

Chapter 10

Lean Management

“Making Value Flow”

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Virginia Mason Medical Center

- 350-bed hospital located in downtown Seattle.
- Chemotherapy patients spending an entire day receiving their weekly chemotherapy treatment.
- To improve this process, Virginia Mason has turned to the concepts of lean management pioneered by Toyota.

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Virginia Mason Medical Center continued

- Using lean concepts, Virginia Mason completely redesigned the process for chemotherapy patients so that everything flows to the patient as opposed to the patient flowing through the process.
- Lean initiatives have resulted in:
 - Savings of \$6 million in capital spending,
 - Freed up 13,000 square feet,
 - Reduced inventory costs by \$360,000, and
 - Reduced the distance hospital staff walk each day by 34 miles.

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Xerox

- 1980's established Leadership Through Quality Initiative which focused on improving business processes in order to improve customer satisfaction, quality, and productivity.
- Late 1990s and we see Six Sigma and Lean being adopted by Xerox's manufacturing and supply chain functions.

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Xerox continued

- Mid 2002 Xerox's leadership decided to integrate its Lean and Six Sigma programs across the entire enterprise, naming the initiative Xerox Lean Six Sigma.
- Xerox estimates that it achieved an initial \$6 million return in 2003 based on a \$14 million investment in Lean Six Sigma and expects even bigger gains in the years ahead.

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Honeywell International

- A diversified technology company with 2004 sales in excess of \$25 billion.
- Successfully integrated its Six Sigma initiatives with its lean initiatives.
- Honeywell competes in four major industry segments: Aerospace, Automation and Control Solutions, Specialty Materials, and Transportation Systems.

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Valley Baptist Hospital in Harlingen, Texas

- Hospital patient discharge process is often associated with substantial patient dissatisfaction.
- To address the inefficiencies often associated with the patient discharge process, Valley Baptist Hospital utilized Lean, Six Sigma, and change management techniques.

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Valley Baptist Hospital in Harlingen, Texas continued

- One specific goal of this project was to reduce the time from when a patient discharge order was entered into the computer until the time the patient was transported from the room to 45 minutes.
- Process improvement team began by mapping the current patient discharge process.
- The process improvement team developed a new standard operating procedure consisting of six steps for the patient discharge process.
- Mean time to discharge a patient was reduced by 74% from 185 minutes to 48 minutes.

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Lean Thinking

- Five lean principles:
 - Specify value from the customer's point of view.
 - Identify the value stream, the complete set of activities required to create the output valued by the customer.
 - Make value flow through the value stream by eliminating non-value added activities and streamlining the remaining value added steps.
 - Have the customer pull value through the value stream.
 - Pursue perfection.

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History and Philosophy of Lean

- **Lean production** (also known as **synchronous manufacturing** or simply **lean**) is the name given to the Toyota Production System.
- The Toyota system is known for its minimal use of resources and elimination of all forms of waste, including time.
- Just-in-time (JIT) is a substantial portion of the Toyota system.

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Toyota Production System

- Primary tenets:
 - Minimizing waste in all forms.
 - Continually improving processes and systems.
 - Maintaining respect for all workers.

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Traditional Systems vs. Lean

- **Priorities:** With lean, the target market is usually limited and the options are also limited.
- **Product/Service Design:** Engineering in the lean firm designs standard outputs and incrementally improves each design.
- **Capacity:** Excess capacities are kept to a minimum to avoid inherent waste, particularly the WIP inventories.

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Traditional Systems vs. Lean continued

- **Layout:** With lean, equipment is moved as close together as possible so that parts can be actually handed from one worker or machine to the next.
- **Workforce:** Lean strives for a broadly skilled, flexible worker who will look for and solve production problems wherever they appear.

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Traditional Systems vs. Lean continued

- **Inventories:** In Japan, inventory is seen as an evil in itself. It is a resource sitting idle, wasting money. Reduce the inventories until inventory investment is practically gone. The result is a greatly improved and smoother production system.

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Traditional Systems vs. Lean continued

- **Suppliers:** With lean, the desire is for frequent, smooth deliveries of small lots with the supplier considered part of the team.
- There is no incoming inspection of the materials to check their quality—all parts must be of specified quality and guaranteed by the supplier.

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Traditional Systems vs. Lean continued

- **Planning and Control:** In the lean approach, the focus is on control. Thus, procedures are kept simple, visual, and made as routine as possible. Rather than planning and forecasting for an uncertain future, the firm attempts to respond to what actually happens in real time with flexible, quick operations.

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Traditional Systems vs. Lean continued

- **Quality:** The traditional approach to quality is to inspect the goods at critical points in the production system to weed out bad items and correct the system. With lean, the goal is zero defects and perfect quality.

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Traditional Systems vs. Lean continued

- **Maintenance:** In the traditional approach to production, maintenance has been what is termed **corrective maintenance**, although **preventive maintenance** is also common. In lean organizations, the maintenance function assumes greater responsibility and has greater visibility.
- The lean enterprise relies much more heavily on the operator for many of the maintenance tasks, especially simple preventive maintenance.

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Specify Value

- At the heart of lean is the concept of value. Another common definition of value is that it is the opposite of waste.
- Waste is often classified into one of the following seven categories:
 - *Overproduction*
 - *Inventory*
 - *Waiting*
 - *Unnecessary transport*
 - *Unnecessary processing*
 - *Unnecessary human motions*
 - *Defects*

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Identify the Value Stream

- The value stream includes all activities (value added and non-value added) from the creation of the raw materials to the final delivery of the output to the end consumer.
- Activities within a value stream map are often broadly categorized as:
 - Value-added (e.g., patient diagnosis)
 - Non-value-added but necessary (e.g., requiring patients to sign a HIPAA form)
 - Non-value-added and not necessary (e.g., waiting for the doctor)

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Make Value Flow

- Having identified the value stream, the next step is to transform it from the traditional batch and wait approach to one where the flow is continuous.
- A key aspect to achieving such a smooth flow is to master-schedule small lots of final products.

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Continuous Flow Manufacturing (CFM)

- According to this tenet, work should flow through the process without interruption one unit at a time based on the customer's demand rate.
- Delays associated with setting up equipment, moving work between departments, storing work because a needed resource is unavailable, equipment breakdowns, and so on must be eliminated.

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The Theory of Constraints

- A systematic way to view and analyze process flows.
- Key aspects of the theory of constraints (TOC) include identifying the bottlenecks in the process and balancing the work flows in the system.

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The Theory of Constraints continued

- The following ten guidelines capture the essence of the theory:
 - Flows rather than capacities should be balanced throughout the shop.
 - Fluctuations in a tightly connected, sequence-dependent system add to each other rather than averaging out.
 - Utilization of a non-bottleneck is determined by other constraints in the system, such as bottlenecks.
 - Utilizing a workstation (producing when material is not yet needed) is not the same as activation.

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The Theory of Constraints continued

- An hour lost at a bottleneck is an hour lost for the whole shop.
- An hour saved at a non-bottleneck is a mirage.
- Bottlenecks govern shop throughput and work-in-process inventories.
- The transfer batch need not be the same size as the process batch.
- The size of the process batch should be variable, not fixed
- A shop schedule should be set by examining all the shop constraints simultaneously.

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Implementing the Theory of Constraints

- *Identify the system's constraints).*
- *Exploit the constraint.*
- *Subordinate all else to the constraint.*
- *Elevate the constraint.*
- *If the constraint is no longer a bottleneck, find the next constraint and repeat the steps.*

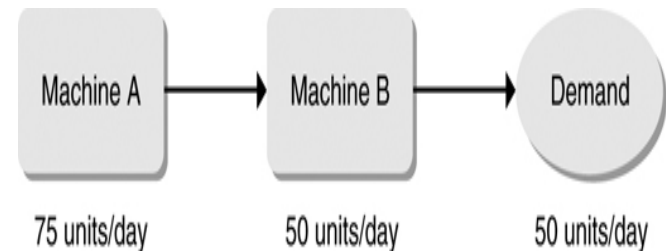
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Pull Value Through the Value Stream

- A way to capitalize on the increasing strategic importance of fast response to the customer is to minimize all the lead times.
- As opposed to the MRP approach of “pushing” materials through a plant, lean enterprises rely on **pull systems** whereby actual customer demand drives the production process.
- A pull system is a control-based system that signals the requirement for parts as they are needed in reality.

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Sequential Production System



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[Pursue Perfection]

- Five commonly used tools lean organizations turn to in their pursuit of perfection:
 - 5S
 - the visual factory
 - kaizen
 - poka yoke
 - total productive maintenance

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[5 S]

- *Sort*
- *Straighten (Set in order)*
- *Scrub (Shine)*
- *Systemize*
- *Standardize (Sustain)*

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[The Visual Factory]

- The objectives of the visual factory are to help make problems visible, help employees stay up to date on current operating conditions, and to communicate process improvement goals.
- With the visual factory, problems can be made visible through the use of charts displayed throughout the workplace that plot trends related to quality, on time delivery performance, safety, machine downtime, productivity, and so on.

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[Kaizen, Poka Yoke]

- Kaizen translates into continuous improvement.
- Goal of poka yoke is to mistake-proof work activities in a way that prevents errors from being committed in the first place.

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Total Productive Maintenance (TPM)

- Equipment impacts waste in a number of ways including:
 - Breakdowns
 - Setups
 - Stoppages
 - Reduce speed
 - Yields

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Total Productive Maintenance (TPM) continued

- Key components of a TPM program include:
 - Identifying ways to maximize equipment effectiveness.
 - Coordinating the work of engineering, operations, and maintenance employees.
 - Giving employees the responsibility to maintain the equipment they operate.

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Benefits of Lean

- Five primary types of benefits:
 - *Cost savings*
 - *Revenue increases*
 - *Investment savings*
 - *Workforce improvements*
 - *Uncovering problems*

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