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LEAN SIX SIGMA AND SWOT ANALYSIS OF INDIAN FOUNDRYSECTORS

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ABSTRACT: *In this paper author describes the lean six sigma methodology, goals, barriers and benefits of lean six sigma, Lean and Six Sigma in service and manufacturing industries ,operational innovation and excellenance by lean six sigma in foundry industry and in last SWOT Analysis for foundry industries.*

Keywords: *Lean six sigma, Lean, Six sigma, Foundry Industries*

1,Introduction to Lean Six Sigma

• Lean and Six Sigma are both process improvement methodologies
• Lean is about speed and efficiency
• Six Sigma is about precision and accuracy – leading to data-driven decisions
• Both rooted in the 1980s (and earlier)

2,Why Lean and Six Sigma?

• Six Sigma will eliminate defects but it will not address the question of how to optimize process flow
• Lean principles exclude the advanced statistical tools often required to achieve the process capabilities needed to be truly 'lean?
• Each approach can result in dramatic improvement, while utilizing both methods simultaneously holds the promise of being able to address all types of process problems with the most appropriate toolkit.
For example, inventory reduction not only requires reducing batch sizes and linking operations by using Lean, but also minimizing process variation by utilizing Six Sigma tools. If we apply lean and six sigma then flow and variation in process is minimized

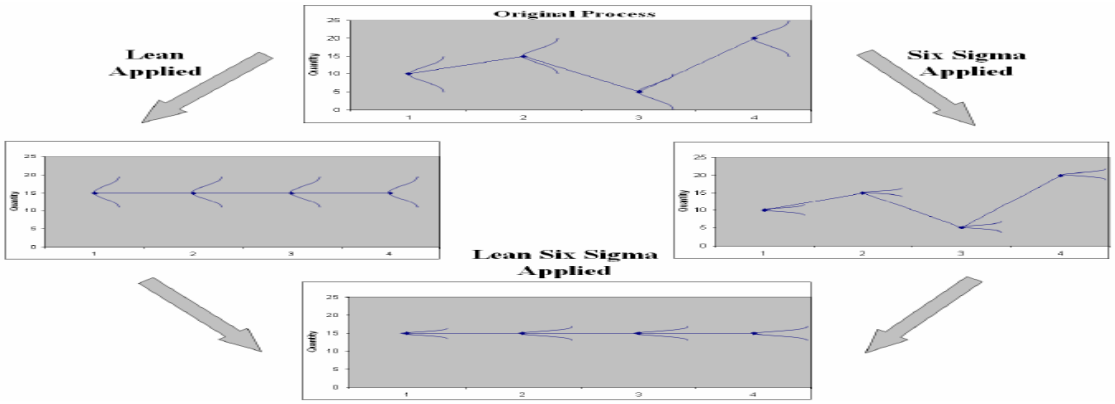

Figure 1. How Lean Six Sigma Attacks Flow and Variation

3,Lean Six Sigma Goals and Benefits

• Achieve total customer satisfaction and improved operational effectiveness and efficiency
Remove wasteful/non-value added activities
Decrease defects and cycle time, and increase first pass yields
• Improve communication and teamwork through a common set of tools and techniques (a disciplined, repeatable methodology)
• Develop leaders in breakthrough technologies to meet stretch goals of producing better products and services delivered faster and at lower cost

4,Comparison of Lean and Six Sigma Methodologies

Table below shows the comparison of lean and six sigma

Program	Lean	Six Sigma
Theory	Remove waste	Reduce variation
Application Guideline	1. Identify value 2. Identify value stream 3. Flow 4. Pull 5. Perfection	1. Define 2. Measure 3. Analyze 4. Improve 5. Control
Focus	Flow focused	Problem focused
Assumptions	Waste removal will improve business performance. Many small improvements are better than analysis.	A problem exists. Figures and numbers are valued. System output improves if variation in all processes is reduced.
Primary effect	Reduced flow time	Uniform process output
Secondary effects	Less variation. Uniform output. Less inventory. New accounting system. Flow-performance measure for managers. Improved quality.	Less waste. Fast throughput. Less inventory. Fluctuation-performance measures for managers. Improved quality.
Criticisms	Statistical or system analysis not valued.	System interaction not considered. Processes improved independently.

5,Differences between Lean and Six Sigma

Issues/Problems/Objectives	Six Sigma	Lean
Focuses on customer value stream	N	Y
Focuses on creating a visual workplace	N	Y
Creates standard work sheets	N	Y
Attacks work-in-progress inventory	N	Y
Focuses on good house keeping	N	Y
Process control planning and monitoring	Y	N
Focuses on reducing variation and achieve uniform process output	Y	N
Focuses heavily on the application of statistical tools and techniques	Y	N
Employs a structured, rigorous and well planned problem-solving methodology.	Y	N
Attacks waste due to waiting, over processing, motion, over production, etc.	N	Y

6,Lean Six Sigma DMAIC

Define (D)	**Define the process cycle time or lead time and take time.**
Measure (M)	**Measure CT and Map the current state processes from the start to end points.**
Analyze (A)	**Analyze value and non-value added processes, bottleneck constraint and process efficiency.**
Improve (I)	**Improve to future state flow with cellular manufacturing, leveled schedule, single piece flow, quick setup, cross-training etc.**
Control	**Control inventory and cycle time with kanban pull, visual control ,fool proofing and standardized works.**

7,GOALS AND BARRIERS OF LEAN SIX SIGMA IN FOUNDRY INDUSTRY

Lean Six Sigma is a proven methodology for reducing cycle time, defects, and delay, and for boosting profits. It's a results-oriented, project-focused approach to quality, productivity, and profitability. Lean Six Sigma has simple goals, such as:
GOALS

- Thirty to sixty percent reduction in Turnaround Time

- Twenty to forty percent reduction in floor space requirements
- Twenty to thirty percent improvement in equipment capacity
- Twenty to fifty percent improvement in productivity
- Thirty to sixty percent reduction in inventory

These reductions and improvements translate into cost savings, profit growth, and competitive advantage.
Unfortunately, many companies have barriers that keep them from executing a Lean Six Sigma approach. Following are some of the common barriers to executing Lean Six Sigma and some suggestions on how to overcome them.
Barrier 1: People don't like being measured.
Barrier 2: Having a "macho man" complex.
Barrier 3: Getting achievers and problem solvers to work together**.**

8 . Lean and Six Sigma in service and manufacturing industries

1,You are in a service of manufacturing environment, the work unit in progress is transformed from an input to an output ready to meet customer demands, using a process. Regardless if you are in a service of manufacturing environment you need universal "core processes": a process to develop products/services, a process to bring them to the market, a process to produce them, a process to cash in revenue generated by them and a process to take care of your customers during use of them.. You also need processes that support the "core processes". If you have a process, you can apply Lean and Six Sigma principles and tools.

2, In theory the universal processes needed in service and manufacturing organizations are perhaps of a similar nature, in reality they are not fully comparable.

An example: the typical life time of a car generation in the automotive industry is about 4 – 6 years. The typical life time of a communication product generation is a couple of months, 2 years maximum. There is clear difference in product generation turnover. Consequently, processes need to be designed and put into production a lot quicker, there is less time to optimize and lean them out to the full extend. This would suggest quick changing service industries should get their products and processes as defect free as possible before launching them. As this is certainly not always the case, service organizations may end up in endless loops of fire fighting. It might explain the current success of DMAIC and DFSS in service industries.

3, In manufacturing industries you can see the raw materials or semi finished product transform into the final product along the production line. In a service environment at best you can follow a paper flow, but in most cases you'll need to trace the production history of the service in the computers. This creates certainly differences in the application of some of the tools. Take Value Stream Maps as an example. In manufacturing you can go see the shop floor and count the work in process in between the different work stations. In service industries you'll need to dive into the computers and torture them until they give away their secrets and tell you where the work in progress is waiting to be processed. This can be a discipline in itself. The type of data is different. Sure, you'll find continuous and attribute data in service and in manufacturing, but not in the same amounts. In manufacturing, most of the data is continuous. In service the data I come across mostly is attribute. This has consequences on the application of many analysis tools (graphical tools and hypothesis tests), determining process capability and control charts.

4,It depends on the kind of activity. There is no such thing as the service industry and the manufacturing industry. A car glass repair specialist with workshops and mobile work forcess is a total different kind of service then banking or insurances. Chemical process industry is a totally different kind of manufacturing industry then automotive assembly. Consequently, there might be big differences in the application of Lean and Six Sigma principles in service and manufacturing industries, depending on the type of activity.

9. OPERATIOAL INNOVATION AND EXCELLENANCE BY LEAN SIX SIGMA IN FOUNDRY INDUSTRY

1,**Qualifound** – a modular tool developed for quality improvement in foundries

2,Improving the capability of a redundant **robotic cell** for cast parts finishing

3,**Cleaner production** for environmental conscious manufacturing in the foundry industry

4, Obtaining desired surface roughness of castings produced using ZCast direct metal casting process through **Taguchi's experimental approach**

5,The feasibility of quick changeovers in foundry small and medium enterprises based on a "SMED" (single minute exchange of die) approach. SWOT Analysis of foundry shown below.

STRENGTHS	WEAKNESS
High quality castings	**low degree of mechanization**
Good availability of alloys.	**Use of inefficient mfg. practices**
Strong industrial base.	**High energy consumption, increasing input prizes**
Regular supply of electricity	**Labor shortages**
Proximity to Mumbai and Pune	**Slowdown in market.**
THREATS	OPPORTUNITIES
Technological obsolescence , for smaller foundries	**Robotic use and simulation technologies**
Global rise in price of raw material	**Easier availability of bank loans**
Direct competition with China	**Various quality improvement tools**
Non proven technology for green sand reclamation	**Status of regional expert centreContinued recession**

CONCLUSION:

After reading all above research papers, we conclude that all the previous work is on lean six sigma's challenges ,opportunities , their benefits ,obstracles to implement lean six sigma in small to medium scale industry as well as combining lean six sigma with supply chain management,comparision of lean six sigma with TQM,Scope of lean six sigma in pharmatutical industry,call centre, health care ,service organization, Increasing Efficiency of Forensic DNA Casework .however no one has doing work on lean six sigma in foundry industry as well as in mechanical engineering. There is a big gap of lean six sigma implimentation in Foundry Industry.

