice business result is not part of TQM, but they have added it here, because only then one could really say it is worth going for this award.
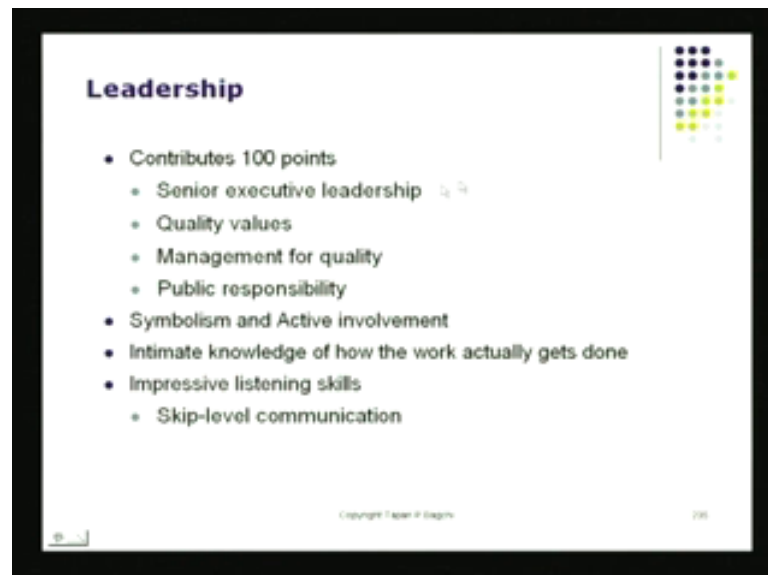
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It is a US national award as I mentioned started in 1987 and some details are given there, it is the auditor uses 7 category 1000 points scoring system. So, it is based on a scoring system; and this scoring system would look at leadership information and so on so forth, the same thing is there.
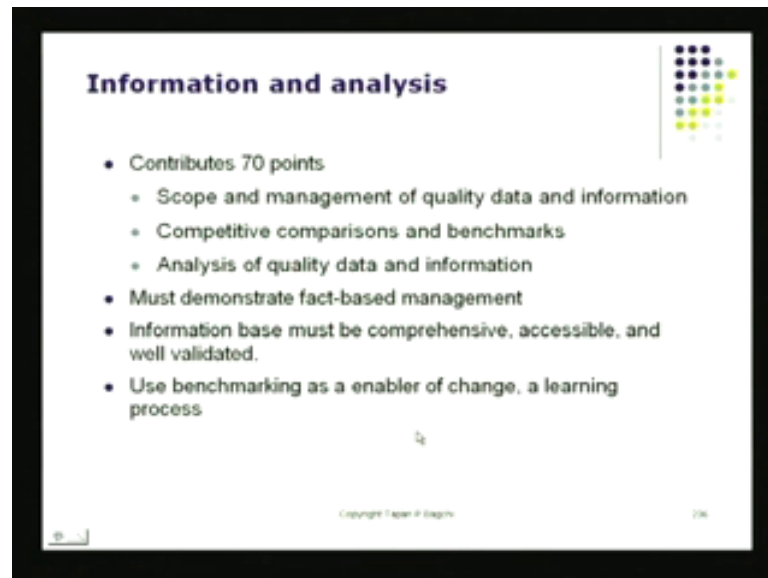
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Let me give you an example leadership for example, contributes 100 points, it really looks out senior executive leadership, quality values, the way they are projected by senior leadership management for quality, are they really managing toward quality,

public responsibility that is like an another dimension that is looked at. And clearly active involvement that is there and management stands out as the models for excellence; intimate knowledge of how the work actually gets done. That is also important this particular clause here. Impressive listening skills this is something that is really that is really desired by top management and skill level communication.
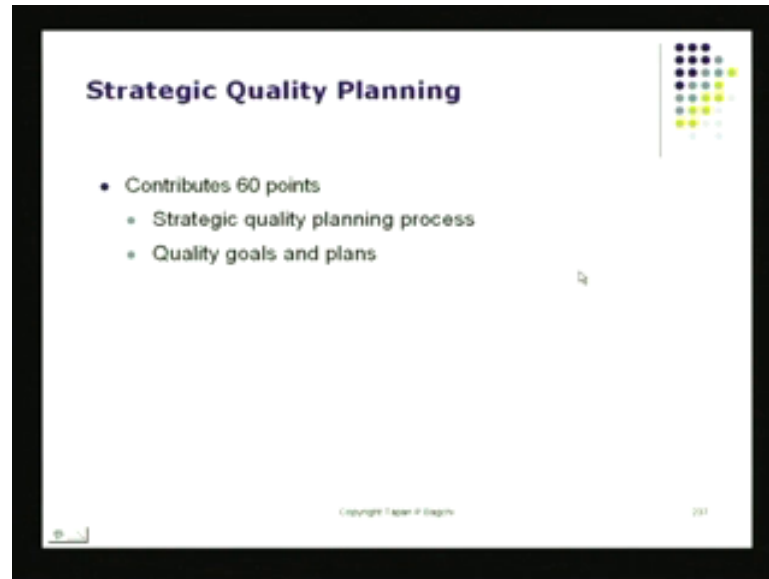
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Information and analysis this is when you begin to get into looking at quality data and quality information and competitive comparisons and benchmarks. This is something where you are utilizing information and utilizing analysis. And the analysis of quality data and information, this is by far the foremost use of this approach this clause looks at that it must demonstrate facts based management fact based is basically any decisions that you make those are based on facts and some rational basis. And the information must be comprehensive accessible well evaluated there is something that is looked at by the by the auditors. It is say enabler of change and it is a benchmarking method that is how it is done.

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Strategic quality planning this is like this contributes 60 points, and there are certain planning processes which are utilized here. Quality goals and plans have been spelled out by the company.

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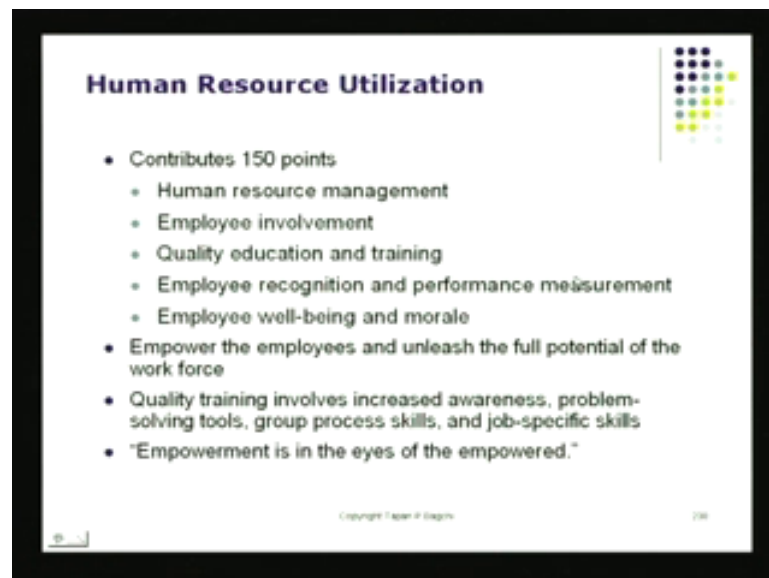
Human resource utilization how exactly are we getting people ready for you know, moving for (( )) toward top-touch quality involvement, quality education, employee recognition and performance measurement employee well being and morale that is also, something that is looked at and we try to unleash the full potential of the work force.

That is something that you try to do quality training involves all these things they are like problem solving group process skills job specific skills and so on so forth. And it is very very important that the those who are being empowered, they should see they should feel the they have been empowered, this is also the measure for empowerment that is also is looked at when you looked at the look at the total rating for human resource management.
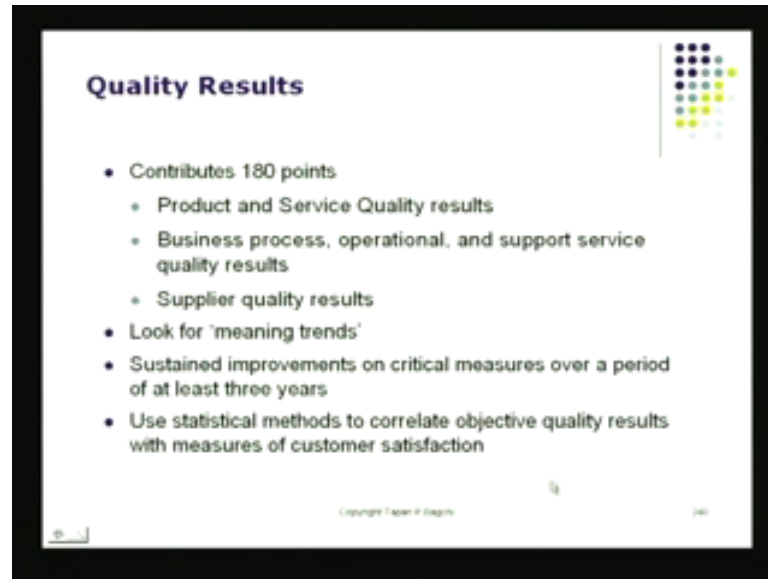
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Then of course, quality assurance of products and services and this would lead to 140 points design and introduction of quality products and services process quality control, continuous improvement of processes quality assessment and so on so forth. All these are there and the emphasizes really on the process as per the emphasizes.

Quality results, what are the results of your quality efforts product and service quality results. What are the business process and operation and support service quality results? That also looked at support quality results are looked at look for meaning trends are basically those things that are really implying. That certain improvement, certain impact is there, because of equality incentives sustain improvements on critical measures; this is like something over a period of time.

And if it shows up over a three years that actually means, you really taken some action, which have (( )) impact use some statistical methods to correlate the objective quality results, which are like assessment through data with measures of customer satisfaction. And now, you are looking at a correlation between your quality results and how satisfied the customer is very very important.
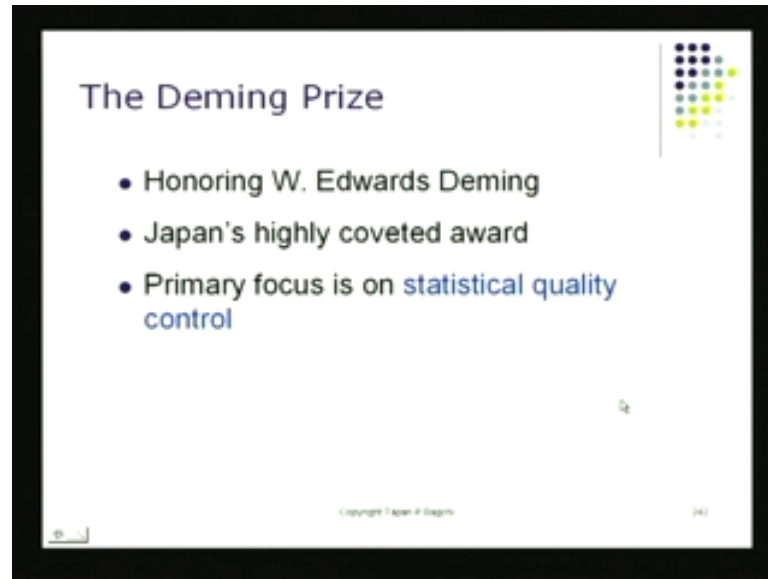
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Customer satisfaction this has got the highest thing, because if you remember TQM one of the foundations of TQM is strong customer orientation. And what we are really looking and there is are the customers really related with the business that we are running the product that we offer them and the service. That we provide them Determining customer requirements and expectation by far the starting point of this customer relationship management, customer service standards, commitment to customers, complaint resolution these are all basic very basic and good customer relationship management, determining customer satisfaction also getting some assessment there customer satisfaction results.

What are the results of you are trying to satisfying the customer satisfaction comparison that also is something that you got to be able to do. And in some cases they compare to other people also who are in the same game you try to find customer information from a wide variety of sources focus groups surveys and so on. Are you doing all these things? And what are the results are there some records that you can display the measures are objective and they are validated they are not by here sake it is not something. That will be accepted this was one way to try to manage quality the baldrige award.
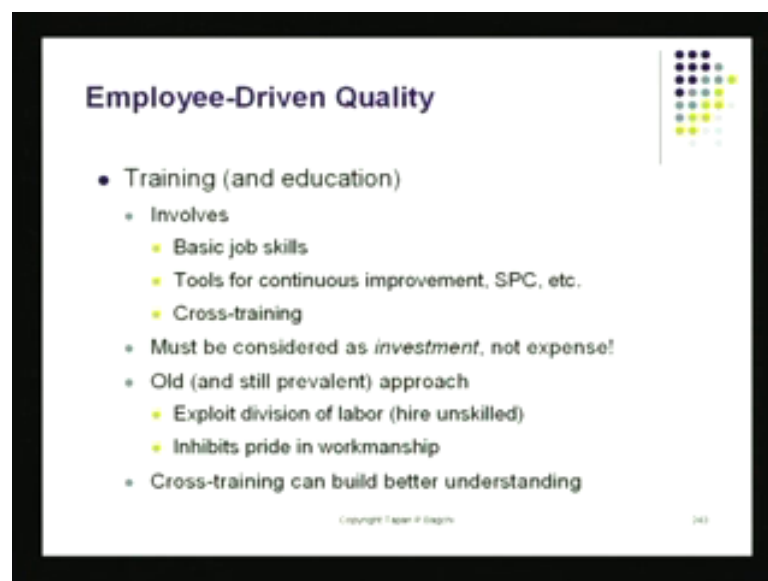
There is another way to try to manage quality this is to go after the Deming prize and this really the focus really here is (( )) on statistical quality control. The different methods like for example, I mentioned SPC use of 7 tools DOE any of these things that actually leads to use of statistical methods for example, there is a company there is an Indian company that utilizes DOE quiet regularly in process improvement studies. So, you could really say have they gone six sigma yes, they could reach six sigma if it is that kind of process they could probably reach six sigma.

But they are using advanced statistical methods and therefore, actually those this particular company has own the Deming prize. Employee-driven quality what concept is this basically it really says employee themselves they are driving the quality. How are they doing it? What are the enablers training is by far the very important one basic job skills. This is taken for granted it got to have these things then of course, tools for continuous improvement SPC. And these things these are all required for the employees to become drivers of quality. Then cross-training knowing each others function this also is very very important.

Without knowing these things they would not really appreciate what they impact is for. They are not doing something right on the next step that also will not understand unless there is this cross-training. This is so beneficial you would not believe, because many times what happens when these stages of production are passed over to the next stage. When a person has worked in department A and also in department B, he knows what the first department must do in order to make sure that the job in the second department is here or they can meet there own quality target this is very, very important.

The old approach is basically exploit labor you hire unskilled labor. You try to exploit them as much as you can and what that really does is you know there is something that you always require, when required employees to have deliver. What we call quality, they must be able to take pride in their workmanship. If they are able to take pride in their workmanship, they will obviously, try to deliver quality that is something that goes without saying. And I said, as I said before cross-training is also is a great way to build better understanding across the different department.
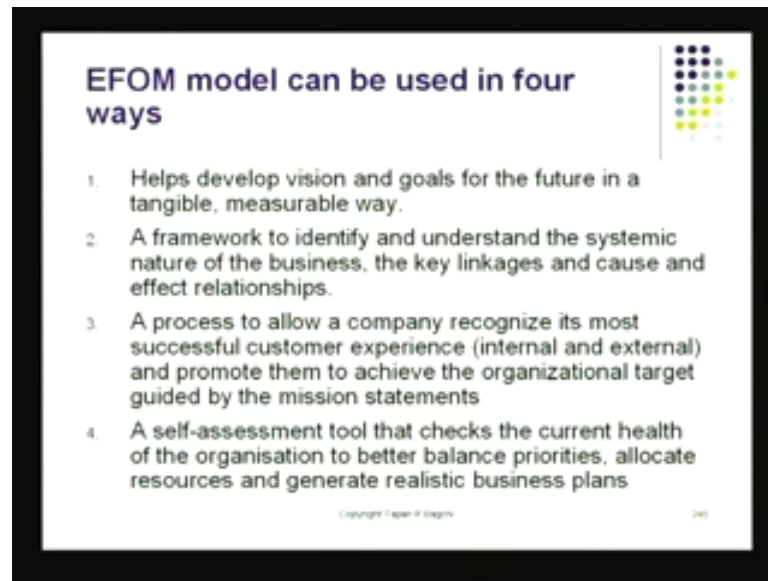
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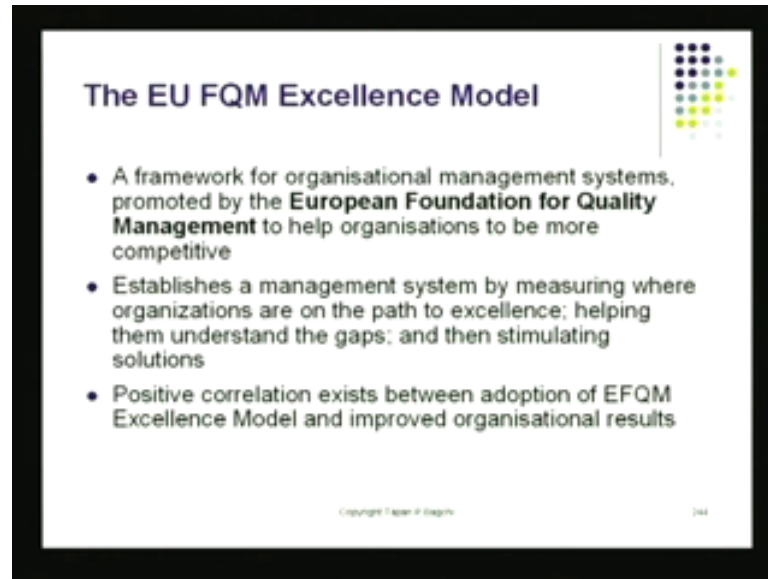
There is the European model and the European model also is founded on basically the TQM, the TQM is also there as the foundation for the (( )). So, the European model also is very much like the balding model for example, not very different from it and it also establishes management system by which we measure excellence. And we try to understand gaps and we try to stimulate solution that is something. We try to do and there again people have found those who have gone for the European quality management award.

They have also shown improved organization result, this has been verified by independent research. So, in fact these awards are not just for hanging a little you know, memento on the wall. It is not for that reason, it is an it does produce results and these have been verified by third party people. Third party people have gone in they have said you guys had this award. And now, you been operating under this for a while show me the situation before this award was won by you and show me the results. Now, if I see a correlation then of course, I will know yes that that winning that award it had an impact on you and that has been seen I has been seen in many places.

The European model it can be used in four ways. It can help people develop a vision and goals for future that is tangible and the it is going to be measurable also the future is going to be measurable and also tangible. It is also a way to understand the systematic nature of business a system is something that consist of components and together these. All components together they try to deliver a composite function they try to measure, they try to deliver a function, which is a function of the system this is very important in the systems know. How so? A system acknowledges that the system is made up of component, the components themselves they have their own functions.

But what is important is that that the components come together and form this complete function this complete function is what the system is there for and this is the systems orientation. So, you have analysis involved here you also got synthesis involved here. That system few of things that is appreciated, once you go into this framework and you start managing your way using European quality model, a process to allow a company to recognize it is most successful customer experience.

What was the time, when they had when they achieved the highest customer satisfaction? What was that time, what was that incident, what was that it can it be recorded can it be made into a case. I need that, because I want to build promote the practice across the organization this is something very very important. In fact, it is something that is so important that I got to always compare the target and the mission statement that are set

for the company and this can be done only when I am delighting delightful customer experiences.

And I have documented then written on exactly. What exactly happen? What did I do to achieve that level of customer satisfaction? It is also self-management tool, self-assessment tools by which you can process yourself and you can really figure out how good or bad I am and what is the gap between what I want to be and what I am right.

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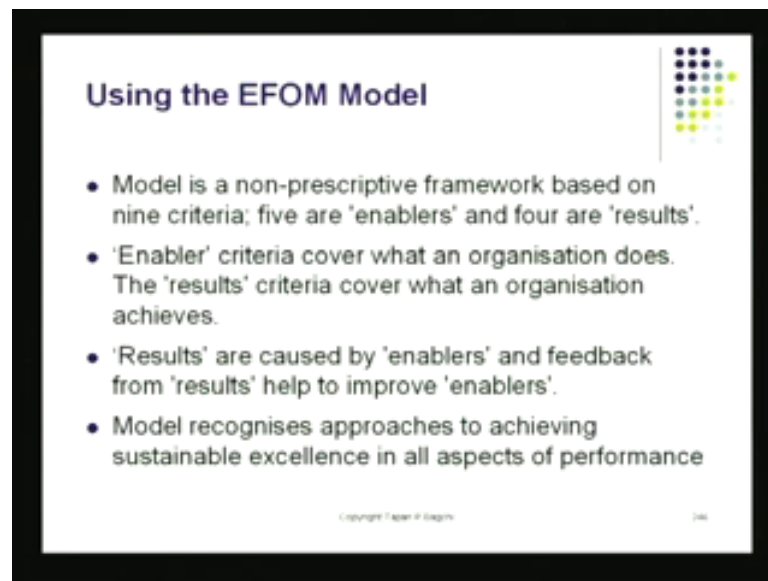
Now, using how do you use the model there is a framework and the framework has nine criteria and the criteria actually are divided into 4 parts 5 are enablers actually they try to enable the company to do. What it wants to do and the results are basically they cover the areas that the organizations or the aspect of the organization want to achieve. So, there are two, one the doing part, then the results part. These are two parts which are there in the framework in the European framework the results are caused by the enablers and the feedback from the results back to the enablers is used to try to improve the enablers.

So, there are like two types of criteria used here. One is for the enablers and the other is for results. And they kind of you know feed into each other the enablers would lead to good results. And when there are good results if there are not so good results, then of course, those are used as feedback to try to improve the enablers and the model

recognizes the approaches to achieve sustainable excellence in all aspects of performance.

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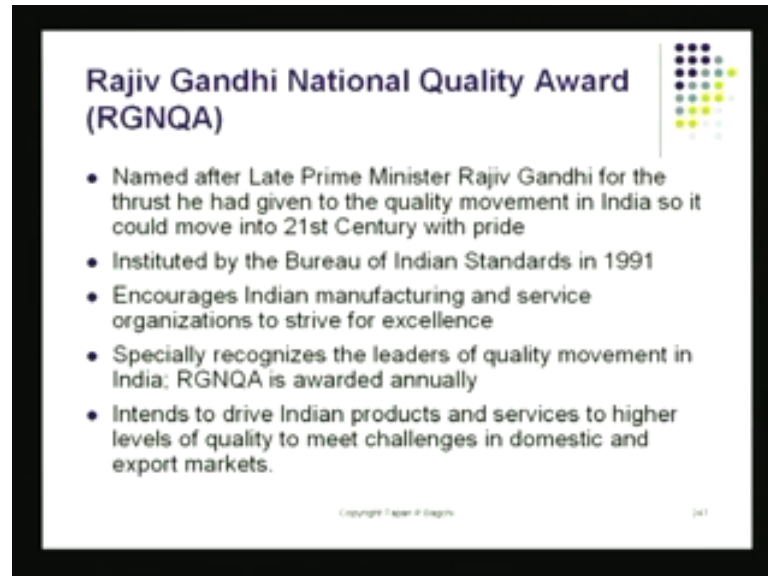
This is like again you could see the spirit of you could see the spirit of TQM hidden behind then of course, in this country in India we have something called the Rajiv Gandhi national quality award or the RGNQA. This is named after the late Prime Minister Rajiv Gandhi for the trust that he had given to quality movement in India. So, it could move into the 21st century with pride that was something that was (()) by Rajiv Gandhi.

It was like something that was not there, before I would not say, it was not existing at all because, we built the Taj Mahal we built all these fabulous temples. And we have fine cuisine and we have a fine textile we got lot of other stuff that. We that we have really T (( )) and we are the best in the world there is no doubt at all

But, are those things are those also seen in practices in our factories in our railways in our you know, an airline and so on so forth. In our postal services are they seen there? So, for that we needed a model again and that model was propagated by installing this Rajiv Gandhi this RGNQA award. What does it do it is managed by the bureau of Indian standards they started this in 1991 they basically managed it they encourage Indian manufacturing and service organization to strive for excellence.

And specifically, it if this particular award recognizes leaders in the quality movement in India there are lot of thing happening in the country and there are certain leaders who are really emphasizing quality. And those are the people, who are you know, they are just for this quality award and they are awarded that. That this particular prize it the intension here is to drive Indian products and services to higher level of quality that can meet the challenges not only in the domestic market but also in export market you know we talk of improvements in Japanese products.

We know that in the 50s Japanese products were perhaps not. So, good even in the 60 when I you know drove some Japanese cars around 1967, 1968, 1969 and so on, I remember old datum cars they would rust they would not perform very well and so on so forth. Those were small cars yes they were they are the fuel economy they were not like the huge you know the Chevy and the impalas and so on. They were not like those they were smaller car.

So, they gave fuel economy, but in many other respects they were not that good. But the Japanese car started to improve and today look at they are the winners in the world they have what we call the Toyota they have the Lexus and so on so forth. And they have there (( )) and so on. So these are like benchmark cars today worldwide. So, Japanese products have improved you look at Chinese products. Chinese products I remember, Chinese battery cells would sell for one rupee a piece, they would not last more than may be half a day, if you use them somewhere. If the person knew, you using a Chinese battery they probably, say please do not put it on watch on a clock on the wall.

Because I have to climb back after a week, I have to climb back and change that battery there because Chinese battery just as last that was the story not too long ago as 45 years ago; I saw pretty shoddy Chinese goods on kawakawa street in new York city. And I wondered actually is there a market for these things funnily enough even in the US; there is a market for these things. So in fact, many of these shoddy products, they were made in china, they did not have the china they did not have made in china written on, but you know pretty well that these plastic parts, they came from china those also were not so good.

But you look at today's Chinese parts a lot of cameras a very fine cameras, they are made in china probably the lances imported from Japan. But the body and the case and

everything molding and it is all been done in china and a lot of other things are there, but the Chinese are competing nearly with the best in the world. Today, what about Indian products you look at Indian TVs; Indian TVs made 10 years ago, the once that you could buy in the market place or Indian telephone.

You look at the once that was made 10 years ago or 15 years ago or 20 years ago and they were pretty well, what you and I would call trash nearly, if you have few of those (( )) still sitting somewhere in the closet in your house. There you probably never would even bother dusting them, because they were useless pretty well. But what happens as the market opened up this happened with the initiative that our prime minister took there are and then the finance minister doctor Manmohan Singh, he took the he opened up the market place. We went into this reform and so on.

That the target barriers started to come down and with that they were hold on imports that could come in. And we could afford the imports because the tariff and had been brought down, and we started tasting Indians, started tasting the quality of good imported products. Now, many Indians who travelled abroad they had seen good products there was no problem there.

We saw very fine fountain pen, we saw very fine electronic goods and so on, forth. We bought some sonny you know, sonny electronics stuff we bought the asahi, pentax, cameras and icons and so on. All those we had seen in abroad. But sitting here not many Indians had seen good qualities. So, they actually carried along with their shoddy products there was no really issue there, but the movement reform came along financial reform came along we started seeing a flood of foreign products. And obviously, when they were on the shelf Indians would go and buy them. And the result is today, if you look at Indian product today it is as good as a foreign product.

If you lay them side by side you would not really know, which is a which one is Indian which one is not for this all you have to do is go out to an appliance store. And look at Indian made washing machine or a refrigerator or any of these appliances, they are as good as the once that are sold in New York or Europe or anywhere. There is no difference at all and look at Indian cars look at the performance of the Indian cars, they match neck to neck for the conditions, and which they operate they match performance

neck to neck with foreign imported cars not the top of the line not many American cars can match.

I will say BMW the typical American car on the road will never match the quality of the BMW for example. So, an Indian car also will not match the quality of BMW, it will not but if you compare that with Korean car not much to not much difference actually. So, Indian cars have also improved and that has happened, because people have recognized consumers have recognized quality and this has this is what is driven competition and awards like this like the RGNQA awards this recognizes such effort.

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This is actually helping industry this already helped industry, it has tried to help maximize customer satisfaction. This is something it has done it is recognizing achievements of organization, which are improved quality to certain example for others establishing guidelines and criteria for industry. This is also something that has been that has been happening quiet rapidly providing guidelines to organization. That is willing to learn from the experience from others who have done it very well and the Rajiv Gandhi award. It is modeled after the US Malcolm balding award. So, again we are talking about world class awards.
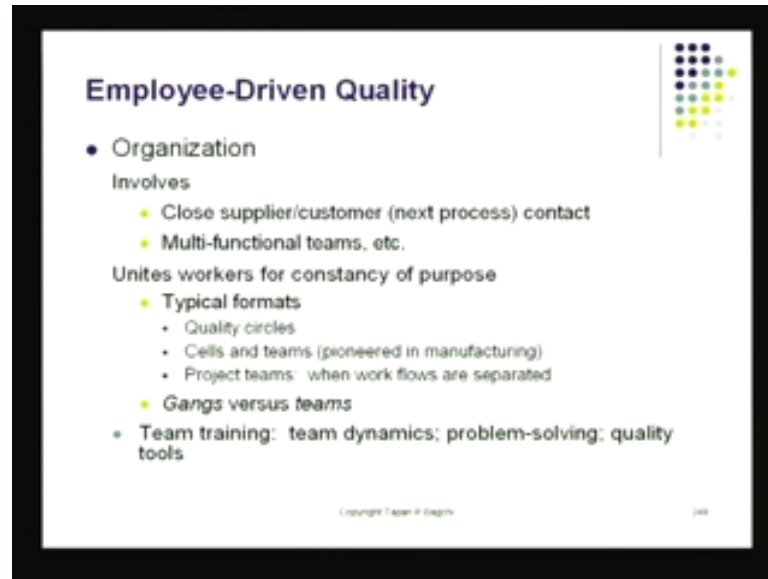
What exactly is then employee-driven quality there is like another aspect that I want to bring out here organization. And one very important thing is the contact with the customer contact with the supplier and contact with the customer. Let me give an example many times what happens is the person, who is doing the job, he is probably working on some aspect of a motorcycle.

That is being assembled for example, if this mechanic, if he has no contact with the user of the motorcycle. He will not have the sensitivity as a person, who is in direct contact with the user or unless he is using that motorcycle himself in his house. For example, only then he will know what it feels like, when you look at the product, which has been made by a factory has been shift to him.

And he is now the customer this is very important, I have seen many instances, when the company somehow has not brought the workers in direct face to face contact with the customer. The customer then really is far, far away he is kind of mysterious nebulous thing that exist somewhere, this is an abstract thing and the worker really has no idea no real idea about the true feelings. That the customer really has when he is using the product, I am giving you an example for example, when a lady prepares a dish and she serves you know she does not keep looking at the dish itself. She looks at your face when you start eating, when you pick up the a spoon and you pick up your fork and you start eating. She watches your face, what is your expression does your expression change.

If it changes, if it becomes like something that more pleasant, you feel she feels that she has done a good job. She is really today she is delivered or when you know people come home for example, and something special is served, what the lady watches, she watches the expressions of you and the kids and her husband and so on so forth. And from that she gets the signal has she done a good job has she really been able to get that strive of delight. And that is the sparkle in the eyes of the people, who are there to enjoy her product this is something very important.

We are coming direct face to face contact with the customer, the consumer and this is (( )) they can be no better feedback than this is something that. We have to enable, we have to make sure that. We do that and that is part of employee-driven quality and after that you do not have to drive quality you do not have to tell the lady please prepare the dishes better you do not have to do that many times cooks in restaurant. They come out you might have noticed these chefs they walk around once in a while they are basically they are just watching people they are watching people here.

And there how are people enjoying their food are they really you know are they really having a good time they watch this, because that is the signal that is the feedback you might think they have just come of come out of the hot kitchen just to cool off it is not just that they are also keeping an eye on the results of their product. The results of their labor so, this is then this is then what becomes employee-driven quality it is very important and of course, we can also do that by following quality circles and sells and teams some project teams and so on so forth. And this is also, something very, very important in order for us to raise the sensitivity of people who drive quality.

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Recognizing quality again benchmarking, if we do benchmarking again you becomes one of those people, who then become benchmark himself. That is a pretty good recognition that you are you are doing that and in many companies this is done quite frequently. They will go out and they will try to make sure that if they done something good it is known to people. It is known to the organizations that are industrial association and so on so forth. So, there you know their good work gets some publicity and so on forth that is very good for people.

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There are certain benchmarking processes and steps again, and I have laid it out in the slide, and you can read them at your own time. There is no real problem there, and there is a certain things that really lead to good improvements.

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And I have personally seeing how good practices in benchmarking, they lead to really good quality. I have seen that let me give you one example you might just think this is just a story, those one company that made, if you look at in electronic device like for example, I pick up I keep picking up my cell phone here inside the cell phone there is like a printed circuit board and on which they are mounted all these little transistors resistors and so on. There is some IC and chips and so on. They are mounted inside these components just soldered on the board. So, the board is there and on that they stick in all these components, the components are stuck there and underneath of course, they apply some solders.

So, that the connection takes place now, this is done today automatically but not too long ago you know these components are pretty big and the printed circuit was pretty simple so on and forth. And people did manual soldering. So, they would take a soldering gun and they soldered joint a, then joint b, then joint c and so on. That is how it was done. In fact, many older two wheelers these are motorcycle for example, those were actually manufactured this way the electronic components, they were hand soldered, and they were put in the vehicle.

Then there was one company that was in the game of that was in the business of producing these electronic parts for motorcycles, and they called me once in a while for some quality problems. I was a quality expert around in that town there I would not name the town right now. I will do that in some other lecture, some other occasional, I will do that but they invited me many times to come over and help them with their things. So, I did some training and so on.

And once in a while I had gave some guidelines on the shop practicing also they took me out there they said professor, we have a lot of problems with our quality there and there is something that we really got to do around here as to fix this. So, would you please help us I said fine can I take a look at your operation, I said yes you are very welcome. So, I went out there, and I found a whole bunch of these guys, they were doing the hand soldering I said have you thought of doing anything different.

Now, they said yes we have another unit by the way, which is like next door in the next room. There will be got automatic machine that also does the automatic soldering. And I said let us go out and see that and again, I saw that room there, but the automatic welding machine the soldering machine was there and following that there was another room. And in this room, there were people who were fixing the output of the first department, which had actually had come out of the automated machine.

They were doing all these touch up soldering on the same parts had come out on the machine. Then these guys they were sitting there with their soldering guns and they were doing the touch ups here touch ups here and so on, because many joint apparently had not formed correctly by the automated machine my god I said these people they spent so much money in getting this automated soldering system. And it is not doing the job; I should be able to help I am an expert in quality; I really said to myself, I got to think about this. So, the first thing I thought of as you know being a (( )) believer in six sigma and design of experiments and so on.

I said may be I will run some experiments with the process conditions. And see I could reduce the number of defects there have I thought of doing that and I started doing a little bit of Mickey mouse trails here. And there let us change the temperature, let us change the belt speed, let us change this that and see what happens? And I had couple of

students also helping me and they said sir yes, but the defect levels are so high. We got to really take some big step.

And it seems like one very sharp observation made by one other student was. Sir people are not very well involved they are not very closely involved in this thing. They just come to work they do their soldering here and there and so on. That do some QC checks then they walk away they are not really feel that. They there is piece of them, there is a part of them that is not the part of the product there they do not feel that way. It is they are like they are doing the job.

So, somehow we have to get the people involved and I thought of (( )) I said I see, we have to wake people up somehow we got to wake them up. You have to really open their eyes. And let us see how we can do that? I had a friend who ran as similar output but he was not making motorcycle electronic parts. He was not doing that he was doing it for some radio or something. He was he had another company there, it was also a small manufacturing company and they produce these transistor radio and stuff like that they also had an automated soldering machine.

I said first let me find out what the defect rate is with their automatic soldering system. So, this friend of mine who had this radio assembly company there, I went out there and I asked him can you tell me what your how good is this machine? I did not say what kind of defect you produced, I just said how good is this machine is this machine really any good or is it as bad as doing hand soldering he said no machine is pretty good. And. In fact, if you want take a look at it anyhow sir it is doing a fine job.

I went out there and of course, I took a look at it and asked was pretty satisfied. And the thing that I looked for was where they doing any touchups and there was no touchup there was AQC department that produced a few defective things that this separated. But there was no real massive touch up as they had in the first company the one that made the motor cycle electronic component.

Then I came back to know motor cycle company and I said gang we want to go out for a trip and I would like to take about 8, 10 of you and may be about 7, 8 people from the shop floor and couple of other supervisors. And one manager type we are going to hire a minibus, I am going to ride to this other town and then there is a company there that is also is a very similar operation. We just go and take a look what is it that they are doing

they have similar operation. They just go and take a look may be they are just as bad as us or something like that I made up a little story.

We went out there and we land in this new company there the guys who make the radio parts there and there was this last wall. And of course, inside was the automated machine it was running on it is own. It had the flow of things taking place it just went from the left and from the right. Then these people they said sir now, where does the output go it is coming out there what is happening on this side can we can we go and take a look that side. So, they went out there they thought they were expecting actually a huge touch up room there they were expecting like they had in their own company.

That a touch up room they were expecting that touch up room there my god there was no touch up room there was a small Q C people. (( )) Q C pursuing was doing some little Q C but there was no real touch up room there was no like massive fixing rework of the board. That had been passed on by the first stage of the production operation. They said this cannot be possible how this is and I said spend some more time. So, we were there and if you been to Naas if you been to Dallas or if you been to even Canadian center or some other place.

If, you seen any of these space you know where the from where they control the satellites and so on. It is like a large very large room where there is lot of T V screens around and there is a visitors area and between there is this huge sheet of glass. And then of course, the controller sitting there they have got there consoles and screens and. So, on there are some very large displays on the wall they are like the movie screen or (( )) having the back there that sort of thing huge things with big displays there and the satellite movements and so on, those are already displayed there.

The visitor cannot get there and there is this huge wall in between. So, the visitor can go there you can just watch what is going on the go there and stand there for 10, 12, 15 minutes he watch some satellites flying here and there. And he see the controller in action then he come away this was the same thing that was done in that company there is. So, these visitors were come from that motorcycle company they watch this operation that was going on just as if they were watching this stage show there.

After about an hour or so, there was trying to go and get some tea and I was sitting with them in a separate area and they were speechless you know just speechless. Sir how

could it be that they have similar looking machine as not working there at all and this is the here is benchmarking. They could physically see an operation that is similar to there but with much better performance it makes them believers. Yes, this can be done may be it will take something for us to change to that level, but yes it can be done. Because it is real I can see, I just wanted to tell you this little story about making a big impact on quality by getting people involved getting them to think yes they can also improve they can also get up there.

I can give another little example and that is from I you know we take a little bit of pride. We are not perfect teachers we are like anybody else most teachers today they have a PhD. So, many of them have a PhD and yes some of us probably spend a few more hours in our offices. We probably have some more experiments that we do probably we read a few more books, few more journals that is what we do in IIT probably? It is not possible because, of various other distractions in a small engineering college.

But we have we are very similar we are like any one of them there are some teachers that are sent to IIT is as QIIP students and they come here to improve their quality. Basically quality of their teaching and some other extra subject that learn about and domain and so on, so forth. That is what they do? So, one of these teachers had come and that was the first time he was in IIT he had come in as a student.

And he attended he started or he asked me actually he started to work with some colleagues and myself. And he said sir please give me some advice I want to really I am very ambitious I want to go back and make an impact on my college. That is what I would like to be able to do and I would really like to know how IITs teacher? How you IIT professors? How you teach I want to really see you people in action.

Now, he had come to IIT to do his research but we speared sometime, we actually made it possible for him to attend some lectures. I said pick some subjects in which you are some interest and please start attending the lectures and he started to sit in the back. And I said no back is not probably place come and sit somewhere in the middle or trying to (( )) come and sit somewhere near the front. And just go through it take notes and everything do the quizzes whatever it is go through the rituals, and just observe make some notes, find out how the teacher is teaching? After a week, he was speechless. He said sir now, I believe why IITs are different. Now, I believe why IITs are different we

never bother about some of these things and the class that discipline the silence and so on, and the attentiveness and so on. This is a rare thing it is not possible I said may be you should even send some students to IITs may be they should sit with our students and just see how a student is behave in a class when they are intent on learning. So, this again was benchmarking this was again was an example of benchmarking. So, you do not really have to go very far to pick out benchmarking this can be done almost anywhere.

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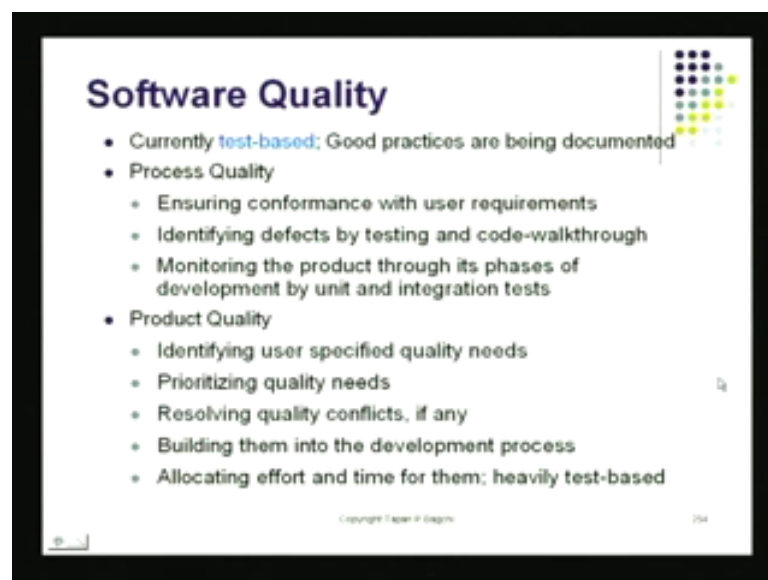
Let us get into couple of other areas one is software quality I should just tell you that this is a large area. Because probably more money is lost per year caused by software disasters because, the places where softwares are today for example, there is a little software inside my little watch here there is software this lecturer being delivered by software. That is what he is delivering this lecture there is a little bit of analog component but most of it is digital that is why you are able to see this.

We were look at launches of satellites if we look at the running of operation of airlines if we look at various places if we look at all the different automation that is there every where we have software, but look at what is happen because of this some major party convention had to be cancelled, because something was wrong with the excel formula that was used in producing that worksheet some climate orbiter that went to mars it is totally lost because of the confusion between pounds and kilogram in the software

The Arianne 5 rocket is exploded because, of again the data conversion became too large Denver airport could not be commissioned for long time. Because of some bugs with the software that handled the baggage handling for example, the Pentium processor had problems there were issues with the look up table the patriot scud this is a huge missile disaster. That again took place because of some rounding error that took place inside the software and the mariner one. That was lost it was a Venus probe that went there and there was period put in place of comma in a Fortran do loop and these are there and there are hundreds of other examples software disasters are pretty big that actually directly tells.

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You that software also it is an area that requires a serious attention as far as quality assurance people are concerned why it is this way. If we look at the progress of quality if you have to look at the total progress of quality software is struck at the testing stage at the inspection stage. We do not have process control in software. We have no design of experiments in software and we have some quality management system. But they are in terms of CII models the not CII the SEI the software engineering institute models.

These CMM models that what we have some process control of course, we have no six sigma in software. So, most of software work has got move beyond inspection testing is the only method by which Microsoft for example, done its quality control and look at any major company you ask them. What is your biggest expense he said I wish we could

get rid of our testers I wish somehow, we could produce software without any bugs would really have nothing? In fact, I have done personally some research in this area and I have found that there are certain issues in design.

That can lead to good software as certain issues (( )) that can lead to pretty poor software that is there. So, we are slowly begin to understand, we beginning to understand software development process. But it is still a wide area and most of all current software quality practices they are still testing based then of course, we got something called process quality. That we have not done here there is a long way to go there and there is the product quality aspect that also is something that we got a long way to go we got a lot of things which is like a big list of things to do for us and software practices today they are nowhere near there.

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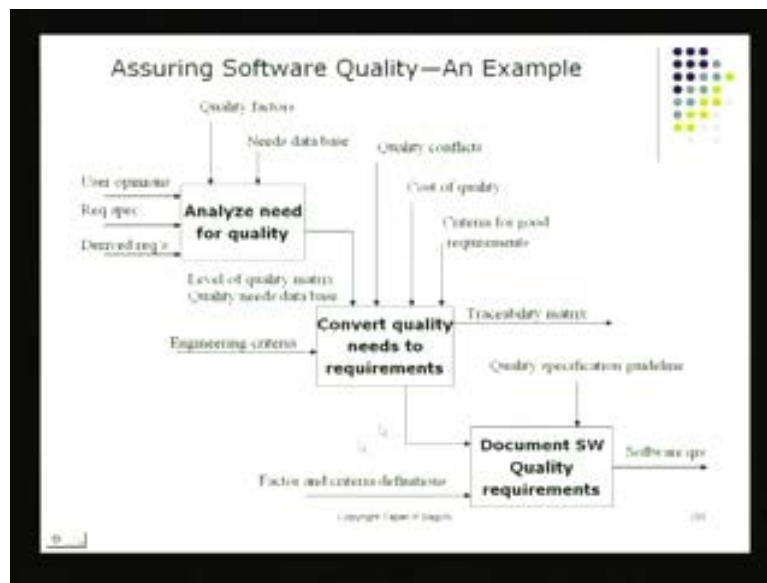
Something that has been done is at least people are started to look at the stages of development. And they have tried to see what could be done to try to make sure that the at the end the software. That is delivered it has good quality one movement that has been there is the movement towards x p x p is extreme programming. When you code a line and you test it immediately, and you code the line by finding out, what the requirement is you code just that much and you test it immediately. Then you go to the next stage find out what the requirement is you code that and you test it immediately.

So, you do code test code test if you do it this way what are you doing? What is your quality assurance yes you modified the process a little bit but they are still using testing as the only mode of quality assurance. So, we still at the testing stage you are stuck on that chart that I have then I have got inspection. Then I have got SPC then I have got DOE. You are still stuck there oh there is no way we could do SPC in software at least not today may be someday and that is like that is going to come that is not yet here yet.

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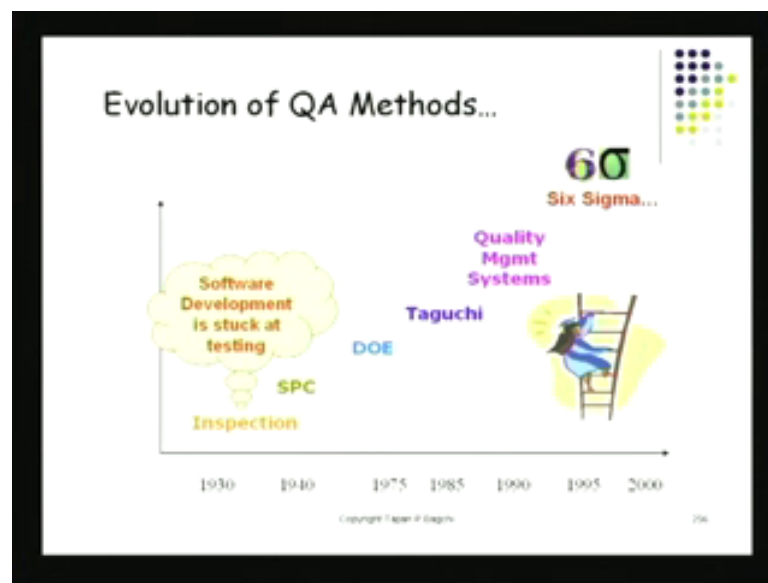
So, where software is stuck, software stuck right in the beginning software stuck right to the beginning which is like software development stuck and inspection. It is got a long way to go before we could start doing SPC or DOE or Taguchi or any of these things that is going to be quiet away. So, yes manufacturing is dirty work manufacturing involves lot of grease and lot of dirt and lot of those things crazy things and messy cloths and everything else.

And you got to have hard boots on this is what is required in manufacturing shop and there is smoke and there is oil mixed and everything else and it smells bad and so on so forth. By comparison when I sit in a software room it is a room like this and I use the tools. That I have right here which is like APC and perhaps some floppies perhaps some CDS that is all I need and my brains and I need a computer language manual that is all I can go into software business quiet easily.

This is very clean work. So, I am using Hi Tech, but in terms of practices, I am pretty primitive my testing method for quality assurance is like I show on the screen here is stuck right at the bottom that is where it is stuck. So, it is a long way to go software has a long way to go.
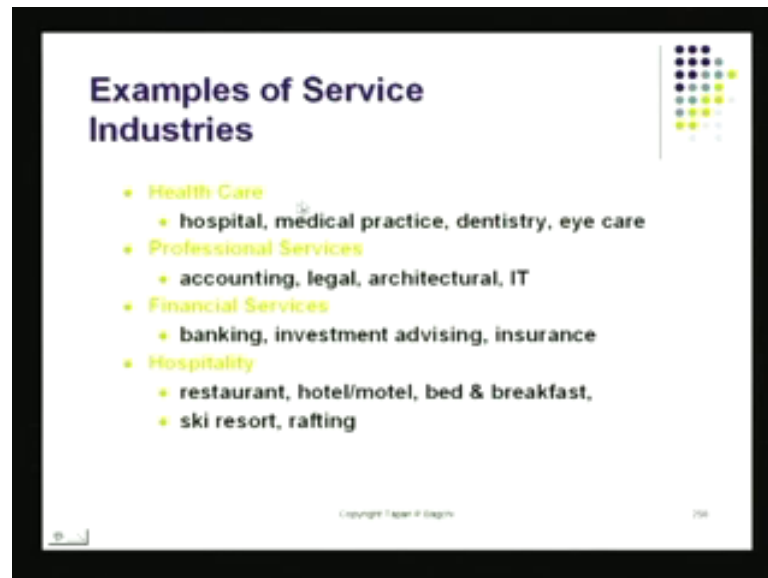
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I slowly move toward what we call service quality let us take a look at this, let us see how far we C can go with this and whatever remains. We will cover in the next lecture service quality is something that is now, becoming more and more important, because now, many people are trying to compete through services.

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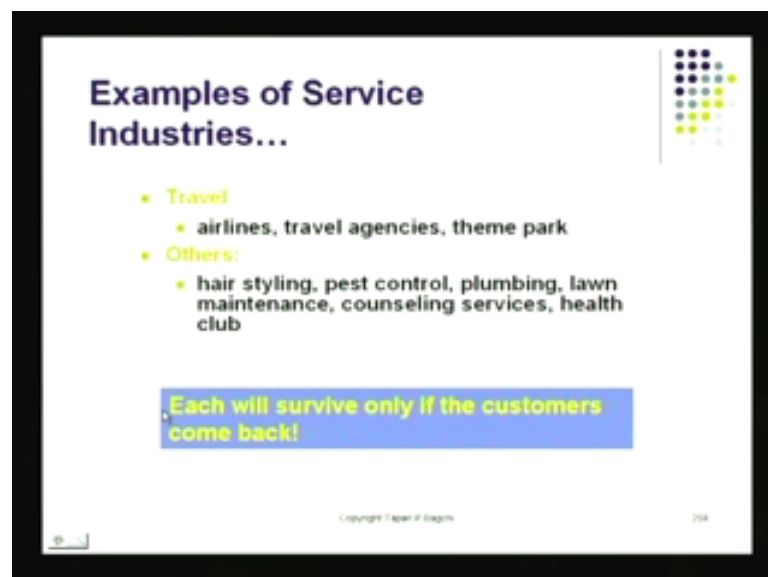
And let us take look at some examples health care is a service professional services they are of course, services then financial services, hospitality these are all they are not manufacturing, they are all services most of these are services.

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If we look at travel and others, they are also many of those are also services. For example getting a hair cut that is a service pest control is a service plumbing is service counseling is a service any of these are and each of these will survive only. If the customer would come back and these businesses would not survive if customer would not come back but

what is service stuck right now. Just like software services most of it is still stuck at inspection we are not doing SPC in services, we are not doing DOE in services, we are not doing tag chi, we are not doing any of these stuff, we are certainly not doing six sigma as far as services are concerned because we do not understand the process very well.

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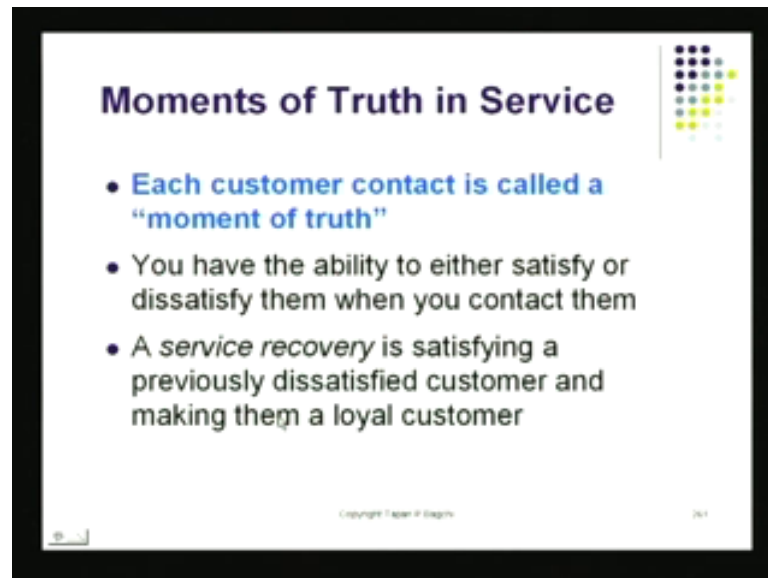
Yet each customer contact is actually called the movement of truth because services cannot be stored. I have to deliver the service on the spot standing in front of in from of the customer that is what has to deliver by service.

So, you have the ability to either satisfy or dissatisfy the customer when you come in contact with him the worst thing of course, is like when the disaster is already taken place. And I have created a customer, who is not satisfied, I try to do some disaster recovery (( )) that is like fixing things after the they can the crowd run out of the bound or the horse run out of bound. That likes after the fact that pretty bad actually that really not good practice.

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It is difficult to supply, difficult to synchronize supply and demand with services. That like something there unlike already mentioned services cannot be returned or resold it just cannot be done.

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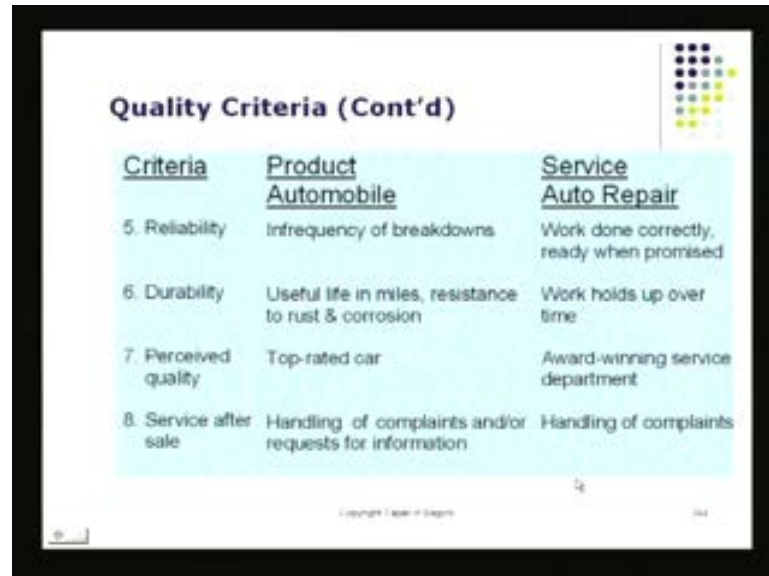
Today of course, unfortunately the customer looking for the total experience he is looking at some product aspect. And you seen this slide before this is product aspect of anything that I offered the customer, then it is service aspect also and these are all some very important. I had just taken the example of so, I have got the hardware part on this

side and I have got the service part on this side these are all very, very important each of them they can make or break your business.
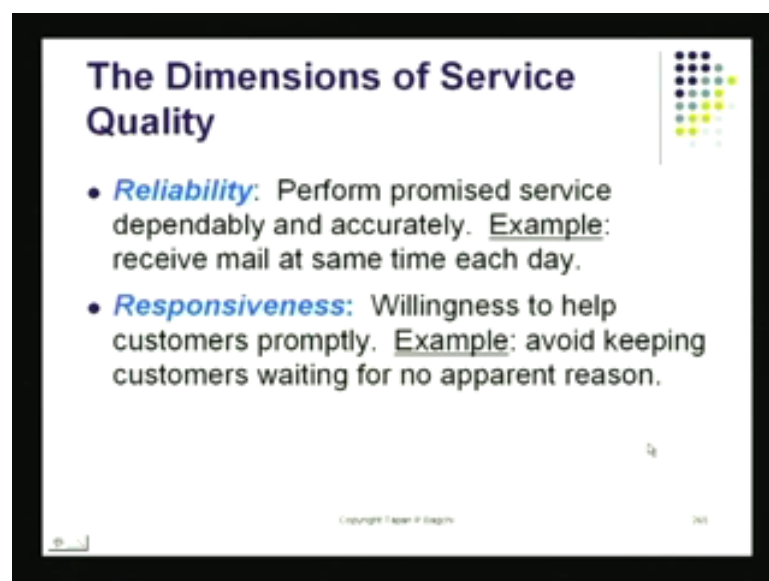
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And the same thing would go for other aspects of the product and correspondingly. They are the corresponding aspects of services also you will have reliability in service, you will have durability in service and award winning service and so on so forth. And handling of complaints these are all there.

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And there are of course, some examples and I put them there reliability and responsiveness, they are there assurance really means the ability to convert convey trust and confidence.

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Dimensions of Service Quality contd.

- **Assurance:** Ability to convey trust and confidence. <u>Example</u>: being polite and showing respect for customer.
- **Empathy:** Ability to be approachable. <u>Example</u>: being a good listener.
- **Tangibles:** Physical facilities and facilitating goods. <u>Example</u>: cleanliness
- See Kano model to prioritize customer needs

Assurance I assure the receiver that I will be able to give you good service and you are going to be enjoying the experience. That you have being polite and showing respect for the customer, this is like an example of assurance I am assuring good level of service empathy being a good listener. That could be one way in it is like a very important dimension service then of course, I have got tangibles. And in those cases there would be like physical facilities and to try to make sure you addressing. The right things you got to make sure you use the Kano model, I cannot over emphasize this if you designing a service you got to make sure you using the Kano model.

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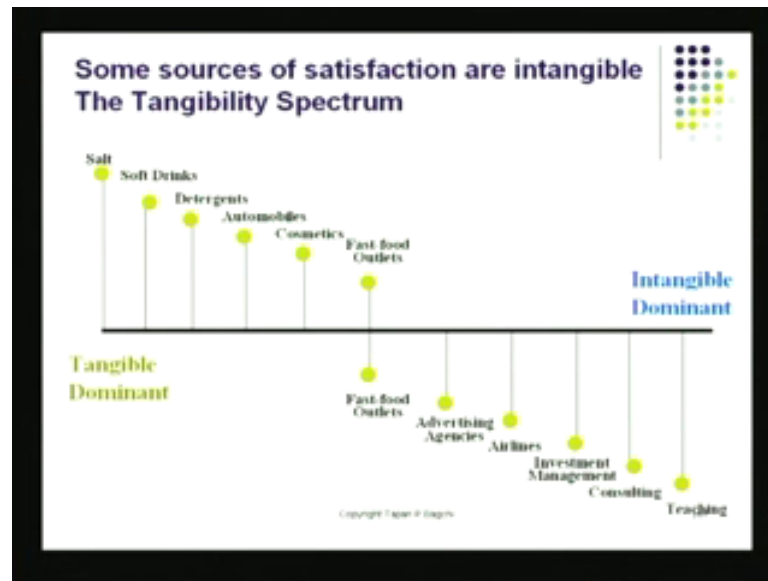
So, do not offer them bells and vessels, if they do not really care to want the bells and vessels there is a tangible component of the package. That we offer there is also an intangible component of the package. That we offer a customer tangible components are of course, you know look at salt soft drinks, detergents, carts and so on so forth. This is a huge tangible component but then there is an other area, which is mostly intangible for example, teaching for example, consulting investment management and so on so forth. These are going to have a pretty heavy dose of intangible.

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So, this is our mostly in this area and this is a mix of service and products why would a customer come and have do business with you. Because there is the lack of better alternative that is why he is coming to you and this better can be just in variety in different ways not only the prize but also the total experience.

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And if, we look at if we have a dissatisfied customer he is going to tell between 10 and 20 other people about the problem. That he had with you so, this is exactly what tells you how serious customer feedback is and word about you knows spreading of messages in time in terms of doing. It and some statistics are provided here these statistics they are taken for industry data.

And they can actually tell you how important it is for us to make sure that the customer is delighted right at the back the best is 1 and the worst is 10. In terms of failure to serve for example, there are various ways degree of severity rating is one if it is level one the customer is not even observed that there is an (( )) adverse effect if you go deep into it.

If you look at the worst effect for example, there is an negative impact on the customer or people or on society. And this is going to lead the (( )) of this is assured failure of business and the existing control. It seems like if this is how you are operating, you are
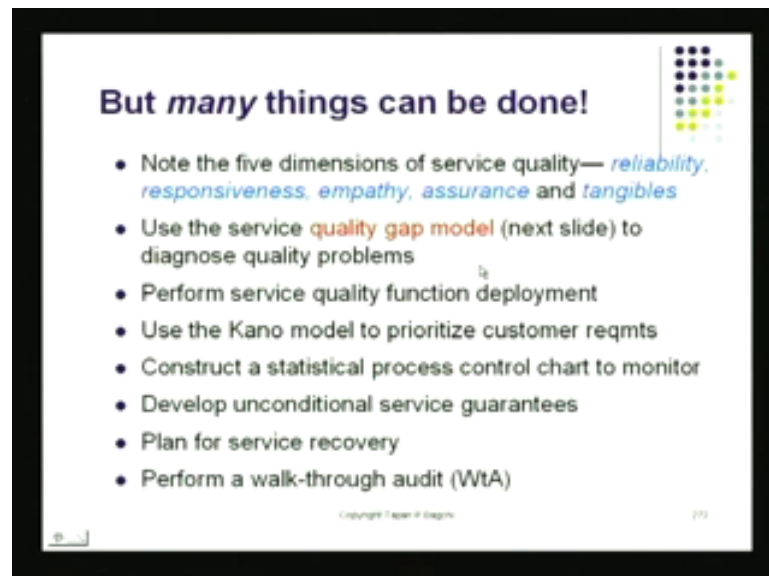
operating with rating 10 somebody gave you a rating 10 for your service quality, your existing control could not even detect if there is any potential failure.

Look at rating where we got warranty service as the means to control service quality this is model failure rate without supporting documents. This is like (( )) approach I mean I may have a breakdown on the road. And that is a warranty situation and controls are not like to defect to detect it or to prevent the potential failure found reaching the next customer. Controls are really, because that is why I have got warranty is something for which I am not totally sure, but I can live with the cost of paying the customer you know the cost of replacement or perhaps.

I will provide him a free service compare that to this one compare that to rating two customer experience slight discomfort low failure with supporting documents. I have got some supporting documents with which I really, I can justify that yes these are the things and this is how I can explain what the thing is you can always be sure that. You will detect the potential failure before it reaches the next customer, because here the customer (( )) is experiencing something that is slight and I am able to document that this is like something, so that there are these things, these are this is like a spectrum.

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But _many_ things can be done!

- Note the five dimensions of service quality— _reliability, responsiveness, empathy, assurance_ and _tangibles_
- Use the service quality gap model (next slide) to diagnose quality problems
- Perform service quality function deployment
- Use the Kano model to prioritize customer reqmts
- Construct a statistical process control chart to monitor
- Develop unconditional service guarantees
- Plan for service recovery
- Perform a walk-through audit (WtA)

How do I address this? I have could really do, I have to look at the quality gap model, and I just give you a glimpse of the gap module.

Start with something that we call customer expectation and the gap between that and perception expectation is here. The gap is between what the customer perceives to be quality and what he expects to be quality. That is a gap; that is going to determine customer satisfaction. If these two are identical the customer will be delighted and perhaps you will be definitely very satisfied to be able to understand the customer, I have to really see him management customer of customer expectation, management perception of customer expectation if there is a difference between what management perceives to be what customer is looking for and the true expectation of the customer, I have a problem there my problem really is understanding the customer. That is the problem there.

Management has one perception and then it sets service standards; if there is a gap there is a flow in service design, because management says go and do these things that will take care of the customer. And that is how it sets the service standards; if there is a gap there, there is a service design gap there. Of course, on this side, I have got customer perceptions and I deliver certain services, there is a gap between those two, then I have got a communication problem. I have got a communication problem there, and these are again quality gaps, then delivery of the service and the standards if there is a gap there, then I am not confirming with the standards that is there.

So, here I have got 5 gaps. I have got customer satisfaction gap, I have got communication gap, I have got conformance gap, I have got designed gap and I got customer market research gap. Market research gap is there when some expectations are there but managements do not seem to register. That is actually the most serious gap then of course, because everything depends on that from gap 1, I go to gap 2.

I go to service design; from there I come to conformance. What I deliver does that meet that this is very, very important then of course, I have got managing service, I have got managing the evidence which is like the feedback that I got between what the customer perceived it to be and what the service was; that is like something that I got to do again manage there. There could be a communication issue there, customer perceives something but I deliver something else. I was just like this gap is there. Take a look at this thing, when you go into this, I will be discussing more of this as we will go into the design gap. And I will start with that in the next lecture. Thank you very much.