Achieving Operational Excellence Using Lean

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Purpose

To provide attendees with an overview of Lean thinking and methods that will illustrate its potential for improving organization performance.

Objectives

At the conclusion of the presentation, attendees will be able to:

1. Identify the seven major types of waste present in organizations.
2. Describe the five key Lean Principles.
3. Describe various methods for eliminating waste.

Topics

1. Purpose of Lean
2. Value and Waste
3. Seven Types of Waste
4. Lean Principles
5. Lean Methods
6. Case Study: Providence Medical Center

Topic

Purpose of Lean

Ohno's Definition

Taiichi Ohno defined the Toyota Production System (TPS) in terms of business goals that included more than the factory.

Ohno wrote:

> "All we are doing is looking at the timeline from the moment the customer gives us an order to the point where we collect cash. And we are reducing that timeline by removing the non-value-added wastes."

Womack & Jones

The book “Lean Thinking” by James Womack and Daniel Jones, defines lean thinking as follows:

"In short, lean thinking is lean because it provides a way to **do more and more with less and less** – less human effort, less equipment, less time, and less space – while coming closer and closer to providing customers with exactly what they want."

Toyota's Definition

The simplest, and possibly the most elegant, definition of Lean comes from Toyota, in two parts:

The purpose of Lean is twofold:

1. The total elimination of waste.
2. Maintaining respect for people.

Implementing Lean

Many organizations that have attempted to implement Lean have focused only on the elimination of waste.

To be successful, organizations must **focus on both equally**, eliminating waste and having respect for people.

Topic

Value and Waste

Adding Value

An activity **adds value** when it provides benefit to the customer.

An activity that does not add value is said to be non-value-added (NVA).

Key Idea

Value is determined from the point of view of the customer.

What is Waste?

Any activity that does not add value from the point of view of the ultimate customer is viewed as **waste**.

Determining Value-Added

Lean thinking gives specific rules for determining which activities are value-added (VA) or non-value-added.

The three rules that must be met for an activity to be considered **value-added** are:

1. The customer must be willing to **pay** for the activity.
2. The activity must **transform** the product or service in some way.
3. The activity must be done **correctly** the first time.

Determining Value-Added

All three rules must be met or the activity is viewed as non-value-added.

To remember the three rules, use the acronym **PTC**:

→ P = Pay

→ T = Transform

→ C = Correct

Rule #1

The customer must be willing to pay for the activity.

Often, the providers of a product or service **assume** what is valued or not valued by the customer.

Providers cannot assume an activity is value-added simply because it has always been done, or done in a particular way.

One method for determining what customers value is to **ask them**.

Example: Healthcare

Time a patient spends directly with caregivers would be value-added.

Having to give the same medical information to three different people would be considered non-value-added the second and third times.

Rule #2

The activity must transform the product or service in some way.

Examples from Manufacturing:

- Installing a car door changes the product in a value-added way.
- Time spent moving doors in a factory would be non-value-added, because nothing is changing with the product.

Rule #3

The activity must be done correctly the first time.

If an activity is done **incorrectly** the first time, thus requiring time and resources to redo it correctly, only the correction of the activity is viewed as value-added.

Examples from Healthcare:

- Healthcare providers have often been paid for non-value-added work.
- The Centers for Medicare and Medicaid Services (CMS) will no longer pay for certain things not done correctly the first time.

Topic

Seven Types of Waste

Waste (Muda)

The Japanese word for waste is **muda**.

Taiichi Ohno was the first person to recognize the enormous amount of muda that existed in the workplace (gemba).

Ohno classified waste in the gemba according to the following seven categories:

7 Types of Waste

1. Overproduction
2. Excess inventory
3. Defects
4. Excess motion
5. Over-processing
6. Waiting
7. Excess transportation

Overproduction

Overproduction means producing **more** than what is needed by the customer, or producing it **sooner** than needed.

Overproduction is the exact opposite of **just-in-time** (JIT) production.

Ohno viewed overproduction as the **worst** of the seven wastes.

Causes of Overproduction

Anticipatory production, i.e., producing product in advance of demand.

Large-lot production.

Replacement of defective items.

Machines that produce parts too quickly.

Impact of Overproduction

Increased inventory, and all of its associated costs.

Increased occurrence of defects.

Excess Inventory

Excess inventory is stock that an organization has on hand **beyond what is needed** to meet customer demand in a timely way.

Inventory includes: raw materials, work-in-process (WIP), assembly parts, and finished goods.

The cost of inventory include: production costs, transportation, storage, and obsolescence.

Excess Inventory

In Lean production, inventory is regarded as a symptom of a "sick factory."

Inventory **hides problems**. It has been compared to water in a stream that hides the rocks (problems) below the surface.

Reducing inventory reveals problems.

Key Idea

To reduce inventory, eliminate the causes of inventory.

Defects

Defects can be defined as any work activity not done correctly the first time.

The muda of defects includes all the material, time, and effort involved in making and repairing defects, along with inspection and handling customer complaints.

The **cost of poor quality** is the cost associated with this type of muda.

Excess Motion

Excess motion involves the **movement of people** in carrying out their work that does not add value.

Productivity and quality suffer when there is unnecessary walking, reaching, or twisting.

Excess motion also has a major impact on **safety**.

Over-Processing

Over-processing involves doing more than is required by the customer.

Examples

- Unused or unnecessary information collected
- Re-entering data
- Expediting
- Multiple signatures

Waiting

Waiting is the **delay** caused when material, information, people, or equipment is not available when needed.

Examples

- Waiting for approvals or signatures.
- Slow computer response time.
- Meeting delayed because of late attendees.
- Hospital patient waiting until a room is cleaned and made available.

Excess Transportation

Excess transportation involves the **movement** of product that does not add value.

Examples

- Excess transportation due to poor workplace layout.
- Moving product in and out of storage.
- Transportation of patients between hospital departments.

Key Ideas

In most processes:

Value-added time is only a **small percentage** of the total time required to complete the activity.

In general, the percentage of value-added time to total time may range from 0.5% to 3%.

Traditional vs. Lean Process Improvement

Traditional process improvement efforts typically focus only on the **value-added activities**, i.e., the 0.5%-3% in terms of time.

Lean thinking, on the other hand, concentrates on eliminating or reducing the non-value added activities.

Discussion Question

Of the seven types of waste, which are most prevalent in your organization?

How do these wastes impact organization performance?

Topic

Lean Principles

Lean Principles

In their book “Lean Thinking,” Womack and Jones defined five principles that describe a Lean environment.

Lean Principles

1. Specify **value** from the standpoint of the end-customer.
2. Identify all the value-added steps across department boundaries (**the value stream**), eliminating steps that do not create value.
3. Keep the process **flowing smoothly**.
4. Avoid pushing work on the next process or department; let work be **pulled**, as needed.
5. Pursue perfection through continuous improvement.

Lean Principle #1

Specify value from the standpoint of the end-customer.

Waste (muda) is an activity that does not add value.

Value is defined ultimately by the end-customer.

Three rules for defining value, described by the acronym **PTC**:

→ P = Pay

→ T = Transform

→ C = Correct

Lean Principle #2

Identify all the value-added steps across department boundaries (the value stream), eliminating steps that do not create value.

The value stream is all the **specific actions** required to bring a **specific product** through three critical activities of any business:

1. Product definition
2. Information management
3. Physical transformation

Identifying the value stream almost always **exposes** the enormous amounts of **waste** that exists.

Lean Principle #3

Keep the process flowing smoothly by eliminating causes of delay.

What does continuous flow look like?

- No waiting
- No batches
- No queues
- No rework
- No wasted effort

Techniques of Flow

Three steps are required and must be done together:

Step #1

Focus on the **actual object** and never let it out of your sight.

Step #2

Ignore the **traditional boundaries** of jobs, departments, and firms to remove all obstacles to flow.

Step #3

Rethink specific **work practices** to eliminate back flows, scrap, and stoppages of all types.

Lean Principle #4

Avoid pushing work on the next process or department; let work be pulled, as needed.

Letting the end-customer **pull** the product from the value stream eliminates:

→ Finished goods inventory

→ Elaborate inventory-tracking systems

Lean Principle #5

Pursue perfection through continuous improvement.

Lean thinking and methods create an environment where there is **no end** to the process of:

→ **Reducing** effort, time, space, cost, and mistakes.

→ While offering a product that is ever more nearly what the **customer wants**.

Discussion Questions

Does flow exist in your organization?

If not, what are the main obstacles to flow?

Does your organization carry out a formal program of continuous improvement?

Topic

Lean Methods

Standardized Work

Standardized work is the current best way to safely complete an activity with the desired outcome and the highest quality.

Premise

- We should analyze our work and seek to identify the best way of doing that work.
- **Current** means the best method we have at the moment.
- Not meant to be permanent.
- Is the basis for **Kaizen** (continuous improvement).

Guidelines for Standardized Work

Do not standardize simply for the sake of standardizing.

Do not emphasize speed over quality.

Lean documents are written by the people who do the work.

Examples

Areas where hospitals have made efforts at standardizing include:

→ Hand washing and hygiene
→ Labeling of specimens
→ Labeling of medications
→ Methods for using equipment

Visual Management

Goals of VM

- To make waste, problems, and abnormal conditions **visible** to employees and management.
- **Expose problems** so they can be fixed, as opposed to hiding problems to make things look good.
- VM can also be used to create awareness and **prevent problems**.

Visual Management

An **andon** is an electronic information or signaling device used to communicate important status and failure messages to employees and customers.

In manufacturing environments, an andon can be a **three-color signal board** that indicates, in-spec, near-limits, and out-of-spec conditions for a running process.

In service environments, an andon display can indicate **customer wait times**.

Discussion Question

What situations do you encounter in your organization that would benefit from the use of visual management?

5S

The 5S methodology reduces waste through improved workplace organization and visual management.

The term 5S comes from the description of the method using five

Japanese words, each starting with the letter S.

The equivalent English words are:

1. Sort
2. Store
3. Shine
4. Standardize
5. Sustain

5S

1. **Sort** → Separate the necessary from the unnecessary.
2. **Store** → Arrange for easy use.
3. **Shine** → Keep the workplace clean daily.
4. **Standardize** → Create guidelines for keeping the workplace clean.
5. **Sustain** → Maintain improvements and look for new opportunities.

Discussion Questions

Do you see a need for a 5S program in your organization?

What roadblocks exist to implementing a 5S program in your organization?

Error-Proofing

Error-proofing is the development and use of methods designed to help people **avoid mistakes** when carrying out work activities.

It is not always possible to error-proof a process. In this case, we can work to make it **harder** for errors to occur.

Also called mistake-proofing, fool-proofing, and poka-yoke.

Key Ideas

Error-proofing is **not a specific technology**.

Rather, it is a **mindset** and an **approach** that requires **creativity**.

First and foremost, it requires **determination** to prevent errors, or at least make it harder to make errors.

Examples of Error-Proofing

Product designs with physical shapes that make it impossible to install parts in any but the correct orientation.

Diesel gasoline nozzles that are **too large** to fit into an unleaded gasoline vehicle.

Many hospitals have implemented **automated storage cabinets** to reduce the chance of a medication error.

Case Study

Illustrating Where Error-Proofing Was Needed

A Portland Police officer mistakenly fired lethal rounds at a person from the officer's beanbag shotgun.

The lethal rounds are colored red, while the beanbag rounds are colored yellow.

The officer carried both lethal and beanbag rounds in the **same duty bag**.

Case Study

The Police Bureau adopted a new protocol designed to prevent such a mistake from happening again.

Unfortunately, the new protocol is much more complicated than using a beanbag shotgun that does not accept lethal rounds.

The Portland City Council approved a $2.3 million settlement to resolve a federal lawsuit dealing with this shooting.

It is the largest individual settlement in the city's history.

Case Study

The individual was permanently disabled.

He narrowly escaped bleeding to death only because OHSU was near the shooting scene.

Discussion Questions

Do you see a need for error-proofing in your organization?

What error-proofing efforts, if any, have occurred in your organization?

Kaizen

Kaizen is the continuous improvement of an entire value stream or an individual process to create more value with less waste.

Lean is a **never-ending** journey. As you eliminate waste, you'll discover waste you never knew existed.

In its simplest form, kaizen means you improve something every day.

Kaizen is both a philosophy and a methodology.

Kaizen

The continuous improvement process is described by the acronym **PDSA**:

→ P = Plan

→ D = Do

→ S = Study

→ A = Act

Case Study

Improving Antibiotic Delivery Time to Pneumonia Patients: Quality Improvement in Action

Providence Medical Center

Portland, Oregon (1992)

Stage 1: Project Definition

Step #1:

Initial Problem Statement → Average length of stay for pneumonia patients = 6.6 days, compared to the regional average = 5.4 days.

Step #2:

Baseline Study Carried Out → Retrospective Study Served as the standard against which improvements were measured.

Stage 1: Project Definition

Step #1:

Initial Problem Statement Revealed Two Significant Issues →

1. Patients waited, on average nearly **7 hours** before receiving their initial antibiotic dose.
2. There was **wide variation** in antibiotic treatment – 24 different antibiotics, oral and intravenous.

Stage 1: Project Definition

Step #3:

Project Definition Narrowed →

Phase I (Present) - Focus on the process of antibiotic delivery and variation in antibiotic treatment.

Phase II (Future) - Build on the efforts of Phase I and evaluate problems contributing to length of stay.

Stage 1: Project Definition

Step #4:

Multidisciplinary Team Formed

Step #5:

Mission Statement Written, Project Plan Developed →

The boundaries of the project were defined, beginning when the entered the ER to when antibiotic therapy is initiated.

Stage 2: Diagnostic Journey

Step #1:

High Level Flowchart Created → Identified the sequence of major activities.

Step #2:

Detailed Flowchart Created → 15 delay points identified, 5 ultimately chosen for further analysis.

1. Delays in admitting paperwork.
2. Delays due to multiple phone calls between ER and admitting.
3. Inappropriate bed assignments.
4. Delays in antibiotic administration due to specimen acquisition.
5. Timing of antibiotic administration.

Stage 2: Diagnostic Journey

Step #3:

Theories Generated for the Causes of Delays

Step #4:

Data Collected to Test Theories → Two theorized causes of admission delays and inappropriate bed assignments were supported.

1. Main admitting overwhelmed by incoming calls or backlog of admissions taking priority.
2. ER nurses failed to notice bed assignments on the patient's chart.

Stage 3: Remedial Journey

Protocols developed for sputum collection and antibiotic therapy.

ER preadmission procedure developed, aimed at achieving the following:

1. Better bed control planning.
2. Initiation of paperwork for a likely admission without waiting for required approval by the attending physician.

Stage 4: Implementation

Within 6 months of implementation, the following results were achieved:

1. Average antibiotic initiation time **dropped** from 6.8 hours to 3.6 hours.
2. Recommendations for antibiotic selection and dosing led to **cost savings** of over $190,000 per year.
3. To prevent **backsliding**, a protocol was developed to monitor the time to antibiotic start, monthly for one year, and quarterly thereafter.

What Was Learned

A multidisciplinary team was vital to success.

Individuals developed a sense of mutual trust and respect through working together, resulting in improved interdepartmental cooperation.

The view of the patient as customer was impressed upon team members through the issue of timeliness of treatment.

Discussion Question

What key learning occurred for you as a result of examining this case study?