

Project Cost Management

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PMG 213

Lecture 9



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Total Quality Cost Management and Lean

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- What is Quality Costing?
- A means of helping companies to reduce manufacturing costs by identifying excessive costs and NON-VALUE-ADDING ACTIVITIES
- **The total of the cost incurred by:**
 - (a) *investing in the prevention of non-conformances to requirement,*
 - (b) *appraising a product or service for conformance to requirement, and*
 - (c) *failing to meet requirements*



- Quality costing is important tool of **quality management and continuous improvement**.



Ignoring **Quality Costing** can make goods and services more expensive, which will affect competitiveness, salaries, jobs and standards of living.

Quality costs Categorization :

Prevention – Appraisal – Failure (PAF)

Price of Conformance and Price of non Conformance (POC/PONC)

- **PAF:**
- **Prevention costs** – costs associated with reducing the *potential for defective parts or services* (e.g. training, quality improvement program, quality planning, Supplier review)
- **Appraisal costs** – costs related to *evaluating product, processes, part and services* (e.g. testing, labs, inspectors)
- **Failure Costs**
- **Internal failure costs**
- **External failure costs**

- **Internal failure** – *costs that results from production of defect part or service before delivery* (e.g. scrap, rework)
- **External costs** – *costs that occur after delivery of defective parts or service (e.g. loss of customer, warranty, rework of return goods).*

• PAF examples:

• **Internal Failure**

- Rework
- Scrap
- Obsolescence
- Downtime
- Sub-contractor Faults
- Replacement
- Defect/Failure Analysis
- Re-inspection and re-testing
- Accidents
- Improper Invoicing

• **External Failure**

- Complaints
- Warranty Claim
- Returned Products
- Concessions
- Loss of Sale
- Product Liability
- Extended Warranty
- Product Recall
- Overdue Accounts Receivables

- **Quality - Costs relationship**
- Increased prevention costs lead to decreased failure costs
- Improved quality leads to increased sales and market share
- Quality improvement at the design stage
- Higher quality products can command higher prices

Lean manufacturing is one of the total quality management tools (TQM)

What is Lean Manufacturing?

- ***A systematic approach to the identification and elimination all forms of waste from the value stream.***
- **"Lean" is not an acronym**
 - It means to do more with less waste
- **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**

What is Lean purpose?

- **The purpose of lean is to remove all forms of waste from the value stream.**
 - Waste includes cycle time, labor, materials, and energy

Benefits of Lean Manufacturing

- (1) Lower production cost → higher profits and wages**
 - Cost avoidance flows directly to the bottom line.
- (2) Supports ISO 14001 and "green" manufacturing**
 - Reduction of material waste and associated disposal costs → higher profits
- (3) Shorter cycle times: make-to-order vs. make-to-stock**

Toyota Production System (TPS)

Definitions of Waste

1. Overproduction
2. Waiting, including time in queue
3. Transportation (between workstations, or between supplier and customer)
4. Non-value-adding activities
5. Inventory
6. Waste motion
7. Cost of poor quality: scrap, rework, and inspection

Waiting as a Form of Waste

- Of the total cycle time or lead time, how much involves value-adding work?
 - How much consists of waiting?

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

- Value Stream Analysis
- 6S
- Cells
- Standard Work
- Rapid Improvement Events
- Gimba Kazen
- Just in Time (JIT)

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

➤ **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, takt 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

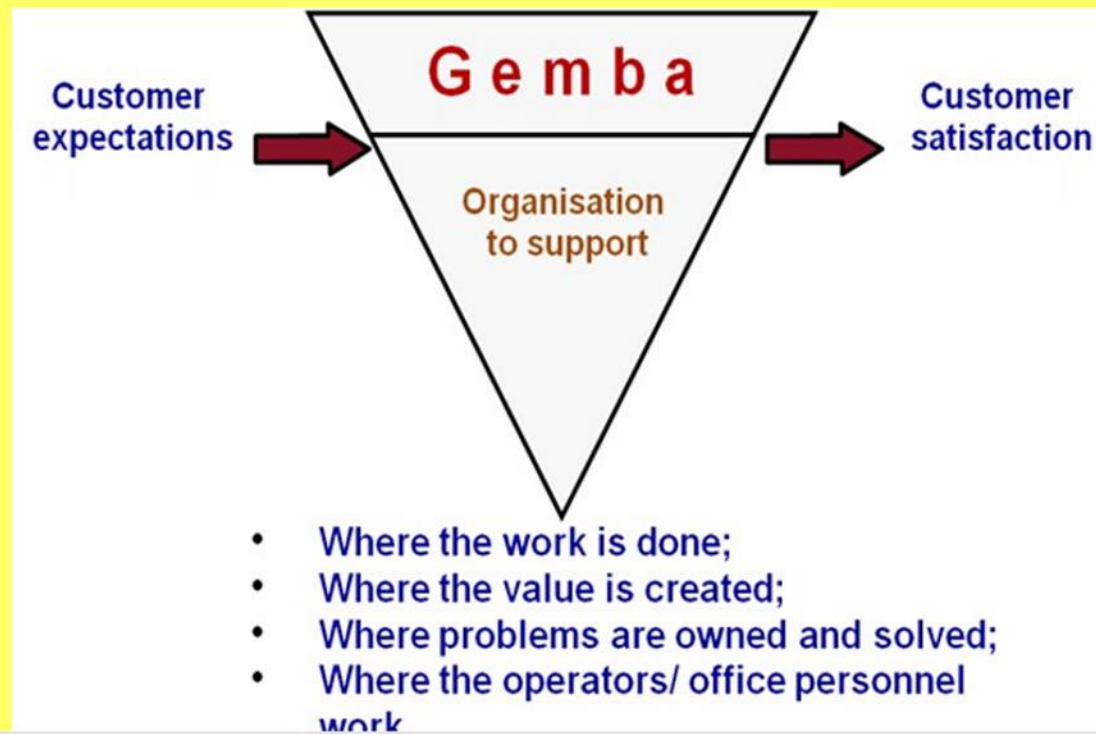
Rapid Improvement Events

- 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

Gemba Kaizen

- Gemba Kaizen as a Low Cost Approach to Management
- Managers today often seek to apply sophisticated technology and tools to problems they could solve with simple common sense
- Gemba Kaizen shows how to apply common sense to make spectacular improvements in company performance
- Significant gains can be generated by making many incremental improvements to working processes at very low cost and risk for the company
- Performance gains require closer contact between management and production sites.

Gemba Kaizen



Just in Time (JIT)

- JIT manufacturing is a coordinated production system that enables the right quantities of parts to arrive when/where they are needed.
- Key elements of JIT manufacturing are the pull system and kanban production, small lot sizes and quick setups, uniform plant loading, flexible resources, and streamlined layout.

Summary:

Lean

Lean :A philosophy based on Toyota Production System that aimed at reducing the time from order to delivery by eliminating waste & non value adding activities, A culture of continuous improvement .

Lean Principles:

1-Provide customers with required value, quality and quantity on time

2-identify value from the customer view, map current activities

3-make the value flow (Value stream map), **Pull** from the supplier and perfect continuously

4-Sets up a waste elimination culture trying to be perfect.

It Focuses on:

- Waste elimination & non value adding activities
- improving the speed of production & its efficiency

It considers INVENTORY as a kind of waste so it adopts JIT.

Seven types of waste:

over-production, waiting, transportation, inappropriate processing, inventory, unnecessary motions and defects .

so, **The five key principles of the lean organization are:**

- (1) Identify value (from the point of the customer).
- (2) Measure the value stream.
- (3) Pull on customer demand.
- (4) Create flow.
- (5) Achieve perfection

The lean production principles (3) and (4) are embedded or included in **Total Quality Management** theories, principles and tools .

Briefly, lean is about controlling the resources in accordance with the customers' needs and to reduce unnecessary waste (including the waste of time).

Lean concept : “A systematic approach to identify and eliminate waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection”

Methodologies and tools:

Lean principles are fundamentally customer value driven, which makes them appropriate for many manufacturing and distribution situations.

Five basic principles of lean manufacturing are generally acknowledged:

- (1) Understanding customer value. Only what the customers perceive as value is important.
- (2) Value stream analysis. Having understood the value for the customers, the next step is to analyze the business processes to determine which ones actually add value. If an action does not add value, it should be modified or eliminated from the process.

(3) Flow. Focus on organizing a continuous flow through the production or supply chain rather than moving commodities in large batches.

(4) Pull. Demand chain management prevents from producing commodities to stock, i.e. customer demand pulls finished products through the system. No work is carried out unless the result of it is required downstream.

(5) Perfection. The elimination of non-value-adding elements (waste) is a process of continuous improvement. “There is no end to reducing time, cost, space , mistakes, and effort”

The main elements contributing to the elimination of non-value-added

activities are the following:

excess production, excess processing, delays, transport, inventory, defects and movement.

A variety of approaches are available for reducing or eliminating waste. These approaches include value stream analysis, total productive maintenance, Kaizen costing and cost analysis, engineering and change management, and document management. Tools used include Kanban cards for pull through the supply chain and the closely related JIT system for inventory reduction.

Effects:

There are many reasons to introduce lean techniques in an organization , as it may contribute substantially to cutting costs and providing competitive advantages.

Lean benefits include reduced work-in-process, increased inventory turns, increased capacity, cycle-time reduction and improved customer satisfaction. These improvement areas include: operational improvements (reduction of lead time, increase in productivity, reduction in work-in-process inventory, etc.), administrative improvements (reduction in order processing errors, streamlining of customer service functions so that customers are no longer placed on hold, etc.) and strategic improvements (reduced costs, etc.).



Thank You