The CPO's Guide to Lean & Six Sigma – Part 2 (Six Sigma)

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In the first installment of this series for the Chief Procurement Officer (CPO) focusing on how to apply Lean and Six Sigma to Source-to-Pay and broader supply chain processes in the inbound value chain, we talked about the history of Lean and the Toyota Production System (TPS). We now turn our attention to Six Sigma.

Six Sigma shares common "DNA" with Lean in terms of a focus on (processes that deliver) quality, continuous improvement and meeting/exceeding customer requirements.

Six Sigma is a set of techniques and tools for process improvement that was developed by Motorola in the late 1980s and adopted by GE in the mid '90s. Its primary goal is to improve process quality by identifying the causes of errors and variability and eliminating them. At a high-level, the primary difference between Lean and Six Sigma is that while Lean, which was derived from TPS, focuses on the improvement (and operation of lean) manufacturing processes, Six Sigma was designed as a tool that can be used to optimize both manufacturing and business processes.

Six Sigma uses a set of quality management methods, including statistical methods, to identify variations in a process (that lead to error or decreases in quality or efficiency) and diagnose ways to reduce those variations. The name comes from statistics and indicates that the process is executed within 6 process standard deviations between the mean of the process and a customer's specification limit. It also implies that a customer's aggregate experience with the process over time will statistically result in no more than 3.4 defects on a parts per million (ppm) basis.

Six Sigma is based on the beliefs that:

- continuous improvement efforts are of critical importance as processes must be predictable and repeatable
- manufacturing and business processes have characteristics that can be measured, analyzed, controlled and improved using DMAIC or similar data-driven improvement cycles
- improvement can only be sustained if there is a commitment from the entire organization

Six Sigma is typically implemented using either the DMAIC or the DMADV process.

DMAIC, which stands for Define, Measure, Analyze, Improve and Control, is a 5-step project methodology where the organization will:

- **D**efine the system based on the requirements and goals of the customer

- **M**easure the current process using key metrics and collect relevant data
- **A**nalyze the data to identify issues, determine and verify cause and effect relationships and, ultimately, root causes
- **I**mprove the current process using knowledge gained during the analysis phase using appropriate tools or processes, which could include tools designed for Lean
- **C**ontrol the future state process to ensure that any deviations from the improvement plan are corrected before they result in defects or errors

DMADV stands for Define, Measure, Analyze, Design and Verify. It is sometimes viewed as equivalent or a subset of DFSS (Design For Six Sigma), which is a similar 5-step project methodology where the organization will:

- **D**efine design goals that are consistent with customer requirements and the overall enterprise strategy
- **M**easure and identify critical to quality (CTQ) characteristics as well as any risks inherent in the production process
- **A**nalyze the data to developer alternative, less risky or error-prone processes
- **D**esign an improved production process
- **V**erify the design

These processes are essentially interchangeable as each process

- **D**efines the goals
- **M**easures the key aspects of the situation
- **A**nalyzes the measurements to identify alternatives
- Selects the best alternative
- Implements the best alternative and monitors the implementation.

The key is that the frameworks can be used for clean slate design of processes or for iterative improvement of existing processes. As such, the frameworks can be used as part of a broader closed-loop performance management process for a business and for any processes. When procurement aligns its process to the broader business processes, we call that Procurement Performance Management (PPM). And, when procurement does PPM well, it is ultimately aligning supply performance (i.e., the balanced scorecard that you use at the supplier-level, category-level, etc.) to broader business performance. It's a concept called Supply Performance Management, and a few firms have actually implemented DMAIC as the way to get the supply chain organization oriented (and continuously improving) around the customer. For more on this, see Using DMAIC 2.0 to Blow Up the N-step Procurement Process.

Regardless of the particular Six Sigma process approach that is used, the key to success is good measurements and the application of tools to identify design alternatives that would improve the measurements. There are a host of quality management tools that have been used in the Six Sigma context, including:

- **5 Whys** – an iterative question-asking technique where an analyst keeps asking "why?" until all of the cause-and-effect relationships underlying a particular problem, down to the root-cause, is identified
- **Axiomatic Design** – methods based on mathematical and logical principles that can be

used to translate customer needs into functional requirements and system parameters
- **Business Process Mapping** – documents the current process used by a business and minimally includes the success criteria, who is responsible and one or more metrics to judge the efficiency as well as the level of efficiency expected
- **Critical-to-Quality** (CTQ) – trees that are used to decompose broad customer requirements into more easily quantified elements that can be more easily addressed and incorporated into a design
- **Quality Function Deployment** (QFD) – a methodology to take customer requirements and produce quantitative parameters that can be used to specify qualitative factors that will be used to analyze and select new process that will yield an acceptable level of quality

Depending on the process that needs to be optimized and the issues that are identified from the measurements, the organization might try some or all of these tools, or a totally different set of Six Sigma tools to address the process from the dozens that have been developed over the years.

By mastering Six Sigma, an organization can not only optimize its designs to allow suppliers to use the most efficient production processes, but it can also optimize it's sourcing cycles, inventory levels, distribution channels and payables process. And if the organization is really advanced, it can embrace both concepts (Lean and Six Sigma) and employ what is known as “Lean Six Sigma.”

Lean Six Sigma, developed just a little over a decade ago by Michael George and Robert Lawrence, is a methodology that relies on a collaborative team effort to improve performance by systematically eliminating the different kinds of waste in a process using a refined DMAIC process and an extended toolkit that incorporates all of the Lean and Six Sigma toolkits.

Many procurement groups, especially at large organizations, use some form of Lean Six Sigma internally (e.g., especially when the broader enterprise has adopted it) and also occasionally with suppliers. Large progressive automotive firms are very adept at offering expertise to suppliers to help them reduce their costs and improve quality by working with supplier operations staff (and then equitably sharing in the savings).

In the next installment of this series, we’ll look at how a CPO can apply Lean and Six Sigma to procurement and some example processes.