Lean Six Sigma: Creating Breakthrough Profit Performance

Alessandro Anzalone, Ph.D
Hillsborough Community College, Brandon Campus

Agenda

1. Introduction
2. The Roadmap to Higher Shareholder Value
3. The Lean Six Sigma Secret
4. The Lean Six Sigma Value Proposition
5. Lean Six Sigma and MRP (Materials Requirements Planning)
6. The Power Is in the Total Process
7. References

Introduction

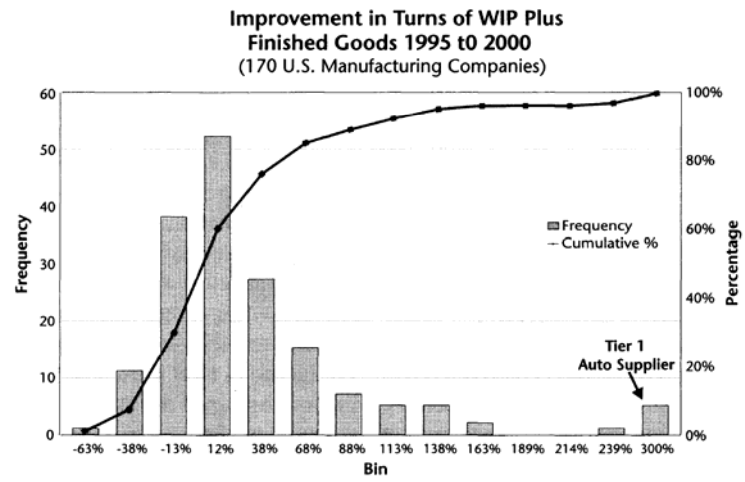


Figure 0-1. Histogram of percent improvement in lead time (170 companies)

Introduction

"It's hard to be aggressive when you don't know who to hit." - Vince Lombardi

The "who to hit" question facing the CEO of the Tier 1 Auto Supplier was what specific improvements should be executed and in what order to achieve these goals? This question is the key breakthrough of Lean Six Sigma that was not, and could not, be understood by those who separately advocated only Lean or only Six Sigma.

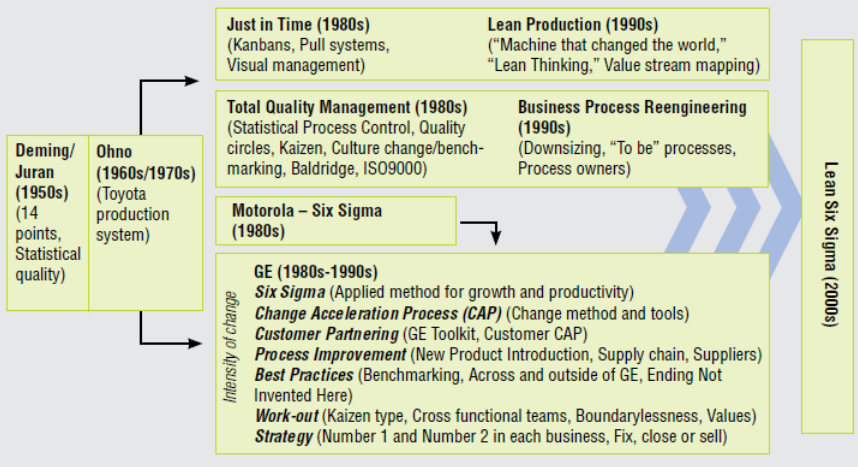
Introduction

The Principle of Lean Six Sigma:

The activities that cause the customer's critical-to-quality issues and create the longest time delays in any process offer the greatest opportunity for improvement in cost, quality, capital, and lead time.

Introduction

FIGURE 2.
Lean Six Sigma builds on the practical lessons learned from previous eras of operational improvement.



Source: IBM Global Business Services analysis.

Introduction

Comparisons of 3.8 Sigma and *Six Sigma* Defect Examples

3.8 Sigma (99% Good)	*Six Sigma* (99.99966% 6σ)
• 200,000 wrong drug prescriptions per year	• 680 wrong prescriptions per year
• 5,000 incorrect surgical operations per week	• 88 incorrect operations per week
• More than 15,000 newborn babies accidentally dropped per year	• 5 newborn babies dropped per year
• 2 short or long landings at major airports per day	• Less than 1 short or long landing every 8 years
• 20,000 articles of mail lost per hour	• 7 articles lost per hour

Introduction

Comparisons of Old (Traditional) and New (Lean *Six Sigma*) Methods

Problem	Old methods	New methods
Design	Product performance	Product producibility
Analysis	Experience based	Data based
Issue	Fixing problems	Preventing problems
Manufacturing/ Molding	Trial & error process	Robust design process
Inventory level	High production quantity	Low production quantity as needed
People	Cost to company	Asset to company
Management	Cost & time	Quality & time
Employee goal	Company	Customer
Product engineering	Little input from customer	High input from customer
Quality focus	Product	Process
Dominant process factors—selection	Apply one factor at a time	Apply design of experiment
Process improvement	Robotic technique	Optimization technique
Proving	Experience based	Statistically based
Company outlook	Short-term plan	Long-term plan
Customer satisfaction	Production at statistical acceptance quality level	Fewer defects, when and what quantity customer wants
External relationship	Price relationship	Long-term relationship
Layout	Functional	Cell type
Production schedules	Forecast	Customer order
Manufacturing cost	Continuously rising	Stable and decreasing

The Roadmap to Higher Shareholder Value

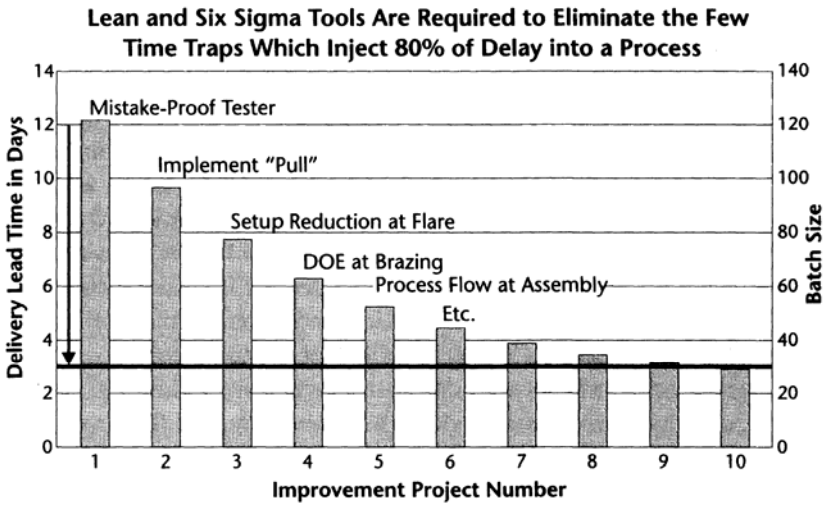


Figure 1-1. The top 10 time traps

The Roadmap to Higher Shareholder Value

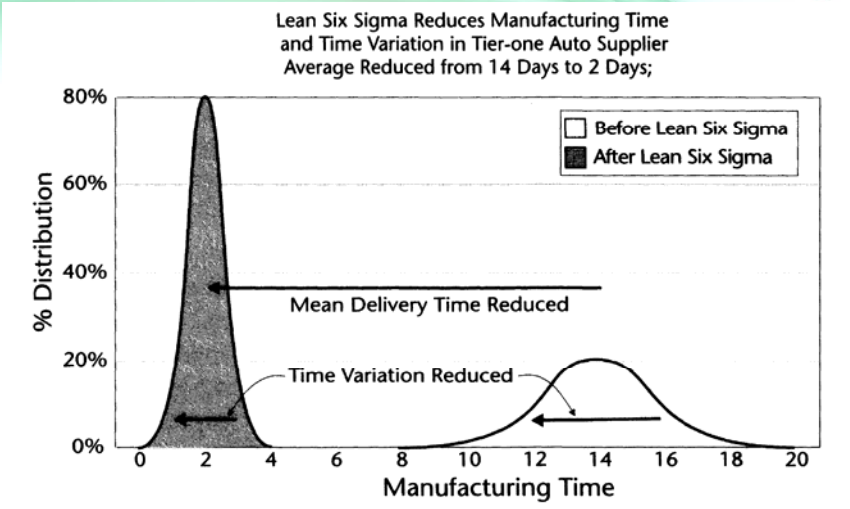


Figure 1-2. Tier-one supplier results from Lean Six Sigma

The Roadmap to Higher Shareholder Value

Lean Six Sigma is a methodology that maximizes shareholder value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed, and invested capital.

The fusion of Lean and Six Sigma is required because:

- Lean cannot bring a process under statistical control.
- Six Sigma alone cannot dramatically improve process speed or reduce invested capital.

The Lean Six Sigma Secret

Most material in a manufacturing process spends 95% of its time waiting . . . waiting for someone to add value to it or waiting in finished goods inventory. . . . By reducing this wait time by 80%, manufacturing overhead and quality cost can be reduced by 20%, in addition to the benefits of proportionally faster delivery and lower inventories.

The Lean Six Sigma Secret

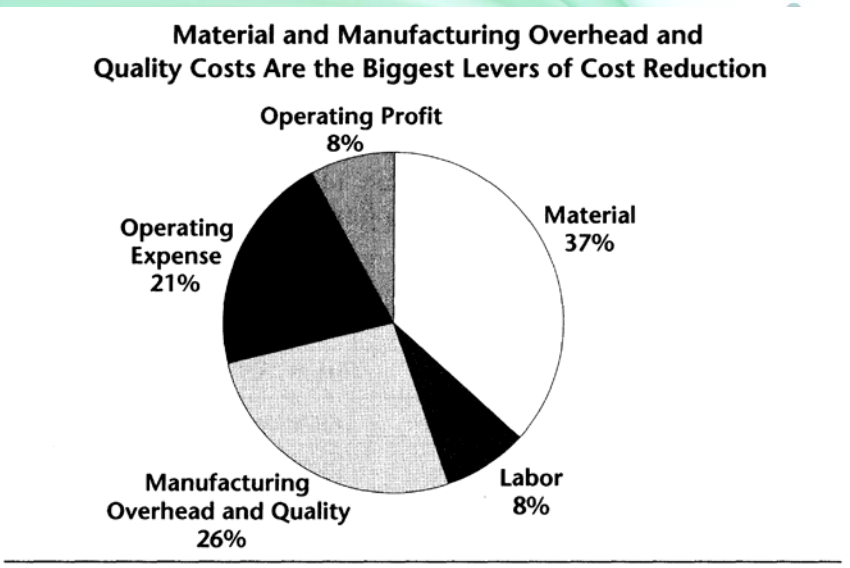


Figure 1-3. The cost levers

The Lean Six Sigma Value Proposition

Ask yourself these questions:

- Do customer value-added activities consume less than 5% of my total process time?
- What competitive advantage would I have if I could deliver in 50%-80% less time?
- What financial benefit would result from a 20% reduction in manufacturing overhead and quality cost?
- What cash infusion/debt reduction would result from a 50%-80% reduction in work in process (WIP) and finished goods inventory?
- What revenue growth would result from reducing delivery time and time-to-market?

The Lean Six Sigma Value Proposition

Operating Margin	from 5.4% to 13.8%
Capital Turnover	from 2.8 to 3.7
ROIC	from 10% to 33%
Enterprise Value	increased 225%
EBITDA	increased 300%
Economic Profit = ROIC % - WACC %	from -2% to 21%
Manufacturing Lead Time	from 14 days to 2 days
Work-in-Process Inventory Turns	from 23 to 67 turns per year
On-Time Delivery	from 80% to > 99.7%
Quality Performance (External CTQ)	from 3σ to 6σ

Table 1-1. Operational and economic benefits of Lean Six Sigma seen by the tier-one supplier

The Lean Six Sigma Value Proposition

	% of Revenue		% Cost Reduction
	Current	Future	
Revenue	100%	100%	
Direct Costs			
Material	30%	28.5%	5%
Labor	10%	10.0%	0%
Overhead & Quality	25%	20.0%	20%
Cost of Goods Sold	65%	58.5%	10%
Gross Profit	35%	41.5%	
General & Administrative	10%	10%	0%
Marketing	10%	10%	0%
Interest			
Other	5%	5%	0%
Operating Profit	**10%**	**16.5%**	

Table 1-2. Lean Six Sigma value proposition

The Lean Six Sigma Value Proposition

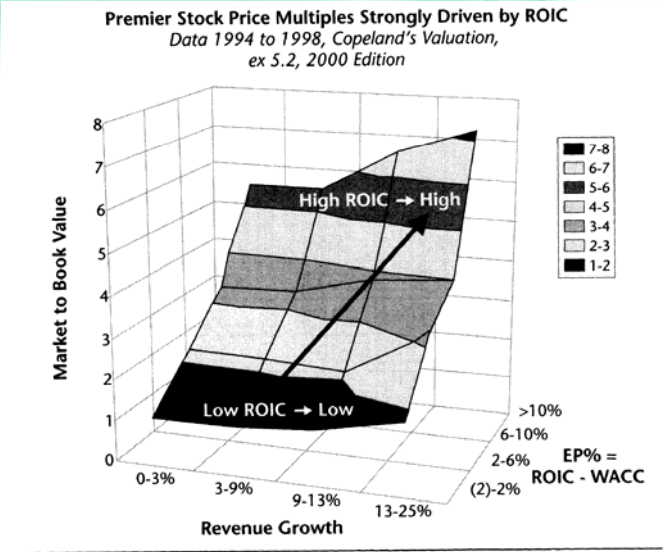


Figure 1-4. The empirical link between ROIC, growth, and stock price: "the value mountain"

The Lean Six Sigma Value Proposition

So how does Lean Six Sigma deliver on its value proposition?

1. Increasing shareholder value requires higher ROTC and growth, both of which roll up into one number: net present value (NPV).
2. Value streams for improvement should be selected based on potential increase in NPV.
3. Once a value stream has been selected, customers' critical-to-quality issues and the time traps (less than 20% of the activities) should yield project ideas.
4. Projects are selected based on the highest rates of return (the benefit-to-effort ratio).
5. The projects are then attacked using the Lean Six Sigma improvement tools.

The Lean Six Sigma Value Proposition

An example of a Six Sigma successes is Motorola Corporation, which increased net income from $2.3 billion in 1978 to $8.3 billion in 1988, using the Six Sigma program. As a result, Motorola received the Malcolm Baldrige National Quality Award by President Reagan in 1988. The award is presented to the industries that become quality role models for others. GE also implemented Six Sigma in the mid-1990s in a fi ve-year program and boosted its profi ts by a substantial amount. By the year 2002 GE had achieved $4 billion in savings per year. Other companies that benefit from Six Sigma are Allied Signal, Inc.; Polaroid Corporation; Asea Brown Boveri Power Transformer Company; and DuPont.

At three sigma the cost of quality is 25 to 40% of sales revenue. At Six Sigma it reduces cost of quality to less than 1% of sales revenue. In fact, Lean Six Sigma is the epitome of quality and should be adopted by all manufacturing companies to remain in business. Therefore, one must change measurement of quality in parts per hundred (percentages) to parts per million. This has changed the makeup and culture of industries that adopted Lean Six Sigma.

Lean Six Sigma and MRP

One reason why Lean Six Sigma can deliver results faster is that it uses data stored in MRP systems to locate time traps and define what kind of improvement is necessary. This gives “eyes” to the improvement process. Many who advocated Lean or Six Sigma separately were somewhat aloof about MRP systems. ERP systems have been criticized by some advocates of Lean because they claim it “pushes” unneeded material into the line, causing congestion and poor flow. Lean Six Sigma makes use of the ERP “order point” to trigger releases from the pull system to prevent congestion. Thus MRP systems are enablers of Lean Six Sigma, which in turn creates a significant return on investment on these systems.

The Power Is in the Total Process

Why do you need Lean Six Sigma? Superior speed, quality and cost are the engines driving productivity and revenue growth and sustained competitive advantage. Because of its speed in reducing process lead times, quality defects, cost, and invested capital, Lean Six Sigma provides common direction from the organizational leaders to managers and employees.

The Power Is in the Total Process

Understanding the Lean Six Sigma value proposition is a prerequisite for understanding what Lean Six Sigma really is and how to use it to greatest advantage. As you'll see in the next three chapters, there are essential cultural structures—such as true management engagement—and tools that are necessary for effective implementation. When these pieces are in place, Lean Six Sigma's relentless pursuit of product quality and process speed leads to corporate success and to personal success for the people who contribute to that journey. In a recent conference, Lockheed Martin summed up current thinking in the title of its presentation: "It's not Lean or Six Sigma, it's not Lean then Six Sigma, it's Lean and Six Sigma."

References

1. Michael George, Lean Six Sigma : Combining Six Sigma Quality with Lean Production Speed, McGraw-Hill, first edition , 2002, ISBN-13: 978-0130176158.
2. http://www.army.mil/ArmyBTKC/focus/cpi/tools3.htm
3. http://www.isixsigma.com/me/lean_manufacturing/
4. http://www-935.ibm.com/services/us/gbs/bus/pdf/g510-6331-01-leansixsigma.pdf
5. http://www.georgegroup.com/
6. http://www.amc.army.mil/pa/leansixsigma.asp
7. Salman Taghizadegan, Essentials of Lean Six Sigma, Elsevier Inc., first edition, 2006, ISBN: 978-0-12-370502-0