

Lean Six Sigma – Innovative Safety Management

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Introduction

The organization's safety effort is to create an injury-free workplace. This traditionally means writing programs, training employees, inspecting worksites, and managing the process so as to improve the loss outcomes. To manage the process information is needed. Traditionally the information to manage the process comes from historical loss data. The analysis of this information and accident reports becomes the basis for deploying improvement strategies. This has been the predominant practice for decades, and though there has been some improvement in safety outcomes, they have been less than stellar.

How Past Practices Have Influenced Safety Management

Safety traditionally is reactive in its posture, using historical loss data to deploy interventions so as to improve performance. There are some inherent weaknesses in this approach. Loss reports get their information from accident reports. The data is then reviewed and categorized by a claims person who does not necessarily have operational knowledge and may mischaracterize the nature of the injury or its cause. An example of this may be a worker carrying material tripping on debris on the floor and injuring their back. This injury may be characterized as a manual material handling accident. This would logically result in an ergonomic recommendation for improvement, whereas the true driver of that particular injury was poor housekeeping. Of course the quality of the accident reports are going to play a key role in the value derived from these loss reports. The better and more thorough the accident report, the better the quality of the loss data.

Another thing to consider is that the future state is never exactly the same as the past. Therefore interventions deployed from historical data may not necessarily prove to be the "best" solution because of possible changed conditions, practices, procedures, people, goals, objectives, etc. etc. etc!

Back in the 1920s Heinrich did a study of a large body of accident reports, whose findings placed 88% of the reasons for those accidents on the unsafe actions of workers. Later studies verified these findings even to a greater extent. This eventually placed the focus of safety interventions on the worker. These practices include training, warning, protecting, observing, feedback, communication, punishment, and other worker focused interventions. When the expected results are not achieved the next step is to make greater effort in these same areas or make one of them a priority which usually does not result in substantial gains. This has been the accepted practice for decades; all do work to some extent but never ultimately result in an injury free workplace.

Another area to explore is the traditional safety metrics (recordable rates, frequency and severity rates, etc.) which report outcomes. This tells us how we have done in the past up to some point in time. To be able to manage effectively and to create an injury free work place, process information is needed. Information that tells management how they are doing at any given point in time which allows for process interventions that eliminate the conditions or actions that may lead to an incident. Process (systems) metrics allow for a holistic approach to managing safety interventions.

Understanding the Lean Six Sigma Framework

Safety Lean Six Sigma is a framework with which to achieve an injury free workplace. It is the combination of two powerful approaches to management. Lean Six Sigma Safety creates a framework that combines the best of both approaches to assist in managing safety by focusing on the stakeholders' needs, using data driven decision making as well as streamlining internal processes to achieve stellar results.

Companies strive to find an effective performance measurement system to maximize operational and financial results. Results metrics that served business well for hundreds of years is insufficient in meeting today's management needs. With the rapid flow of information via the internet, the globalization of business, increased competition and shrinking margins management needs more than information that monitors. They need information that tells them how they are doing in real time to address their customer's needs and wants, they need to have "real-time" information on how to manage their internal processes so as to effectively meet their customer's needs, they need predictive information so as to respond to changing conditions and demands. They need information to identify opportunities and deploy strategy to maximize profitability, and growth without pitting one against the other.

Six Sigma Basics

The Six Sigma framework is a widely used data driven, quality improvement process, and has been successfully used by a number of multinational organizations to drive improvement through facts and information so as to drive better solutions. Sigma stands for standard deviation. It is a statistical means of describing how much variation exists in a set of data, or process.

1 Sigma	38.85%	effective
2 Sigma	69.15%	effective
3 Sigma	93.32%	effective
4 Sigma	99.38%	effective
5 Sigma	99.997%	effective
6 Sigma	99.99966%	effective

The Six Sigma process is a customer focused data driven framework that aligns internal processes to achieve near excellent results. Six Sigma is:

- A statistical measure of the performance of a process, department, or organization
- A goal that strives to reach near perfection in performance and results

- A system of management that achieves self sustaining system improvement, business leadership, and organizational excellence.

Besides customer satisfaction Six Sigma strives: to improve, cycle time (making the organization nimble – responsive to change) and reduce defects (improve quality). Six Sigma not only is useful in the quality improvement process, but also is a powerful business initiative. Six Sigma is an organizational commitment to the philosophy of excellence, with a strong focus on the customer, internal process alignment and data driven decision making. Six Sigma is about aligning the organization to better meet the ever changing environment and customer's demands, as well as responding to the organizational, employee and shareholder needs.

Deming preached that most quality issues rouse from the process used and not the people using the processes. It was his observation that 96% of the quality issues were built into the work systems and only 4% arose from the employees' actions or inactions. What this points out is that any improvement initiative needs to focus on the work systems where virtually all the improvement opportunities exist.

Lean Enterprise Thinking Basics

Manufacturing uses a discipline called Lean that focuses on process speed and efficiency. This is also known by other names, Lean Thinking, Lean Enterprise, Lean Manufacturing, Lean Transformation, etc. This process has assisted a number of innovative organizations in garnering tremendous efficiencies in their operations as well as becoming more nimble in product and process innovations. Lean Transformation starts with the elimination of the seven wastes, (over-production, waiting time, transportation, processing, inventory, motion, and scrap). The implementation of the Five Ss, [Seiri (organization), Seiton (neatness), Seiso (cleaning), Seiketsu (standardization) and Shitsuke (discipline)] The Five S methodology is easy to understand and relatively straightforward to implement, and can add value as a stand alone improvement technique and also establishes the essential prerequisites of process thinking, and value mapping which are fundamentally necessary for supporting further systems improvement. Another Lean thinking tool is constant process analysis (Kaizen) and pull production (Kanban) as well as error-proofing the process (Poka Yoke)

Lean has been around for many centuries. In 1104 the Venetians had set up a continuous flow process to mass produce war galleys. In 1574 they demonstrated their technique to King Henry III of France by producing a war galley in one hour. By 1765 French general Gribeauval using standardized interchangeable parts was effectively making repairs in the battle field. In England by 1807 Marc Brunel was making blocks for the navy by using 22 different kinds of machines in an assembly line configuration. In the United states in the early 1800s the Springfield armory was mass producing gun stocks and interchangeable metal part in their weapons production. In 1914 Ford used the now famous assembly line to mass produce cars. In the late 1930 the German aircraft industry used Takt, a precise time measure, to assemble aircraft. Mitsubishi, who had a technical relationship with the German companies; transferred this technology to Japan. Toyota was located nearby adopted this. By the 1950 Toyota combined Fords continuous flow with Takt time adding the concept of flexibility and the Toyota Process was born.

Lean Thinkers agree that Lean Transformation is not a collection of tools, but rather a holistic approach to an enterprise-wide process that is designed to vertically integrate the people with the

strategy and horizontally align the customer with the internal processes. Key lean transformation principles include:

- Pull processing: products are pulled from the consumer end, not pushed from the production end
- Perfect first-time quality - quest for zero defects (Six Sigma).
- Continuous improvement – increase productivity, quality, reducing waste and costs
- Waste minimization – eliminating all activities that do not add value
- Flexibility – product diversity
- Building and maintaining a long term relationship with suppliers through collaborative risk, cost and information sharing,

The critical point of lean thinking is value. It is the customer who defines value. Lean thinking requires a complete and critical review of the Value Stream. It involves a study of every step from conception, through design, production, information management, up until delivery to the customer. Continuous flow brings efficiency to the process. With the above three elements in place Lean thinking can shift to higher efficiency by being able to provide exactly what the customer needs without any backlog or inventory. Thus value is created; resource utilization and profits are maximized.

The Lean Six Sigma Framework

Lean Six Sigma is a combination of the “best” of these two processes. It combines the use of data to drive improvement as well as streamlining internal processes and procedures to maximize efficiency. It is attuned to the need to produce high quality, rapid delivery at minimal cost. The foundation on which the Lean Six Sigma concept rests is facts, data and information. The three key elements of Lean Six Sigma are customer focus, internal processes and the organization’s employees. Each element is supported by two pillars. The customer focus element has agility and quality as its pillars. The internal processes element has flow and variation control as its pillars. And the people element has teamwork as well as innovations and learning as its pillars. This results in a 360 degree integration and alignment of an organization’s systems and resources. One needs the creativity of the people, working on the internal processes with data and understanding to create solutions that will delight the customer by not only meeting, but exceeding its expectations.

Applying the Lean Six Sigma Framework to Safety

Safety Lean Six Sigma

The Lean Six Sigma framework then feeds into a larger system of customers, competition, communication, finance, banking, etc to name a few. All these in some way exert some degree of influence on the decisions the workers make every day in performing their tasks. Some of these decisions if made without an understanding or appreciation for the complex systems at work may lead to incidents and possible injury and losses.

Applying Lean Six Sigma thinking to safety has tremendous possibility and potential. Lean Six Sigma provides safety with a framework for integrating safety into operations and in tactical as well as strategic planning. The organizational systems that drive efficiency and quality are applied to the safety process. Safety goals are aligned with business objectives thereby creating a linkage between resource needs and allocation. Lean Six Sigma addressed the needs of all the organizational stakeholders and creates a holistic and integrated approach to managing safety. The

result is that the process creates innovative solutions that not only meet but exceeds the organizational, business as well as stakeholder expectations.

Safety Lean Six Sigma Structure

The goal of lean six sigma safety is the creation of an injury free workplace for the company and its employees. The frame work requires a strong foundation consisting of a culture that values an injury free workplace. The Injury free workplace must be an integral part of the company's vision. The framework includes three elements which are People, performance management and internal systems integration. Each of these elements has three attributes. The people element has leadership, innovation and ethical behavior as its attributes, the internal systems has processes & procedures, planning & risk management and innovative solutions and flawless execution. And finally the performance management has Metrics, data & information, and Goals & objectives as its attributes.

The framework starts with value statement which sets the tone and climate of the organization. No decision is made without considering safety implications. All the stakeholders in stellar safety performance are identified. The vision statement portrays a picture of the future state, which is an injury free workplace. For the vision to become operational the organization must have a strategy to make it happen. To drive the strategy there must be objectives, measures and targets. The metrics are an important part of the framework.

Metrics

Metrics drive organizational behavior. Metrics provide the necessary information to drive the achievement of world-class performance. World class is defined as achieving or exceeding a performance goal that is near perfection (6 Sigma = 3.4 Defects per Million Opportunities). Each organization must define what that is and how it will achieve this.

Metrics require dashboards. Dashboards are visual displays of critical information. Six Sigma metrics foster causal thinking, which is critical in safety to identify the underlying drivers of loss; as well as providing information on how the internal processes are going and therefore have the potential of providing management with "real-time" information for process improvement.

Dashboards

A dashboard is a visualization tool that enables an organization to articulate its strategy through a series of process-based causal relationships. A dashboard is a collection of related measures, (outcomes and drivers) that are derived from and directly linked to the organization's mission and strategic objectives. A dashboard is used to monitor, analyze, and improve business drivers and their outcomes. A dashboard measures the progress of achieving the Organization's goals.

To be effective, dashboards must be, sensitive, balanced, clearly defined ("On Target", "Caution", "Needs Attention") drive the "right" behaviors, aligned, and linked to recognition and rewards.

Building effective dashboards requires, knowledge of the stakeholder and what they value, knowledge of the processes that drive the desired results, knowledge of the best measures and how to use them, and knowledge of the organization's skills and capabilities to meet the stakeholder's needs.

The number of dashboards depends on the organization and its needs. Five to ten; maybe fifteen would probably be the higher limit of the number of dashboards. Too many dashboards will overwhelm management. Dashboards need to be a mix of “leading” and “lagging” measures.

Example of a leading measure:

- H&S management action plans on schedule
- Pre-operational plans
 - Completed on time
 - Meets effectiveness criteria
- Risk assessment
 - Completed on time
 - Meets effectiveness criteria
 - Worker training & education
- Orientation prior to start of work
 - Skills / knowledge assessment
- Performance management
 - Goal setting
 - Feedback and coaching
- Audits and evaluations

Example of a lagging measure:

- Recordable rates
- Lost work day case rate
- First aid cases

Dashboard management requires the collection of data for each metric in the dashboard (frequency varies by metric, i.e., weekly, monthly, quarterly, annually, semi annually, etc.). Dashboards should have colors coding for quick visual assessment. Green indicate that things are within expected target ranges. Yellow indicates that these metrics need to be watched, and red indicates immediate attention. Action plans should be when dashboard metrics are Yellow or Red Conduct a formal review (at least quarterly) of the status of dashboard metrics and action plans with senior management. .

Management summarizes the overall safety performance of a company by indicating the results for all the dashboards. There ought to be dashboards for management involvement and support of safety, as well as dashboards for general safety performance, as well as any specific area that is of sufficient importance to warrant metrics. .

Dashboards help management align the organization’s vision, with stated strategies, and provides metrics and targets to indicate status, progress and/or target achievement. Dashboards also identify specific opportunities for process improvement as well as share and distribute clear and consistent information. Dashboard also aid in focusing on the critical few drivers of results and help understand cause-and-effect relationship between performance indicators.

Dashboard also provide a framework for cross-functional alignment and integration of organizational resources. And drive effective capital and resource allocation. Dashboard are invaluable in integrating the strategic business planning and execution processes

Conclusion

Dashboards provide visibility to key performance measures that indicate achievement of stated strategic goals:

- Enhanced strategic feedback and learning
- Clear accountability.

Causal Thinking enhances the understanding of cause-and-effect relationship between performance indicators (lagging vs. leading) and outcomes:

- Identifies 20% of the drivers that account for 80% of the desired outcome
- Concentrates on measuring the right things
(Can't measure everything given limited resources).

Dashboards, measures and charts allow for data to be viewed as a picture:

- View trends over time versus point-in-time comparison
- Identify meaningful patterns over time.

Dashboards drive the focus on the opportunities that require intervention:

- Develop action plans where needed, to improve results.

Dashboards drive alignment and integration of organizational resources:

- Aligned plans, targets and strategic initiatives
- Improved project selection
- Optimized resource allocation.

Dashboards keep management dialogue focused on the right things:

- Provide data for effective and timely decision-making.

Enable proactive versus reactive actions.

What gets measured gets managed, as the saying goes.

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