

Six Sigma
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Lecture No. # 39
Implementing Six Sigma

Good afternoon, we resume our lecture today.

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This is in the series of lectures on Six Sigma that have been conducting for some time and we have the last two lectures to go, there is this one today about implementing getting the organization ready for implementing six sigma. And in the last one, I will be giving you some examples of what exactly the actions are, once you are **on with the project** on with a project on six sigma. As you realize **you know**, they have been a lot of movements **in** in the direction of qualitative, because of competitive pressures and pressures on profits and so on, so forth.

In industry, a lot of people have been trying to do various things and this has been going for quite some time; it **started in the 60's, the movement**, the quality movement started in the 60's and it went through some statistical trainings, some training in T Q M and so on, so forth. And sporadically they have been very various interventions done by different companies and they had mixed results.

It was only, when **you know** results got quantified and companies, some leading companies they did some good introspection as to, what exactly they had to do, to try to get their organization ready for a big movement like six sigma; to reach a level of excellence that is, that had not been achieved till this point. People really realize that, **you know** something different had to happen now. There are companies and you can find many of them even now, who would probably say that, well T Q M was a **(())** and the other methods are too complicated, I cannot really get my boys to do control charts and so on and so forth.

So, unless you give me some small pill, give me the silver bullet, I am really not going to be doing anything different from just inspecting my goods that is it. In fact, the training **in this area** in the area of quality assurance, quality management, quality control has been so **(())** that, many engineering graduates come out of colleges without having much of precision of either of statistics or of methods to try to improve, help improve quality of the organization, if they are going to work.

And quality is becoming even more important than it was before, because of couple of things; one is there are many **competition**, competitors; they are all providing the same product or the same service or the same mix of things. And if you got to survive, you got to win volume, you want to win good profits, you got to make good money and that just cannot be done, if customers are going somewhere else, it just cannot be done.

So, it is kind of critical that you saw that, taking place for example, in the automotive industry you saw that, in electronics companies that could not really come close to the best in the **in the** world in the global sense; they are not surviving any more, they have their businesses have gone down and company such as, Motorola could see these signals coming way back and they started taking steps that were quite different the way they had traditionally manage **manage** quality.

You know about, **you know** the special programme that they put through they coined it six sigma, there is someone in the company, who realized someone in Motorola, who realized that, a matrix had to be there and a methodology had to be there, whereby the movement who are trying to reduce defects would really become part and parcel of the daily operation, day to day operation inside the company till that happen, it just would not be feasible in fact, to be retain good business, it just would not be feasible.

Now, suppose some company x wants to move into six sigma many of them, they have a feeling that could be done overnight, it could be done with some training and perhaps, we could get a consultant, he could probably shape things of **you know**; shape things of for us and then, business will be hunky-dory, there should be really no problem at all. There is a lot of stuff that has to be done at the managerial level, at the professional level, at the workers level and so on and so forth, lot of things have to be done differently. If you really want to go with six sigma way, if you really want to bring those big **big** bucks to your company.

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Must Capture the \$\$Benefits of Six Sigma!

- Capacity increase
- Fixed cost takeout
- Variable cost takeout
- System cost takeout
- Product mix improvement
- Sales growth
- New product sales growth

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The slide features a title in bold blue text at the top left. To the right of the title is a decorative graphic of a grid of colored dots. Below the title is a bulleted list of seven benefits. To the right of the list is a collage of various US dollar bills. At the bottom left, there is a small copyright notice, and at the bottom right, there is a small number '1'.

Couple of things have to be kept in mind, you are doing six sigma for the benefit, you are not doing this because, somebody else did T Q M and you heard about it, so **you also** you would be doing T Q M, you would be doing quality circles and stuff like that, six sigma cannot be done that way, you really have to quantify the potential benefits, you have to go after them. So, if you look at the slide it says, what are some of the benefits that you can expect out of six sigma; capacity increase, because there will be fewer defective parts produced; fewer defective products produced, fewer customers are happy and so on, so forth.

So, whatever he produce that is going to be all basically useful stuff and that is going to be sold and that is going to bring you good money. Fixed cost takeout, this is like something that you **you** know once **once** you put in some money, you think it is going to

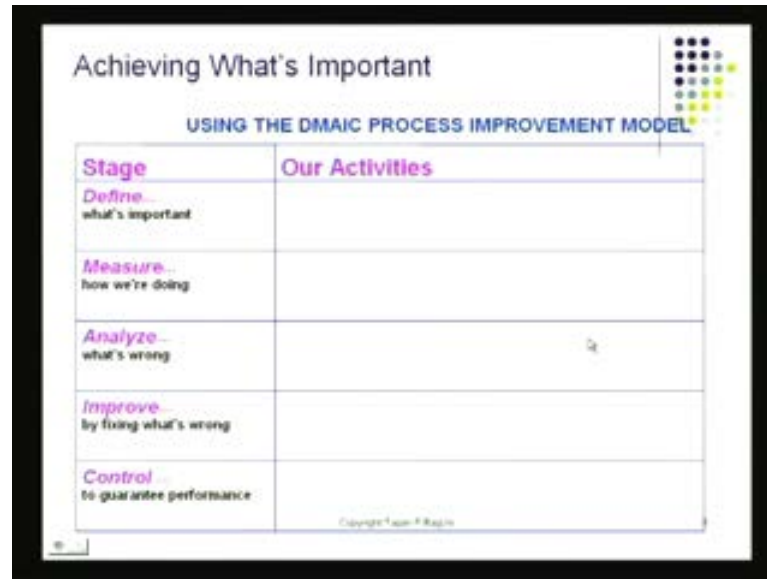
be kind of **you know the the** thing, but the thing is know, once you go into a movement like six sigma; lot of fixed costs, they become less and less important.

Variables cost, how does variable cost get affected, if you go into six sigma, something you got to remember is, variable cost changes would be amount of volume that you produce, the **the** number of items that you produce. So, the number of customers you serve, something you got to remember is, if quality is good, if the fraction of production that you produce is, if it is all saleable that is going to bring down your variable cost also, because your fewer defects **you know** less **less** labour utilized in it, less utility utilized in it, less material utilized in it. And therefore, that is going to bring down your variable cost that is also something that is going to be there.

Systems cost; all the time that you takes you to track down customer complaints and so on, those are also going to be reduced. So, those are also going to be places, where your companies probably going to make some benefits, draws some benefits out of. Product mix improvement; your products are going to be better targeted and **you know** exactly that I am if I produce something there is going to be good market for it, because my whole process started for example, with Q F D and Kano process and so on, so forth.

You pinpoint it precisely, what was required by the customer by this the segment of the market that I am after. So, should be basically improving your product mix also, the offer is that you would be doing you would making those also would be much better tune. Sales growth is going to be a natural consequence of this. And new product sales growth, because this is a whole process of bringing out a new product also changes, it goes through a lot of scientific steps before you bring out a new product.

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Stage	Our Activities
Define what's important	
Measure how we're doing	
Analyze what's wrong	
Improve by fixing what's wrong	
Control to guarantee performance	

In fact, it is going to be very critical for you to realize, what is it that you would like to achieve and you achieve what is important, how do I get there, again I could approach this using the DMAIC model. I define, **what is important** what is important and what would be our activities to discover, what exactly is important. This is something I got to **you know** do some good thinking about and then only, I will be able to list out activities that will help me find, what exactly is important and what is important to customers, what is important for my system, what is important for myself, what is important for my business, all those things would come into play, once you try to define this.

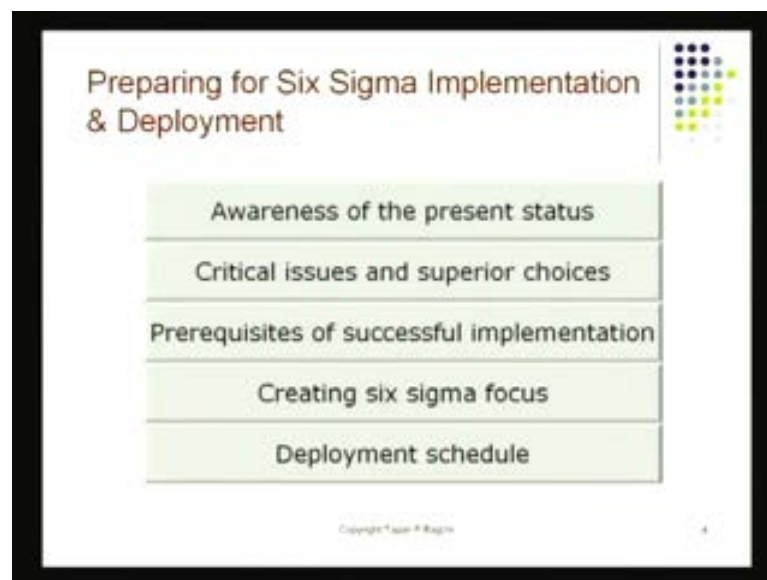
Then of course, measure how we doing, how is our quality performance, how is our customer satisfaction performance, how is our C P K, how is the control charts doing **you know**, what sort of defects are we producing, what sort of various types of costs, costs of poor quality **we are we are** we are basically piling up, that is also is something well I need some measurement. Then, once you locate the problems, once you locate that is not such a good **good** story you will have to analyze and there you will bring in tools like the cause and effect diagram, for example. And you will do root cause analysis, you will do analysis to try to find out, what is wrong and what might have caused it.

This is the place, where you try to get some handle on what might be required for you to do, what changes **you might** you might require in your company or in your processes to be able to make that improvement. And the next is of course, fixing what is wrong **if**

you, if you have discovered the gap, if you understood what exactly is not quite right, what is not meeting specs, what is not really neither missing meeting the customers basic needs nor function needs nor delighting him. Then I got to do something about it, I have got to fix things and the method that we discussed in this process in the DMAIC framework was, improvement and that has one of the key tools in there use there is your design of experiments D O E.

Once, you found the optimum settings for your control parameters, once you done that, whether it is process parameter, which the way you deal with your customers and so on and so forth, whatever it is, once you have located the optimum settings of this control actions, you got to maintain that and that is exactly. When your control action comes in, you guarantee performance **once you** once you reach that optimum level optimum **optimum** setting of the control variable, you got to keep them there. And there you got to do some monitoring on an ongoing basis, this could be done using control charts or any kind of matrix that you want to set up that will give you some feedback as to, what is going on?

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If you want to prepare for implementing six sigma, there are these things that we have to do; awareness of the present status this is something we got to do, we cannot really escape this, we cannot really jump over this. Then, exactly **we have to look at** we have to look at for example, what are the critical issues, what are the critical customer

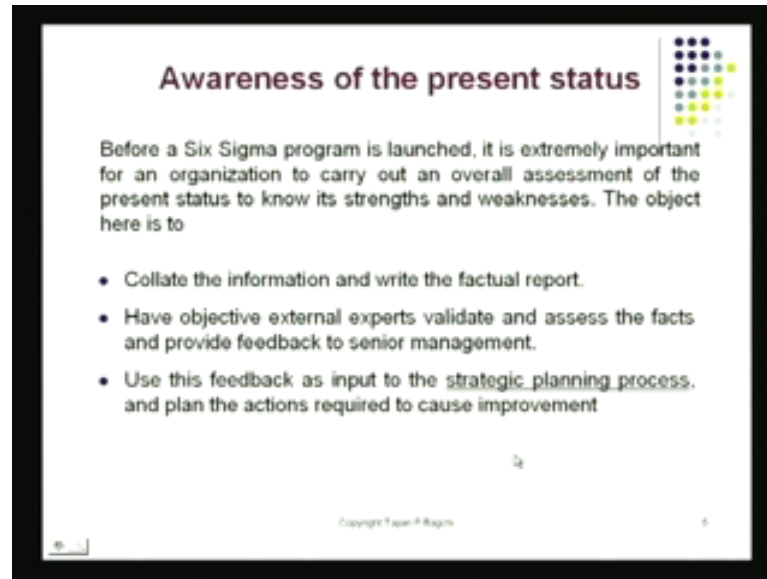
dissatisfaction issues and what are going to be some of the superior choices, this is something you got to be able to do, what are going to be the prerequisites for successful implementation, this also is something that you got to be able to do.

These are prerequisite in the sense; there is got to be some certain amount of preparedness, this might involve training, this might involve benchmarking, this might involve finding out how best this process could work who else is using it, how is he using it, what about supplier performance and so on and so forth, what about worker training level and so on and so forth, these are some of the things, where you got to work. And this is like your prerequisites before you can implement six sigma successfully.

Then of course, you got to create six sigma focus, you got to get people everybody in the organization oriented towards excellence, this is something you got to be able to do unless, you do that people would not be pulling it in the all in the same direction is very **very** important. Then of course, you got to come up with the timeline out of plan and that is the requirement schedule.

How I am going to bring in these different interventions in my existing operation, how I am able to bring them in, some of these might be at the R and D level, some might be at the shop floor levels, some may be with suppliers, some may be with customers and so on and so forth. These are all going to be there, what is my time schedule, how am I going to be doing it, so this preparation also is part and parcel of how you are doing it.

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Awareness of the present status

Before a Six Sigma program is launched, it is extremely important for an organization to carry out an overall assessment of the present status to know its strengths and weaknesses. The object here is to

- Collate the information and write the factual report.
- Have objective external experts validate and assess the facts and provide feedback to senior management.
- Use this feedback as input to the strategic planning process, and plan the actions required to cause improvement

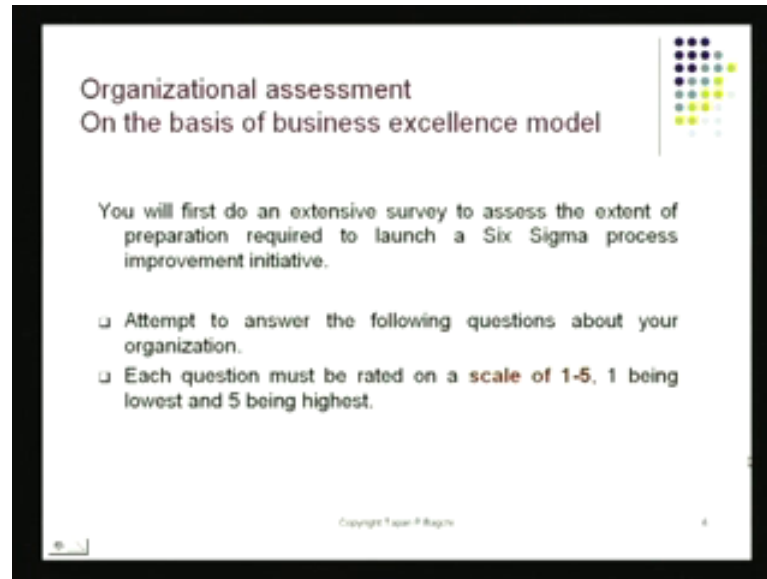
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Now, let us peel the onion a little bit, let us try to find out, how I find out, how I get the awareness of my present status, how do I find out how I am doing. So, the questions that would be raising would be the following; collate the information write a factual report, you got to produce this report in an objective manner, reporting the present status, whether its C P K number, whether it is a level of knowledge that people have, is being able to control quality, being able to do take preventive actions and so on.

That also will have to be done, we will have to probably get external experts and let them do an audit, let them try to validate some of the assumptions, let them tell you exactly, what things are right and what things really require some improvement there.

I have to use that feedback, that feedback that has come from these experts I have to use that in a strategic planning process; this plan is going to guide your progress into six sigma, with the six sigma project basically for the next few months, which could be 6 months or 1 year, it could be as short as 3 months, but that plan will have to be laid out there. And you are utilizing these experts advice, the expert's views on this.

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The slide is titled "Organizational assessment" and "On the basis of business excellence model". It contains the following text:

You will first do an extensive survey to assess the extent of preparation required to launch a Six Sigma process improvement initiative.

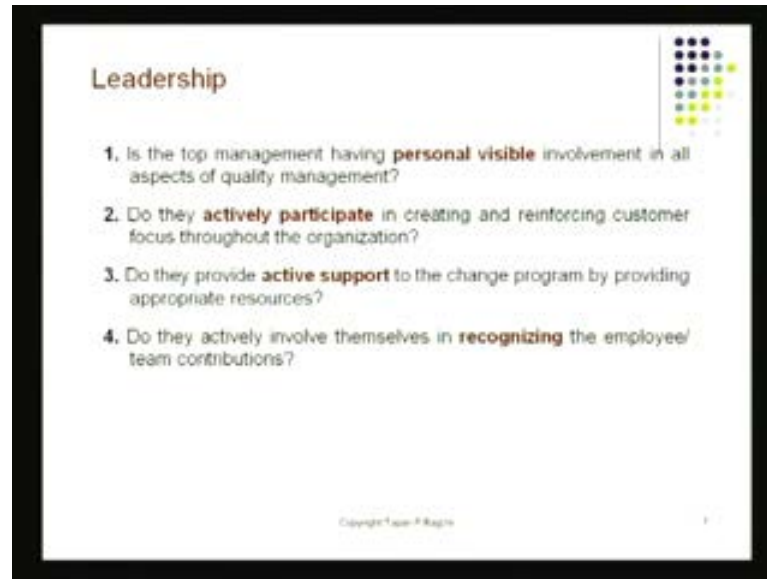
- Attempt to answer the following questions about your organization.
- Each question must be rated on a scale of 1-5, 1 being lowest and 5 being highest.

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Organization assessment this is something you also have to do. And basically this **this** is like knowing how you are doing, attempt to answer the questions I am going to give you the questions on a scale of 1 to 5 and these are going to be a set of questions. And I am going to be putting on the screen, one after the other and you realize answering them, can give you a lot of insight.

Let us take a look, what I like you to do is, put this in front of you and then, try to rate your own organization on the basis of **you know** try to respond to the question and respond it with a rating, when 1 is lowest and 5 is the highest, that is like if you are doing it all, if you are in a perfect state of status of affairs then of course, you rate yourself 5, if you are not doing so, if you are doing pretty badly, you probably rate yourself 1.

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And let us, just take a look at some of these questions; these are going to be indicating to you basically your preparedness about your preparedness, about moving into six sigma, it all begins with leadership. As I mentioned to you this is like this was done in one of the earlier sessions, that is very very important for the top person to act like a true leader he should be in fact, his visibility is very important and this visibility in regard to satisfying customers is very important, if **if** the top man talks quality, if he talks customer satisfaction, everyone is going to be oriented toward it.

So, this is the question **that you would like to ask** that you would like to ask you can probably get **get get** someone to tell **you you know** tell you how things are going you can probably get a sense of it, when you are dealing with, when you are speaking with your C E O or someone like that, try to get a sense of how committed he is toward this.

Do top management actively participating in creating and reinforcing customer focus throughout the organization do **(()) if they are doing this** if they are doing this routinely, if they would be rated; obviously, at 5. If they provide active support again, they will be rated 5 and do they recognise employee and team contribution, if they are doing these are part and parcel of leadership, if these things are going on, they are doing pretty well.

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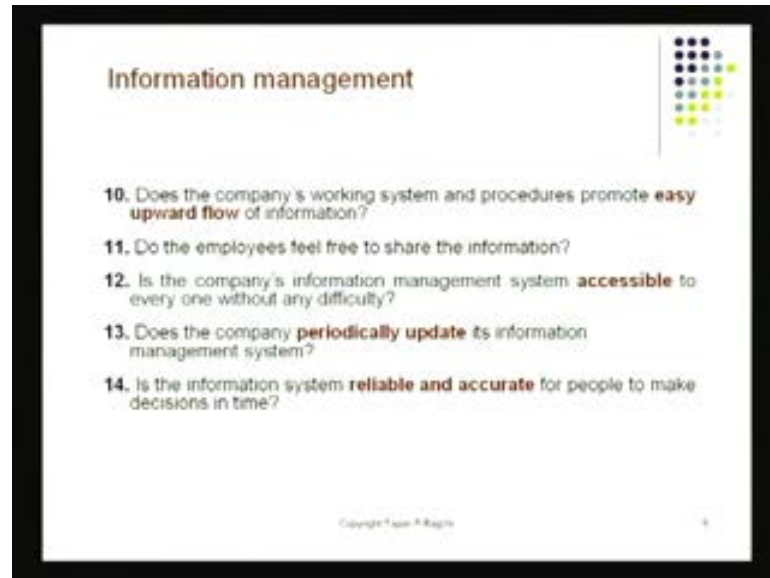
If it is not happening then of course, you are not doing so well. Then **strategic planning** strategic planning, if you remember it really has to plan out of the vision that the company has and strategic planning positions the company in a better competitive position **that is what** that is what strategic planning does; it really it orients the company to be more competitive. If you have got right strategies, your goal is going to be your actions are going to be such that, you **you** would be able to outcome compete other people, who are also in the game with you in the same game with you.

Does **they have does** the company have a common vision this is that strategy; this common vision has to be shared by all employees in it is true sense is that bear or there is there an alignment towards that vision. As far as, what processes are concerned, are they aligned towards that and in fact, do they all are they all synchronized in that direction there or their targets that have been quantified and are they measurable. These are some of the things, where you **you** would like to probably get some assessment.

Is the commitment of resources for new facilities, process improvement and training done considering long term objectives, because those are strategic objectives do you when you put in resources or put in training programmes and so on and so forth. Do you keep this long term prospective in mind that would save the reverse strategic orientation is good. What about comparisons with the competitors **(())** that actively, if you are doing that actively, if you are doing this very actively then of course, you **you** got that strategic

orientation and you would be rating yourself pretty high, if not you would be rating low, on all of these things.

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Information management this is like very **very** important again, because people top management particularly, they must get good information to be able to do it. And take a look at the information flow is it easy for information to flow upward, is it easy **you know** generally speaking what happens **you know** whatever the top people say **you know**, those come out in notices and so on and so forth. They come out in various notifications; they come out as in policies and so on and so forth.

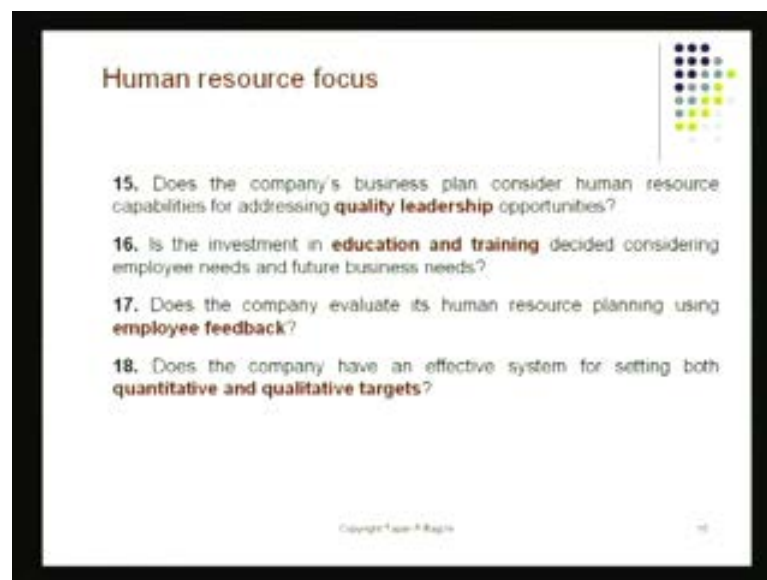
So, communication upstairs to downstairs is generally there in all companies, there is not much problem there, but in fact, knowing whatever is happening at the grassroots having that, bubble up upstairs is **is** that easy to take place in your company. The employees feel free to share information is this something that can happen very easily is something is right or something is wrong is that shared fairly easily or do people try to people have a problem there.

What about access to information? Is that something that can happen without much difficulty; if it happens without any difficulty at all, you would be ranking yourself pretty high, and you would be doing that. What about periodical updates, if the periodical updates of the information management system as you know with technology a lot of

things have changed **you know**, we had basically paper, logbooks and so on and so forth now, at that changed gradually and so on and so forth.

Now, you have got electronic databases, you got knowledge banks and so on and so forth, how easy is it for us to get these updates **you know** and the information system itself is that getting updated, once in a while. What about the quality of the information itself? Is that reliable and accurate for people to make decisions in time, this is like something that is very important.

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What about human resource focus? This is also something you would like to be able to get and handle on and that of course, begins with quality leadership, this is something very **very** important. And as far as, **you know** setting an example is concerned, it must begin right at the top because, **you know** most people see that as an example; they would like to follow through from that itself, this is something very **very** important.

The leaders must be true examples, if unless that happens, companies will not I mean many people will not find role models and they will do whatever makes good sense to them and that is about it.

What about education and training and is that really oriented toward couple of things. One is the needs of the employees, needs of the workers, needs of managers, middle managers and everybody else that is something very **very** important. And also is it in

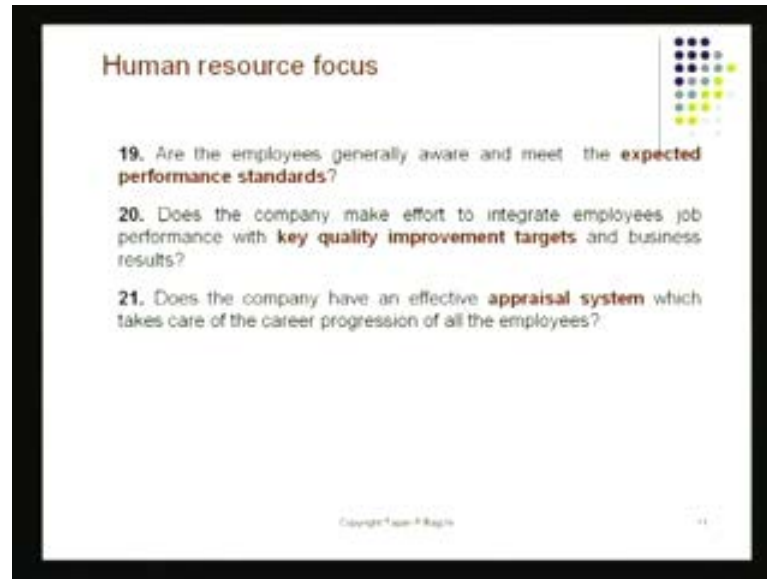
sync with the requirements, it is very important for training to be relevant. First of all, understanding what are the requirements **you know**, what all kinds of competencies I want. So, some sort of competency mapping would also be useful here and then, you appropriately **you know** plan out the educational calendar **(())** for different people, this is something that part and parcel of it.

As you **as you** probably have a sense, you must have sense this that six sigma requires the knowledge **the the you know**, deep knowledge of certainly some of the statistical methods and lot of other things also. And **that** that training is pretty intensive and you got to have some good training done in order for **for** people to reach that level and be able to execute those decisions and actions and so on and so forth and that is also very **very** important.

What about employee feedback; your H R focus, does that allow for quick and easy feedback from employees, if it is there and if it is evaluated by the company, not just the feedback you received, but it is also evaluated very well **that is very very important** that is very **very** important for you can actually see that, if that thing is there six sigma is probably going to be succeeding in **in** terms of it may effective and it being easy to implement.

Does the company have an effective system that is for setting both quantitative targets and also qualitative target **these are**, these are again these are human resource focus, these are the kind of things, where human resource people they can come out and say that, **yes** we do that very well. And we did quite easily, most people are aware of these things that is like something that human resource people can sense very easily and **they should be able to** they should be able to kind of relate that.

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There are so few other things also, that also come under human resource for example, expected performance standards are these known to people, if that is not known to people then of course, it is going to be pretty tough for people to kind of (()) where they are?

Key quality improvement targets are these known to people, these are key quality improvement targets and these have to be integrated into the person job, if there is a certain level of performance that is going on right now, what about the improvement targets, are they aware of this, if they are aware of it, they will start thinking about it. And this is something that is got to be again ensured by H R people; H R people have the time for it and because, they have a lot of contact with employees and so on.

They can very easily check, whether this is there or not or the improvement targets are clear to people. What about the appraisal system and does it actually take care of career progression employees also, because people when they do a good job, they want to be appreciated, they want to be **you know** given a decent feedback, they want to be able to kind of **you know** appreciated for whatever contribution they make. In general of course, having a positive orientation will go a long way; this create good relationship between employees and **and** the company. And this is something that probably cannot be skipped, if you are really aspiring to have full participation.

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Human resource focus

19. Are the employees generally aware and meet the **expected performance standards**?

20. Does the company make effort to integrate employees job performance with **key quality improvement targets** and business results?

21. Does the company have an effective **appraisal system** which takes care of the career progression of all the employees?

22. Is the company concerned about **employee well being**?

23. Is the good performance **suitably rewarded**?

24. Is the employee **motivation level** high and good performance suitably rewarded ?

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Along with of course, there will be employee (()) and then, the issue of reward and a general sense of the motivation **motivation** level in the company in among the employees is it (()), is it oriented towards good performance and **is** good performance suitably rewarded. And these are the kind of things that are going to be absolutely essential, if you are going to be succeeding with six sigma someday.

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Human resource satisfaction

25. Is the company able to **realize the full** potential of its people and people's commitment to job is visible?

26. Are the existing system of **incentive and reward** adequate for maximum employee contribution?

27. Is the company's image as an employer good and the company is able to attract the **best talent**?

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There are a few other things also, human resource satisfaction, this is like **V M** company; a company has not only hardware, raw materials and so on, it also got this fast body of

fast **you know** a number of people, who are there and they are their resources, they are very important part of the total resource that is there. Does the company make effort, is it able to realize the full potential of all the people, who are there in the company, is it able to realize that full potential. Many times there are so many skills and know how that **that** **that** employee have, but the company is not able to utilize them fully, this is something very **very** important.

Unless, that happens with man will not feel like **you know** really that, he is accomplish something, he has got certain skills, he has got certain know how and so on, but nobody is interested in knowing about them. Then, probably even the level of motivation will probably go down.

The existing **you know** scheme of incentives and rewards is that adequate for maximum employee contribution, this is also something that you would like to be able to see this. And are you are the company image such that **you know**, people feel that in this company **you know** I really have good people to work with and they are able to attract good **good** talent, the best talent possible. What about customers and what about the market place?

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We got to look at a few things there that are kind of important, these are so important that **you know**, without having this focus in place, focus towards the customer and the market I really will have no target to shoot at. This is something very important, it has

become more important, because this **this** the times these days are such that, there are many customer many of course, there are many customers, but there are many competitors also, many suppliers, who would like to be in the same business, would like to offer something that is slightly better than what you are doing.

And it is very **very** important for people to realize for the companies to realize that, the future needs are going to be dictated by what **what** competitive picture is there. And **because** this is because expectations are changing and generally speaking, competitors they are coming up with new services, new products and so on and so forth. It is very **very** important that, when I do my planning, when I look at customers, when I look at market I think of tomorrow, I think of the needs of tomorrow, I think of the opportunities for tomorrow and so on and so forth.

I must find out a couple of things, I find out must find out the trends, which way are the innovators going, which way are, some of the leaders in the pack going. And customers are going to be many of them; they are going to be trying those new ideas and new products and new services and so on and so forth. And I should be ready to offer them, the moment the style catches on, I must be there with my products and with **with** good quality performances also to be able to take care of them.

It is very important for us to realize that, customer expectations keep changing and whatever I did before, whatever I did last year or 5 years back, probably the same thing is not being expected anymore by customers. And I got to make sure that, with this changing customer expectation I also write that tide, I got to make sure, I write with it. Unless, write with it, I will have big trouble there, this is something I have got to **make in my** keep in mind.

So, changing customer expectations are again something that I got to know, performance standards also got to be found out; because, performance standards are basically for us to find out **you know**, how we are doing and **this is** this could be in a variety of different ways, it could be for example, an example is **you know** how are other people doing versus how we are doing, what is the **you know** and you can do a lot of these things by doing either customer service, focused group service and so on.

And getting lot of feedback from them you can find out, how your performance is there is going to be that external performance, which is going to be close to the market place

and it is also going to be internal performance by looking at your for example, your internal failure cost and you also got to look out for those, who are leaving your business, they are going somewhere else, all this data is very **very** important. When I have a problem or I have an issue, do I trace problems using quality measures do I do that, this is something that should be cultured, I should really use quality measures.

And what are quality measures? These are customer satisfaction measures and **for for the** for the company inside, it could be the **the** amount of rework and the amount of you basically cost of internal losses that go on, this is something, these are going to be quality measures. So, quality measures are going to be found in a couple of ways one of course, is going to be the level of satisfaction that the customer achieves and the level of dissatisfaction of the customer attain that also is kind of important.

I got to do a same thing for internal customers also, what about expanding market share is that due to my just better service or is the better quality or a combination of there off, these are the kind of things I got to discovered. So, I got to make sure I take care of these things, when I am moving slowly gradually toward, what we call six sigma.

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Take a look at some of the other factors that also have to relate to customer focus and market focus, do I regularly evaluate the kind of commitment I have for service performance to match customer expectations, there are customer expectations and today

in today's age people are looking not only at finish products, but they are also looking at services **they are also looking at services.**

In fact, they are looking at total experience the product plus service. And in fact, what we have to do is, we got basically look at the commitment that the company has to try to improve try to excel in that direction, this is something we got to evaluate on a periodic basis.

And we got to promptly resolve all formal and informal customer complaints this is something **if we**, if we ignore them the moment you start ignoring them, the customer is going to ignore you, this is something that I cannot really escape, **I** I got to be able to do this. And of course, something that we did in Q F D and also we did in Kano analysis, which is like determine the customers current requirements and the expected requirement that he might like to have down the road for example, if he does not have it today, this also is something that would like to be able to do that.

Are we using is the company using customer listening technique, because the voice of the customer has to be called, has to be captured and one fairly state for way for doing that is to do Q F D for all your key products and key services, try to do a Q F D, try to do some benchmarking there, try to look at who is the best in town, that provide the same product or the same service.

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Customer and market focus

36. Does the company analyze and use information on customer loss/gain and product performance to develop **future strategies**?

37. Does the company effectively **determine** customer satisfaction and make effective efforts to improve it further?

38. Does the company's customer satisfaction measure capture key information that reflects their likely **future behavior**?

39. Is the customer satisfaction level effectively compared with that of your **key competitors** by studies and independent surveys?

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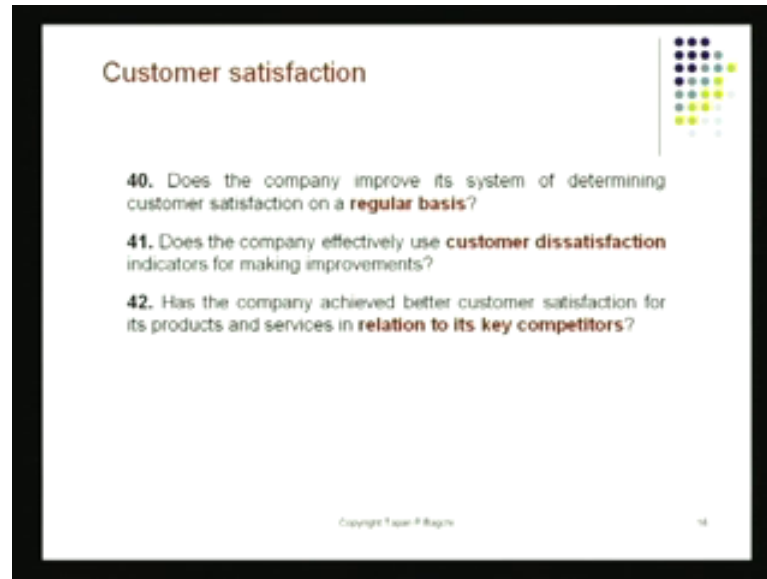
This way you would be a lot closer to satisfying the customer then, (()) what about future strategies, how do do they bring in, does the company analyze and use information on customer loss and customer gain for example, and related to product performance to develop future strategies, if things are not going so well or the things are going well, how do I how do I dream up new strategies down the road.

In fact, that is the manner in which, I am going to be running the company down the road, for example. How effectively do I determine customer satisfaction make a efforts to improve it this is, this is what requires a lot of good survey data, you got to be able to get a lot closer to the customer, you got to have really good ear to to hear what he is saying and listening to the customers voice is is by far probably the best important best best example.

And let me remind you again there are two reasons, why you should be listening very close to your customers very closely your customer; the first is of course, what are her requirements this number 1 reason, why you should be listening to your customer. Number 2 is, does she have any complaint, so what are her requirements and does she have any complaint, these are the two key reasons, why you must be listening to your customer.

If you do not do this, you are ignoring your customers and then, the customer is going to go somewhere else. And probably, most likely you would not be able to take the action that will keep you competitive. In fact, it is very very important for us to have this in place you also have to have a good knowledge of who your key competitors are and what they are what they are offering the customer.

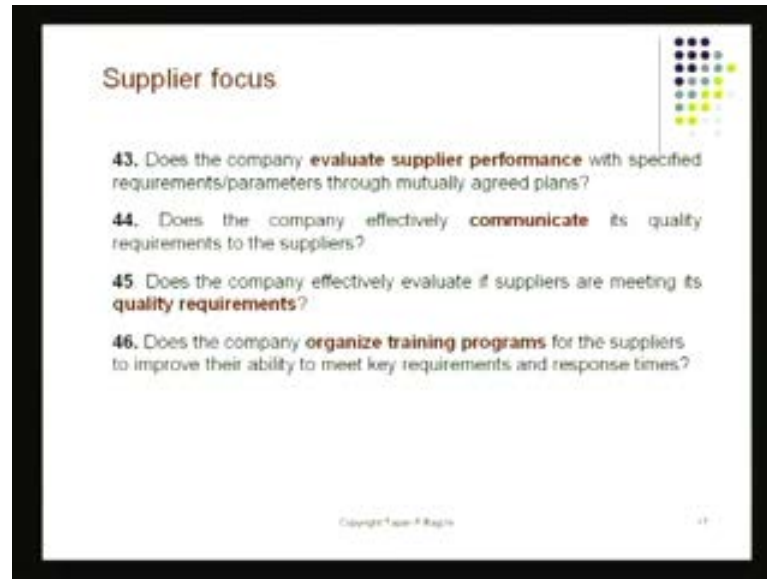
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You got to do this system for measuring or determining customer satisfaction on a regular basis, you got to find or probably you got to improve the system. So, there may be some system there **it may** it may not be providing all the signals that you want in the sense. These are the various instruments are using to get a sense of what is going on in the minds of the customer in the market place.

Take a look at the system once in a while, take a step back and find out how effective are the systems, the **the** system that I have in place already. What about dissatisfaction indicators, these are also very **very** important, because they lead to redesign **of your** of your either your product or your service, retaining of the offering that you make, that can come a lot that can come really once you got these dissatisfaction data with you. What about the **you know the** level of satisfaction, how does it compare to whatever your key competitors are doing?

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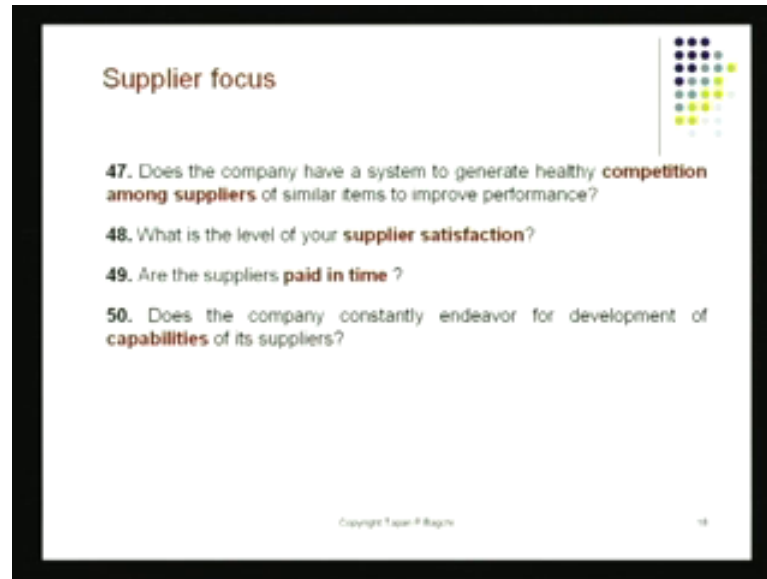


How do you stacking up against them, that are like one major area you got to keep an eye on. Because, in most places you are not the monopoly, you probably have a lot of competition around you.

Supplier focus this is also a large area evaluates supplier performance you got to make sure that, your supplier is also top-notch. First of all, find out what is C P K is for example. Do you communicate effectively **with your** with your supplier as far as quality requirements are concerned, as far as delivery requirements are concerned, do you have written contracts, do you audit them once in a while, do visit them once in a while, quality requirements are so important.

And also once in a while, you might even organise training programmes **you know** there are good companies that do extensive training for the suppliers, because this is done to try to make sure, what they deliver meets your requirement and for this, they may not be prepared, they may not have to know how, they may not have the technology. And some cases; you may have to invest in some technology that he is using, we may have to upgrade his machinery, he may have to upgrade is training to be able to make sure that, whatever he supplies you can use it almost in a J I T manner, this is very important.

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There are few other things also. Probably and this is of course, where **there is a there is a** there is a difference between the western approach **and the** and the eastern approach. In the eastern approach; you have a cooperative arrangement for the supplier. And the western approach, you try to setup competition among the supplier. So, hopefully that way, there would be **you know there would be** working better and so on and so forth, they **they** would become better suppliers, but the eastern way of thinking which is what the Japanese use, for example.

And the Koreans use is to get into a partnership with their suppliers. And this way you feel, there are success is achieved together **if the**, if my business goes down, because of poor quality coming in my supplier business is also going to go down, if I succeed, my supplier must have some share of that, success also. So that, they **so that they** also feel like they have got something out of the **the** increase share of market place or increase profit that I had as his customer, this is something that is other important.

What about supplier satisfaction, do I keep an eye on that, do I have any kind of measurement, are they paid on time and they these are some critical things, you may not think much of this, but it is very **very** important, when it comes to maintaining a healthy relationship with your supplier. What about development of capabilities, this is like something that many companies are now trying to do, they work with their suppliers;

they try to make sure the suppliers have the capability to be able to take care of the requirements, which are like today's requirements.

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Now, let us get inside the process, this is like **this like (())** inside my **my my** house my factory, does product design this my design shop, do they consider the customers implied and future needs. Certain **certain** things are heard from the customer, something are employed by the customer, our product design people; do they really keep their ears open for this kind of thing, this is rather important, if this is not done, someday the customer is going to discover **he is not going to be** he is not going to be as happy using my product as per someone else product, when I say product of course, I also include services in that.

Does the company validate the design some design I have come up with and I try to validate that design considering all the different factors, for example. Performance of the product that I make the process and supplier capabilities, do I validate the designs, this is something that has to be done, am I delivering am I designing something that actually can handle various types of issues and so on and so forth. This is something will it perform the way it has been design, will it deliver the function that it has been designed to **to** deliver, for example, this is going to be important.

What about improvement of design, how do I go about doing this and this is; obviously, a cyclic process as market requirements change our customers preference change and so on and so forth. Do I come back and how exactly, what is my process for improving my

design, what is that cycle. What about the causes of variation, there is no process in the world that does not have some variation in it, but I have got to make sure, I understand that variation, I understand what is natural variation, what is assignable variation, what is kind of random variation that customers are probably willing to live with, that will determine basically my C P K.

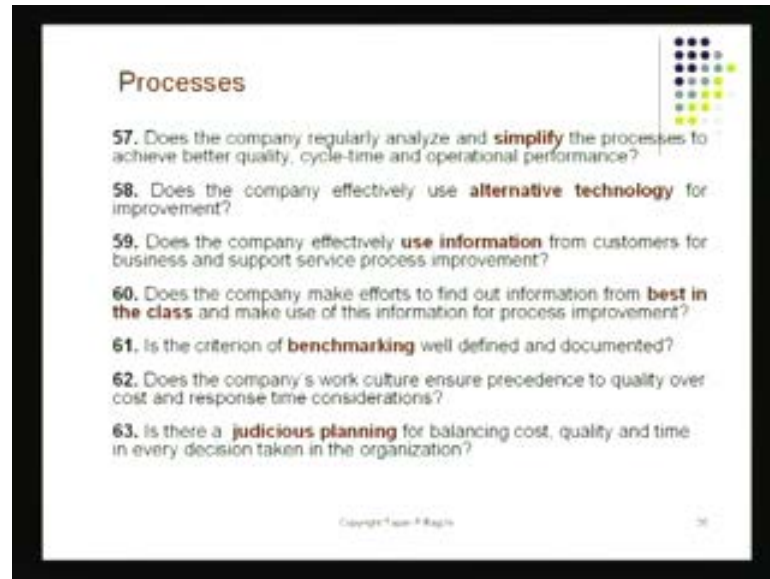
And what is that extra variation that is very disturbing that is like happens once in a while, but it is assignable. And I must make an effort to try to keep the assignable variations, how? This is something I should be able to do. As you know the aim of six sigma is to tracking your variation, is to make sure the process that has got this kind of width, is just barely matching customer requirements, I have got to make my process tighter, so that the customer requirements are here, but my process variations only this little small thing, which is really a fraction.

So, almost there is no chance for my requirements, my **my** production to go away outside on this side, outside this spec limits, out of the expectation or of this side, because my process is pretty tight. So, I got to keep an eye on my process variation also, this is also something very important. And for that of course, we go through this total process of trying to understand variability and we go through the DMAIC process, one of the key objectives in the DMAIC process is to reduce variability, just as one of the goals is try to reduce losses.

What about better operational performance, does the company analyse processes to try to achieve better quality, **do** does it do it routinely, does it look at better operational performance, this is something that the company got to be able to do.

And what about business processes, there are these processes that are going in the factory, but a lot of transactions that taking place through business process and these are transaction processing, order processing, ordering staff from suppliers **you know**, dealing with **you know** employees and so on and so forth. There are lot of business process in action, what about the quality of those processes, what sort of bugs are there, what sort of errors are there; are they efficient, **are they** do they **do they** meet these **these** goals that we have.

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For example, **you know** making sure the requirements are met, make sure the delivery takes place on time and make sure, it does not cost too much, make sure its adds value you in other words I have done value engineering, I have done some reengineering of these processes as far as, business processes are concerned, my goals should be to try to analyse and regularly simplify processes, which are there, this is very **very** important.

Unless, I do this routinely, my lot of my processes are going to be basically loads. What about the alternative technology, how often do I look at this, now any of these questions mind you they have to be rated on a scale of 1 to 5. So, if you find your company is not doing this, you are probably going to rate this then at **1 and 2** 1 or 2 level. And if the company is doing these things in a manner that is nearly the best in town, then of course, you will rate it probably near 4 or 5. What about use of information, what about benchmarking, does the company use benchmarking, for example, does it use judicial planning, these are some of the things that the company should be able to do.

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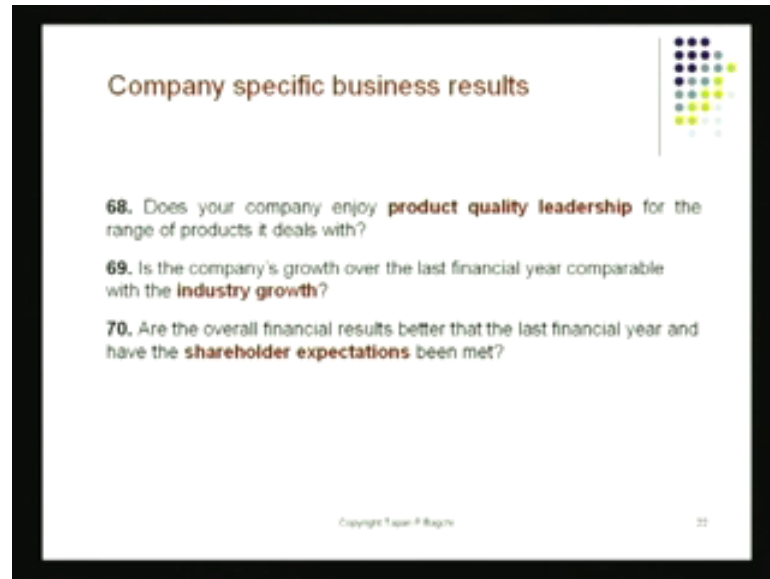


If processes reflect this, then of course, the company is doing very well. What about impact on society? Because, I am not running my company in isolation, I got to make sure that, I take care of the needs and expectations of society at large also, that is also like an orientation that, the company must have in order to move towards something as fancy as six sigma.

If I rate low on this, there are going to be lot of problems down the road, if I try to force the company to move towards six sigma, if some of these things are not there for example, what about the possible impact of products, this gets into a lot into what we call (()) manufacturing and so on. Because, we got to make sure that, the impact of these products or services on society or the community at large **you know** that is not really harmfully in an way at all, that is something I got to be able to take care of.

What about ethical conduct can (()) as an example if I can then of course, **I will be rating** I will be rating the company at 5 close to 4 or 5. What about preservation of global resources is the company active in this area or does it really not bother about tomorrow, if it does not bother about tomorrow of course, it is going to get low rating.

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Company specific business results

68. Does your company enjoy **product quality leadership** for the range of products it deals with?

69. Is the company's growth over the last financial year comparable with the **industry growth**?

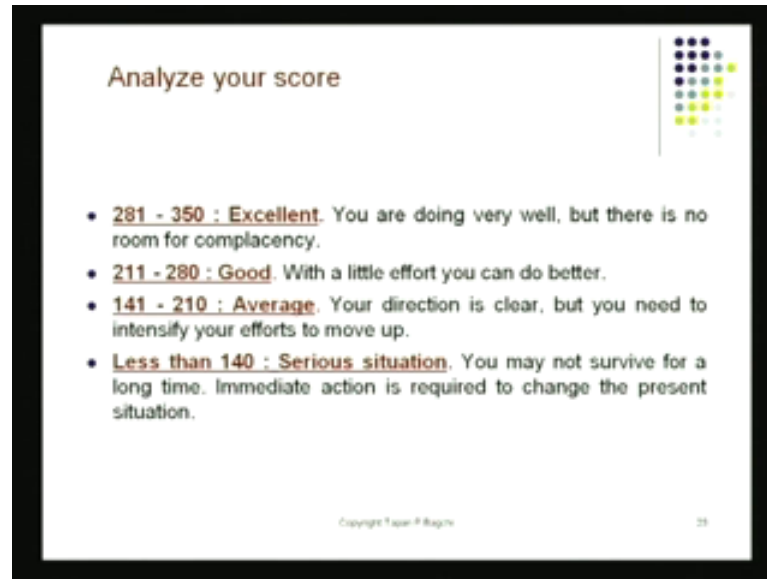
70. Are the overall financial results better than the last financial year and have the **shareholder expectations** been met?

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What about business result at the bottom line for example, do will you really have a quality leadership, what about industry growth as far as my **my** progress is concerned, how does it compare with for example, what we call industry growth; the overall industry has been growing at 10 percent level, that is year to year, what about my company how is it doing, is it better than 10 percent, is it double of 10 percent or is it below 10 percent, I got to have some **some some** idea there. What about shareholder expectation, this also is something, where **you know there is a** there is a direct link between these numbers the shareholders expectations and the basically the business results of a company that is also something very **very** important.

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Analyze your score

- **281 - 350 : Excellent.** You are doing very well, but there is no room for complacency.
- **211 - 280 : Good.** With a little effort you can do better.
- **141 - 210 : Average.** Your direction is clear, but you need to intensify your efforts to move up.
- **Less than 140 : Serious situation.** You may not survive for a long time. Immediate action is required to change the present situation.

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Once you have done this **once you have done this (())** ratings turn out to be between 281 and 350, does the sum total of all the questions that you answered, suppose rating turns out to be in this range here 281 to 350 that is pretty good news, you are doing very well, but there is; obviously, no room for complacency, you got to make sure that, you keep the charge on, you keep the mission **you know** shining brightly.

So, that everybody is oriented towards that everybody is moving towards that you doing the good job, you got sustain it, you got to maintain it and if possible try to explore **you know** go up a little bit, because you might not be at 350, 350 is the max score, you may not be there. So, try to find out **you know**, why the **the** gap and that is there. Suppose, we are doing 211 to 280 most likely many other companies are doing just this. So, you are just plotted the big large pack here.

In fact, it turns out that, if you are in a condition like this, same this 211 to 280 range with a little bit of effort you can move up with just little bit of effort, because this is what everybody is doing and this is probably what you are doing without any kind of special effort at all. This is something you got to keep in mind, you got to make **make** sure that, you understand that, if I do not make any effort and then I am here then perhaps with just slight bit of effort I may able to move **move** up into this slot of 281 to 350 and that is what the real **(())** that is what the real returns are going to be, you got to remember every

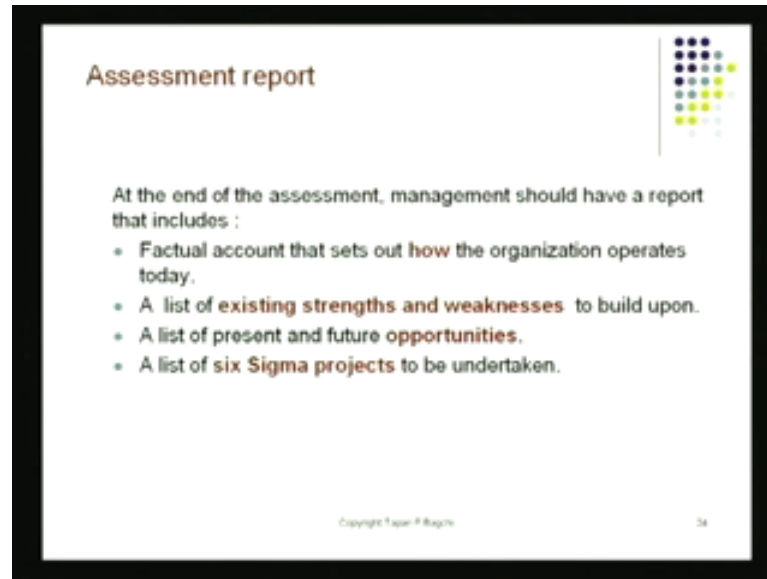
six sigma project every six sigma project has to be justified on cost basis on loss prevention basis, on loss reduction basis on.

For example, so cost reduction or increase market share and so on is got to show positive return, unless you are able to show positive (()) from any kind of six sigma effort, we put into the company, it is not going to be worth it. Then, you are doing something that is no different from the general H R improvement and that kind of thing is just another campaign that is really not going to be very motivating and most likely, if you stay at this level, which is six sigma projects, the company is not going to support future improvement.

Even, if they are very sensible, because they will have a sour taste in their mouth from this. Now, suppose you are below 140 that are like, if you really ended up scoring below what we call, if you are at 141 of course, the direction is pretty clear that, we got to improve that that is pretty clear. So, you need to intensify your effort to go up, but suppose you are below 140, that is a very serious situation; that means, you may not be able to survive for long. This is something that we got to really watch out for its extremely important for us to realize that, as far as times go we got to make sure that, we are never caught in this sort of thing.

And of course, you would be caught in this, if you are sleeping throughout, you have been sleeping throughout, you would not been in the first two; first two is like excellent or good you would not be there, you would probably an average or even below that. And this is pretty dangerous sign and of course, this might be you need a revamp not just your technology for example, you also need a lot of training, you need a lot of contact with knowledgeable people and you got to make sure, you set up your course right. So, you start with your mission, you got some vision there; you got the mission there from that, you work out the strategy, then you try to actualize those strategies. DMAIC would give you great framework to try to move with that direction, this is like something that we cannot really escape.

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The slide is titled "Assessment report" in a dark blue font. In the top right corner, there is a decorative graphic consisting of a grid of colored dots in shades of blue, green, and yellow. The main text on the slide reads: "At the end of the assessment, management should have a report that includes :". Below this, there is a bulleted list with three items: "• Factual account that sets out how the organization operates today.", "• A list of existing strengths and weaknesses to build upon.", and "• A list of present and future opportunities.", "• A list of six Sigma projects to be undertaken." At the bottom of the slide, there is a small copyright notice "Copyright © 2010 P. Rajan" and the number "24".

Assessment report this is also something that we do got to be able to produce, this is a basically factual account of how the company is operating today, this is something very important. This assessment report basically is a condition of the health of the system and it is so important I just cannot tell you how important it is, this is of course, something that is done pretty routinely, except the reports are stacked up once in a while, there is some action there.

But, what happens most of the time people are fighting fire very few people really those, who are at middle level and and below that, they are able to do much just beside just fighting fire. And that is really not the way we should be doing this.

So, if you got assessment reports see, if you could track it, if you could look look for a trend, if you could identify a trend, if any trend does not look like something you would like to see for your company try to see, what interventions could be thought of. Make a list of existing strengths and weaknesses something that is done in sort analysis. There is something very important you got to make sure, you prepare a list of present and future opportunities, it could be new markets, it could be training opportunities, it could be up gradation opportunities, it could be R and D opportunities, it could be new product opportunities, it could be any of those things.

Make a list of those things and of course, then we should try to see, if you could make a list of what we call six sigma projects; what are six sigma projects, these have a specific

mission, this start with something, where you **you you** either have a large loss and that is going to cost you some money or your poor performance or your performance that is not competitive. And you got to make sure, either you cut your losses or you reach your cost or produce some new market, new opportunities or you improve your quality. The moment you start improving quality, it is going to be noticed; it is going to be noticed by customers, they want to make sure that, you actually offer something that is better than what they are getting somewhere else.

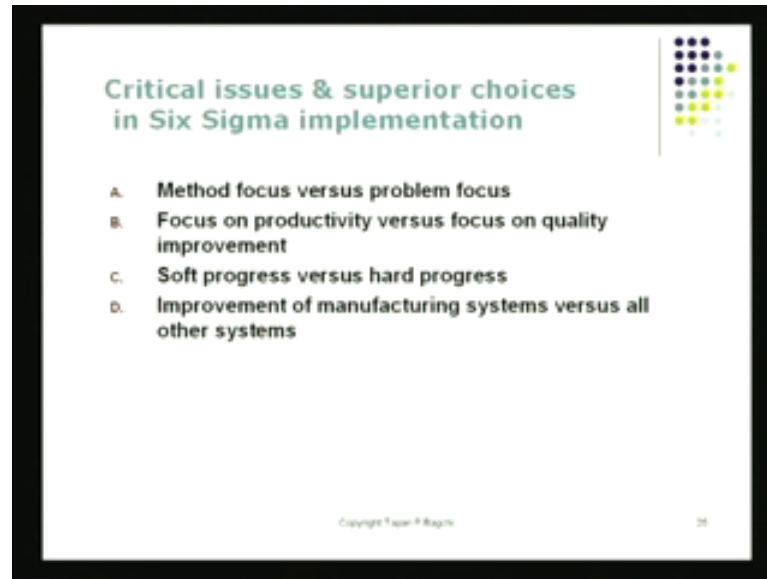
If you are not experienced in this today, you have to work out a DMAIC plan, you got to again start with definition, define the gap, it is very important that you define the gap; define basically is the problem. Then, you measure the present level of performance you measure that and then, when the gap is there, when clearly this is different from where it should be, there is a difference between target and where you are, you look at these difference and you try to sort of see, why this, you will do this cause and effect analysis this will be at the analysis phase.

And try to **(())** basically on at a speculative level all the different factors that could be contributing to this gap, this is very very important. Once, you identify the gap that is your half the job is done. Because, now you can speculate about causes and you can move gradually toward improvement; the improvement is going to be very very systematic improvement; it is going to be using a lot of statistical training, lot of **you know** perhaps even get some field data, customer data and so on and so forth.

And you would be trying many different alternatives to try to come with better solution, either a better product, better design, better service, improve service and this could be done on any front, it could be done in terms of for example, cost, meeting requirements delivery times, these are some of the things that are or perhaps employ morale, any of those things any place, where you can make a positive impact make that the target and that is going to have an overall **(())** effect on overall performance of the company, these are the areas, where you could conceive a six sigma project.

So, it could be either to cut cost or reduce losses produce costs is a very very **very** important contributed to the bottom line. And improvement in quality is a very big contributed to the top line, which is like your total sales and the expanding market share both of these can actually give **give give you a give** you an edge and do wonders for you.

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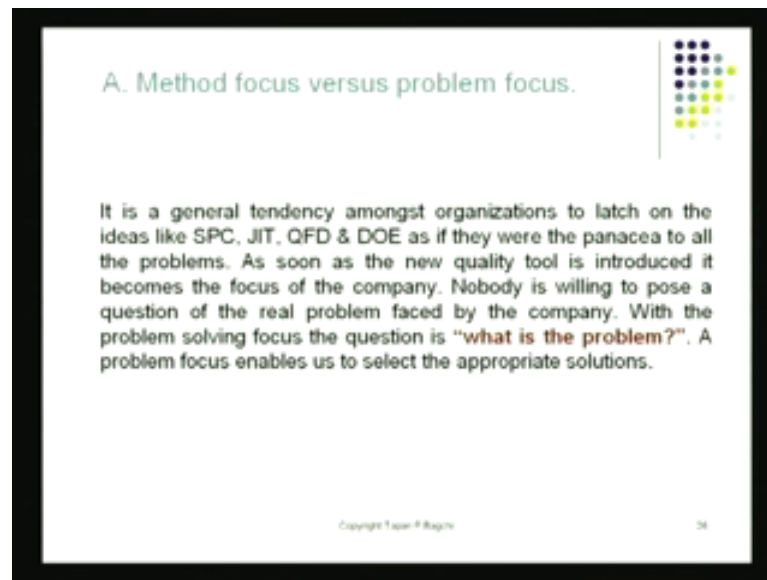
Critical issues what are on the critical issues; the **major focus versus problem focus** method focus versus problem focus, what we really should be doing is, we should really see, what we could do and these are superior choices. And let us take a look at some of these things, **the tradition has been** the tradition has been you look at methods, but really what we should do is, when you look at an opportunity, you look at focus on the problem, do not worry about too much about the method, and focus on the problem. What about productivity, should we really worry about productivity or should you put concern on quality, but the wise people say is focus on quality, productivity will follow on its own.

What about soft progress versus hard progress, this also is something **that** that one has to look at and in this case of course, hard progress takes place when you really produce impact as on the top **top** line, which is your sales **sales** money or the bottom line may be, got cost there. And focus on manufacturing systems versus all system, should you focus on the manufacturing system only, remember now, quality is the job; quality is the responsibility everybody.

So, see even if you improve, even if you come up with the top-notch manufacturing system, is your design system equally good, is your delivery system equally good, is your customer service equally good, you may have done a top job in best producing, the best possible product as far as manufacturing goes, what about these other part, what

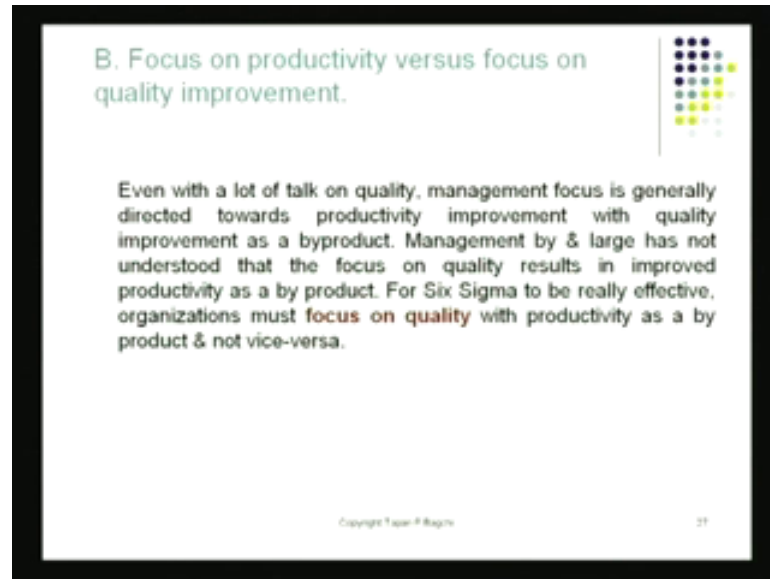
about talking to the customers to try to understand their requirements, for example, are you also doing as good as job there. If these are not going to be there and that really means improving systems all around, not just focus you on the manufacturing, this is something very very important.

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Let us take a look at methods versus problem focus, your goal really should be do not worry too much about these specific tools like S P C, J I T, Q F D, D O E any of these things by themselves, do not really fall in love with any of these tools by themselves and just justify your words just because, you love D O E, that is not important. What is really important is, for you to locate the problem, if you locate the problem, if you find the answer can be found through D O E go ahead and use D O E, but here the focus really should be on the problem and not on the particular method that you might be using.

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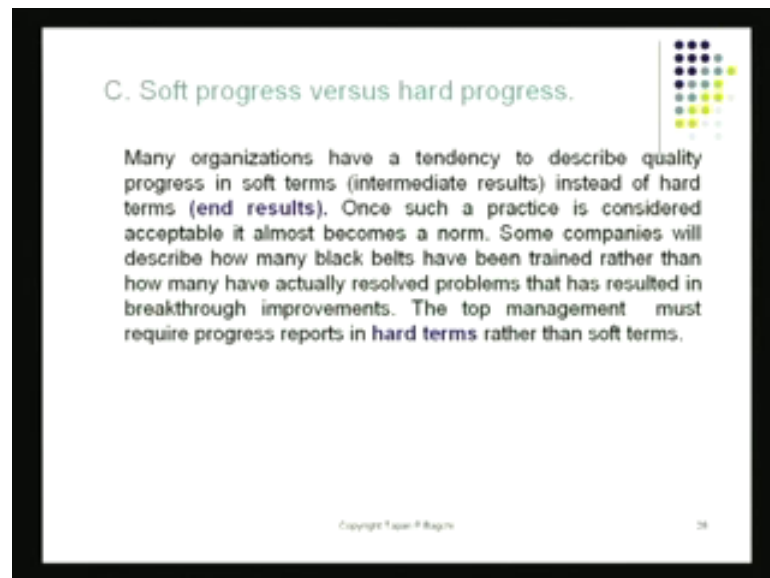
B. Focus on productivity versus focus on quality improvement.

Even with a lot of talk on quality, management focus is generally directed towards productivity improvement with quality improvement as a byproduct. Management by & large has not understood that the focus on quality results in improved productivity as a by product. For Six Sigma to be really effective, organizations must **focus on quality** with productivity as a by product & not vice-versa.

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What about this focus on productivity versus quality as you know very well, focus on quality will eventually lead to an improvement in productivity, because the fraction of parts produce, which are not going to be so good, they are also going to be there and that is something that is very very important for us to realize.

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C. Soft progress versus hard progress.

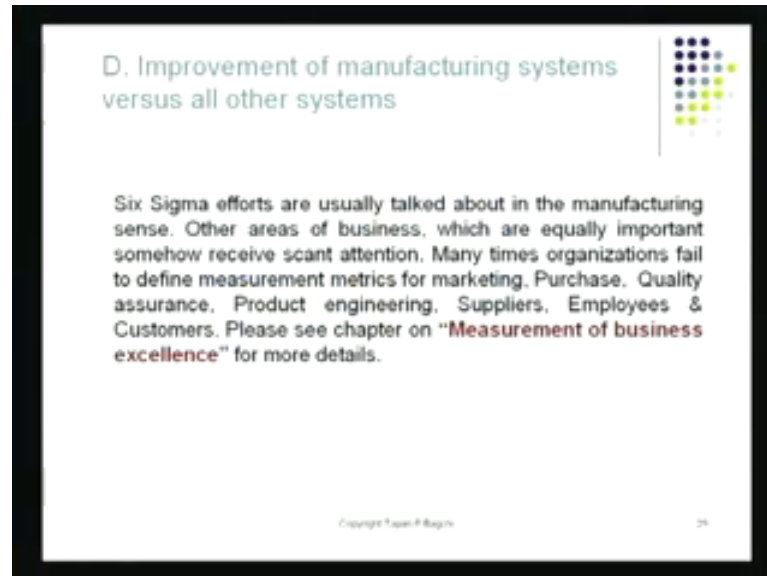
Many organizations have a tendency to describe quality progress in soft terms (intermediate results) instead of hard terms (end results). Once such a practice is considered acceptable it almost becomes a norm. Some companies will describe how many black belts have been trained rather than how many have actually resolved problems that has resulted in breakthrough improvements. The top management must require progress reports in **hard terms** rather than soft terms.

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We got to make sure, there is soft progress versus hard progress and there of course, **we want to make sure that** we make sure that the intermediate results also looked after and of course, I have got to make sure, I got to keep an eye on the end result also, but the

intermediate results, these part of quality chain, so we got to make sure that, the total system works right, and all the pieces are work right.

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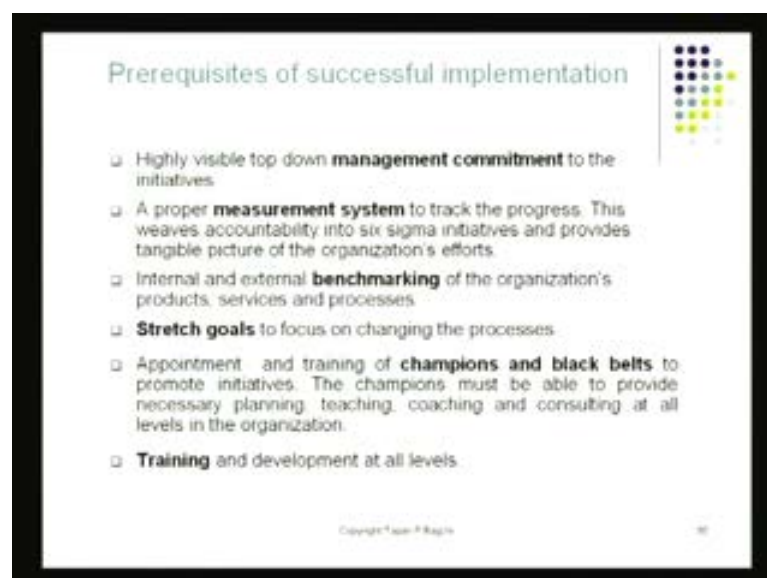
D. Improvement of manufacturing systems versus all other systems

Six Sigma efforts are usually talked about in the manufacturing sense. Other areas of business, which are equally important somehow receive scant attention. Many times organizations fail to define measurement metrics for marketing, Purchase, Quality assurance, Product engineering, Suppliers, Employees & Customers. Please see chapter on "Measurement of business excellence" for more details.

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And please do not focus only on the manufacturing system, when you are trying to get into six sigma; many people feel that, six sigma basically looks at manufacturing only, and that is really a misconception, because six sigma can go after any process at any stage **of your** of the conduct of your business something that is there.

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Prerequisites of successful implementation

- Highly visible top down **management commitment** to the initiatives
- A proper **measurement system** to track the progress. This weaves accountability into six sigma initiatives and provides tangible picture of the organization's efforts.
- Internal and external **benchmarking** of the organization's products, services and processes.
- **Stretch goals** to focus on changing the processes.
- Appointment and training of **champions and black belts** to promote initiatives. The champions must be able to provide necessary planning, teaching, coaching and consulting at all levels in the organization.
- **Training** and development at all levels.

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What are some of the prerequisites of successful implementation; Let us, take a look at this, the top one of course, is management commitment, if this is not there, you will have trouble there, a measurement system that produces; that gap that identifies and produces the gap. A benchmarking system that basically looks at, what is best in town, what is best in industry and compare that with your performance, so identify the gap then, you set up some stretch goals these are these should be way beyond, where you are performing today.

As you probably know as you probably remember for the cases, Motorola try to improve their quality performances 100 folds in a couple of years, they wanted to do this, 100 fold. So, they if they had their defect level at let us say, 5000 they wanted to bring it down to 50 in a couple of years, they wanted to **make a** make a 100 percent improvement in this thing, this is the stretch goal, this is not something have to be achieved overnight with some tinkering of processes and so on. So, this is also something you got to keep your eyes on.

You got to have a few of these great guys, who are like the black belt, the champions any our organizations, they are the ones, who have **the know** how, they also have the motivation; they want to perform so on, so forth. And to be able to support them, to make sure, you got a good team there, you got to make sure, you got good training all around, these are going to be some of the prerequisites for **for** successful implementation of six sigma.

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Creating Six sigma Focus:
Selection of Projects

Six Sigma projects can be selected on the basis of any of the following criteria:

- Focus on project cost savings
- Focus on Deliverables
- Focus on the processes
- Focus on the problems

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Creating six sigma focus this is of course, I have already given you some of these tips, focus on cost savings, focus on deliverables whatever the customers are interested in, focus on processes to try to make sure, their capabilities are good. And focus on problems, whenever there are problems, there are deviations from what is expected you got to make sure, you take care of them.

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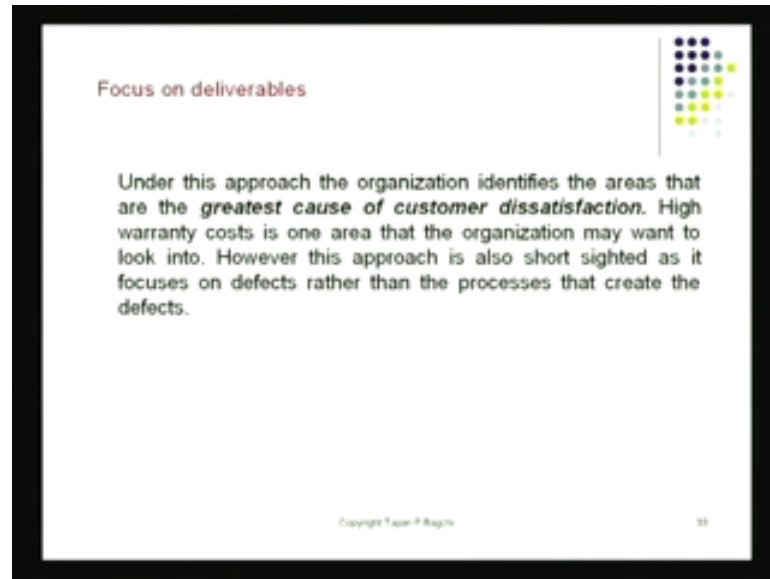
Focus on project cost savings

Under this criteria the Six Sigma projects are selected for potential *reductions in the fixed or variable costs*. The organization should however be aware about the limitation of this approach, particularly when they are trying to propagate quality.

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Focus on project cost savings, basically they are fixed or variable costs, both reduction can be achieved and both (()) can be targeted.

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Focus on deliverables

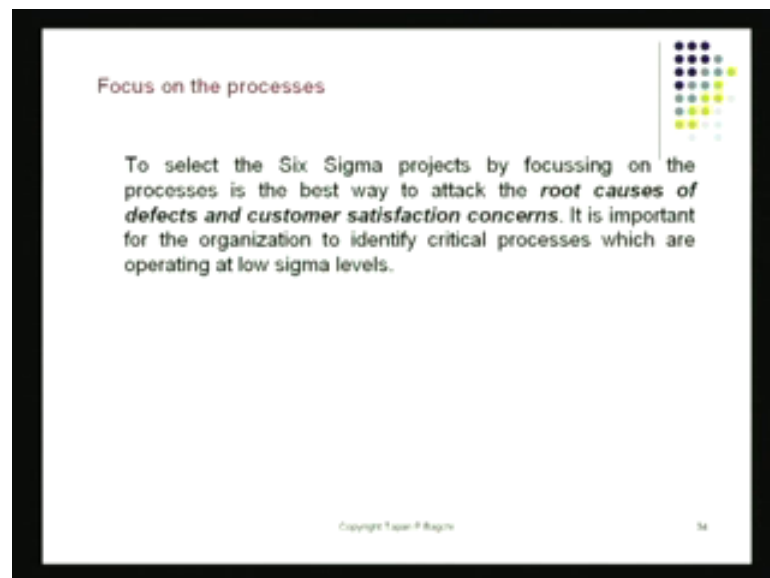
Under this approach the organization identifies the areas that are the **greatest cause of customer dissatisfaction**. High warranty costs is one area that the organization may want to look into. However this approach is also short sighted as it focuses on defects rather than the processes that create the defects.

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The greatest cause for customer dissatisfaction is basically we are not really worried about deliverables **this is like**, this is like something very very important.

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Focus on the processes

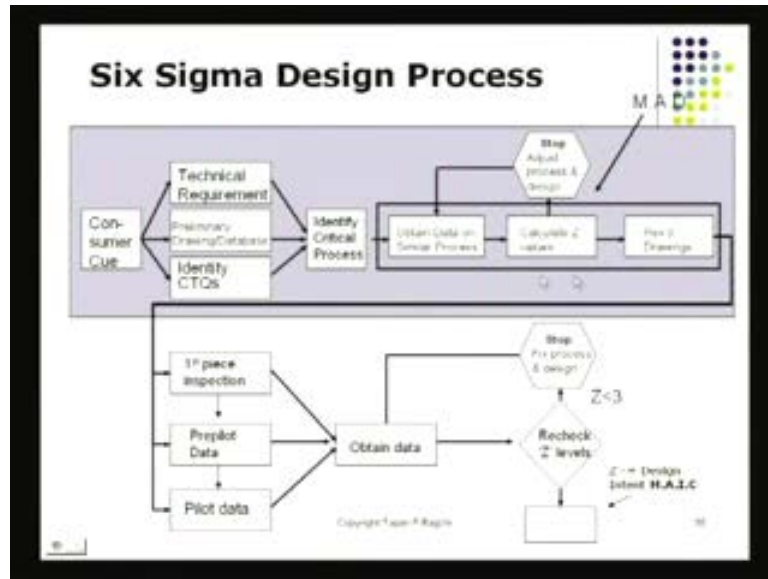
To select the Six Sigma projects by focussing on the processes is the best way to attack the **root causes of defects and customer satisfaction concerns**. It is important for the organization to identify critical processes which are operating at low sigma levels.

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Root causes of defects, because I have got to go after processes and customer satisfaction concern these would be done, when I focus on processes. And root causes are analyzed **the one of** the one of the greatest tools is the cause and effect diagram.

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That is something I got to be able to do. The six sigma design process, if you look at the design process, how is the process design, how the product is put together; there are certain steps and I am showing here in a full chart take your time, basically take a look at it and just like we talked about process improvement using six sigma, you can also improve designs using six sigma. I have got a few tips here.

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Focus on the problems

Another way to select the Six Sigma project is to straightaway **focus on the problem**. Many a times there may be nothing wrong with the process, but the products may still not be doing very well. One example could be weak design of the products. The organization can straightaway focus on redesign of the products.

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Focus on problems as far as design is concerned, we got to be able to do that.

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The Six-Steps to achieve 6σ Process

Manufactured Product

- Identify physical and functional requirements of customer
- Determine characteristics of product critical to each
- Determine, for each characteristic, whether controlled by part, process, or both
- Determine maximum range of each characteristic
- Determine process variation for each characteristic
- If $C_p < 2$, redesign materials, product, and process as required

Administrative/Office

- Identify the work you do (your product)
- Identify who your work is for (your customer)
- Identify what you need to do your work, and from whom (your supplier)
- Map the process
- Mistake-proof the process and eliminate delays
- Establish quality and cycle time measurement and improvement goals

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And as far as achieving six sigma is concerned, I can do certain things **when I**, when I am involved in manufacturing. And there are certain things I can do, when I am doing administrative jobs, there also I can have and this list is there for you to take a look at and see what you can locating **your own** in your own **own** organization. And **to** try to do good job there. So in fact look, not only at manufactured products or manufacturing **manufacturing** processes, also look at the administrative office and so on and so forth, you will find many opportunities, where you can make an impact.

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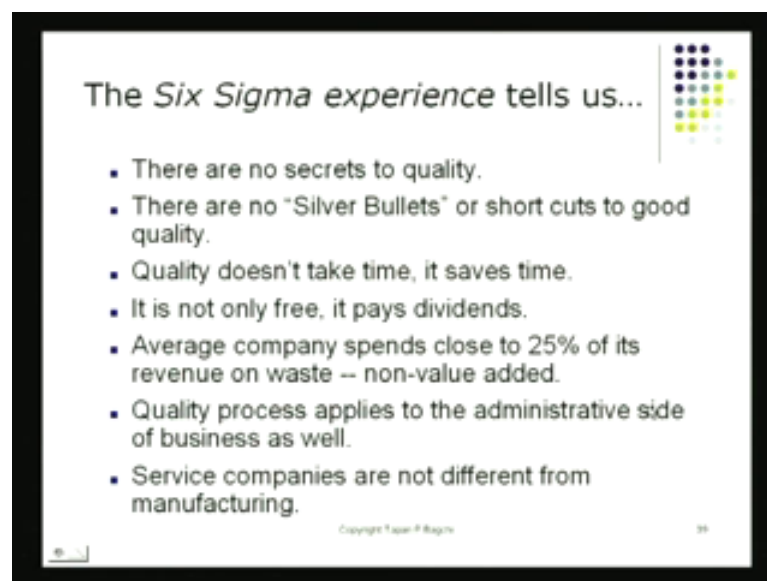
Actions Required to Institutionalize a Quality Process

- TOP DOWN COMMITMENT AND INVOLVEMENT
 - Set the example, be active in the audit process
- MEASUREMENT SYSTEM TO TRACK PROGRESS
 - At both macro and micro levels
- TOUGH GOAL SETTING (REACH OUT!!)
 - Benchmark Best-In-Class -- audit often
- PROVIDE THE REQUIRED EDUCATION
 - The "Why" and "How To"
- SPREAD THE SUCCESS STORIES

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So in fact, there will be actions required on any of these fronts, top down commitment and involvement, this has to come from top management, this has to be there. A measurement system should be there. Toward goal setting this is like something reaching out having stretch goals and so on. And to provide the **the** required education to be able to sort of ask why and we able to answer, how to and those things, this will come through training **and these** many of these are facilitated, when you got black belt people with you. And of course, spread success stories, whatever success stories are there, you got to make sure, those are publicized, so all the people keep **keep** believing in it.

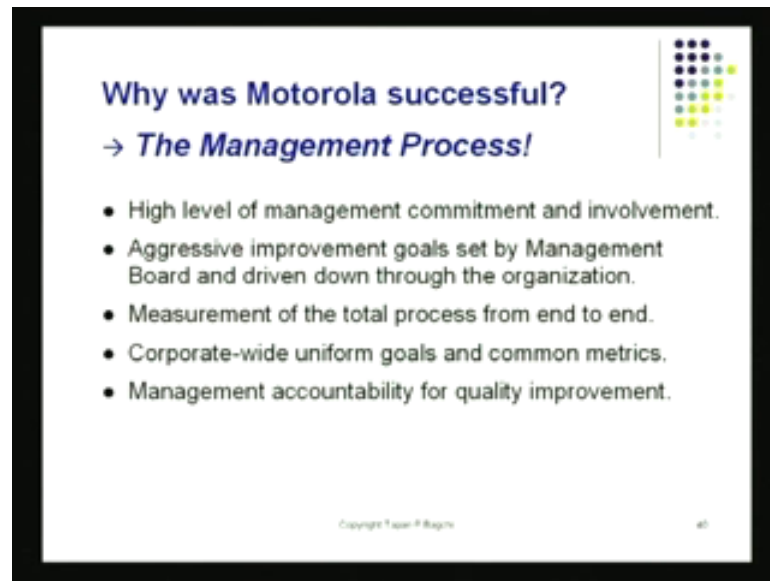
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So, what is the six sigma experiences telling us; it is telling us that, there is no secret to quality, it is all very systematic. There are no silver bullets; there are no magic bullet that tell you, if you take the bullet, you **you** will be able to win, that is not there. Quality does not take time; it actually ends up saving time in the end. It is not only freely, it actually pays back some dividend, this is the story of quality average. And average company spends about 25 percent of its time on wasted revenue, the revenue has wasted 25 percent of it is wasted on non-value activities, this is their.

Quality processes apply to administering side as well as, the business side, this is something that we got to remember, not only manufacturing other people also can also benefit from this. And service companies are no different from manufacturing; this also is something, that we got to make sure.

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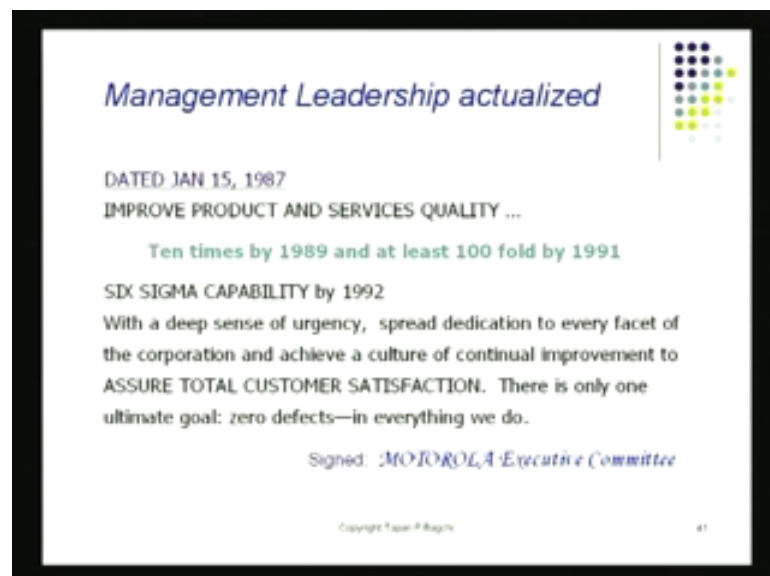
Why was Motorola successful?
→ *The Management Process!*

- High level of management commitment and involvement.
- Aggressive improvement goals set by Management Board and driven down through the organization.
- Measurement of the total process from end to end.
- Corporate-wide uniform goals and common metrics.
- Management accountability for quality improvement.

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Why was Motorola successful, there is a little thing; high level of management involvement was there, aggressive involvement was there towards setting goals measurement was done, corporate-wide uniform goals were done and definitely they did very extensive training including that of management. And accountability also was there for quality improvement, these are some of the things that lead to Motorola being really one of the leaders.

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Management Leadership actualized

DATED JAN 15, 1987
IMPROVE PRODUCT AND SERVICES QUALITY ...

Ten times by 1989 and at least 100 fold by 1991

SIX SIGMA CAPABILITY by 1992

With a deep sense of urgency, spread dedication to every facet of the corporation and achieve a culture of continual improvement to ASSURE TOTAL CUSTOMER SATISFACTION. There is only one ultimate goal: zero defects—in everything we do.

Signed: *MOTOROLA Executive Committee*

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And if you see, how they actualize **that** that is in the last slide and they did this with the deep sense of urgency, spread dedication of to every facet of the corporation. And achieve a culture of continual improvement to show total customer satisfaction. There is only one ultimate goal and that is zero defects in everything we do sign by executive committee of Motorola. Just see, how strong that commitment is and they try to improve there quality performance ten times by 1989 and 100 fold by 1991 starting at 1987, we will continue with our wrap up story, which will be in the next lecture, thank you very much.