

Lean Thinking is not a Fad Diet

By *Dennis Sowards*

When Charles asked me to write an article about Lean, I wondered how I could add something new to the field. It seems that everyone is writing about Lean, in fact it may be that more is written about Lean than is currently known! For those already familiar with Lean I hope this may be a good refresher and for those not yet familiar I intend that this will be a useful introduction. I am writing this in a conversational form using questions and answers. Since it is really a one-way conversation, hopefully the questions are representative of what you might ask.

Q: What is Lean?

A: Lean is giving the customer increased value and eliminating waste. Lean is about only providing what the customer needs and delivering the product or service (almost) instantly. Lean is about driving out waste. In fact, waste is defined as the opposite of value, as *anything that does not add value to the customer*.

Q: What is Value?

A: Value is what the customer is actually willing to pay for. The economist defines value as the ratio of usefulness (to the customer) to the cost. Value includes the product's functions and features and relates to the whole product and/or service. Cost includes the price paid and the cost in terms of time and hassle in obtaining and using the product/service. In today's fast-paced world, customers often place greater value on experiencing less hassle than on price. Jim Womack, author of *Lean Thinking* and creator of the term "Lean" defines value as:

Solving my need or problem completely

Not wasting my time

Providing exactly: What I want; When I want it; and Where I want it!

Q: What is Waste?

A: Waste is anything that does not add value! A Lean company views the waste and non-value-added activities from the customer's perspective and is dedicated to driving out waste. The seven basic kinds of waste are:

- **Waste of Defects:** This is work that contains errors or rework or does not function as designed or intended. Misunderstanding the customer's requirements or expectations can cause defective waste. This waste often stems from lack of having and using standard processes.
- **Waste of Transportation of Goods:** This is the movement of material or goods. Though necessary, any movement of a product does not usually add value. Only if one fabricates or changes the product while transporting it does it add value. Sometimes during transporting, damage occurs causing more waste. This type of waste is caused by poor work area layout, by lack of an organized system for materials placement or staging, by poor logistics planning and/or by receiving material too early to use.
- **Waste of Over-Production:** Producing more than the customer needs or more than is needed at that time is waste. Examples include fabricating material to keep the plant or shop busy or based on a sales forecast, stockpiles in the warehouse or printing more marketing report copies than needed.
- **Waste of Waiting by Employees or Equipment:** This is waiting for processes, crews or equipment

to finish work or for an upstream activity to be completed. Examples are idle time in which workers are waiting for instruction or materials, a machine waiting for material or when payroll is waiting for late time sheets. Waiting is caused by poor communication between the operations, support functions and/or suppliers. It also happens when people are unsure what is to be done; and/or because of poor coordination between functions.

- **Waste in Over-Processing:** Unnecessary or extra steps in the process or any steps that do not create value from the customer's viewpoint are waste. Over-processing includes writing too many purchase orders, over-engineering, multiple handling of timesheets, too many approval signatures, duplicate entry on a form or in data-entry fields, inspections, and getting double and triple estimates from suppliers. Over-processing is caused by a lack of standard methods, over control, poor communication or poor planning. Waste often occurs when a process slowly changes over time and no regular examination is conducted to assess whether the process meets current requirements.
- **Waste of Motion:** Movement of people that does not add value such as treasure hunts by operations workers looking for tools, material or information; or searches in the office for contracts, files or vendor catalogues. Waste in motion may occur when an operator has to reach for a tool, part or material that is outside his or her strike zone. Waste of motion is caused by poor planning and organization, poor ergonomic design of the work area and/or by a lack of standard methods.
- **Waste of inventory:** Any material or parts not being used by the customer is waste. This includes raw material, work in process and final production. This type of waste includes parts, excess space and unused tools, copies and reports. Stashes and personal stockpiles are waste, too. While inventory may be needed to ensure that the work is performed in a timely manner, it is still waste. Inventory is an especially costly and usually overlooked as waste. Accounting even calls it an asset, but it is waste. It ties up working capital and space, requires controls to ensure security, must be continually monitored and leads to additional handling.

Companies have traditionally accumulated inventory because of unreliable support from suppliers or delivery function or because of breakdowns in the production process. Inventory is especially bad because it often hides other problems.

Two other types of waste that have more recently been identified are:

- **The waste of Not Being Used or Not Meeting the Customer's Needs:** This includes designs, products and reports that may be perfectly sound and functioning but do not meet the need defined by the customer.
- **Waste of Not Utilizing Human Talent and Knowledge:** Not asking for, involving, following up and/or implementing the ideas and suggestions of employees is waste. The front-line workers are closest to the action and see more problems than managers may ever identify. Waste results when workers' ideas are ignored. Waste happens when operations supervision is not involved in reviewing design drawings for manufacturability. Waste also occurs when lessons learned and best practices are not shared or replicated from one project or work team to another or across the company.

The Japanese call waste "Muda," an ugly sounding word in English and Japanese. Lean champions are waste-busters.

Q: Why do Lean?

A: Companies implementing Lean have seen improvements in the following areas:

- **Manufacturing Lead Time** - less than 1 day

- Delivered Quality – 3 PPM (Parts Per Million so 3 PPM means three defective parts in a million parts - this is operating at a Six SIGMA level)
- Delivery Performance – 99+%
- Inventory Turns – Greater than 50 turns per year
- Conversion Costs (materials to finished goods) - 25 – 40% less than mass producers
- Manufacturing space - reduced 35 – 50% less than mass producers
- New product development – less than 6 months

(Source: Henderson, Bruce A. and Larco, George L. Lean Transformation)

Q: What does Lean look like?

A: While the application of Lean would vary for each organization, here are some basic characteristics:

- Fast, uninterrupted flow of work
- Elimination of waste
- Flexible planning process effective responding to changes
- Design process supports the “Pull”
- Low inventories and no stashes of materials
- Frequent replenishment of materials
- Safe work environments
- Empowered and engaged workers
- Organized plants, shops and offices
- Rapid response to problems
- Employees understand and live the purpose for the company

Q: Where did Lean come from?

A: The Lean principles and techniques were mostly developed and refined by Toyota and are sometimes called *Kaizen* or the *Toyota Production System (TPS)*. Most leaders give Toyota’s Taiichi Ohno the credit for developing the Lean approach. Some have credited mistakenly Fredrick Taylor. While Fredrick Taylor is credited with the principles of Scientific Management, Taiichi Ohno gives Henry Ford credit for the initial ideas of Lean. Ford did not want to be associated with Taylor’s works. Their ideas are very different. Taylor taught that there is one right way to do each job - say shovel dirt and that the worker should do it that way and nothing else. In Taylor’s world, the worker was not to think or try new ways. Ford would determine the right place to put the dirt first. Ford and subsequently Ohno encouraged workers to be involved in finding efficiencies.

The Lean approach grew out of many years of trial and testing to continuously improve methods and results. Ideas and techniques still are being refined and advanced. Regardless of its origin, American and international manufacturers have embraced Lean and achieved remarkable results.

Peter Drucker, the father of modern-day management thinking said:

“What has changed Manufacturing, and sharply pushed up productivity, are new concepts. Information and automation are less important than new theories of manufacturing, which are an advance comparable to the arrival of mass production 80 years ago. Indeed, some of these theories, such as Toyota’s “lean manufacturing”, do away with robots, computers and automation.” (Drucker, Peter. “The Economist,” page 12, November 3, 2001)

Q: Is Lean TQM or Six Sigma?

A: *Lean or Lean Thinking* is focusing on delivering value (as seen by the customer) and eliminating waste. Lean is not *Total Quality Management* (TQM) but is one approach of continuous improvement, which is an element of TQM. Lean is not *Six Sigma*. Lean focuses on driving out waste in the process and reducing cycle time. Six Sigma focuses on measurable problem solving to make the process capable. Some companies are now practicing what is called *Lean – Six Sigma*. Six Sigma methods are used to solve problems that surfaced in Lean activities.

Q: Most recently, much is being said that American automobile manufacturers are still losing to Toyota even though they are doing Lean?

A: It took a long time for the big three Auto makers in the US to quit blaming trade barriers, difference in wages and unions on why they were losing market share to Japan. In the last ten years they have been very serious in applying Lean techniques to their operations. They have seen great success. But they have missed the point that Lean is more than techniques, it is a set of principles, a way of thinking and doing work. Lean has had a mixed bag of success around the world with other industries as well. The techniques do work and help improve a company’s processes but without the principles being understood and lived the success will not be sustained.

Q: What are these Lean Principles?

A: Different people have described them in many ways. I like how Jeffrey K. Liker describes them in his book *The Toyota Way*:

- Base management decisions on a long-term philosophy, even at the expense of short-term financial goals.
- Create continuous process flow to bring problems to the surface.
- Use “pull” systems to avoid overproduction.
- Level out the workload.
- Build a culture of stopping to fix problems, to get quality right the first time.
- Standardize tasks.
- Use visual control so no problems are hidden.
- Use only reliable, thoroughly tested technology that serves your people and processes.

- Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others.
- Develop exceptional people and teams who follow your company's philosophy.
- Respect your extended network of partners and suppliers by challenging them and helping them improve.
- Go and see for yourself to thoroughly understand the situation.
- Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly.
- Become a learning organization through relentless reflections and continuous improvement (Kaizen).

Q: What are the tools and techniques of Lean?

A: Lean tools and techniques are still being developed to meet the intent of providing value and eliminating waste so a complete list is not possible. Here are the more proven ones:

5S's: The 5S's came from Toyota. The 5S's are used to organize and visually control the workplace to eliminate waste. The 5S's are *Sorting, Simplifying, Sweeping, Standardizing* and *Self-Discipline*.

Heijunka – Leveling the production over a set period of time.

Just-in-Time (JIT): A system for producing or delivering the right amount of parts or product at the time it is needed.

Kaizen Event: A quick-hit method for Lean process improvement. It typically consists of several days of intense training combined with immediate application of the concepts just taught to identify and eliminate waste in a specific work area.

Kanban: Japanese term meaning “a signboard.” A communication tool used in JIT production systems. The signal tells workers to pull parts or refill material to a certain quantity used in production.

Last Planner System (LPS): The Last Planner System is a Lean tool developed by the Lean Construction Institute and is a Lean application to project management. The LPS approach routinely gets better results than traditional project management – 30% better as a median (Koskela, Lauri and Howell, Greg, “The Theory of Project Management: Explanation of Novel Methods,” Proceedings IGLC – 10, Aug. 2002. Gramado, Brazil.).

Poka-Yoke: A mistake-proofing method or device developed by Shigeo Shingo that is used to prevent an error or defect from happening or being passed on to the next operation.

Root-Cause Analysis: A systematic method of analyzing possible causes to determine the root cause of a problem.

Rules of Release: Lean concentrates on the hand-offs between operations. Rules of Release are established to ensure the hand-offs are done right the first time.

Set up Time Reduction: A process of changing production machines and equipment to run a different part. Sometimes called Single Minute Exchange of Die (SMED). ‘Single minute’ is in reference to the target of reducing the times to a single digit (less than 10 minutes).

Spaghetti Chart: A physical map of the work area that shows the path taken by the specific product or a person being observed. A line is drawn from start to end indicating the path moved by the product or person.

Standards: The set defined way to do the job. As used in this context it is assumed to be the best way to do the job or task.

Total Preventive Maintenance: (TMP): Pioneered by Nippondenso, a member of the Toyota team that developed many of the Lean techniques, TMP is a set of methods used to ensure production equipment is always working properly and does not stop production. Many manufacturing companies have applied TMP with great success, but this research did not find any applications in construction.

Takt Time: The time required to produce a piece of product ordered by the customer that is calculated by dividing the total production time by the number of units ordered. Takt is the German word for musical meter and the takt time is the drumbeat of production.

Value Stream Mapping: Includes all the processes, activities and information used to design, produce and deliver the product or service to the customer. A special value stream flowchart is developed to identify all the activities, operations, steps and work times for a process. Steps are classified into value added and non-value added.

Visual Control: Sometimes called transparency, *visual control* is the displaying of tools, schedules and performance reports in full view of front-line workers so everyone can see the status of work and their unit's performance. Visual control also includes marking the locations of equipment, tools, inventory parts, disposal cans, cabinets, etc., so that everyone knows where everything belongs. Using visual control helps eliminate waste and is a valuable part of any 5S's effort

Q: Does it really matter if I do Lean?

A: In industry after industry, the companies who have applied Lean correctly become and stay the industry leaders. The rest become second-string players or go out of business. This is being played out in the auto industry right before our eyes. How many plants can Ford or GM close down before they cease to be in the automobile manufacturing business? One does not have to do Lean or make any improvement efforts. As Dr. Deming said "Survival is not mandatory!"

Q: Where can I learn more about Lean?

A: Good Web sites are

- Lean Construction: www.leanconstruction.com
- Lean Thinking: www.lean.org
- Learning about Lean: www.joelylean.blogspot.com
- Lean Ideas on the Web: www.productivityinc.com
- Poke Yoke - www.Shingoprize.org

Books & Articles:

- **The Gold Mine** by Freddy Valle and Michael Balle, Lean Enterprise Institute, 2005
- **Lean Production Principles**, by Dennis Sowards, New Horizons Foundation, 2004

- **Lean Thinking** by James P. Womack and Daniel T. Jones, Simon & Schuster, New York, NY 1996. www.Lean.org
- **Lean Solutions** by James P. Womack and Daniel T. Jones, Free Press, 2005. www.Lean.org
- **5 Pillars of the Visual Workplace** by Hiroyuki Hirano, Productivity, Inc. Portland, OR, (1-800-394-6868) www.productivityinc.com
- **Gemba Kaizen**, by Masaaki Imai, McGraw-Hill, New York, NY, 1997
- **All I need to Know about Manufacturing I Learned in Joe's Garage** by William B. Miller and Vicki L. Schenik, Bayrock Press, 2000. (208-376-2266)
- **Lean Transformation** by Bruce A. Henderson & Jorge L. Larco, The Oaklea Press, Richmond, VA, 1999. www.oakleapress.com/pd_lean.cfm
- **The Toyota Way** by Jeffrey K. Liker, McGraw-Hill, 2004.

Some articles I have written include:

- ***Waste is Everywhere but isn't Inevitable. Part 1*** - Contractor Magazine - Dec. 2005, ***Part 2*** - Jan. 2006
- ***Lean Production Principles*** - New Horizon Foundation, 2004
www.newhorizonsfoundation.org
- ***Is Inventory the root of all evil?*** - Contractor Magazine - Sept. 2004
- ***5S's that would make any CEO Happy*** - Contractor Magazine - June 2004

Lean is a powerful approach to improving but must be done with an improvement culture already in place. Just doing some of the tools of Lean is much like companies who tried to do some aspects of TQM. They really did **PQM** or Partial Quality Management and failed.