SIX SIGMA

Structure and Implementation

Group Members:

17117093	Utkarsh Aashu Mishra
17117089	Tejas Patil
17117087	Tarun Kumar
17117045	Lavkush Verma
17117014	Arpan

Aspects of the Project

- Explanation of 6 Sigma Process
- Case Studies
- Implementation in Mess Facilities

Features

What is 6 Sigma?

Six Sigma seeks to improve the quality of process outputs.

Six Sigma approach is a collection of managerial and statistical concept and techniques.

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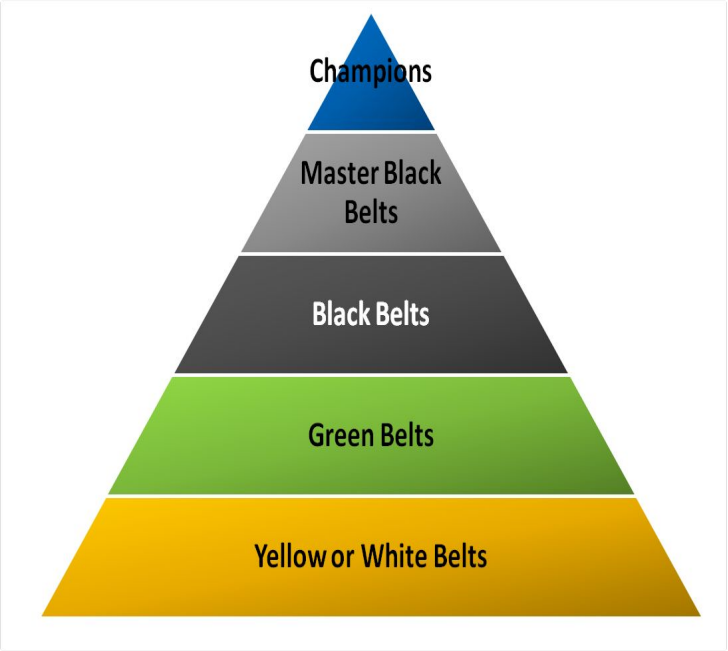
99.99966%
products ma
are statistically ted
to be free of def ts.

Why Should we use 6 Sigma?

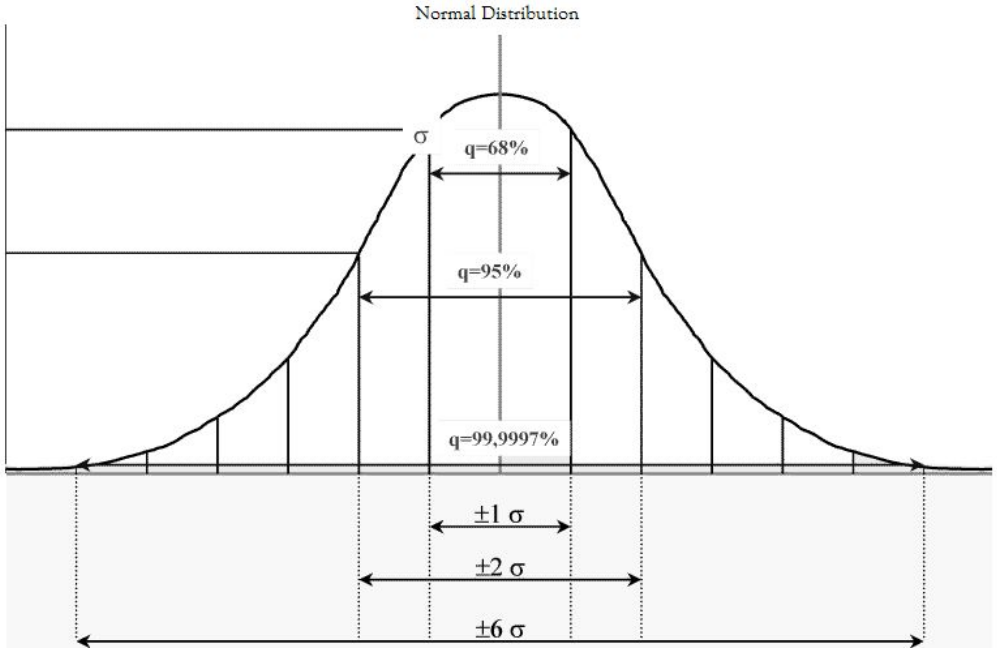
Quality
Process Improvement
Time reduction
Customer Satisfaction
Growth
Money

roduction,
duction & Mass
production.

Organizational Structure



Learning Structure



CASE STUDY

Motorola

In the **late-1980's Motorola** extended the **Six Sigma** methods to its critical business processes, and significantly **Six Sigma** became a formalized in-house ‘branded’ name for a performance improvement methodology, i.e, beyond purely **‘defect reduction’**.

In **1991 Motorola** certified its first **'Black Belt'** Six Sigma experts, which indicates the beginnings of the formalization of the accredited training of Six Sigma methods.

CASE STUDY

Ford

Ford has pledged to utilize innovative products and use **Total Quality Management** to accomplish its goal of **“Quality Is Job 1”**.

Ford implemented **Six Sigma** in the **late 1990s** The initiative was called **'Consumer-driven Six Sigma'.**

JD Power and Associates (JDPA) ranked **Ford 7th** in terms of quality in the world in **2001**. In **2003 JDPA**, ranked **Ford** at **4th** position which was a remarkable improvement over this two-year period.

CASE STUDY

US Defence Forces

US Army began its use of **Six Sigma in 2005** and till now total savings incurred due to Six Sigma reaching nearly **$2 billion.**

US Navy started using **Six Sigma in 2006**. The total savings brought about by Six Sigma projects conducted in 2006 and 2007 was **$450 Million.**

CASE STUDY

Amazon

Amazon works to deliver continuous improvement for customer experience and to drive productivity, margin, efficiency, and asset velocity across the entire corporation.

To achieve their goal, Amazon set about hiring the best and brightest. To reduce variation, Amazon actively used DMAIC, Root Cause Analysis.

Result of this is 63% of Amazon customers are their Prime members.

Implementation in Mess

Challenges:

Challenge 1

Organizational Structure Establishment

A need of a proper organizational structure was identified during the process which has to be addressed.

Challenge 2

Data Collection System Improvement

Response collection system is not well maintained, this may restrict the overall implementation of proper Six Sigma.

Challenge 3

Process Improvement in terms of DPMO

Finally, the process improvement in terms of the total defect measurement and customer satisfaction has to be achieved.

What is the problem?	What data is available?	What are the root causes of the problem?	Do we have the right solutions?	What do we recommend?
What is the scope?	Is the data accurate?	Have the root causes been verified?	How will we verify the solutions work?	Is there support for our suggestions?
What key metric is important?	How should we stratify the data?	Where should we focus our efforts?	Have the solutions been piloted?	What is our plan to implement?
Who are the stakeholders?	What graphs should we make?	What clues have we uncovered?	Have we reduced variation?	Are results sustainable?

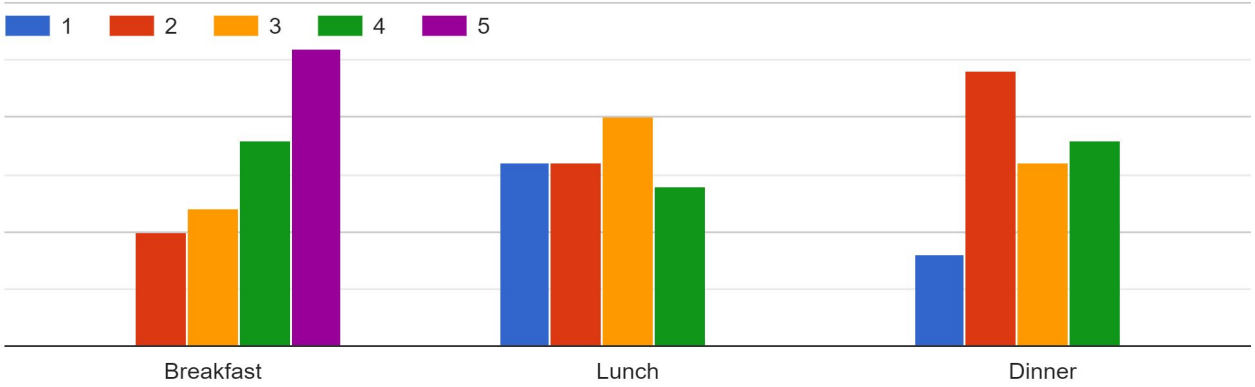
Defining the Problem

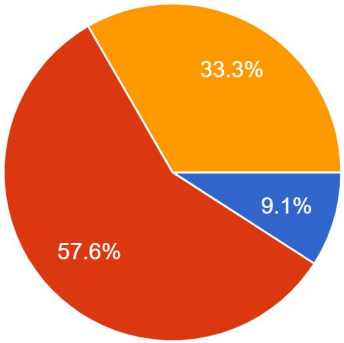
- Improper management of mess Facilities
- Lack of student satisfaction, wasting food or skipping their meals
- Scope of our study includes:
  - Process Analysis
  - Appropriate Organizational Structure and Response Collection methods
- **Key metric** is the measure of **daily responses** of the students
- **Stakeholder group** comprises of the **mess executives and students**

Measure the Process Parameters

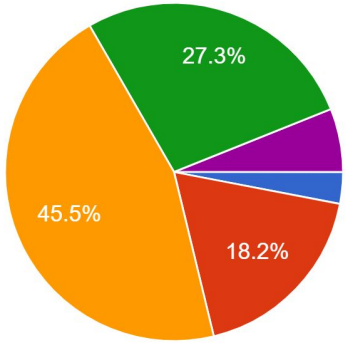
- Data regarding the daily responses of students **(on a scale of 5)** based on overall food quality and facilities was available (very unstructured and incomplete data)
- This data cannot be trusted to be accurate, although an accuracy upto **70%** can be considered.
- Stratification of the data was based on the time of meal, i.e. **breakfast, lunch and dinner** and on **messing facilities**
- **Responses** wrt. each strata was **obtained and visualized**

Responses





Waiting for Rotis



Waiting for Utensils

Based on 200 respondents from Jawahar bhawan

Analysis: The method

- **Performance Index** was used as a measure of DPMO
- C_{pk} as a measure of **deviation from specification limits,**

  Upper Specification Limit(USL) = 5 on a scale of 5

  Lower Specification Limit(LSL) = 3 on a scale of 5 (60% acceptance),

  was obtained
- Here, the C_{pk} is then visualized as the **percentage Defects per Million Opportunities (DPMO)**
- The targeted outcome of non-defects is **99.99966%** i.e 3.4 DPMO

Results of Analysis

$$C_{pl} = \frac{\bar{x} - LSL}{6\sigma}$$

$$C_{pu} = \frac{USL - \bar{x}}{6\sigma}$$

$$C_{pk} = min\{C_{pu}, C_{pl}\}$$

$$C_{pk}^{net} = mean\{C_{pk} \quad for \quad each \quad strata\}$$

$$C_{pk}^{net} = 0.7742 \quad (\quad before \quad considering \quad accuracy \quad)$$

With Accuracy Considerations, $C_{pk}^{net} = \frac{C_{pk}}{Accuracy \quad Percentage}$

$$C_{pk}^{net} = 1.106 \quad (\quad after \quad considering \quad accuracy \quad)$$

DPMO	Sigma Value	C_{pk}
130295	2.625	0.875
105650	2.750	0.917
84566	2.875	0.958
66807	3.000	1.000
52081	3.125	1.042
40059	3.250	1.083
30396	3.375	1.125
22750	3.500	1.167
16793	3.625	1.208

We obtained **34767 DPMO** as per the responses collected and **Cpk** value obtained.

Analysis: Outcomes

- Root causes of problems identified, verified by the mess personnel and mess secretary, were:
  - **machine efficiency,**
  - **working efficiency,**
- Our **main focus** was on the **machine efficiency** of the mess facilities.
- Clues uncovered from the analysis were **management of the facilities and food quality.**

Proposed Solution

- **Machine Efficiency**
  - Periodic maintenance.
  - Higher Capacity machine can be installed.
- **Working Efficiency**
  - Proper Communication.
  - Employing more workers.

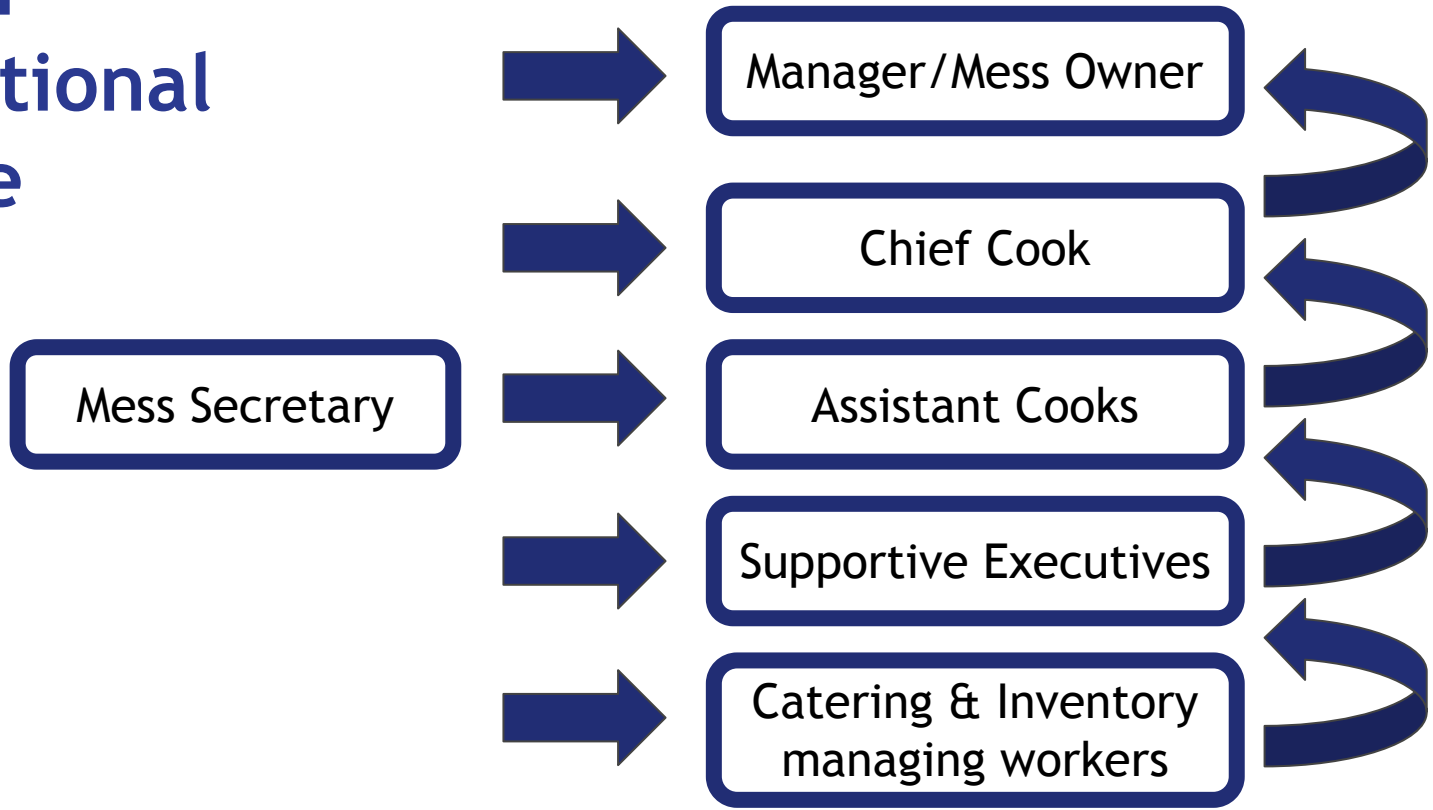
Improve the Process Outcomes

- Solution technique is aimed to increase the C_{pk} value to **2.00** or level of accuracy to **99.99966%**
- **Verification** can be done by taking the **responses** of the students after the implementation
- Solutions will be piloted on the **Jawahar bhawan mess**
- Same analysis method can be repeated and process variability as an index of C_{pk} and subsequent **DPMO** can be calculated
- If implemented successfully, **Process Variability** and **DPMO** is expected to be **lesser than before**

Control the Improved Outcomes

- Our recommendation is the:
  - **regularly collection** of responses from the students.
  - **Proper management** of facilities for the preparation of meals
- As mentioned, **pilot solutions** are proposed to implement the proposed plan on a small basis
- **Sustainability** of results can be discussed only when the plan is incorporated for sufficiently long period of time

Proposed Organizational Structure



THANK YOU