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Vellore Institute of Technology

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Module – 2

Lean

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Lean

- "Lean" is not an acronym
  - It means to **do more with less waste**
- Most processes in productions are 95% waste
  - Actual hands-on time is only 5%
- The **largest production gains** will be made in **reducing the waste** in a process

Why Lean?

- **Competition is world-wide** and growing
- Companies that meet customer needs and are **more efficient than their competitors will survive.**
- **"You can have any color you want, as long as it's black"** is a dead philosophy.

History of Lean

- **Henry Ford**
- Taiichi Ohno and the Toyota Production System
- "The Machine that Changed the World"
- "Lean Thinking"
- Automotive industry
- Aerospace industry
- ...And beyond

8 types of waste

- Injuries
- Defects
- Inventory
- Overproduction
- Waiting time
- Motion
- Transportation
- Processing

5 Key Principles

- Value
- Value Stream
- Flow
- Pull
- Perfection

What is Value?

- **Specific product that meets a customer's needs** at a **specific price** and **specific time**
  - What is important to the customer
  - What the customer is willing to pay for
- Put yourself in the customer's shoes
- Use the customer's words to describe the product

What is the Value Stream?

- **Set of specific actions required** to bring a specific product through **3 critical management tasks** of all businesses
  - **Problem Solving task** (design, engineering)
  - **Information Management task** (order taking, scheduling, planning)
  - **Physical Transformation task** (from raw material to finished product)

What is Flow?

- **Parts "flow" through a Value Stream**
- Upstream is the beginning or "head" of the flow
- Downstream is the "mouth" of the flow, where the part is pulled by the customer
- **Materials and parts** are the **"parts"** in **manufacturing**
- **Customer's needs** are the **"parts"** in **service industry**
  - Same for administration

What is Pull?

- "It has become a matter of course for customers, or users, each with a different value system, to stand in the frontline of the marketplace and, so to speak, ***pull*** **the goods they need**, in the amount and at the time they need them."
  - Taiichi Ohno, "Toyota Production System"

- "...Nothing is produced by the upstream provider until the downstream customer signals a need"
  - Womack and Jones, "Lean Thinking"

What is Perfection?

- **The complete elimination of all waste**, so that all activities along a value stream add value to the product

- Ideal State Map

Lean Tools

Lean Tools

- Value Stream Analysis
- 6S
- Cells
- Standard Work
- Rapid Improvement Events

Value Stream Analysis

- Use Value Stream Analysis as a **planning tool**
  - Break down the Value Stream in manageable sections
  - **Communicate the "flow" with maps**
    - Information
    - Material
- Use Value Stream Analysis to **create 3 maps**
  - **Current**
  - **Ideal**
  - **Future (near time-within a year)**
- **Develop action plan** from the **Future map**

6S

- Often confused with Lean, because you are "doing" something.
- **Second step, after Value Stream Analysis.**

6S

- A tool to organize the workplace
  - **Sort**—Keep what you need, get rid of the rest
  - **Straighten**—Organize what's left
  - **Scrub**—A clean workplace is **more efficient**
  - **Safety**—Without our people, nothing gets done
  - **Standardize**—Find a best way and have everyone do it that way
  - **Sustain**—Don't let up

Cells

- **Natural groups of parts or steps** that add value to a product
- **Single piece flow** inside the cell
  - One at a time
- If possible, **one operator per cell**
- **U-shaped** to maximize human efficiency
- **Multi-skilled people** required
- **Layout** is based on the **flow steps**

Standard Work

- The precise **description of each work activity** specifying cycle time, take time, the work sequence of specific tasks, and the minimum inventory of parts on hand to conduct the activity

- Everyone knows what they are supposed to do at any moment in time

Rapid Improvement Events

- A seven week cycle of **preparation, action, and follow-up** to **improve** one area or fix a problem
- **People:** work leaders, mechanics, workers, supervisor, and a Lean Change Agent
- Led by the **supervisor** or **work leader**
- **Guided** by the **Lean Change Agent**

Review

- **Concept**
  - History and reasons why
- **Principles**
  - Value, Value Stream, Flow, Pull, Perfection
- **Tools**
  - Value Stream Analysis, 6S, Cells, Standard Work, Rapid Improvement Events

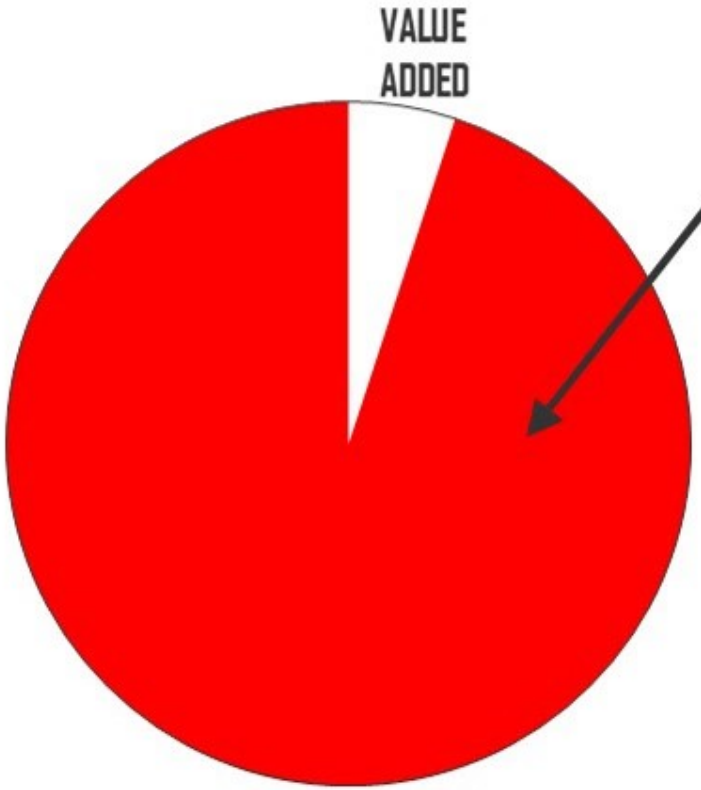
8 Forms of Wastes

Identifying Waste - LEAN

- **Lean** is a **continuous process improvement methodology** that **focuses on identifying and eliminating non-value added** or **wasteful activities.**
- Value is defined from the perspective of the community/populations we serve.
- By knowing what your community/population values helps one **to identify the value-added or those activities which are truly needed.**

8 WASTES

Lean =Systematically *Eliminating* the Waste



Non-Value Added

- Overproduction
- Inventory
- Waiting
- Motion
- Transportation
- Defects
- Extra Processing
- Underutilized People

Typically 95% of time the product is within the plant is non - value added

The acronym **DOWNTIME** is used to help remember the 8 types of waste.

Defects
Overproduction
Waiting
Non value-added processing
Transportation
Inventory
Motion
Employee (Underutilizing)

Defects-Is the work accurate and complete?

- **Charts or reports** with **incorrect or incomplete information**
- **Inaccurate data entered** into computer, on reports, etc.
- **Mislabeled containers, forms, reports**, etc.
- **Clients on hold** and their phone call lost

Overproduction- Are there forms, services, activities that are being done that aren't really needed?

- **Overstaffing of flu clinic when it isn't flu season**
- **Printing all forms instead of capturing the information** in a computer
- **Multiple forms with same information**
- **Staff meetings held** when it could have been **shared in an email**

Waiting

- **Clients waiting** for services
- **Nurses waiting** to use scales to weigh children OR **staff waiting** to use the copier/fax machine
- **Waiting for a response back** via **email,** etc.

Non-value added processing-

Does the activity/task add value for clients?

- **Reports reviewed by multiple people** or multiple sign-offs
- **Passing customer calls around** (phone musical chairs)
- **Multiple chairs/stations** during clinic visit

Transportation-Is there excess movement of supplies, patients, and/or materials?

- **Moving a client from room to room**
- **Too many mouse clicks on your website** before getting to the information
- Having to walk between buildings, floors, etc. to get services

Inventory-Are there too many materials/supplies on hand?

- **Files** in a cabinet that are **no longer used**
- **Overstocked supplies** or outdated supplies, files, etc.

Motion –Is there excessive motion of staff?

- **Staff searching for information**, **supplies**, etc.
- **Walking from the front of the office to back of office** to get something

Employee (underutilization)—Is your agency tapping into skills, talents, and abilities of your staff?

- Is there a way to cross train people to do other jobs?

Root Cause Analysis Tools:

5 Why's, Pareto

Root Cause Analysis Tools – 5 Why's, Pareto

- The "5 Why's" refer to the practice of asking, five times, why the situation has occurred in order to get to the root cause(s) of the problem.
- It illustrates the importance of digging down beneath the most obvious cause of the problem.
- Failure to determine the root cause assures that you will be treating the symptoms of the problem instead of its cause, in which case, the waste/issue will return, and you will continue to experience the same problems over and over again.
- Remember:
- 1. The actual number of why's is not important so long as you get to the root cause
- 2. There can be more than one cause to a problem.

Root Cause Analysis Tools – 5 Why's, Pareto

- The 5 Whys is a method that uses a series of questions to drill down into successive layers of a problem.
- The basic idea is that each time you ask why, the answer becomes the basis of the next why.
- It's a simple tool useful for problems where you don't need advanced statistics, so you don't necessarily want to use it for complex problems.
- One application of this technique is to more deeply analyze the results of a Pareto analysis.

Root Cause Analysis Tools – 5 Why's, Pareto

- Here's an example of how to use the 5 Whys:
- Problem: Final assembly time exceeds target
- Why is downtime in final assembly higher than our goal? According to the Pareto chart, the biggest factor is operators needing to constantly adjust Machine A
- Why do operators need to constantly adjust Machine A? Because it keeps having alignment problems
- Why does Machine A keep having alignment problems? Because the seals are worn
- Why are Machine A's seals worn? Because they aren't being replaced as part of our preventive maintenance program
- Why aren't they being replaced as part of our preventive maintenance program? Because seal replacement wasn't captured in the needs assessment
- Of course, it may take asking why more than five times to solve the problem—the point is to peel away surface-level issues to get to the root cause.

Root Cause Analysis Tools – 5 Why's, Pareto

❑Pareto Chart

- ❑A Pareto chart is a histogram or bar chart combined with a line graph that groups the frequency or cost of different problems to show their relative significance. The bars show frequency in descending order, while the line shows cumulative percentage or total as you move from left to right.
- ❑ Pareto Chart of Failures by Category

Root Cause Analysis Tools – 5 Why's, Pareto

- **Pareto Chart**
- The Pareto chart example above is a report from layered process audit software that groups together the top seven categories of failed audit questions for a given facility.
- Layered process audits (LPAs) allow you to check high-risk processes daily to verify conformance to standards.
- LPAs identify process variations that cause defects, making Pareto charts a powerful reporting tool for analyzing LPA findings.

- Pareto charts are one of the seven basic tools of quality described by quality pioneer Joseph Juran. Pareto charts are based on Pareto's law, also called the 80/20 rule, which says that 20% of inputs drive 80% of results.

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THANK YOU