Lean Six Sigma Supply Chain Case Study: Breakthrough in Trailer Utilization

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EdNet Lean Educators Conference
Boston MA, April 24-25, 2008

Overview

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Introduction

- **Lean Manufacturing and Six Sigma are powerful philosophies backed by several tools for improving quality, productivity, profitability and market competitiveness for any corporation in a holistic manner.**

Lean

- Lean focuses on eliminating waste and improving flow using various proven methods.

- Lean was initially pioneered by the Toyota Manufacturing Company under the banner of the Toyota Production System (TPS).

Six Sigma

- Six Sigma is focused on reducing process variation using problem solving and statistical tools.

- Six Sigma methods were first perfected by the Motorola Company and deployed with ferocious gusto by Jack Welch while he was the CEO of General Electric.

Need for a Case Study

- Real world examples and hands on experience are invaluable
- May not have access to these resources, thus they can teach only theory and basic examples
- Another solution is the use of case studies
- Case studies can enhance the learning experience by allowing the student a role in a real scenario

Companies expect graduates to be *knowledgeable* in Lean Six Sigma

Instructional Method

Key points for instruction included:

1. **write the case study story in a sequential fashion, telling the story how it happened.**
2. **provide information in the case study story that can be used to complete the tools and simulate the process.**
3. **provide templates for the student to use the tools.**
4. **create an instructor guide with definitions, methods, and examples of the tools.**
5. **provide discussion notes that show completed tools from the case study.**

DMAIC Model for Lean/Six Sigma

Define	Measure	Analyze	Improve	Control
Project Charter Stakeholder Analysis SIPOC Process Map Project Plan Responsibilities Matrix Ground Rules CTS tree	VOC Data collection plan Pareto Chart Histogram Scatter Diagram Process Capability Process Statistics Benchmarking Gauge R&R Cost of Poor Quality	Cause & Effect Diagram 5 Whys Test for Normality FMEA Correlation Analysis Regression Analysis Hypothesis Tests 8 Wastes 5S Kaizen	Quality Function Deployment Action Plan Cost/benefit Analysis Future State Process Map Design of Experiments Main effects and interaction plots Dashboards/ Scorecards	Control Plan Mistake Proofing Standard Work FMEA Training Plan Process Capability Statistical Process Control (SPC) Standard work SOP Lessons Learned

Project Charter

Initial Project Overview

Project Name: **Trailer Utilization Optimization**

Project Overview: In alignment with the company's strategic goals, the Distribution and Transportation Executive team has jointly set an achievable objective to reduce their internal operating costs by 25%. This has translated to a 35% reduction of operating costs in the Midwest Distribution and Transportation (D&T) region. The Midwest D&T region's Lean Six Sigma team has examined multiple projects that may impact the breakthrough goal and has identified optimizing trailer utilization as a high priority.

Problem Statement: The Midwest Distribution and Transportation (D&T) region needs to reduce operating costs by 35%. Improving trailer utilization has been identified as the quickest way to reduce costs within their direct control. The Lean Six Sigma team needs to analyze the current state of trailer utilization and then suggest improvements based on an optimized process. If the Midwest D&T region fails to show an opportunity to reduce operating costs as directed by the company's strategic plans, the company may not be able to meet its predicted growth.

Customer/Stakeholders: Transportation Personnel, Warehouse Receiving Personnel, Warehouse Shipping Personnel, Driver, Store Receiving Personnel, Vendor Shipping Personnel

What is important to these customers – CTS: Up to date trailer status, Optimized trailer dispatch plan, Open communication of critical or jeopardy events, Realistic process time estimates

Goal of the Project: Reduce trailer use costs by 20-35%

Scope Statement : The project is limited to the Midwest region which Anita Baker and Joe Thompson are responsible. The Six Sigma team will examine and recommend changes to the major process steps for the use of a trailer: dispatch, load, transport, dispatch update, unload. The investigation is limited to the two methods of live unload and drop and hook, which may occur at a vendor, distribution center, or store.

Projected Financial Benefit (s): Based on an operating budget of $1.5 million, this project will attempt to avoid costs connected with trailer use. The avoidance target is $0.3 – 0.525 million.

DMAIC Phases-Measure

SIPOC

Suppliers	Inputs	Processes		Outputs	Customers	
(Providers of the		(Top level description of the activity)		(Deliverables from the process)	(Anyone who receives a deliverable from the process)	
		Requirements			Requirements	
			Dispatch to Shipping Dock	Dock Location, Trailer at Dock		Driver, Shipping Personnel
			Load Product	Trailer Ready to Transport	Leave On Schedule (LOS)	Driver
			Transport Trailer			
		0 min. before rriving at rec. dock	Driver Reports Status	verbal communication		Driver Coord.
		efore product is unloaded	Driver Receives Dispatch Update	verbal communication		Driver
		Arrive On Schedule (AOS)	Arrives at Receiving Dock			Receiving Personnel
Personnel		LOS	Product Unloaded	Product		Driver, Warehouse or Store

"The team met again to develop the necessary SIPOC diagrams for the processes under consideration. The team decided there were seven main processes:

- Dispatch to shipping dock,
- Load product,
- Transport trailer,
- Driver reports status,
- Driver receives dispatch update,
- Arrives at receiving dock, and
- Product unloaded.

For each of these processes, the team developed an individual SIPOC."

DMAIC Phases-Analyze

Type of Waste	Example in Case Study	Recommended Action
Transportation	Movement to inspection	Perform inspection during unload
Inventory	Excessive inventory	Level load deliveries
Motion	Excessive lifting to reach labels	5S labeling bench
Waiting	Drivers waiting on orders	Kaizen event on shipping order process
Overproduction	Containers pre-shrink wrapped and may not be needed as grouped	Only package when the order is received
Overprocessing	Extra padding added to protect certain products	Determine padding requirement
Defects	Incorrect shipping orders	Auto-populate cells in shipping order
Skill	Dispatch team underutilized in scheduling	Update job roles and provide training

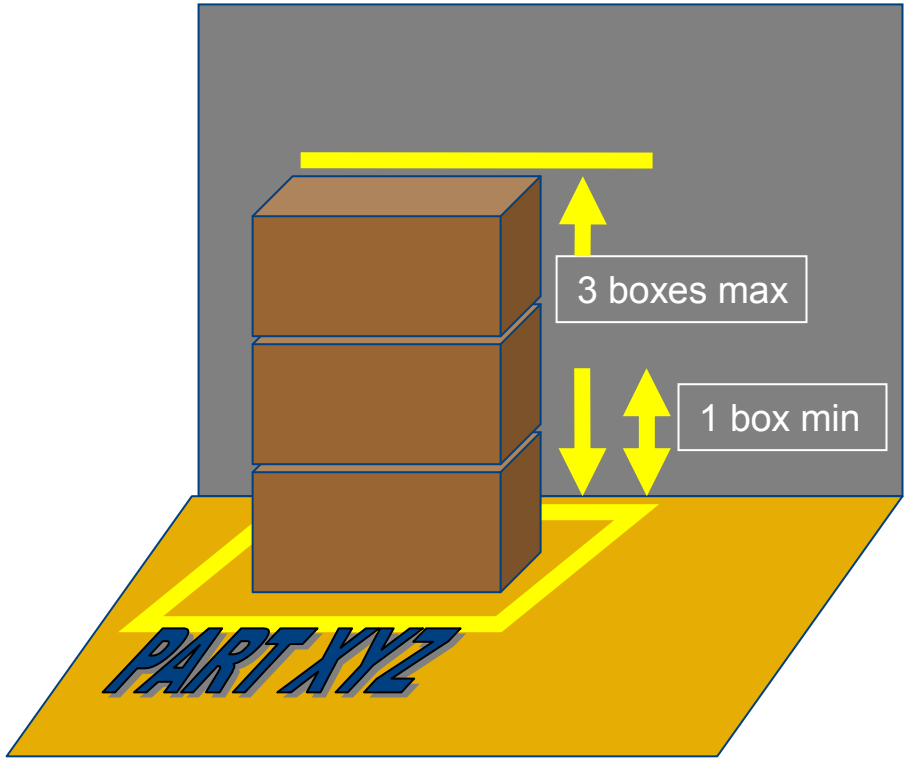
DMAIC Phases-Analyze

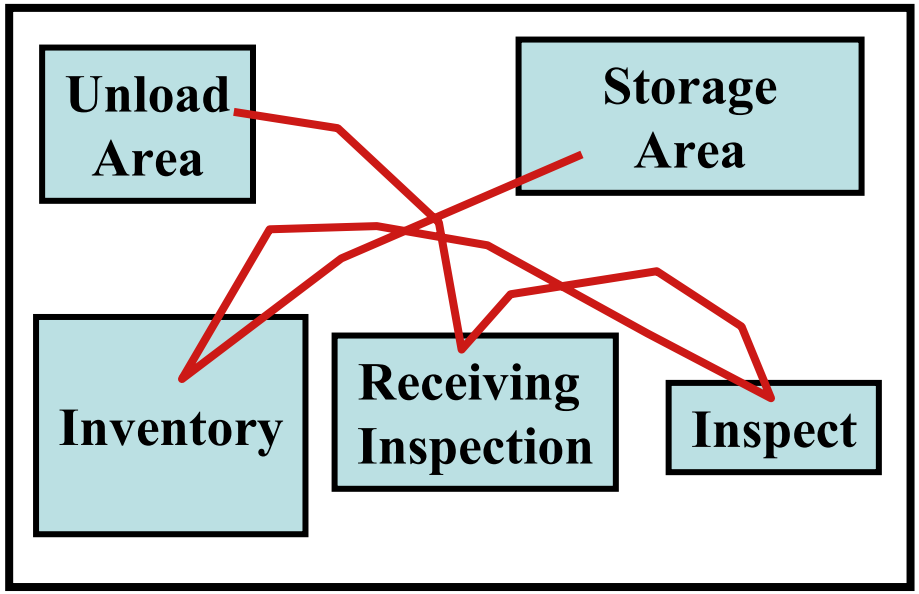
		Arrive on truck
		Wait to unload
		Move to receiving dock
	30 ft.	Unload
		Wait on dock
First in-plant tracking point		Add to receiving report
0.5 day		Check against P.O. and bill of lading
0.5 day		Hold on receiving dock
	150 ft.	Move to incoming inspection
2 days		In queue at incoming inspection
	15 ft.	Take sample to inspection station
		Inspect
		Enter in system as "OK"
1 day	15 ft.	Move sample back to main truck
		Delay before move
	250 ft.	Move to inventory
0.5 day		Delay before storage
		Enter transaction
	100 ft.	Move to storage
4.5 days	560 ft.	In inventory storage

- Store
- Transport
- Inspect
- Operation
- Delay

DMAIC Phases-Improve

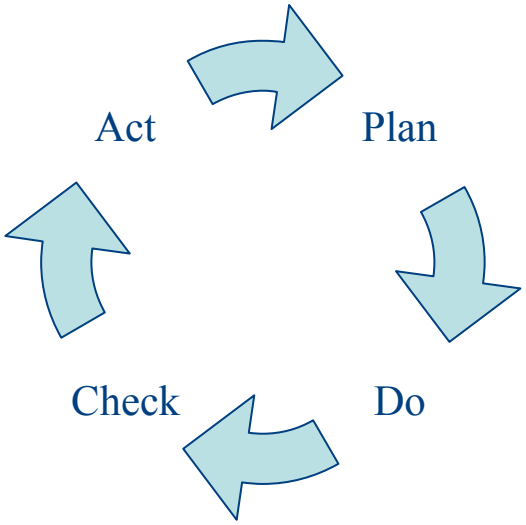
- Design of Experiments
- Regression Analysis
- Future State Map
- Visual Management





DMAIC Phases-Control

- Standard Work
- Training Plans
- SOP
- Control Plans



Summary

- Lean Six Sigma is a growing methodology throughout all industries
- As such, it is necessary to add the methodology to university curriculums
- Case studies can be used either throughout the course to further reinforce concepts or as semester projects

Questions?