

Big Three – Understanding Lean vs. 6 Sigma vs. TOC - Sharpening your Saw

Comparing improvement practices can be confusing. Too many people seem to want to make it complicated and complex. Far better to keep it basic, fundamental, and simple. It's good to relate business to real life examples.

M. of the management literature originally focused tightly on productivity and labor which is generally the smallest element of business cost. According to Taylor, Scientific Management, Labor should adhere to Management guidance, (management knows best), and focused mostly on productivity.

Six Sigma has been around for decades, based on TQM, founded in process and control charting to measure variation according to Shewhart at the turn of 1900s.

LEAN has introduced the additional focus of flow to increase velocity by reducing waste and reducing materials in process. Waste comes in many forms, sometimes resulting from poor quality with high variation.

TOC, Theory of Constraints was the first to focus on imbalances rather than balancing of resources, which are not always possible.

A major problem in industry has been the training and consulting that has added layers of confusion and competing priorities about what these are designed to accomplish and why that is important. People are generally confused as to what tools to use.

A word about **Continuous Process Improvement** generally to preface our study. Going back to early Six Sigma converts, the main driver has been aimed at Cost Reduction. This is primarily an internally focused metric to drive profitability. This approach tends to focus on making a given process better, to reduce its internal cost, while LEAN would first ask, why do we have that process at all? Does it add value to the end result?

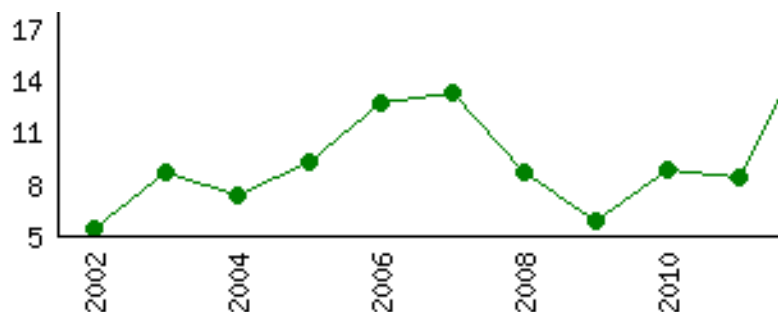
Case study – Seagate and Maxtor, 2006. Cost Reduction as the driver vs Reducing Waste.

The Cost Reduction Project is expected to cost \$90M over 3 years and generate savings of \$120M. Take down head count by 10% and reduce remaining salaries by 10%.

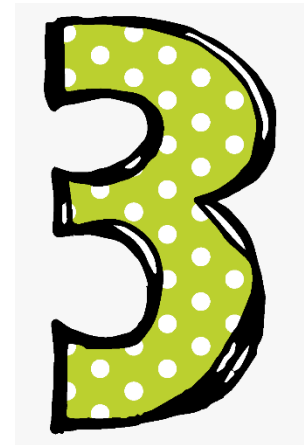


Seagate to cut 187 jobs in Longmont.d

One might ask, did this make things better for customers, shareholders, employees, and the community? Stock price here.

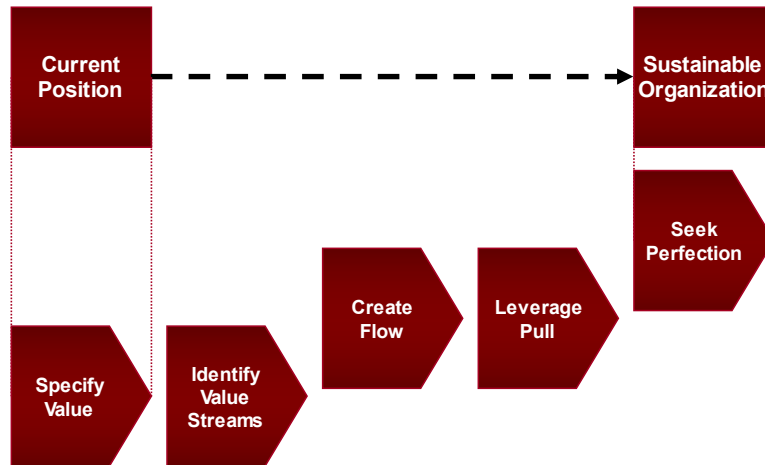


Lean



Define Value – Identify Value Stream – Create Flow – Leverage Pull – Seek Perfection

5 Principles of Lean



Edward Deming, proponent of Shewhart and Juran, Quality Control gurus, supporting Japan immediately after WWII, helped frame efforts to help Japan recover from the war. Taiichi Ohno, Toyota Production System was most interested in reducing costs pursuing efficiency by removing WASTE using PDCA, Plan – Do – Check - Act. They had to make Toyota competitive quickly.

TPS – Toyota Production System - House of TPS, later named LEAN.

Foundation of Heijunka, Standard Work, Kaizen. Supports JIT and Jidoka. Production focused. Now expanded to ANY process.

Necessary to understand “Standard work.” Takt Time, Work Sequence and Standard work IN Process. One best way to perform a task, assuring exact quantities in JIT process.

Muda – Any activity consuming resources that are not adding value for the customer.

Mura – Unevenness, i.e., sales promotion that unevenly loads demand onto factory trying to smooth production for efficiency and cost savings.

Muri – Overburdening, i.e. accepting new orders inside lead time just before the deadline to deliver.

Womack/Jones, 1996

Six Sigma

DMAIC, Define – Measure – Analyze – Improve – Control



Defining scope of project, measuring data to understand variation to identify root causes, that helped focus possible countermeasures, and to control better.

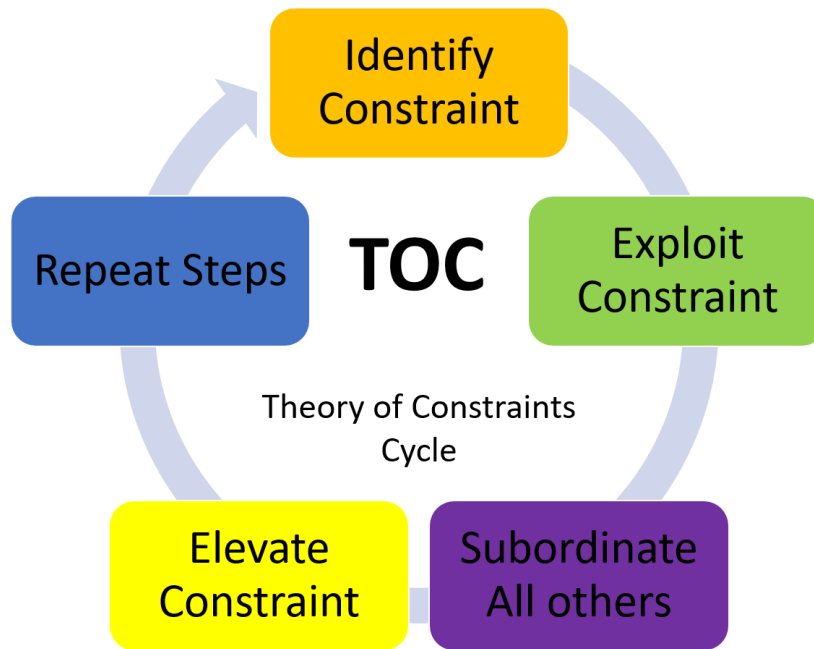
Statistical Process Control, a system of statistical tools focused on eliminating defects and reducing process variability. 3.4 defects per million opportunities is sometimes the target.

Requires significant commitment to training and technical expertise to be effective.

Edward Deming using PDCA and control charting, Demings 14 points of management to assist Japan rebuild.

TOC

Identify the constraint – Exploit the constraint – Subordinate everything to the constraint – Elevate, or increase capacity of constraint – follow/manage the constraint.



Side by side comparison.

Theory	Lean	Six Sigma	TOC
Objective	Reduce Waste	Reduce Variation	Manage Constraints
Process	PDCA	DMAIC	TOC 6 steps
Focus	Flow & Waste Reduction	Problem Solving	System Constraints - optimizing throughput
Primary Effect	Reduce Lead Time, Defects, Costs	Reduce Variation	Fast Throughput
Characteristics	Philosophy, Principles & Tools	Statistical Problem-Solving Tool	Theory
Criticisms	Difficult to emulate Toyota	Inappropriate use of Six Sigma in many cases	Borrows concepts from other operations theories

There is a primary discussion around LEAN and Six Sigma before we add TCO.

LEAN or Six Sigma – applied as designed might be described as this: Doing things right (Six Sigma) vs Doing the Right Things (LEAN). Lean requires incredible amounts of discipline to implement and maintain. Six Sigma is far more difficult to learn and apply correctly. Many practitioners DO process improvement using LEAN techniques but call it Six Sigma. We also have the combined approach called LEAN Six Sigma. And TOC is essentially a repackaging of many other practices where we focus on LEAN and Six Sigma to optimize throughput, very similar to LEAN Flow but not exactly the same.

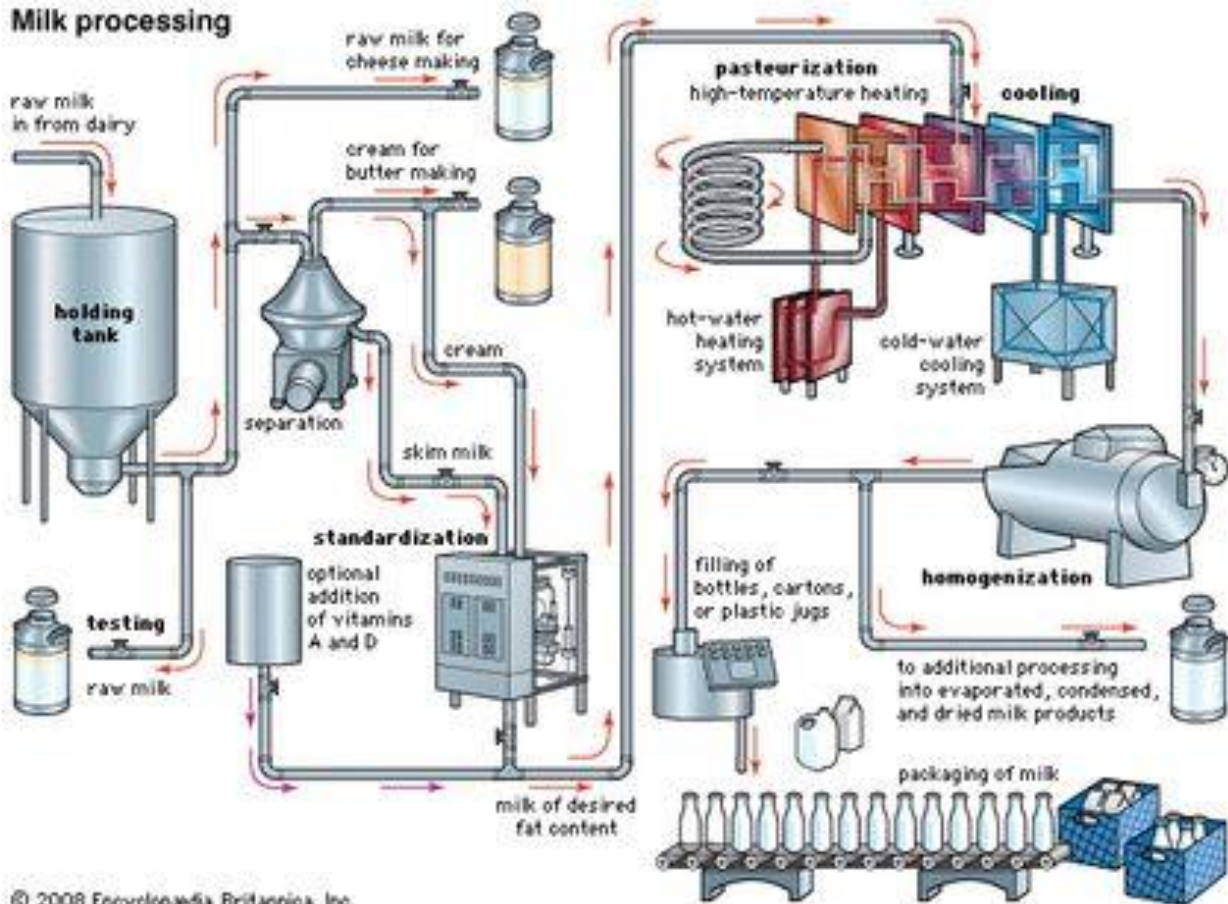
Tools to be applied under each approach.

Theory	LEAN	Six Sigma	TOC
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Common Tools			
	<ul style="list-style-type: none"> • Value Stream Mapping • Process Mapping • 5S • Kaizen • 5 Why? • PDCA • Problem Solving • A3 countermeasures • CEDAC Problem Solving • Visual Management • Standard Work • Kanban/Heijunka • Jidoka • Poka-yoke • Single Minute Exchange of Dies • Total Productive Maintenance • Cell Design • Production Preparation • Value Engineering • New Product Development • Concurrent Engineering 	<ul style="list-style-type: none"> • Process Mapping • Fishbone Diagram • Design of Experiments • Statistical Process Control • Design Interrelationship • Quality Function Deployment • Failure Mode Effect Analysis • Problem Solving • Input/Process/Output Diagrams • Cost of Poor Quality • Regression Analysis • Measurement Systems Analysis 	<ul style="list-style-type: none"> • Critical Chain Project Management • Current Reality Tree • Future Reality Tree • Prerequisite Tree • Transition Tree • Drum-Buffer-Rope • Conflict Resolution Diagram • Throughput Accounting

Six Sigma and TOC both have a myopic focus, variation, and constraints, which do not allow for flexibility of LEAN for a multitude of types of problems. LEAN is more adaptable to many types and therefore more readily applicable to processes outside the factory where TPS tends to aim in the factory.

TOC and the DBR approach would have you ADD inventory in certain points of a process where LEAN would have you focus on FLOW, to eliminate the need for the buffer. Kanban is visual management that is applied specifically because your process is not capable of single piece flow. This is easier to see in some processes than others. Processing insurance claims in an office would easily be a one-piece flow but a manufacturing process may often require some inventory to “Pull” from in order to support a smoother FLOW with smaller batch quantities.



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Comparing LEAN and TOC, we generally see a lot more detail in a properly done Value Stream Map than you normally would in a TOC TREE. This can be hugely more helpful. Also, TOC has no process like Kaizen to actually execute guidance on developing change.

Case Study - Comparing LEAN and Six Sigma; GE adding new retail credit card customers with a 63 day lead time.

Six Sigma approach was to focus on the work content of the process, several hundred pages of data collected on measuring the process steps, showing how they could reduce work content from 1.5 hours per application to .5 hours per application. The real problem was that the total lead time to complete this process was 63 days. Customers would often not wait 63 days. The LEAN approach used zero Six Sigma or TOC tools and quickly reduced the 63 day lead time to 1 day, immediately generating \$216M new revenue the first year. The Six Sigma approach focused on the wrong element and spending too much time and money on collecting data to improve the work content, which was not strategic in the most important objective, to gain new customers quickly.

The comprehensive approach was to develop the cultural shift that LEAN provides with broad application and use this to drive transformational changes in the overall business.

Summary.

When you need to measure and manage Variation – Use Six Sigma

When you need to manage a Bottleneck/Constraint- USE TOC, but in language of LEAN

When you need to improve Flow, reduce lead time and inventory – Use LEAN

Incorporate Six Sigma as a specific tool in the Process Improvement Toolbox where specific problems are complex requiring sophisticated problem solving with quality related data.

Incorporate TOC tools as part of LEAN Toolbox without the rebranding that TOC tends toward, to minimize confusion in problem solving work.

References.

Mark DeLuzio – 2020 - <https://www.youtube.com/watch?v=Elu8jpcj-7A> 1:47:08 time

Dave Nave – 2002 – embedded pdf file



**B04 4. Comparing
the Big 3.pdf**