CAVALLO

APPLYING SIX SIGMA PRINCIPLES TO DISTRIBUTION

Cut Waste to Maximize Profit

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WHITE PAPER

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Introduction

What are Lean, Six Sigma, and Lean Six Sigma? And how can they optimize your distribution operations to minimize waste and maximize profit?

While these disciplines originated in manufacturing operations, distribution pros of all industries have adopted their principles of continuous process improvement in order to eliminate inefficiencies, speed operations, and maximize profits across their supply chain cycle.

What's more, employing Six Sigma and its procedural cousins across departments — from distribution to manufacturing to marketing to finance and more — will align your company for strategic success. Read this white paper to learn why and how these techniques can transform your operations in distribution and beyond.

Let's start with the fundamentals, including these practices' historical roots in the genesis of modern quality assurance.

To contribute to profitability, any business function in any organization must pursue two basic goals:

- Maximize efficiency
- Maximize productivity

Ensuring both of these goals falls under the category of **quality assurance**, a discipline that verifies work is done at consistently high levels with minimal waste.

Quality assurance at scale took off with the Industrial Revolution and picked up steam during the 20th century, with the rise of scientific management.

Today, managing and optimizing quality is championed by organizations like the American Society for Quality, which offers accreditation in a variety of quality management methodologies — including Six Sigma and Lean. (The two are often combined into Lean Six Sigma.)

Both these methodologies were born on the factory floor, specifically among manufacturing operations:

Lean was created in the 1950s with the Toyota Production System to build quality vehicles at maximum efficiency. The methodology is founded on the Japanese concept of "kaizen," or continuous improvement, to eliminate all waste in the value delivery process. Toyota's concepts garnered global prominence and the Lean name in 1991, when James P. Womack, Daniel T. Jones and Daniel Roos published *The Machine That Changed the World*.

Six Sigma was coined in 1986 by Motorola engineer Bill Smith and quickly rose to prominence as a discipline for eliminating manufacturing defects within six standard deviations from the mean. (Statistically, a working six-sigma process means 99.99966% of all opportunities to produce some feature of a part are expected to be free of defects.)

Launched in the 2000s as a discrete discipline, Lean Six Sigma combines Lean's continuous improvement and elimination of waste with Six Sigma's focus on identifying and removing the cause of defects.

This paper will examine how Lean, Six Sigma, and Lean Six Sigma extend beyond their manufacturing roots to distribution operations — and how

businesses that use these methodologies across functional areas are best positioned to realize profitability via quality.

Steps and principles

Six Sigma proposes to improve business operations through statistical analysis. The principles of Six Sigma entail the five **DMAIC steps**: define, measure, analyze, improve, and control.

1. **Define** the problem. Craft a problem statement, goal statement, project charter, customer requirement, and process map.
2. **Measure** the current process. Collect data on current performance and issues. Verify that the data is reliable, and update the project charter as needed.
3. **Analyze** the cause of issues. Examine the process and data that was collected, display the data, investigate and confirm what's causing the issues, and continue updating the project charter as needed.
4. **Improve** the process. Decide on solutions to fix issues and create process maps for those new solutions. Take steps to implement the new fixes and continue to measure improvement.
5. **Control**. Refine the new process, continue monitoring, and use findings elsewhere in the business, if possible.

To reduce waste using DMAIC, first you need to identify it. Six Sigma, Lean and Lean Six Sigma all categorize waste into eight primary types.

1. **Defects**: This form of waste consists of process activities or outputs that do not conform to the customer's requirements.
2. **Overproduction**: Not truly understanding the demand for your product and overstocking as a result is another form of operational waste.
3. **Waiting**: When you're dealing with a work in progress, waiting for something before taking the next action, it results in waste.
4. **Non-Utilized Talent**: Not utilizing the knowledge, skills, and abilities of individuals on your team is one of the most unfortunate examples of waste.
5. **Transportation**: Avoiding transportation waste is a logistics game. Consider where your various resources are located and whether their paths can be streamlined.
6. **Inventory**: Excess inventory can result in product defects or damage, longer production lead times, and inefficient allocation of capital.
7. **Motion**: If you're adding movement without value, you are adding waste.
8. **Excess Processing**: This type of waste occurs when your business is performing more work than is required, or duplicating work.

LEAN AND SIX SIGMA: WHAT'S THE DIFFERENCE?

It's not surprising that Lean and Six Sigma would merge into Lean Six Sigma as practiced by many quality pros: Both disciplines focus on eliminating waste and maximizing quality, both originated in the manufacturing industry, and both even share certain definitions and methodologies.

"There are a lot of overlaps," agreed Six Sigma Black Belt Paul Prunty, veteran quality professional, Certified Six Sigma Black Belt, and 30-year veteran and fellow of the American Society for Quality. Specifically, Prunty said, both disciplines start with the proposition that all work is a process.

"There are some gurus who will chastise me for saying this," he said, "but in my view, Six Sigma is more of a methodology that gives you a lot of tools for process analysis. Lean is a philosophy, but they both have improvement at their core.

"'All work is a process,' so we start with having to understand the process and know it before we can really identify waste," Prunty continued. "And both Six Sigma and Lean and quality improvement activities all start with the process flow."

These eight wastes make a memorable acronym:

8 WASTES OF LEAN

Defects
Overproduction
Waiting
Non-Utilized Talents
Transportation
Inventory
Motion
Extra Processing

More recently, some practitioners have added a ninth waste.

9. **Accident/Risk Waste**: This waste category covers workplace security — both physical and digital — and includes employee illness and injury.

From manufacturing to distribution

Both Six Sigma and Lean started as disciplines focused on manufacturing: Lean, on Toyota's factory floor, and Six Sigma, in Motorola's processor plants.

In each case, the waste and precision in question were tangible. Toyota didn't want to waste a single car part, and Motorola wanted to achieve an extremely high level of accuracy printing circuitry.

Thanks to an overlap in operational processes and the universally relevant principles of efficiency improvement, the basic DMAIC methodologies of manufacturing apply equally well to distribution operations. According to Matt Greyerbiehl, technical sales manager at Cavallo, "I think of Order to Cash as one linear process flow — and so in that sense, Six Sigma's linear process improvement approach is applicable to the whole process.

"When we go into a customer, we say, 'Walk us through your Order to Cash,'

Greyerbiehl continued. "And we're piecing together in our minds a process flow diagram from the time they get the order to the time they collect the cash and everything in between.

WHO NEEDS A WAREHOUSE ANYWAY?

An irony of the use of DMAIC methodologies to optimize distribution: Some hardcore followers of Lean Six Sigma believe that inventory should be so tightly controlled that transportation and warehousing are eliminated completely as pure waste.

So is it time to quit your job or stop reading? Not really.

"I've heard two schools of thought about this," said Cavallo's Matt Greyerbiehl. "The one is that you don't even really need a warehouse. Because you're only keeping two weeks of stock in play at any given time, you're turning your inventory every 26 times a year. That's true single-piece flow: You've optimized in every category, and you don't even need any storage space.

"But there's a different point of view — one that actually proved out with the COVID-19 pandemic," Greyerbiehl continued. "People who were stocking more actually fared better because they had surplus stock when all the supply chains were disrupted due to COVID."

According to Six Sigma Black Belt and ASQ Fellow Paul Prunty, even the manufacturing pioneers of quality assurance extended the practice to distribution. "The first thing that Ford, and GM, and Chrysler did when they embarked on Lean and just in time (JIT) delivery? They built warehouses around their places to store stuff so that they could *get* it just in time."

Indeed, The Toyota Way — Jeffrey Liker's seminal book on Lean methodology — explicitly levels artificial barriers to entry for different processes. "The only thing that adds value in any type of process, be it manufacturing, marketing, or a development process," Liker writes, "is the physical or informational transformation of that product, service, or activity into something the customer wants."

Bottom line: If your company is confident that every other link in the supply chain has eliminated all waste and will continue uninterrupted, there's little left for distribution to do. Otherwise, distribution is a vital component of any enterprise — and it needs to be optimized to the highest levels of efficiency and accuracy.

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"We're analyzing [their Order-to-Cash process] using Six Sigma and Lean best practices to say, 'You got a document waiting here that fails to actively transform into something of value for the customer. Let's fix that. Let's automate that. You got orders sitting in a 'ready to post' queue, waiting for someone to click a button. That's excessive processing waste because you shouldn't have to click that button and you're not utilizing your staff if you're making them click a button 500 times a day.'

"So, it's relevant to the entire linear flow from start to finish."

Paul Prunty, a veteran quality professional, a Certified Six Sigma Black Belt, and a 30-year veteran and fellow of the American Society for Quality, agrees that distribution operations are well positioned for linear process improvement. "I look at the types of waste, and then couple that with a process flow diagram of your warehouse activities," Prunty said.

"Then I say, 'OK where do I see delays? Where do I see misinformation or no information? Where do I see wasted movement? Where do I see bottlenecks?' "

Looking at it this way, the transition between manufacturing and distribution processes comes down to specifics in the process flow.

Eliminating waste from distribution

In distribution operations, then, Six Sigma methodology eliminates waste to optimize the Order-to-Cash process.

To get the improvement process moving, Cavallo's Greyerbiehl suggests distributors consider impediments on the path: "Is there a moment in your Order-to-Cash cycle, from the time you receive an order to the time you collect the cash, where information, a sales document, items, inventory, fail to actively be transformed into something of value for the customer?"

From the time they receive an order to the time they collect the cash, distributors can realize greater profits by eliminating any kind of redundancy, excessive processing waste, motion waste, or any of the other eight types of waste described by Six Sigma and Lean.

Waste Use Case No. 1: Drop Shipping

Cavallo's Matt Greyerbiehl offers an example of how Six Sigma identifies different types of waste to streamline distribution processes for a drop-shipping operation.

Drop shipping doesn't entail keeping inventory in stock to fulfill customer orders. Instead, the drop shipper sends a purchase order to a third-party vendor, which ships it directly to the customer. Without good process management, drop shipping can generate process waste that slows the Order-to-Cash cycle.

1. In a drop-ship organization, the first thing you have to do is enter the sales order you'll receive from the customer. The next thing you have to do is enter a matching drop-ship purchase order so that you can communicate those requirements to your vendor to ship on your behalf.

   This is the first moment in the process when non-value-added waste can occur: The transition from entering the sales order to entering the drop-ship PO could generate waiting waste — while waiting for the sales order to be handed over to the purchasing staff to cut the PO.

2. The second opportunity for waste is the redundancy of having to enter the PO. If you understand what's required to be on that PO from the sales document, you should be able to automate the process.

3. The next opportunity for waste is actually getting that purchase order to the vendor, whether via email or other means of communication. Automating that process eliminates redundancy.

4. Once the drop-ship PO has been shipped and the vendor has acknowledged it, you need to generate an invoice to bill the customer. Without automation, converting PO data to invoice data creates waiting waste as well as excessive processing waste.

By automating the distribution workflow to eliminate these different types of waste, the drop shipper can speed the entire process and realize profit sooner.

Waste Use Case No. 2: Mobile Sales

Cavallo's Matt Greyerbiehl describes how Six Sigma identifies different types of waste to streamline distribution processes for a mobile sales operation.

Any organization that sells in the field — whether it's from a truck or via an outside sales team taking orders where customers are — will be vastly more effective when waste is removed from the equation.

1. Without a mobile tool to capture sales, a traditional process flow might start off with a sales rep in the field armed with triplicate copies and a price guide. Their first step will be to collect the required items from the customer that they're looking to purchase, price them out from physical price sheets, and record those onto a triplicate copy. There's the first opportunity to eliminate waste — in this case, defect waste. (Remember that "defect" isn't necessarily a product defect; it's also an opportunity to introduce an error to the system.)

   If the sales rep is looking at a price guide, what happens if they misread and undercharge? You'll lose out on profit. What if they transpose an item number when recording it onto that triplicate copy, then give the customer the right product? Reconciling with the inventory system will relieve the wrong item and distort your inventory.

   Transposing and manually recording orders, items, and prices is the first opportunity for waste in this mobile sales scenario.

2. Once the items are identified, the prices are identified, payment is accepted, and goods are passed to the customer, sales records that are mislaid en route to the office — before they can be reconciled with the system of record — represent another source of waste. (And driving back to the customer's site to retrieve the information adds motion waste to the list.)

3. Once those triplicate copies are collected and handed off, someone needs to enter them into the system of record to relieve inventory. That means excessive processing waste, recording the sale twice.

4. There's also another opportunity for more defect waste — for example, if the person reconciling those orders mistakes a 7 for a 1.

5. Finally, if you've actually collected funds in the field, how do you reconcile a stack of cash and checks that you've brought back, along with card transactions that you've run into a separate terminal? The painstaking process of applying cash applications to orders can create a lot of redundancy.

Applying DMAIC to your distribution process

These use cases demonstrate two very specific processes, but continuous process improvement tools can and should be applied to every step in your distribution operations, from Order to Cash, using the six DMAIC steps:

6 SIGMA PROJECT STAGES

Meanwhile, Cavallo divides the distribution workflow into five phases:

Note: Each distribution process has its own specific characteristics — informed by the organization's industry, size, staff, customer base and other variables — any of which may introduce waste to the process. That means you'll be defining, measuring, analyzing, improving and controlling a set of factors that are unique to your business.

Nevertheless, you can start cutting waste by applying DMAIC methodology to each stage of the supply chain workflow. Below are examples of the sorts of results you can achieve from Order to Cash (and the tools Cavallo SalesPad uses to help at the Control stage).

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Sell & Order

1. **Define:** Company XYZ has an outside sales team that leverages triplicate copy forms to record orders and payments that are later reconciled in Microsoft Dynamics GP. The act of reconciling orders and payments in GP is duplicative (excessive processing waste), which doubles the cost of sales. This process also creates opportunities for transposing errors, both when the order is initially recorded on the triplicate form and when it is entered a second time in GP. This is a good example of excessive processing waste, defect waste, and waiting waste.
2. **Measure:** The cost of sales is twice what it should be. In addition, transposing errors result in costly stock outs as the wrong items are relieved from inventory.
3. **Analyze:** The root cause can be linked to a lack of digital order capture in the field.
4. **Improve:** SalesPad Mobile lets users enter orders directly into GP with controls to ensure the correct item/price is added, completely eliminating the need for redundant data entry.
5. **Control:** Fifty percent reduction of internal order processing times, and improved order accuracy.

Warehouse & Fulfill

1. **Define:** Mispicked items are leading to a costly number of returns as upset customers return products that were sent in error.
2. **Measure:** Picking accuracy of 90% means 10% errors, or 25 return orders every month. This is a good example of defect waste, allowing an error to be introduced into the system.
3. **Analyze:** Without a way to scan the item and serial number digitally, then validate the item and QTY (quantity) against the original order, 10% of orders shipped have errors.
4. **Improve:** SalesPad's DataCollection module allows users to digitally scan item numbers and QTYs. It also provides validation on the item and QTY, virtually eliminating opportunities for mispicks. In addition, DataCollection prevents the sales document from proceeding to the shipping queue before it is 100% picked with complete accuracy.
5. **Control:** Picking accuracy of more than 99% virtually eliminates the cost of mispicks.

Replenish

1. **Define:** Company XYZ negotiates QTY break pricing with its vendors, which provides significant discounts when purchasing in volume. For example, QTY 1-50 is $9.50/EA, QTY 51-150 is $8.75/EA, and QTY 151-500 is $7.45/EA. The company has no way of capturing these cost breaks in GP and in some cases overpays for items. Alternatively, the company may be close to a QTY break but fail to round up to the next break because it lacks visibility. This would be defect waste: allowing an error — in this case, the incorrect cost — to be applied to the PO.
2. **Measure:** Without effective management of vendor QTY breaks, Company XYZ's cost of goods sold is estimated to be 5% higher than what it should be, leaving money on the table.
3. **Analyze:** With proper visibility into QTY cost breaks for vendor/item combinations, as well as the ability to automatically apply the correct cost to a PO when a QTY threshold is met, company XYZ could drive down its cost of goods sold by as much as 5%.
4. **Improve:** SalesPad's Vendor Card comes equipped with a vendor special costing table that allows for the effective management of QTY breaks. QTY break cost is also automatically added to the PO depending on the purchase QTY
5. **Control:** Five percent decrease to Cost of Goods Sold.

Ship & Deliver

1. **Define:** Company XYZ's customers expect to receive an email confirmation when their order ships along with tracking details. To meet this expectation, sales reps manually copy and paste tracking information from their shipping software and pasting it into emails they send manually.
2. **Measure:** The additional manual touch point of having to copy and paste tracking information into an email is a great example of excessive processing waste: doing more work than what is necessary. This excessive work is contributing to roughly 10 hours of wasted time per week among 15 sales reps.
3. **Analyze:** If tracking notification emails were automated, sales reps could regain the 10 hours they lose every week to carry out more value-added work, like proactively contacting customers for restocking orders.
4. **Improve:** SalesPad's ShipCenter module is fully integrated with popular parcel carriers such as UPS, FedEx and USPS and can trigger automated tracking notification through its workflow function.
5. **Control:** Ten hours time saved for the sales team every week.

Invoice & Collect

1. **Define:** When AR statements are sent to customers, Company XYZ experiences a massive number of inbound calls from customers requesting duplicate copies of invoices that are referenced on the AR statement. This ties up account staff as they handle all of the inbound calls and subsequent emails containing copies of the invoices the customer is requesting.
2. **Measure:** Roughly 15 hours per month are spent handling inbound calls from customers requesting duplicate copies of invoices.
3. **Analyze:** If invoice copies could be sent automatically along with the AR statement, the inbound call requests would be virtually eliminated.
4. **Improve:** SalesPad's AR statement includes the ability to send invoice copies that are contained in the AR balance.
5. **Control:** 15 hours per month in time savings by eliminating inbound call requests for duplicate copies of invoices.

Applying Six Sigma Principles for Distribution Success

Each operational part of a business represents a process, whether it's the purview of distribution, manufacturing, finance, marketing or any other department.

Lean, Six Sigma, and Lean Six Sigma all originated in manufacturing, but their techniques for eliminating waste and generating continuous process improvement can be applied to any operation that wants to improve efficiency and maximize profitability.

This first walk-through is just the beginning of your practice: As you refine your distribution processes, you'll discover new instances of waste and new opportunities to improve. That's the "continuous" part of continuous process improvement, and it's a never-ending pursuit.

The good news: Even the first steps toward improvement will yield big benefits.

Support your DMAIC practices to optimize distribution workflows and exceed business goals.

Request a Cavallo demo.

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