KPMG

Maximising productivity with
Lean Six Sigma

A handy document to give you a quick overview of productivity tools

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Introduction

Lean Six Sigma is a 'management philosophy to improve process capability by reducing variation in the process'.

It is a methodology to improve process to reduce defects (quality improvement), increase productivity, reduce cycle time, reduce cost and satisfying customer needs profitably.

There are various tools in Lean Six Sigma methodology which are used to improve productivity and efficiency of processes.

The objective of this document is to look at some of the tools to maximise productivity in any organisation.

1. What is productivity?

Productivity is the ratio between output and input. It denotes the relationship between output and one or all associated inputs.

In the words of Peter Drucker, 'productivity means a balance between all factors of production that will give the maximum output with the smallest effort'.

The Japanese holistic view of productivity explains productivity as a comprehensive holistic phenomenon encompassing all elements required to improve products/services (output). Productivity in the future must concern itself with seeking affluence of a kind that will provide people with material wealth as well as spiritual satisfaction. Also, the output, particularly in the form of physical pollution, must be controlled in the context of increasing concern of society for clean environment and sustainable development. To improve productivity, products must be designed to satisfy customer needs with optimum consumption of resources minimal generation of waste in the process. 1c

2. Steps to maximise productivity

In order to maximize productivity using Lean Six Sigma Methodology, we must:

- Develop a measurement system for all processes

- Identify critical inputs and processes

- Develop a method for achieving productivity improvement, such as idea generation from employees, continuous improvement programme, best practice replication and standardisation

- Train resources on improvement methodology and tools

- Establish reasonable goals for improvement

- Ensure that the management support for productivity improvement using Lean Six Sigma methodology

- Measure improvements and communicate the to the organisation.

3. Tools to maximise productivity

Lean Six Sigma is a methodology that helps eliminate waste and inefficiencies and improve productivity and quality.

The methodology uses various tools that help with analysis and improvement of processes to maximise productivity.

Lean Six Sigma and its tools have created an impact in the operation of many companies. These tools help organisations identify wasteful activities, problems and opportunities to improve productivity and promote improvements in quality both in a systematic and strategic manner.

In order to maximise productivity, here is a list of five Lean Six Sigma tools that you need to know.

3.1 Value stream mapping

- Value stream mapping (VSM) is a Lean tool that helps to see and understand all the activities required to bring a product/service from customer request to fulfilment or completion. It helps in looking for opportunities to eliminate or reduce waste in the process
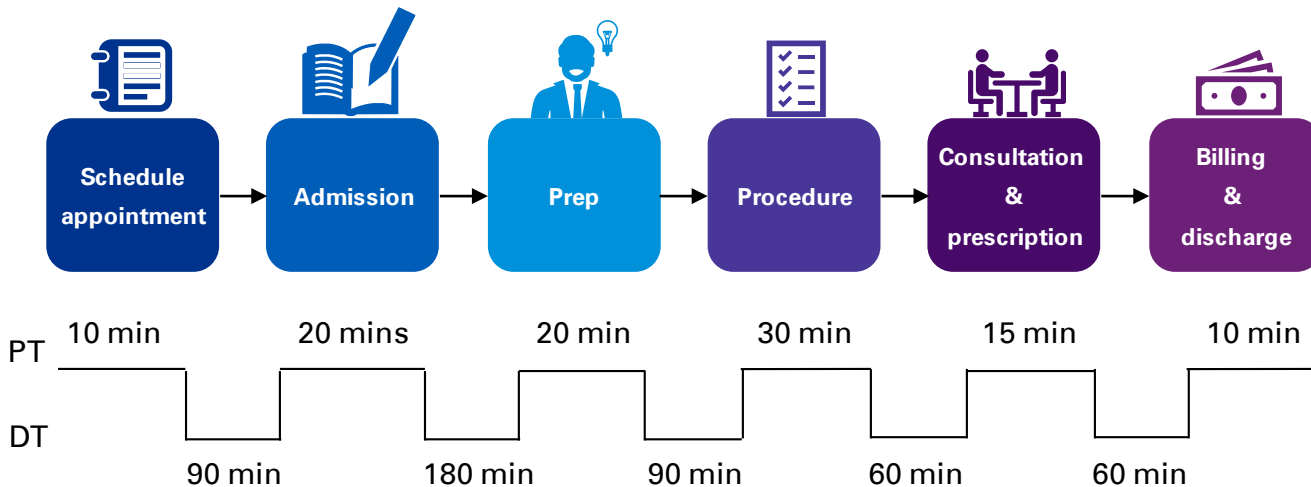
- It is an effective tool for businesses in almost any industry to identify cycle time, error rate and unnecessary delays within the process

- A value stream helps in identifying both value added and non-value added steps.

3.1.1 Why use value stream Mapping?

- Enables to visualize the process / production flow

- Allows to see waste in the system

- Creates framework for designing complete system

- Demonstrates interaction between information and material flow

- Prevents focusing on large improvement opportunities with little impact.

Figure. 1.2

VSM example

| Schedule appointment | → | Admission | → | Prep | → | Procedure | → | Consultation & prescription | → | Billing & discharge |

PT: 10 min, 20 mins, 20 min, 30 min, 15 min, 10 min

DT: 90 min, 180 min, 90 min, 60 min, 60 min

Process time = PT = 10 min + 20 mins + 20 mins + 30 mins + 15 mins + 10 mins = 105 mins

Delay time = DT = 90 mins + 180 mins + 90 mins + 60 mins + 60 mins = 480 mins

Lead time = LT = PT + DT = 585 mins

$$\text{Process cycle efficiency} = \frac{\text{Total process time}}{\text{Total lead time}} = \frac{105}{585} = 17.94\%$$

3.1.2 What is the process of creating a value stream map?

- Focus on the customer and the customer's requirements
- Choose one of the customer requirements to begin with
- Walk the shop floor
- Map the process
- Collect data such as cycle time, processing time and first pass yield
- Construct the VSM.

3.2 Cause and effect analysis

- A cause and effect analysis diagram is also called the fishbone diagram because it resembles a skeleton of a fish. It is one of the well-known Six Sigma tools to brainstorm various causes of a problem

- The cause and effect diagram aids organisational teams to identify potential causes for a described issue. It is also referred to/known as an Ishikawa diagram, named after its developer Kaoru Ishikawa.
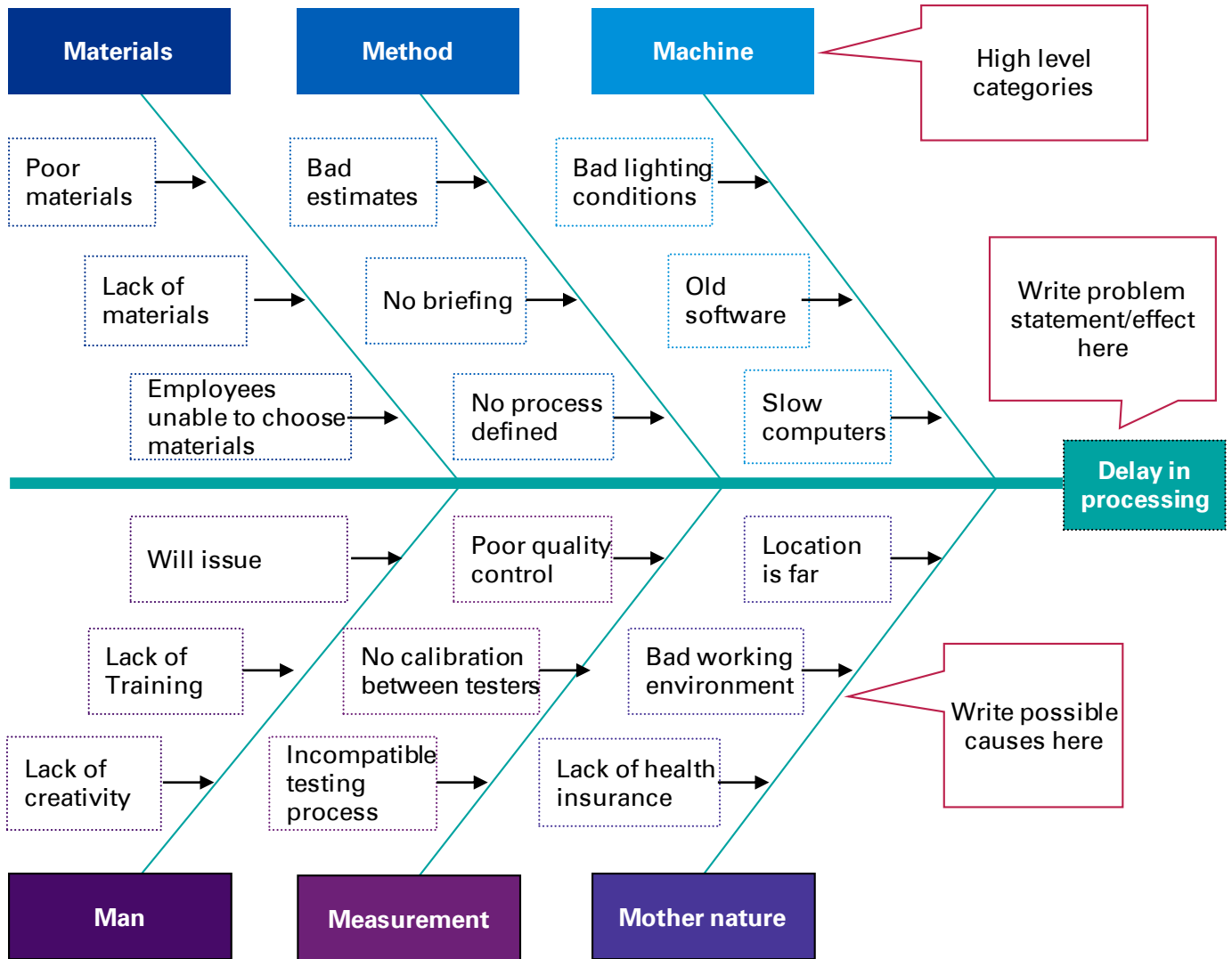
3.2.1 Why use cause and effect analysis?

- To identify potential causes of the problem or effect

- To categorise causes in broad categories for effective problem solving

- To gather inputs from team members or small medium enterprises (SME) on sub-categories of causes.

Figure. 1.3

Cause and effect diagram – hypothetical example

3.2.2 What is the process of creating a cause and effect diagram?

- To start the process, the team should state the problem

- Problem statement is then followed by brainstorming for potential causes to the problem

- Categorise potential causes in categories such as man, machine, material, method, measurement and mother nature

- The problem statement is placed at the head of the fishbone and each of the main bones in the fish address one of the categories. The main categories can further be broken down into sub-categories.
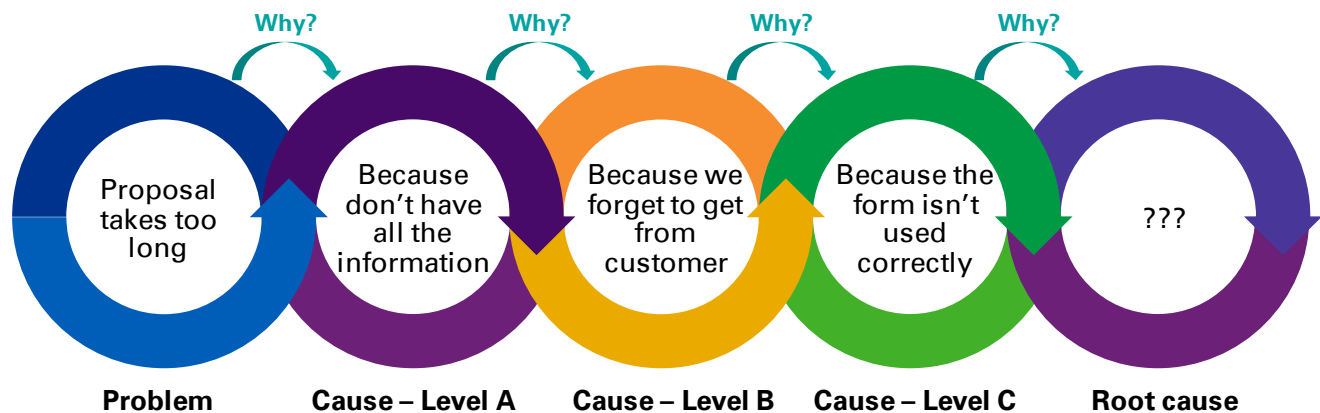
3.3 The Five whys analysis

- The Five whys is a simple problem-solving technique that helps one to get to the root of a problem quickly. Organisations rely on the Five whys as it is a relatively simple method to use and it does not require any data or statistical analysis. The five whys originated in 1930s with the Japanese industrial revolution.

3.3.1 Why use the Five whys analysis?

- The idea is that each time you ask 'why' a problem may have occurred, you move closer to identifying the root cause. But you don't need to stop at five. Keep going until you get to the root of the problem. You may stop once the root cause is identified even if 'why' is asked less than five times.

Figure. 1.4

The five whys analysis – hypothetical example

| Problem | Cause – Level A | Cause – Level B | Cause – Level C | Root cause |

3.3.2 What is the process to conduct the five whys analysis?

- Identify people with knowledge of the systems and the processes under review for the session

- Document and elaborate on the problem

- Question why the problem occurred and come up with possible answers

- If answers to this question do not lead to a root cause, ask again 'why' and again document responses

- Repeat the process until the root case has been determined.

3.4 Pareto chart

- In 1906, Italian Economist Vilfredo Pareto, while researching his ideas, observed that 80 per cent of the land in Italy was owned by just 20 per cent of the people. Joseph Juran, a Quality Guru came to know about the tool and began to apply the tools for quality issues by using the phrase "the vital few and the trivial many"

3.4.1 Why use the Pareto analysis?

- The Pareto chart is a graphic representation of the Pareto principle (also known as the 80/20 rule): the idea that 80 per cent of the problems/effect may be caused by as few as 20 per cent of causes

- The purpose of a Pareto diagram is to separate the significant aspects of a problem. By graphically separating the causes of a problem, a team will know where to direct its improvement efforts.

Figure. 1.5

Pareto chart – hypothetical example
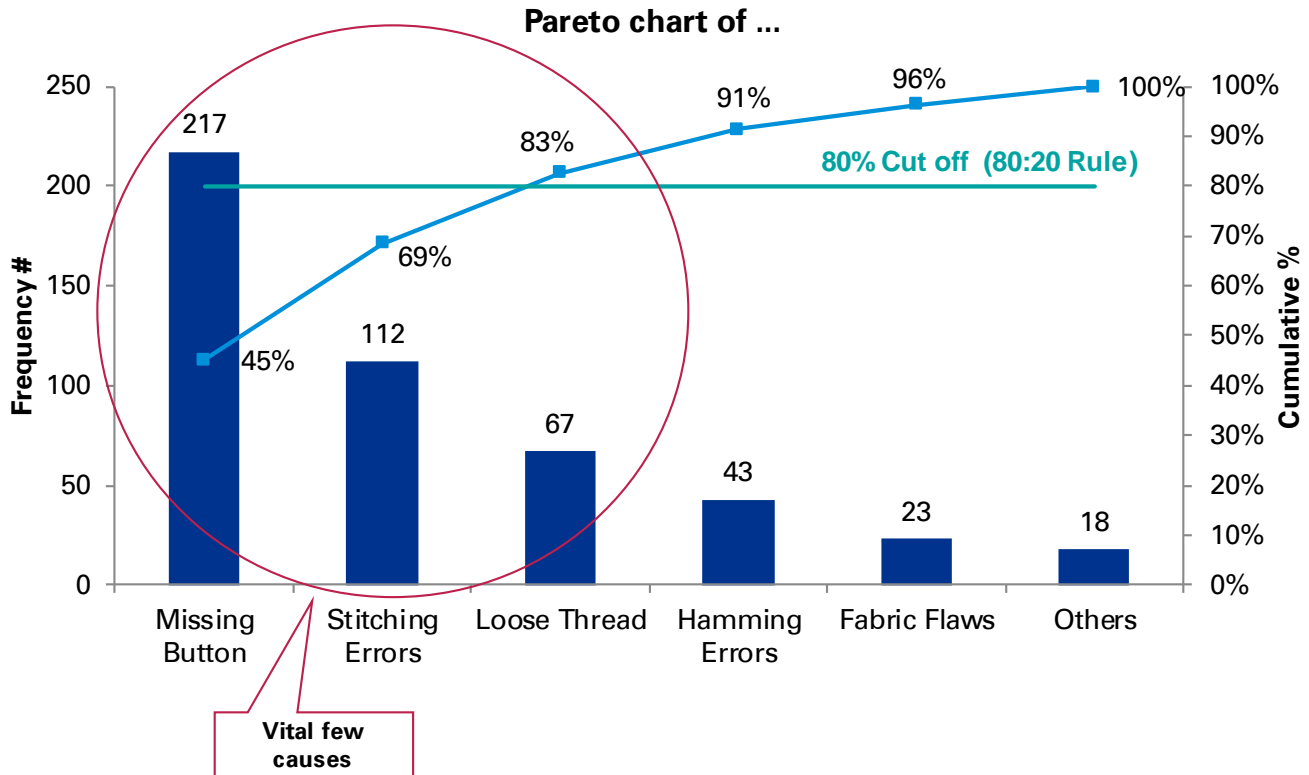
3.4.2 What is the process of creating a Pareto chart?

- Decide what categories will be used to group items. The category or sub-category of causes can be identified from the cause and effect analysis

- Collect the data for each category or assemble data that already exists

- Add data to a spreadsheet and sort data in descending order

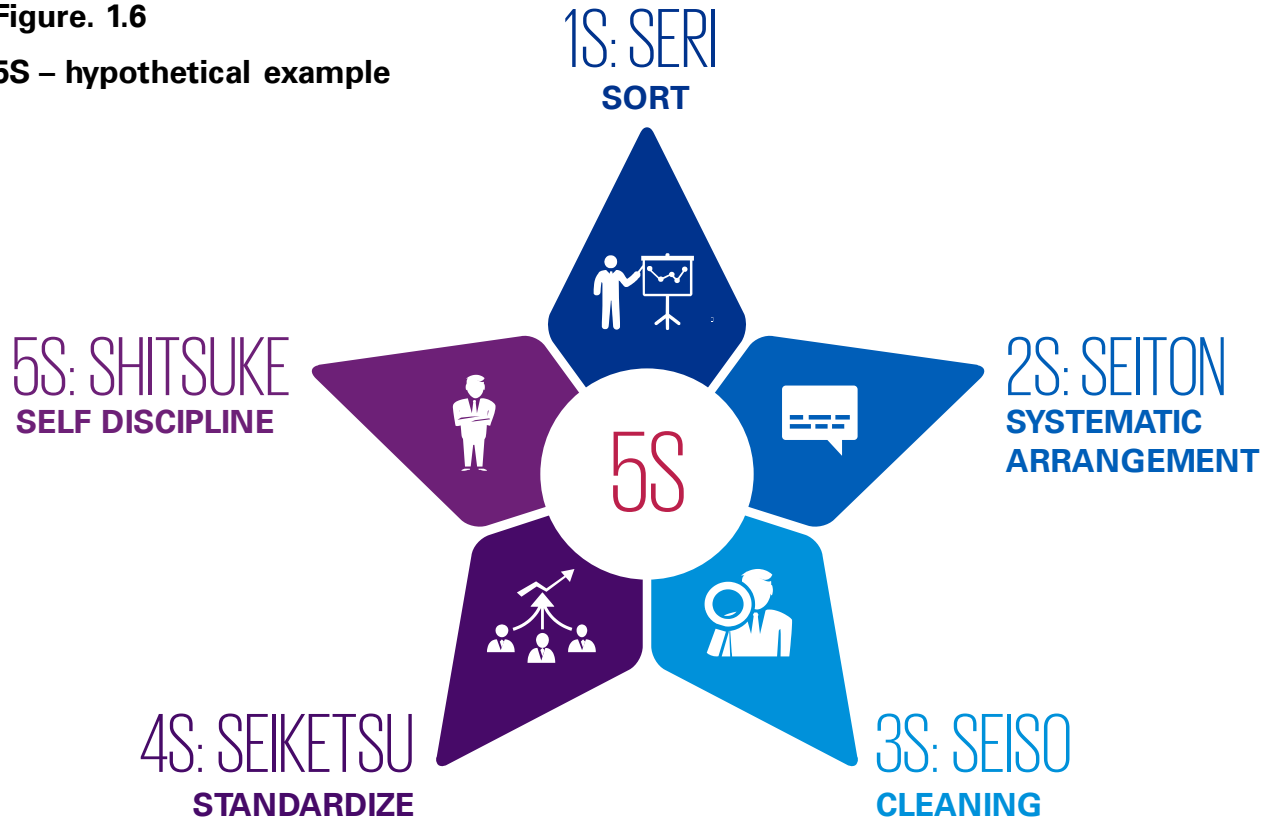- Determine percentages for cumulative data

- Plot the graph.

3.5 5S

- 5S is a systematic approach to organise and standardise the workplace. The 5S was originally developed by Toyota production.

3.5.1 Why use 5S?

- To improve efficiency and productivity
- To maintain control over processes
- To maintain safety and cleanliness
- To maintain a good quality product.

Figure. 1.6

5S – hypothetical example

1S: SERI — SORT

2S: SEITON — SYSTEMATIC ARRANGEMENT

3S: SEISO — CLEANING

4S: SEIKETSU — STANDARDIZE

5S: SHITSUKE — SELF DISCIPLINE

3.5.2 What is the process of creating 5S?

- Seiri (sort): identify items that are unnecessary and remove them; sort items by frequency of use

- Seiton (set in order): identify the place to arrange the items and place them for prompt usage

- Seiso (shine): clean the workplace so that there is no unnecessary clutter

- Seiketsu (standardise): it is the process to standardise the process of sort, set in order and shine

- Shitsuke (sustain): sustain the process by self-discipline of the

Conclusion

Lean Six Sigma methodology and tools are the principles which can be applied to any processes in the organisation to:

- Improve and maximise productivity
- Improve quality
- Reduce cycle time
- Eliminate waste in process.
- Reduce cost
- Improve customer satisfaction
- Improve market share of the organisation

KPMG in India contacts:

Dr. KK Raman
Partner
Management Consulting
T: +91 80 3065 4700
E: kkothandaram@kpmg.com

Venkataramani Sankaran
Executive Director
Management Consulting
T: +91 44 3914 525
E: vsankaran@kpmg.com

Nitesh Jain
Director
Management Consulting
T: +91 120 4785450
E: niteshjain@kpmg.com

home.kpmg/in

#KPMG josh

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