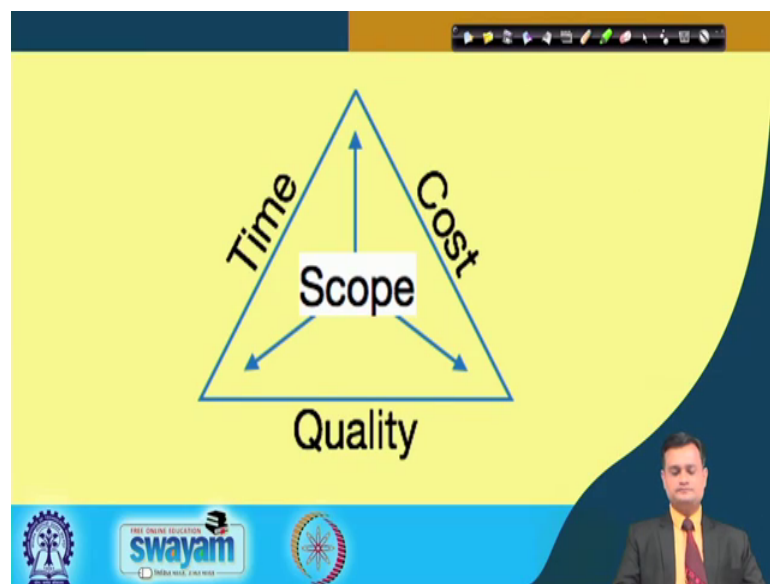


**Six Sigma**  
**Prof. Jitesh J Thakkar**  
**Department of Industrial and Systems Engineering**  
**Indian Institute of Technology, Kharagpur**

**Lecture – 14**  
**Six Sigma Project Identification, Selection and Definition**

Hello friends, I welcome you to our ongoing journey on Six Sigma. And we are now discussing the lecture 14, Six Sigma Project Identification Selection and Definition.

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So, before we go it let me just try to share a very, very import understanding when we talk about a project. So, the project when we talk about the scope, it is decided by time, cost and quality. You want to complete the project in a given schedule that is time, you want to meet certain stipulated quality standards in delivering the project that is your quality and performance, and third you want to complete the project within the allocated budget.

So, always as a project manager, you are sandwiched within these three things that is time, cost and quality, and Six Sigma project is not an exception. When you are executing the Six Sigma project, you must try to focus on the triangle, typically time, cost and quality triangle. And you must see that you can execute the projects which can satisfy the three primary conditions and you remain well within the scope.

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So, with this important insight, before we go ahead let us try to have a recap where are we in our Six Sigma journey. So, this would really help you to follow the structure and be with the course overall content whatever we have discussed, and what we are going to discuss in the coming week. So, I will always follow the system throughout the course to help you to appreciate the structure of the course and integrate the various say phases of the course appropriately. So, we had talked about quality fundamentals and key concepts in week 1 and 2.

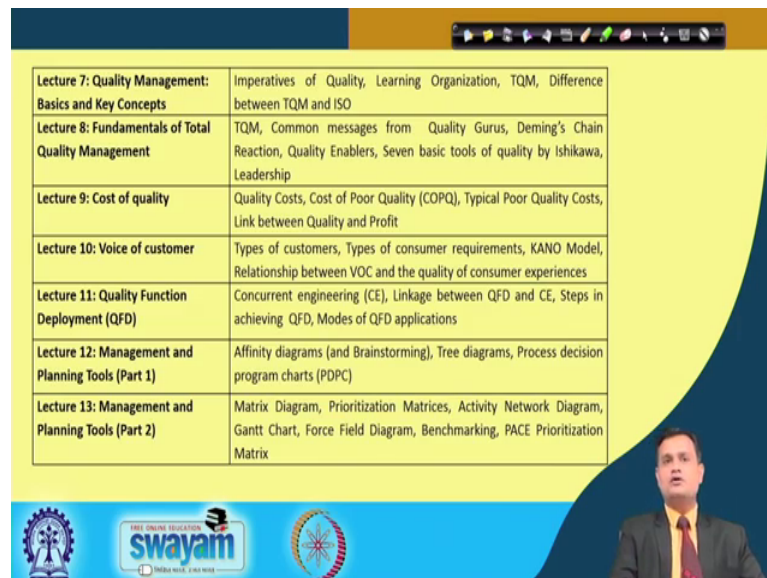
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|  |   |
|--|---|
| Lecture 1: Brief overview of the course                  | Course Structure, Course Coverage, Lecture Plan, Importance of six sigma, Expectation from the Course   |
| Lecture 2: Quality concepts and definition               | Dimensions of Quality, Role of various functions in the Organization towards Quality, Critical Challenges for Indian Organizations, Indian originations recipient of Quality Awards |
| Lecture 3: History of continuous improvement             | Milestones in Quality, Evolution of Concept of Six Sigma, Integration of Concept of Value with Six Sigma, Certification   |
| Lecture 4: Six Sigma Principles and Focus Areas (Part 1) | Six Sigma, Shift in Quality Paradigm, Difference between 3 Sigma and Six Sigma, DPMO, Calculating sigma level   |
| Lecture 5: Six Sigma Principles and Focus Areas (Part 2) | Rolled Throughput Yield (RTY), Classic Yield, First Pass Yield (FPY), Hidden Factory, Six Sigma roles and responsibilities  |
| Lecture 6: Six Sigma Applications                        | Indian organizations doing Six Sigma, Applications of six sigma in select Indian organizations, Challenges faced by Indian Organizations, Six Sigma benefits realized               |

And broadly we have covered in week 1 the brief overview of the course I presented the detailed course structure, exam structure, what are the expectations, what is the prerequisite and what is the suggested text book, reference books. Lecture 2, we deliberated on quality concepts and definitions given by various quality gurus Ishikawa, Crosby, Juran, and many other. Lecture 3, we talked about history of the continuous improvement and how this field has evolved over a period of time in last 100 years.

So, we had seen the history lecture 4, we talked about very very important aspect Six Sigma principles and focus areas part-1. So, what is the difference between 3 and six sigma, what is the PMO, how to calculate Six Sigma level and so on. Subsequently, we had gone into detail and part-2 Six Sigma principles and focus areas. We have talked about few more important concepts like rolled throughput yield, classic yield, first pass yield, hidden factory, Six Sigma roles and responsibilities. Lecture 6, we devoted on discussing couple of applications of Six Sigma in Indian Organization which can motivate you to understand that how powerful Six Sigma is in bringing the desired benefits to the company whether manufacturing or services.

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|   |   |
|---|---|
| <b>Lecture 7: Quality Management: Basics and Key Concepts</b> | Imperatives of Quality, Learning Organization, TQM, Difference between TQM and ISO  |
| <b>Lecture 8: Fundamentals of Total Quality Management</b>    | TQM, Common messages from Quality Gurus, Deming's Chain Reaction, Quality Enablers, Seven basic tools of quality by Ishikawa, Leadership      |
| <b>Lecture 9: Cost of quality</b>                             | Quality Costs, Cost of Poor Quality (COPQ), Typical Poor Quality Costs, Link between Quality and Profit                                       |
| <b>Lecture 10: Voice of customer</b>                          | Types of customers, Types of consumer requirements, KANO Model, Relationship between VOC and the quality of consumer experiences              |
| <b>Lecture 11: Quality Function Deployment (QFD)</b>          | Concurrent engineering (CE), Linkage between QFD and CE, Steps in achieving QFD, Modes of QFD applications                                    |
| <b>Lecture 12: Management and Planning Tools (Part 1)</b>     | Affinity diagrams (and Brainstorming), Tree diagrams, Process decision program charts (PDPC)  |
| <b>Lecture 13: Management and Planning Tools (Part 2)</b>     | Matrix Diagram, Prioritization Matrices, Activity Network Diagram, Gantt Chart, Force Field Diagram, Benchmarking, PACE Prioritization Matrix |

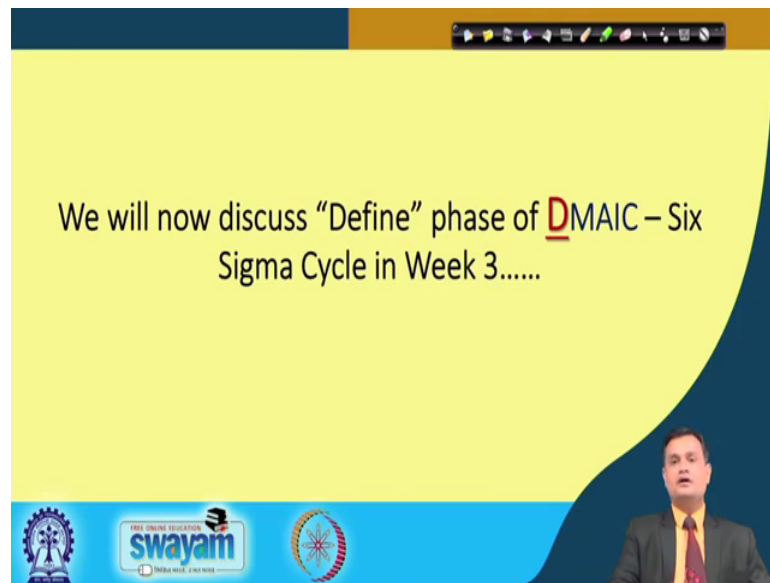
Then we started discussing week 2. And in week 2, we talked about lecture 7, quality management basics and key concepts. It is all about creating the right kind of environment in the organization where the Six Sigma can be implemented and benefits can be realized in a quiet conducive manner. So, you have to start your day. You wake

up, you get ready. You get dressed, you take your breakfast. And then you are energized to take up your professional challenges. Same way you have to energize your organization in terms of cultures, values, beliefs, mindsets, attitude for change, readiness to accept the change, flexibility, and all this part we must ensure as a prerequisite before we actually talk about this Six Sigma implementation effectively. So, that we talked as a power of fundamentals of total quality management lecture 8.

Lecture 9, we talked about cost of quality, prevention cost, appraisal cost, internal failure cost, external failure cost and what are its implications for the top management. Lecture 10, we talked about very very important topic that is voice of customer, your Six Sigma is trying to make your processes and hence the business customer centric. If your customer is not happy, if your customer is not satisfied, customer cannot afford the loyalty your Six Sigma or any other initiative will simply have no value. So, it is very important that whatever change initiative we are thinking must be oriented to our customer, and for that capturing the voice of customer is very important.

So, we have seen how to do this in lecture typically in 10. And then lecture 11, we have talked about a very important say cross functional tool that is quality function deployment which typically works on concurrent engineering. Lecture 12, we have talked about some of the very important management and planning tools as a part-1; we talked about affinity diagram, brainstorming, tree diagram, process decision program chart. And we continued our discussion in lecture 13 on management and planning tools part-2. And we discussed few more tools like matrix diagram, prioritization matrices, activity network diagram, Gantt chart, force field analysis or diagram, benchmarking, pace prioritization matrix and so on. So, this is what we did so far.

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Now, with this first 2 week of understanding on the basics, we are now entering into the first phase of Six Sigma DMAIC cycle. And the first is define. So, we will now discuss the define phase of DMAIC cycle and this we will discuss in week 3.

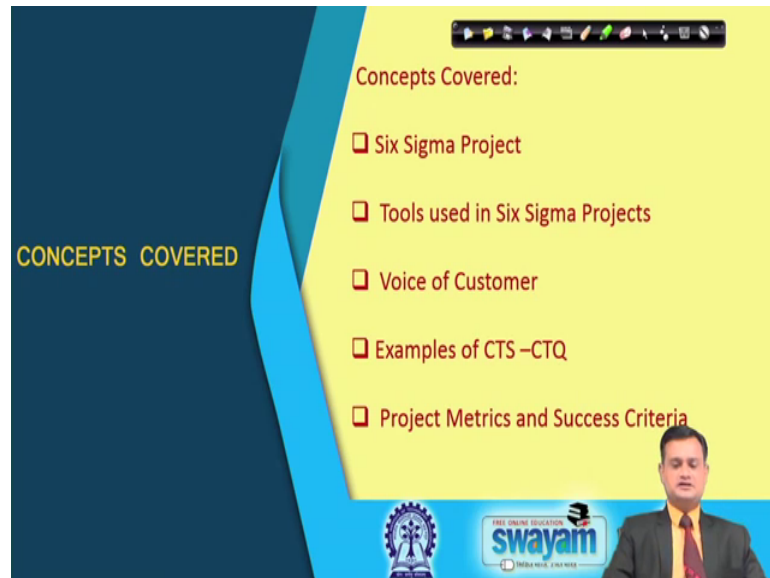
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So, basically you would have the exposure to couple of topics in week 3, this will include lecture 14 - Six Sigma project identification selection and definition; lecture 15, project charter and monitoring creating the bible of my project; lecture 16, project

characteristics and analysis; lecture 17 process mapping SIPOC a very very important tool.

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The slide is titled "CONCEPTS COVERED" in yellow text on a dark blue background. To the right, on a yellow background, is a list of concepts covered, each preceded by a red square icon. The concepts are: Six Sigma Project, Tools used in Six Sigma Projects, Voice of Customer, Examples of CTS –CTQ, and Project Metrics and Success Criteria. At the bottom right, there is a small video feed of a man in a suit. The bottom of the slide features logos for "swayam" and "INDIAN INSTITUTE OF TECHNOLOGY KANPUR".

CONCEPTS COVERED

- ❑ Six Sigma Project
- ❑ Tools used in Six Sigma Projects
- ❑ Voice of Customer
- ❑ Examples of CTS –CTQ
- ❑ Project Metrics and Success Criteria

So, to begin with this particular lecture, we would like to cover Six Sigma project, tools used in Six Sigma project, some little bit understanding on voice of customer, example of CTS and CTQ. We will see it in detail critical to, and project matrices metrics and success criteria.

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The slide is titled "Sorting Projects from Messes" in blue text. It contains two bullet points: "A *mess* is a morass of unsettling symptoms, causes, data, pressures, shortfalls, opportunities, etc." and "A *problem* is a well-defined situation that is capable of resolution." A large red arrow points down from the text to a red box containing the text: "Identifying a problem from within the mess is frequently the first step in the process of project definition." At the bottom right, there is a small video feed of a man in a suit. The bottom of the slide features logos for "swayam" and "INDIAN INSTITUTE OF TECHNOLOGY KANPUR".

### Sorting Projects from Messes

- A *mess* is a morass of unsettling symptoms, causes, data, pressures, shortfalls, opportunities, etc.
- A *problem* is a well-defined situation that is capable of resolution.

Identifying a problem from within the mess is frequently the first step in the process of project definition.

So, let us try to appreciate that when you talk about a problem, and when you have a situation which is totally a mess (Refer Time: 08:44) nothing is clear what is the difference. So, when you say mess, it is a morass of unsettling symptoms, causes, data, pressures, shortfalls, opportunity etcetera. Suppose, there is an earthquake, everything is a mess; you cannot predict anything, you cannot think immediately about any action plan. So, it is situation of mess total chaos, but when we talk about Six Sigma project remember we are not talking about the mess.

The second one is problem. So, problem is a well-defined situation that is capable of resolution. And identifying a problem within the mess is frequently the first step in the process of project definition. So, you are surrounded by many things. There is a total chaos and mess I cannot deal with it; I have to figure out what is the problem. And when I consider this problem as my Six Sigma project investigation and improvement, then this is the first step I have advanced in my Six Sigma journey.

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**Project Qualifications**

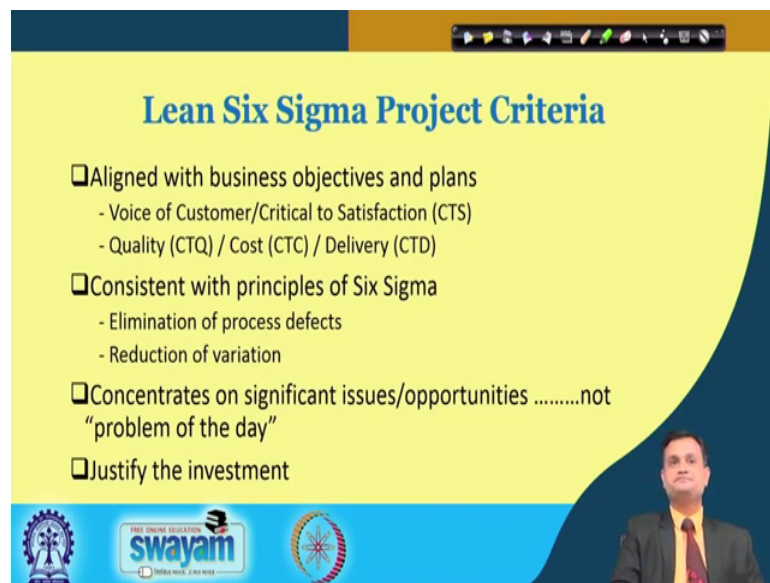
- There is a gap between current and desired performance.
- The cause of the problem is not clearly understood.
- The solution is not predetermined.

Now, just see what is the project qualifications and why it is important. So, there is a gap between current and desired performance. Let us start about in sigma level, your present process is at maybe three sigma, and you want your customer to be more happier loyal, and the expected competitive standard it let us say 4.5 sigma. So, there is gap in performance. When there is a gap in performance, you can consider that as a potential problem and execute a Six Sigma project.



The second is the cause of the problem is not clearly understood. Again you are having a problem, but the cause is not clear, then you can take it up for the detailed investigation and considered as a part of your DMAIC Six Sigma project cycle. The solution is not predetermined. So, you really need to investigate go in to deep deeper say details of the problem, and you cannot pre determined the solution. Again it is a good candidate for project typically called Six Sigma project.

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**Lean Six Sigma Project Criteria**

- ☐ Aligned with business objectives and plans
  - Voice of Customer/Critical to Satisfaction (CTS)
  - Quality (CTQ) / Cost (CTC) / Delivery (CTD)
- ☐ Consistent with principles of Six Sigma
  - Elimination of process defects
  - Reduction of variation
- ☐ Concentrates on significant issues/opportunities .....not "problem of the day"
- ☐ Justify the investment

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When we talk about lean Six Sigma project criteria or maybe the Six Sigma project criteria, you have couple of conditions. If they satisfy this condition then they are the potential and fit candidate to be accepted as Six Sigma projects. So, number one, aligned with business objectives and plans. And we try to basically analyze voice of customer, critical to satisfaction typically call CTS, and then critical to quality, critical to cost, critical to delivery. So, you have voice of customer and you can analyze in terms of critical to satisfaction, critical to quality, critical to delivery, critical to cost and this is something, but I am trying to align the business objectives and the plans.

Number two consistent with principles of Six Sigma Six Sigma tries to bring the process under a stringent control by reducing the variability. So, the defect rate must go down and we have seen that a Six Sigma process produces only 3.4 defects per million. So, when you achieve this, you are a Six Sigma. This is the second case.



Third one concentrates on significant issues, opportunities not problem of the day not routine problem. Maintenance, break down, not the routine problem, you are trying to focus on some special opportunity. Justify the investment you have to get the approval of your top management, and for that you need to justify the benefits that you can incur by implementing the Six Sigma project. And this justification must be acceptable to the top management.

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**Voice of the Customer**

The Voice of the Customer (VOC) is the starting point of any project and data collection plan.

The Voice of the customer includes:

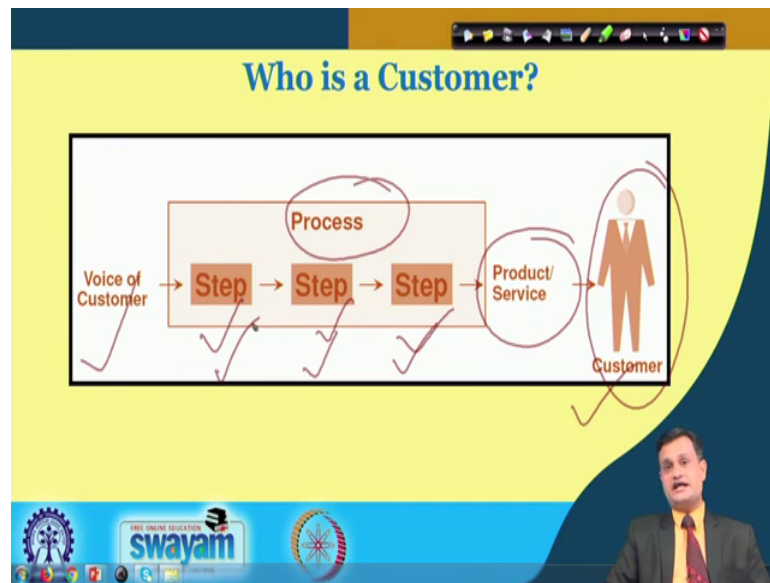
- Expectations
- Requirements
- Opinions

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Now, just see what do you think about voice of customer. It is voice of customer. And my customer has many intrinsic-extrinsic expectations. And if I fail to capture this, then I can really not do justice to my customer by producing the products which are quite customer centric. So, for this I need to understand the expectations, requirement, opinions; when I do this, then I really try to capture the voice of the customer.

Many company they conduct the pilot study. Suppose Lays I have seen a couple of say places that Balaji Wafers, Lays Wafers, many other brands available they will open the counter and they will say ask the customer to taste the various flavors. And directly they will try to collect the opinion and choices of the customer, so that they can revise the recipe or they can do some modification before actually they launch the final product. So, involving customer at a beginning stage, concept stage is very important. And if you capture the voice of customer appropriately, then I think your majority of the problem is solved.

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Now, we talk about customer. And we all are a customer in one way or other. I am delivering a lecture, you as a student, industry professional is attending, you are my customers. I am helped by NPTEL, I am receiving the resources from them; I am receiving the help. So, for them, I am a customer. So, you have the chain of customer. And what you can see here that there is a voice of customer, you have a process which has various steps and then you have the final product or service which would be delivered to your customer. So, please understand that when I talk about the customer, it is not only the end customer that could be many internal customers which are executing the different processes, different stages and my definition of customer is extended.

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A customer sets/affects requirements for your product or service.

- ✓ External
- ✓ Buying customers
- ✓ End-users
- ✓ Regulatory agencies

A Customer is one who receives your output.

- ✓ Internal

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So, with this understanding, we can just summarize about the customer that a customer sets affects requirement for your product or service. It may be external; it may be buying customer; it may be end user; or it may be regulatory agencies. So, many a times you have to seek the approval from government bodies or regulatory agencies, and you cannot ignore them which they are one of the very, very important stakeholder of your product. A customer is one who receives your output maybe internal, and you are processing the product through various stages processes. So, one process will deliver the product to the another process, another process and every process will become a chain of customer.

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## Customer Segmentation

- Generally, external customer needs are more important than internal customer needs.
- Are all customers equally important?
  - External Vs. Internal
  - Customer segments
    - ✓ Regions
    - ✓ Types of business
    - ✓ Volumes
    - ✓ Profitability
    - ✓ Strategic market
    - ✓ Future potential

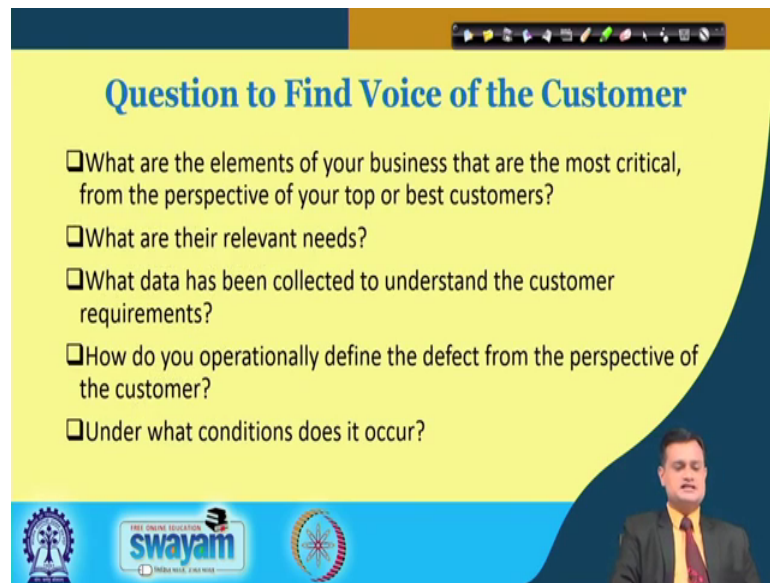


Customer segmentation is also very important to understand when we talk about the project identification as a part of my DMAIC cycle Six Sigma. So, you can classify your project or you can classify your customers, and hence the projects depending upon that what kind of customers are really important to you as a business. For example, you are you targeting the regional customers, or type of businesses, or maybe the volumes, or maybe the profitability these are the various criteria.

If you let us say sale a sandwich on some average restaurant, a customer would be happy to pay maybe 50 rupees, but the same sandwich same quality if it is sold at the airport, customer would pay maybe 200 rupees. Suppose, it is sold in the aircraft, then a customer would pay 300 rupees. So, it all depends what kind of customer you are targeting, and what is the profitability you are expecting. What is the strategic market? Are you targeting a neck market a specific market may be middle class, higher middle class, rich or a typical kind of say region specific market. So, this is again another criteria when you talk about a project.

Then future potential, suppose you are developing a product what would be its future potential at least ten years down the line, and what kind of modifications you would have to do in order to survive in the long run. So, you have various ways in order to specific about your problem and consider that as a project for DMAIC execution and improvement.

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### Question to Find Voice of the Customer

- ☐ What are the elements of your business that are the most critical, from the perspective of your top or best customers?
- ☐ What are their relevant needs?
- ☐ What data has been collected to understand the customer requirements?
- ☐ How do you operationally define the defect from the perspective of the customer?
- ☐ Under what conditions does it occur?

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So, this is about a questions to find voice of customers. I may raise couple of questions to capture the voice of customer. And this could be: what are the elements of your business that are most critical from the perspective of your top or best customer. So, do not try to enter into the all customers, just think about the top customer or maybe the best or loyal customer, and what do they really consider as important and critical from the perspective of this customer.

Number two, what are their say relevant needs? When a customer is coming to you, what exactly he is expecting, what are his expectation? You are attending this course, obviously you would not expect that you should be made knowledgeable in the domain of metallurgy that is not the objective of this course. So, you would expect some intended service when you are opting for a service and this is something what is the relevant need.

Number three, what data has been collected to understand the customer requirements. Many a times company they collect huge number of data without much understanding, and then they cannot figure out anything. So, you need to appreciate that exactly what you want to understand. You want to understand about the product features, you want to understand about the product specifications, you want to understand about the product competitive pricing, or you want to understand about the product performance. Whatever it may be, you need to collect the relevant data, otherwise you will simply get lost and

you cannot really figure out a problem from the mess. Under what conditions does it occur? So, this is the final one that when I am trying to find the voice of customer, what are those conditions under which a customer would like to speak on couple of issues.

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**Tools for Gathering Voice of the Customer**

**Unsolicited data from customers**

- Complaints
- Field reports
- Benchmarking
- Observations
- Etc.

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So, this is something about question of say collecting the voice of customer. Now, there are some of the tools unless you add up some systematic and scientific method, it is not possible to collect your voice of customer appropriately. So, there are some of the tools or records that you can refer. Number one is your complaint register or the complaints you are receiving through email, or maybe nowadays Amazon, Flipkart, and many other they provide even the ratings.

So, you can analyze the rating. And you can use some sophisticated data mining approach. And you can really say get lot of information from this e-businesses. So, this will help you to understand the customer problem. Many a times say you have launched the product, but you feel that the in terms of performance, the product like mixture is excellent, but this product maybe because of weight, make me because of difficulty in operation is not really helping the customer to derive the greater satisfaction. Many a times cleaning is an issue. So, customer would like to say register their voice would like to offer their complaint query or maybe the view, and this could be the fantastic information for improving your product and processes.

Second is the field reports. So, you visit the customer maybe for offering services or maintenance, and there you also get an opportunity to capture the voice of customer. Number three, benchmarking I may feel that my product is best, but there are many such products available. So, before let us say I just check this course as an example, before actually offering this course, I just studied couple of courses on Six Sigma available. And exactly identified that what are the gaps and what exactly the industry as well as the university students they are looking for. I could figure out primarily three things.

Number one based on my benchmarking; number one they are looking for a structured material not the material which covers all the topic, but does not follow the DMAIC cycle. Number two, they are looking for some application of software minitab and other which can really help the university students and the industry professional to do the computations and interpret the results very easily. Number three they look for the content which can really equip them for appearing into the exams for black belt conducted by say American Society for Quality. And if a content can ensure that yes by going through this content, you can really prepare yourself for such examination, then they would be extremely happy. I just did the benchmarking, I try to cover all these three aspects in the development of this course.

You see what an immense benefit a customer can receive if you do a little bit benchmarking. So, in order to save the effort, in order to benefit the customer, it is very important that I conduct the necessary benchmarking and try to understand that what my service or product should include. You may have observations. So, many a times a customer is visiting your retail shop or maybe let us say online channel, and he will have a shop means he will he will just click a product or see the product and he will not purchase. Now, this is also very important that you can investigate that why this customer is not really feeling motivated. So, this is another point that you can capture even the sentiments and voice and expectations of the customer through observations and many other tools you can use.



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**Tools for Gathering VOC**

**Solicited data from customers**

- Interviews
- Focus groups
- Surveys
- Informal customer discussions
- Market research

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So, typically tools for gathering voice of customer, interviews, focus groups you can do it in a more formal way. Surveys you can administer the questioner collect the data on a like scale and do the analysis. Informal customer discussions, fine I am self representative, I will go to customer and just try to discuss without even telling that I am from which company sometimes and I will try to understand that what exactly they are looking for. Market research is a very very important tool and that can help you to understand the trend customer preferences and the move of your competitors in offering a particular product or services.

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**Customer Metrics**

☐ **CSAT (Customer Satisfaction)**

1. % of Satisfied Customer (say a rating of 8 and above on a 10 point scale)
2. % of Dissatisfied Customer (less than 5)
3. % of Low Scores on specific dimensions
4. Average CSAT Rating

☐ **Loyalty**

1. % of Repeat Business
2. Loyalty Rating
3. % of lost customers (lack of Loyalty)

☐ **Customer Acquisition**

1. % and size of new accounts
2. # of New accounts over a specific period

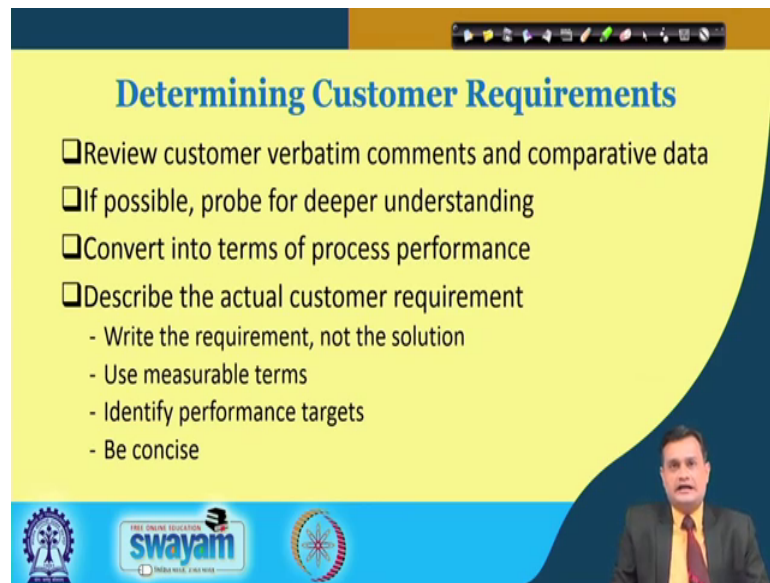
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So, typically we have couple of customer metrics that we must think when we are thinking about the definition of the project or we are talking about the project identification. So, you have CSAT that is customer satisfaction and this could be measured through couple of matrix like percentage of satisfied customer. Let us say a rating of 8 and above on 10 point scale, you may say that they are satisfied customer. So, percentage satisfied customer.

Percentage of dissatisfied customer may be less than 5 rating, percentage of low scores on specific dimensions, average CSAT rating. You may like look into the loyalty percentage of repeat business. It is only not important that how much your customer is satisfied, but is he coming back, is he purchasing your product. So, suppose my family if I say then we have purchased many products of LG. If you talk about two wheeler we are happy with the Axtiva. So, one performance and satisfaction leads to repeat purchase and maybe other products are equally good, but you have captured the loyalty of the customer. I purchased LG TV; I found very good performance, then I can rely that yes if I purchase the washing machine or microwave oven I would have the more or less same quality experience, so this about loyalty.

Then percentage of lost customer this is another measure negative measure how much customers you have lost. Many a times you are visiting a restaurant and invariably if you find that there is a long waiting time, the owner of the restaurant will have feel happy for some period of time. After that you will find that the customer mass is going down, because now customers are not happy to wait and they have just switched their preference from restaurant A, restaurant B. Customer acquisition percentage and size of new accounts typical in banking sector you can see, and percentage of new accounts over a specific period of time.

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**Determining Customer Requirements**

- ☐ Review customer verbatim comments and comparative data
- ☐ If possible, probe for deeper understanding
- ☐ Convert into terms of process performance
- ☐ Describe the actual customer requirement
  - Write the requirement, not the solution
  - Use measurable terms
  - Identify performance targets
  - Be concise


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So, determining customer requirement is all about reviewing the customer verbatism. Customer would only offer the verbatism, you should have the skill and proper method to decode it, so that you can capture those verbatism in the form of a technical specifications when you design the product or process. If possible probe for deeper understanding do not go superficial, because this is the design stage, identification stage of the problem and we need to be extremely critical. Convert into terms of process performance. So, unless I have a process which is customer centric my product cannot be. So, now, I have to convert this verbatism into the product process specifications which can really produce a customer centric product. So, these are couple of things that we try to do as a part of customer requirement determination.

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### What is Customer Satisfaction?

- A comparison of expectation to experience
- A matter of degree
- A result of a good match between supply and demand
- A predictor of repeat business



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And what is customer satisfaction? When you do all these thing a comparison of expectation to experience. So, you have to really see that what is the experience my customer has derived. You can see here I just put the cartoon happier delighted customer. A comparison of customer expectation to experience; a matter of degree, to what degree you could penetrate into the customer satisfaction; a result of a good match between supply and demand; and a predictor of repeat business all this will give you an idea about the customer satisfaction.

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### CTS (Critical to Satisfaction) – CTQ (Critical to Quality) Example

| Need            | Product/Service Characteristics | Metric   |
|-----------------|---------------------------------|--|
| Good Hotel Room | Room is Clean                   | Not sure what clean means<br>Could mean no waste material in dustbin<br>Could mean clean Toilets |
|                 | Room has Hi Speed Internet      | # Rooms with Hi Speed Internet<br># Rooms in Hotel   |
|                 | Hotel has Fitness Center        | # Hours Fitness Center available per Day   |
|                 | Room has many TV Channels       | # of Functioning Channels per Day  |

The slide features a yellow background with a blue header and footer. The title 'CTS (Critical to Satisfaction) – CTQ (Critical to Quality) Example' is in blue. Below it is a table with three columns: Need, Product/Service Characteristics, and Metric. The first row shows 'Good Hotel Room' as the need, with four characteristics: 'Room is Clean', 'Room has Hi Speed Internet', 'Hotel has Fitness Center', and 'Room has many TV Channels'. Each characteristic has a corresponding metric. The footer includes logos for Swamyam and other institutions, and a small video inset of a man in a suit.

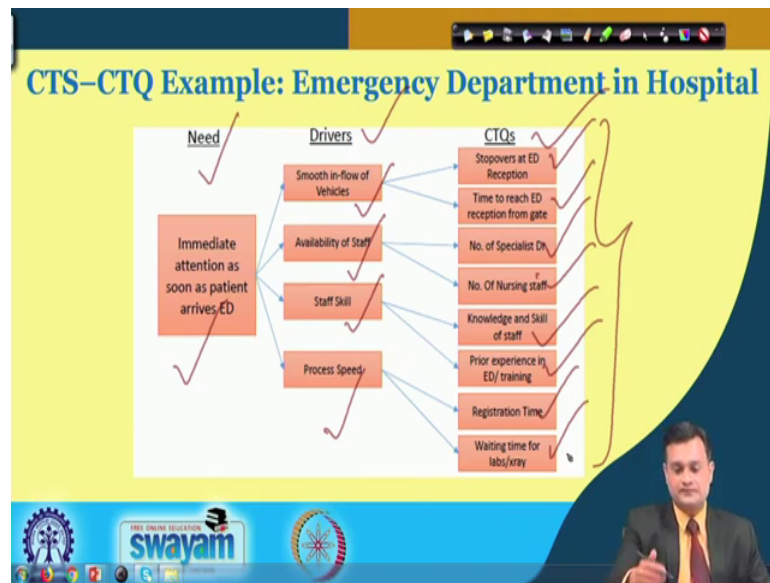
So, let us see the concept of CTS that is the customer satisfaction and how it can be related with the matrix as well as your CTQ. Just take the example you have a good hotel room requirement this is the need. When I when I go to a hotel, obviously, whether it is a budget hotel or it is a luxury hotel, I would expect a good hotel room. Now, what does it mean? So, product or service characteristic maybe let us say room is clean, this is my first requirement. Room has high speed internet this is the second modern requirement. Hotel has fitness centre, I would not like to compromise with my fitness schedule, so must have fitness centre. Room has many TV channels. I just put few otherwise you can add that swimming pool or this spa and other facility.

So, let us say these are the four I have put as product service characteristics. Now, when I try to decode it in terms of matrix, when I say room is clean, it is difficult to say not sure what clean means. Does it mean let us say does it mean waste material is not there in the dustbin when you really enter into the room? The previous guest might have generated some waste, but it should not be there. Does it mean that the toilets are clean, your bed sheets are clean, curtains are properly arranged, TV is operational. So, I do not know, but there could be many things that you can figure out depending upon the say hotel and the budget maybe budgetary hotel or luxury hotel. So, what does it mean when I say room is clean.

Similar way room had high speed internet. So, room with high speed internet, rooms in the number of rooms in the hotel with high speed internet. Similar way hotel has fitness centre. So, you would like to understand number of hours fitness centre is available. Some people they may like to do it exercise maybe 5 o'clock in the morning, they wake up early. Or some people they just want to go to fitness centre maybe in 6 o'clock or 7 o'clock. So, what is that hour that really suits to your schedule.

Room has many TV channels, but number of functioning TV channels per day would be your concern. So, just try to see that how beautifully we can convert the need that is a good hotel room into the information and into the matrix. So, this is a typical example of your CTS-CTQ. And this can really help me to figure out that what exactly my customer is looking for.

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Now, just see another example you have the need, you have the driver, you have the CTQs critical to quality. Now, need is immediate attention as soon as patient arrives the ED. ED stands for emergency department in the hospital. So, drivers are smooth in-flow of vehicles your ambulance availability of staff, staff skill, process speed, these are the drivers which would ensure a faster execution or operation in the emergency department ED.

What could be the CTQs critical to quality? Stopovers at ED reception. How much time do you spend and what are the procedures that you need to complete, time to reach ED reception from the gate location. Number of specialist doctors, number of nursing staff knowledge and skill of the staff prior experience in emergency department training registration time and waiting time for labs and x reports. So, you can understand that any particular system, you can analyze in terms of the need drivers and CTQs. And this can really help you to figure out that where you are lacking and which particular say area or process should be considered for a typical DMAIC execution Six Sigma project. So, out of all this may not be everything you will consider as a Six Sigma project, but you can at least figure out that which one is problematic, and you can conduct a detailed DMAIC Six Sigma project for that. So, this is something about your CTS-CTQ.

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**Customer Needs Translated into "Critical To" (CT) Characteristics**

| Typical Critical to Characteristics |                      |
|-------------------------------------|----------------------|
| CTQ                                 | Critical to Quality  |
| CTD                                 | Critical to Delivery |
| CTC                                 | Critical to Cost     |

**Y**

Breakdown of the processes required to produce the product, service, or deliverable.

- Projects are identified by the relationship between product, service, or deliverable requirements and processes.
- The process parameters that affect the requirements are later identified ( $X_1, X_2, \dots, X_n$ )
- Leverage processes are identified.

Customer needs are translated into products, service or deliverable requirements in terms of quality, deliver and cost. The "Y" of  $Y = f(x)$

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So, I have various critical to say characteristics CTQ is critical to quality critical to delivery, and critical to cost. And customer needs are translated into product service or deliverable requirement in terms of quality delivery and cost. My customer is expecting the best quality, faster delivery. And the third one is at the best competitive cost. If I am going to the Apollo hospital, I would not like to say compromise with quality of the treatment, I would not like to wait for maybe 10 days or 20 days to receive the treatment. And I would not like to pay maybe 2 times or 3 times money compared to the other multispecialty hospital. So, customer is always looking for critical to quality, critical to delivery, critical to cost.



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### Voice of Business

- ✓ Expression of Business Needs and Wants
- ✓ Reflected in Vision, Mission and Objectives of the Organization

So, I have voice of business. And this is all about expression of the business needs and wants; and reflection of mission, vision mission and objectives of the organization. So, like you have the voice of customer, you have voice of business. And you must have the proper alignment of voice of customer and the voice of business.

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### What Do We Expect??

- Increase revenue
- Better utilization of resources
- Higher profit
- Improved sustainability
- Increased customer satisfaction and loyalty
- Improved productivity
- Better compliance

So, what do we expect? Increase in revenue, better utilization of the resources, higher profitability, improved sustainability of the business in long run, increased customer satisfaction and loyalty, improve productivity and better compliance to the regulatory

norms. And exactly this is where I need to identify the problem area consider that as a project wherever any of this thing is falling or couple of things are falling. And then I can use my knowledge about that particular problem in executing the Six Sigma project.

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**Project Selection**

"The best Six Sigma projects begin not inside the business but outside it, focused on the question ----

- ✓ How can we make the customer more competitive?
- ✓ What is critical to the customer's success? ....

One thing we have discovered is that anything we do to make the customer more successful inevitably results in a financial return to us."

**Jack Welch, CEO, General Electric**

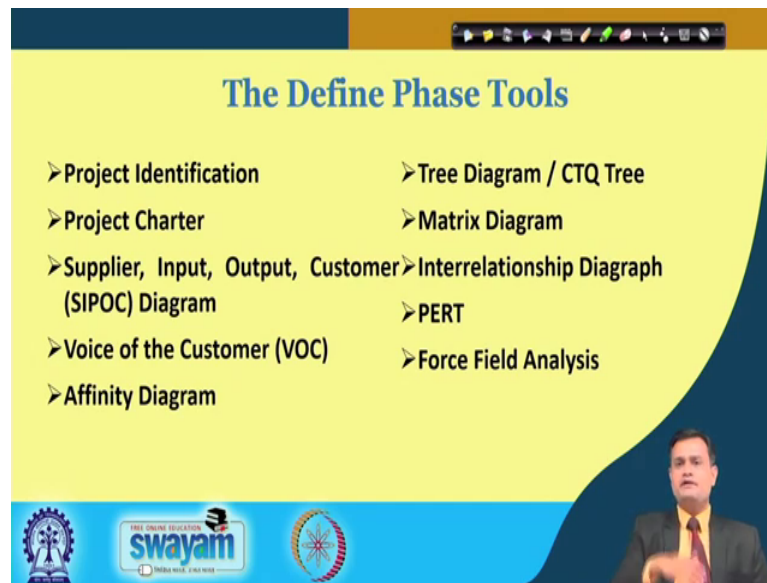
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So, project selection, let us see watch a leading personality Jack Welch, CEO of General Electric says. He says that the best Six Sigma project begins not inside the business, but outside it, focus on the questions. Number one, how can we make the customer more competitive outside the business? Number two, what is critical to the customers success outside the business? Number three that one thing we have discovered out of this two is that anything we do to make the customer more successful inevitably results a financial return to us.

I would say by attending this course if majority of you can opt for the professional certification offered by the international bodies like ASQ. And you can clear it, I think my purpose, my effort, my energy invested in offering this course is really satisfied, and your success basically is a matter of satisfaction for me. So, this is something that strongly Jack Welch believes and that is why Six Sigma emphasizes on making your processes customer centric.

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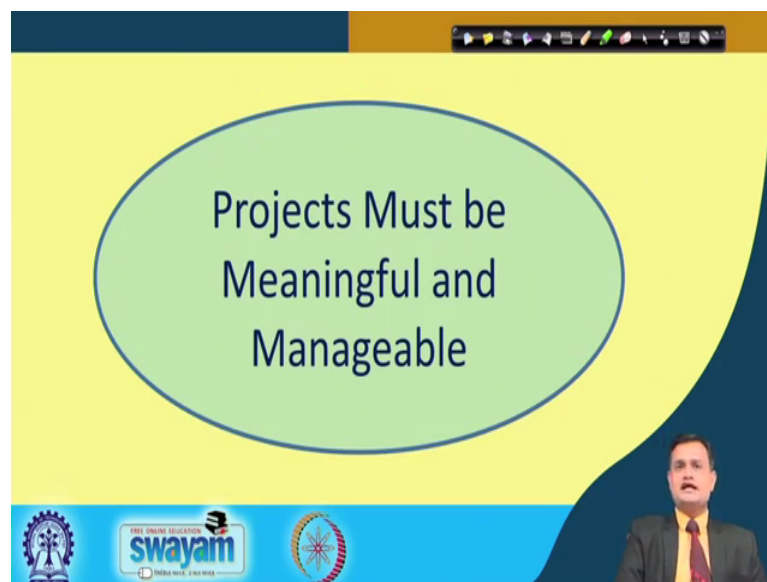
The Define Phase Tools

- Project Identification
- Project Charter
- Supplier, Input, Output, Customer (SIPOC) Diagram
- Voice of the Customer (VOC)
- Affinity Diagram
- Tree Diagram / CTQ Tree
- Matrix Diagram
- Interrelationship Diagram
- PERT
- Force Field Analysis

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So, there could be various tools we use in the define phase like project identification, development of project charter, SIPOC, voice of customer, affinity diagram, tree diagram, matrix diagram, PERT, force field analysis.

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Projects Must be Meaningful and Manageable

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So, project must be meaningful and manageable two most important conditions. Project must be meaningful and manageable. You may have a project, but not meaningful does not carry any importance. It is already executed or the problem is not at all prevailing, it is not meaningful from the customer point of view. The problem is not at all important,

project is not meaningful. Second is manageable you have selected a project, but given the budget, resources and the support of top management it is not manageable, also the skill of the people available. Unless these two primary conditions are satisfied, you cannot have a good selection identification of the project. And you would simply end up with a very very poor Six Sigma execution of the project. So, these two conditions must be satisfied as a prerequisite.

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### Project Metrics – Success Criteria

**Primary Metric**

- ✓ Used to measure project success
- ✓ Consistent with the problem description and objective
- ✓ Plotted on a time series graph and shows the goal and actual performance lines

**Secondary Metric(s)**

- ✓ Control unintended negative consequences (assure the Primary Metric is not achieved artificially)
- ✓ May be used to measure project progress when the Primary Metric respond slowly
- ✓ More than one may be required
- ✓ Plotted on a time series graph and shows the goals and actual performance lines

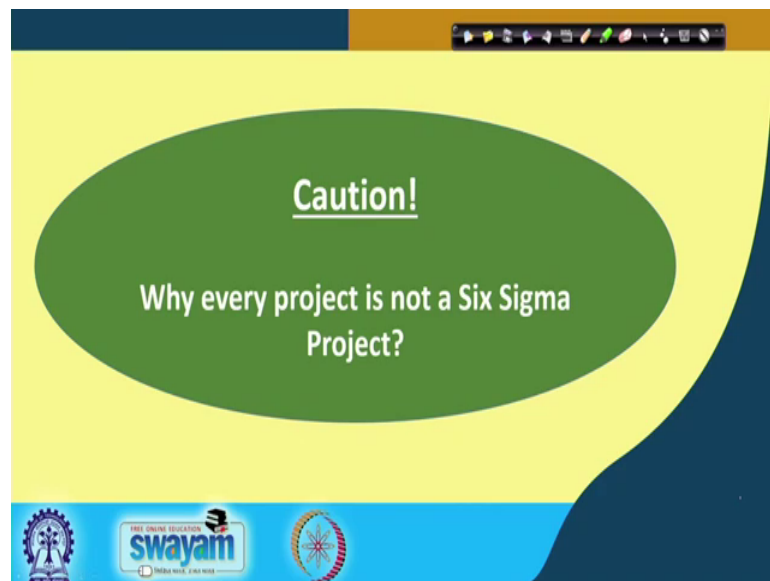
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So, you have some project metrics success criteria like primary metrics, they are used to measure the project success, consistent with the problem description objective, plotted on a time series graph to show that how the performance has improved maybe the improvement in productivity or may be the yield or defect rate is going down. There could be secondary metrics like control say unintended negative consequences, so assure the primary metric is not achieved artificially. So, this is a secondary metric which in turn tries to capture the success of the primary metrics.

Just to give you a simple example that your primary metrics says that your defect rate is going down. But when you try to capture it some other kind of measure maybe unit wise function wise defect or rework, let us say then you would find that no rework has really increased. And if the rework has increased, it does not mean that my quality level has improved. So, this is another way of capturing the negative consequences not captured by the primary metrics.

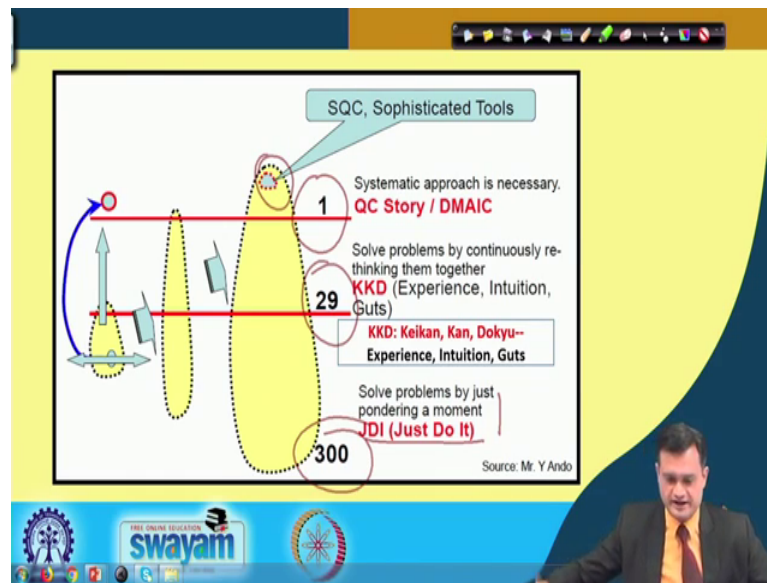
Similar way secondary metrics can be used to measure the project progress when primary metric respond very slowly. So, many primary metrics you would find that customer loyalty maybe it cannot be captured immediately. So, you can have another measure customer satisfaction or maybe the number of customer complaint that can in turn help you to gradually realize that what would be its impact on the primary metrics like customer loyalty which is long term. More than one may be required and you can plot it on the graph.

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So, there is a caution. Why every project is not a Six Sigma project?

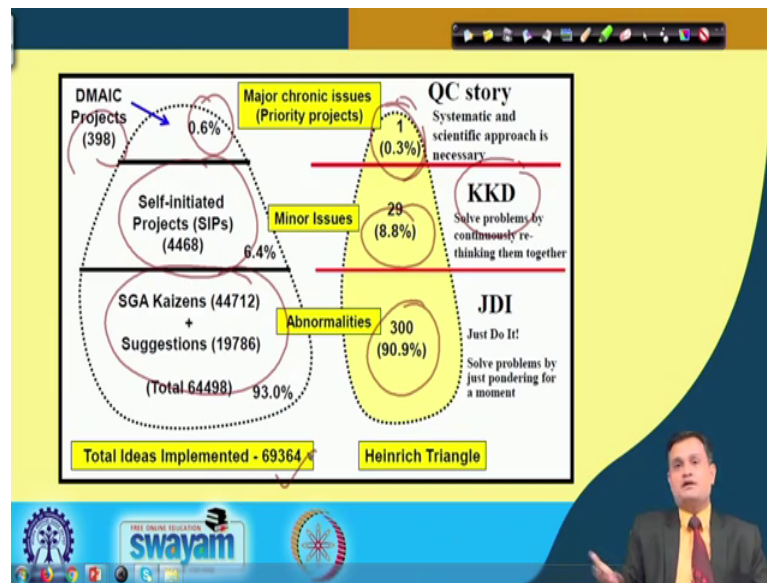
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Just see this before we end. So, you have typically let us say 300 projects and this can just be handled by Just Do It. So, solve problems by just pondering a moment. You do not need actually DMAIC cycle or complete execution of the Six Sigma project, you observe the problem, you try to have little discussion within the group and you just act on it. So, solve the problem, just pondering a moment. Second one you just see that you may have couple of problems maybe 29, just an arbitrary number this can be solved by KKD. And KKD stands for Keikan, Kan, Dokyu. It is Japanese system which says experience, intuition and guts.

And you would find that only one typical problem that needs to be addressed through DMAIC and your quality control in its said you. So, please remember every problem should not be considered as a Six Sigma project. Majority of the problem 95 percent either they can be solved by Just Do It or KKD, experience, intuition and guts, but the one which has very very severe consequence for the customer must be considered as a Six Sigma project. Why this is important to tell, because Six Sigma project demands resources, demands people, demand skills, demands investment of time and hence the budget. If you will start targeting each project as a Six Sigma project, it would not be possible you will never get the adequate support of the top management.

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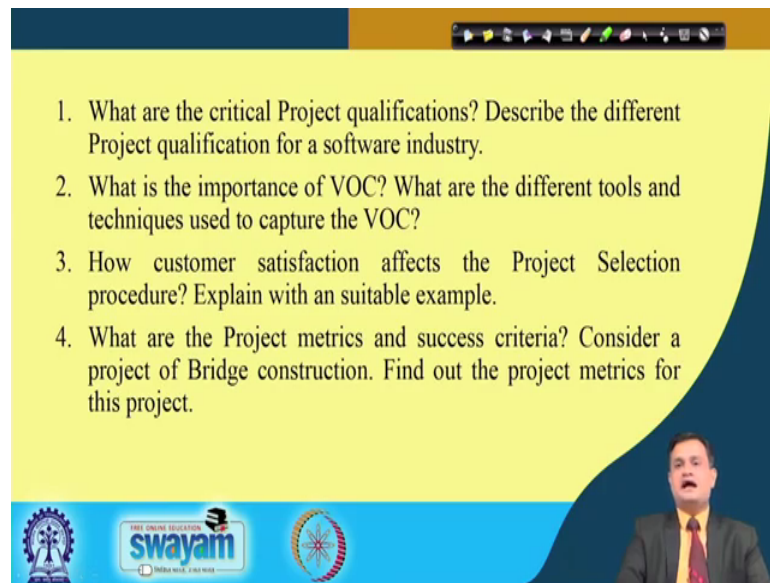


Now, with this let us try to say appreciate that if I just put the same thing little bit in a different way, then you just see that 90.9 percent are just specific to abnormalities and this is for a typical case company then many are solved just by Kaizens or suggestions. Then KKD 8.8 percent problem where solved just by self initiated projects within a group, and only 1 percent only 0.3 percent or 1 or 0.6 percent 398, where only considered at Six Sigma project. So, how many were total projects in this figure, just it is example. So, there were 69364 problems. You can consider all the problems are Six Sigma project and you will simply end up with doing nothing.

So, out of 69364, you just see that majority of almost let us say 64000 are solved 64000 to 65000 are solved, just by doing it. Then kaizen and suggestions then 4468, they are solved by KKD intuition and experience and only 398 are considered as Six Sigma projects. So, every problem should not be identified as a Six Sigma project. So, I think this must have sensitized you that you cannot really effort to run too many Six Sigma project and it is not advisable also.



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1. What are the critical Project qualifications? Describe the different Project qualification for a software industry.
2. What is the importance of VOC? What are the different tools and techniques used to capture the VOC?
3. How customer satisfaction affects the Project Selection procedure? Explain with an suitable example.
4. What are the Project metrics and success criteria? Consider a project of Bridge construction. Find out the project metrics for this project.

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INDIA WIDE, TIME WIDE

So, before we end I would like to float couple of think it for your introspection and quick revision. What are the critical project qualifications? Describe the different project qualifications for a software industry. What is the importance of VOC - Voice of Customer. And what are the different tools you can use to capture it? How customer satisfaction affect the project selection procedure? And explain with suitable example. We have seen the example of emergency department as well as hotel. What are the project metrics and success criteria? Consider a project of bridge construction. Find out the project metrics for this particular project. So, please do it. This will really help you to get a control hold introspection internalization of the concepts and enrich you in your Six Sigma journey.

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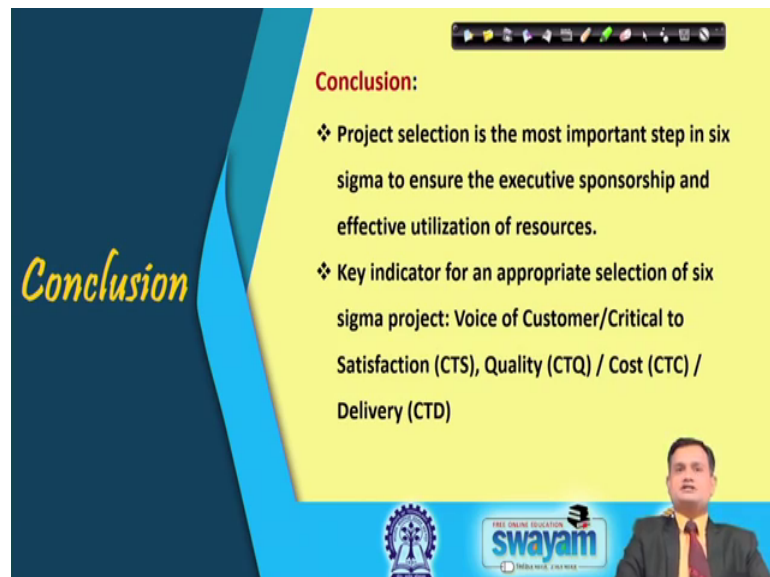
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- ❑ Howard S. Gitlow and David M. Levine, Six Sigma for Green Belts and Champions, Pearson Education, Inc., 10<sup>th</sup> Printing, September 2012.

The slide features a dark blue background on the left with the word 'References' in a yellow script font. The right side has a yellow background with a list of references. At the bottom, there is a small video inset of a man in a suit and tie, and logos for 'swayam' and 'INDIAN INSTITUTE OF TECHNOLOGY KANPUR'.

So, these are the references you can use may be Meredith is a classical book on Project Management, but some ideas of project management you will definitely find in T. M. Kubiak Black Belt as well as Forrest implementing Six Sigma and some little discussion in other books also.

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**Conclusion:**

- ❖ Project selection is the most important step in six sigma to ensure the executive sponsorship and effective utilization of resources.
- ❖ Key indicator for an appropriate selection of six sigma project: Voice of Customer/Critical to Satisfaction (CTS), Quality (CTQ) / Cost (CTC) / Delivery (CTD)

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So, finally, I can conclude that project selection is the most important step in Six Sigma to ensure the executive sponsorship means support of the top management and effective utilization of the resources. Number two, key indicators for an appropriate selection of

Six Sigma project, voice of customer, critical to satisfaction, critical to quality, cost critical to cost and critical to delivery. Every problem is not a Six Sigma project only maybe 0.3 percent out of the thousands of the problem can be considered as a Six Sigma project and for which it would be justifiable to check request and demand a support from the top management.

So, with this I would end this session. Thank you very much for your interest in learning the topic project identification and selection in Six Sigma. Please keep revising, try to visualize couple of situations and try to think about CTQs say CTX, CTQ, CTS, CTD, CTC, and just think that what could be really considered as the Six Sigma project. So, please keep revising, introspecting and internalizing the concepts. I will discuss another topic in the next lecture. Till that time keep revising. Be with me. Enjoy.