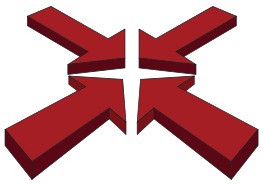


KVALIKON
VEZETÉSI TANÁCSADÓ ÉS RENDSZERFEJLESZTŐ KFT.

Critical Success Factors of Lean and Six Sigma projects: differences and commonalities

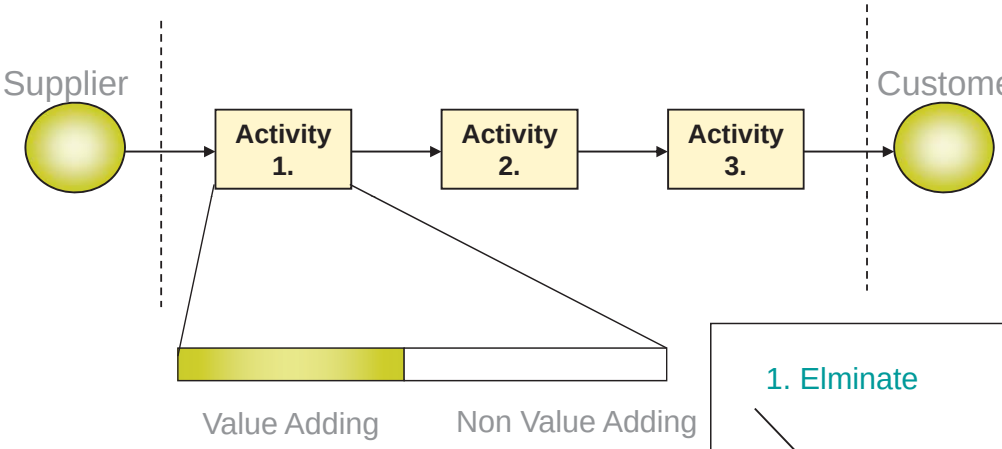
Balázs Németh, PhD.
Kvalikon Consulting

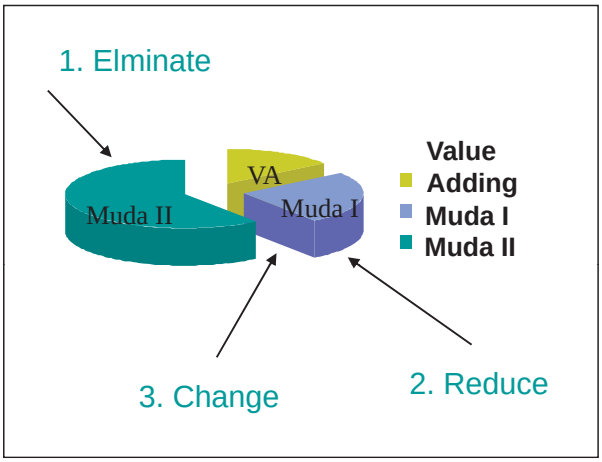
2011.

Lean and Six Sigma

- Lean Management philosophy and projects are mainly focusing on improving value added, reducing order fulfillment lead time by eliminating waste from the processes.
- Six Sigma is aiming at improving quality and reducing costs by reducing variability in the processes.

Value Stream Analysis – Waste reduction

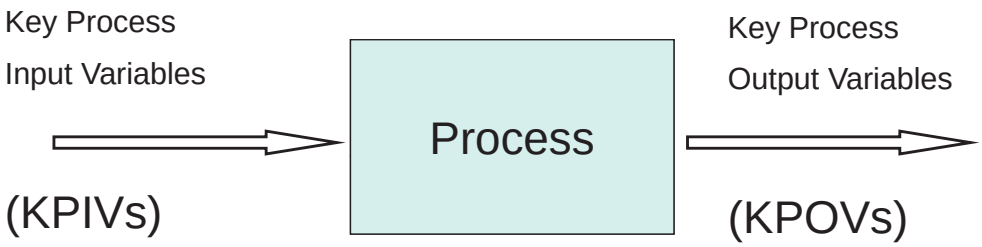


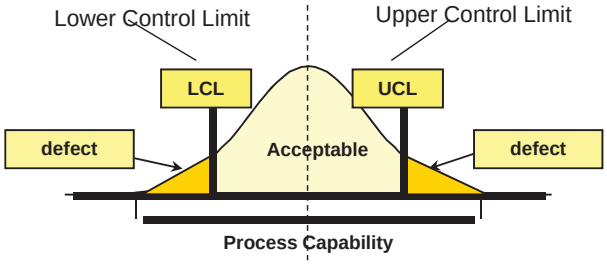


$$\frac{\text{Value Adding Time}}{\text{Total Cycle Time}} = \text{1-10-20\% ??}$$

Six Sigma reduces process variation and stabilizes KPOV

- Y = f (X)

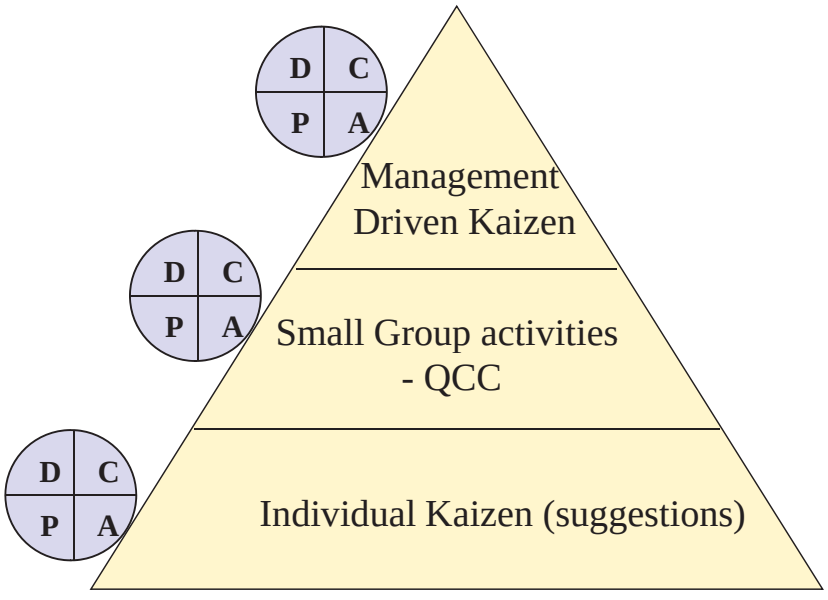




Goals

- The major goal of Lean management is the flexible adaptation to market demand changes (and utilization of resources) by continuously aligning and optimizing organizational resources, and processes according to the market requirements.
- The major goal of Sigma is to achieve Six Sigma level quality in the processes (meeting requirements, customer expectations, and specifications) by reducing variations.

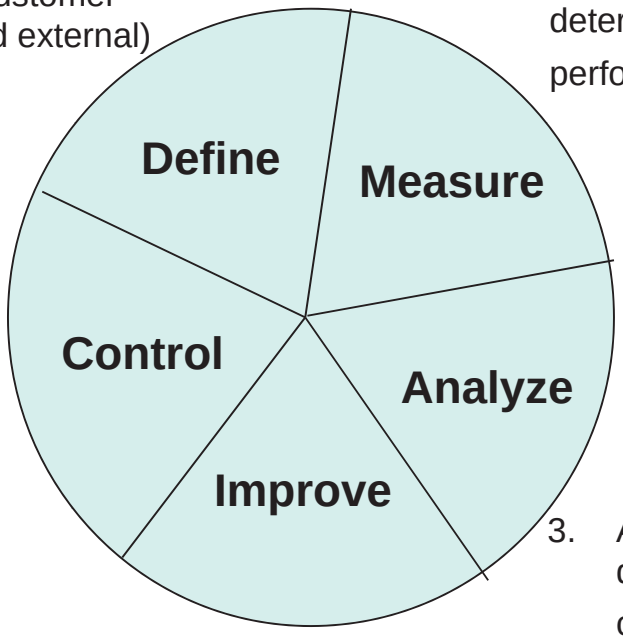
Lean implementation method - Levels of Kaizen



6 Sigma – Improvement cycle

1. Define the project goals and customer (internal and external) deliverables

2. Measure the process to determine current performance

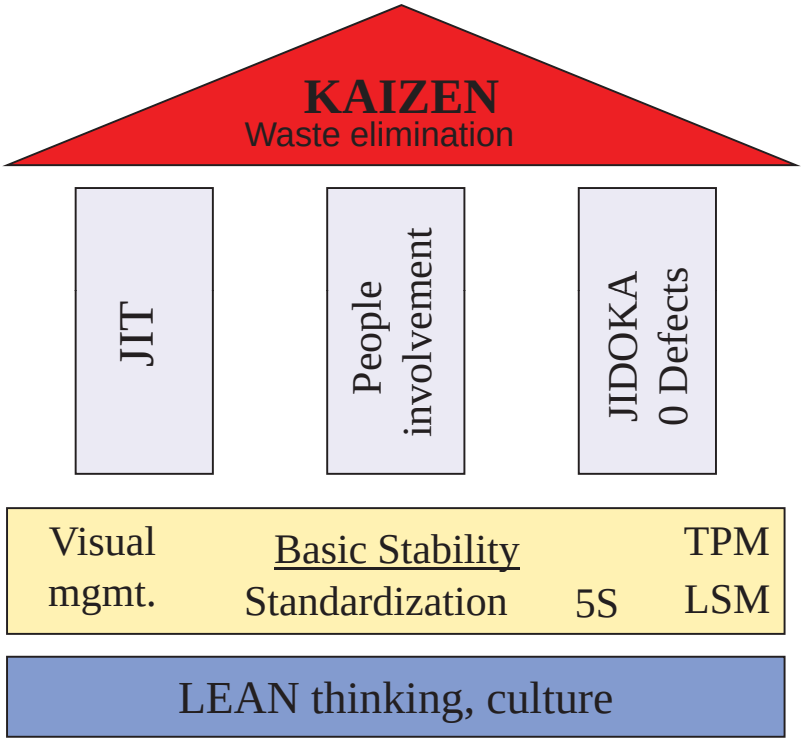


3. Analyze and determine the root cause(s) of the defects

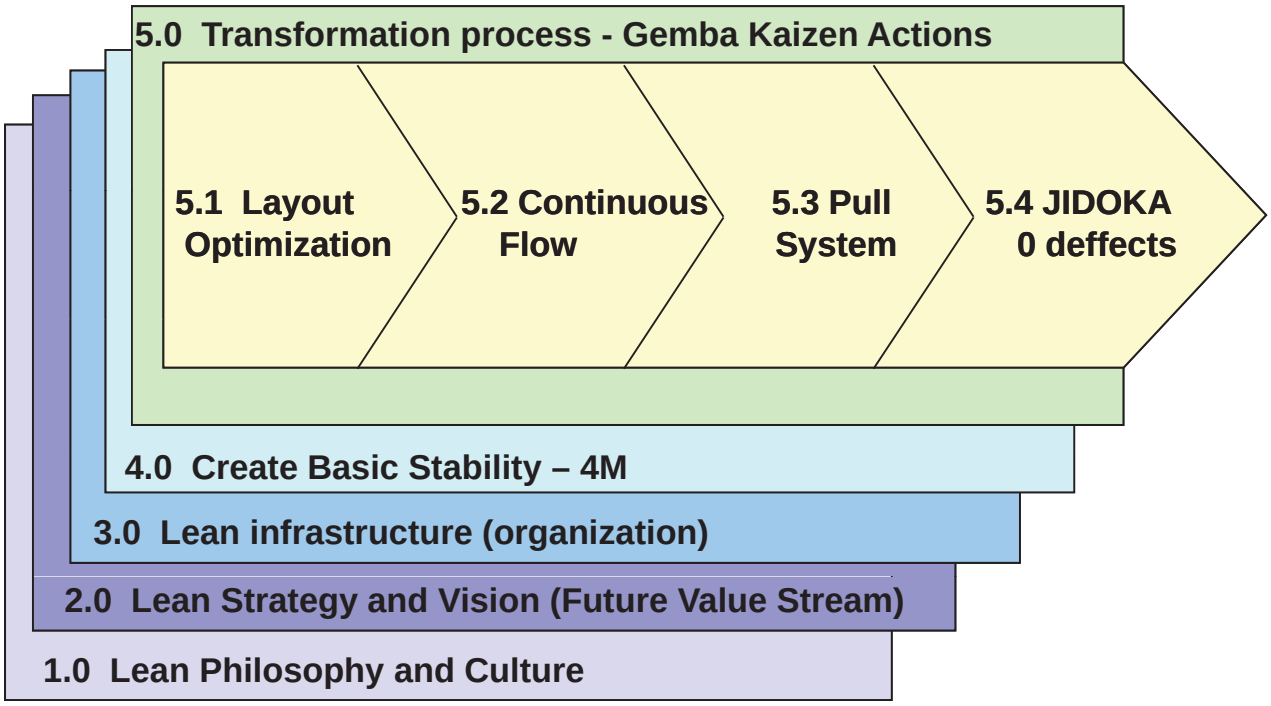
4. Improve the process by eliminating defects

5. Control future process performance

LEAN modules



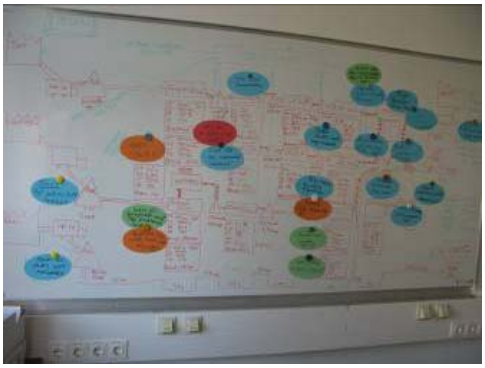
Lean implementation program

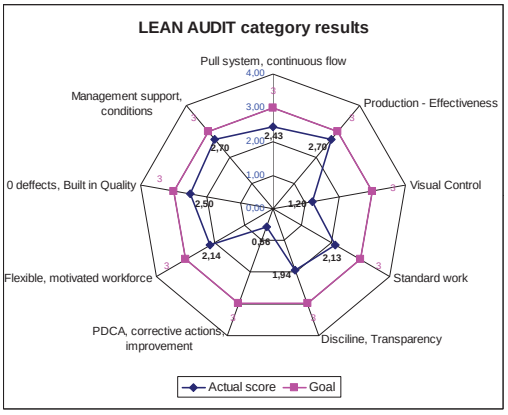


The Major phases and goals of the Lean Implementation program

Phases	Goals, Results	Measures
Waste elimination **PRODUCTIVITY** 3.	Lead time reduction Inventory reduction Reduce downtime Reduce scrap Improve yield	**Lead time** **OEE** **Inventory turnover** **Scrap%**
Pull System Synchronization **FLEXIBILITY** 2.	Continuous material flow Quick change over Trained, Flexible workforce Fast feedback, PDCA Kaizen, problem solving	**No of Suggestions** **OTD** **Change over time**
Build the Lean Foundation **STABILITY** 1.	Lean thinking, people involvement Standardized work 5S, discipline, accountability Transparent operation Built in Quality Controlled, standardized material supply	**Scrap%** **Cp, Cpk** **Plan/Actual cycle time and material cost**

Lean Assessment, Value Stream Mapping





Brush Transformation

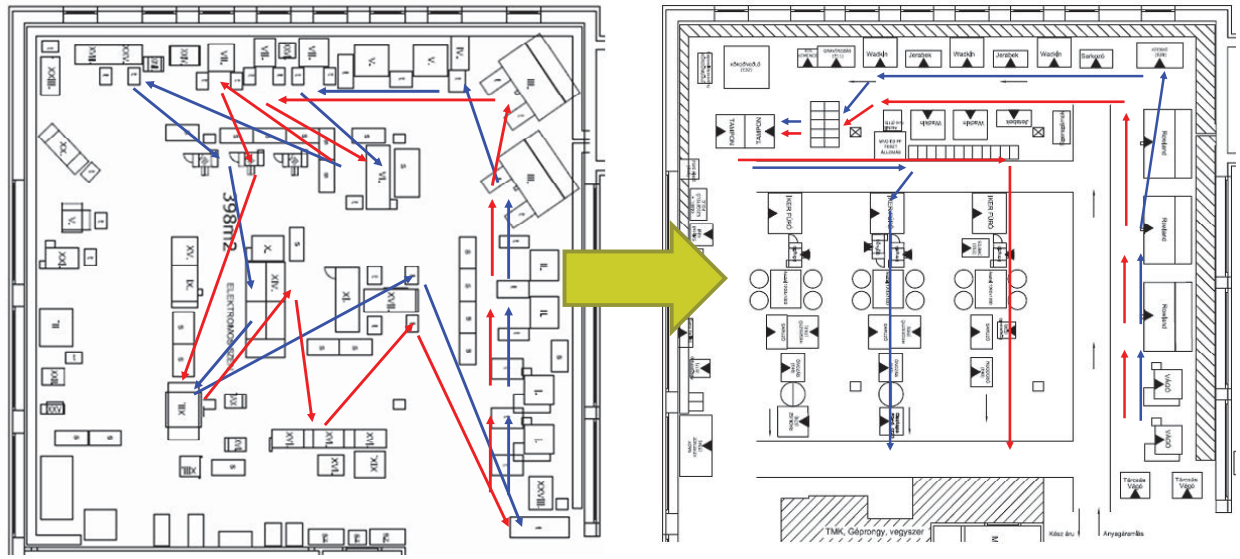
PLAN	1.Project Title	Brush production efficiency improvement project		
	2.Reason		3.Objectives	
	To replace the individual workstation concept by a high volume/high diversity line concept.		To increase output from 25k brush to 35k brush per week without investment and additional people. To realize lean flow and to reduce waste.	
	4. Start Date	29.06.2009.	5. Target End	30.09.2009.
	6. Project Team	Tibor Sill, Gabriel Ridean, Péter Sisa, András Kiss, Kriszta Horváth, Attila Ország, László Pusztai, Zoltán Madócs, Péter Juhász		
	7. Problem Details			

Problem
Material flow in the former individual workstation concept was unclear, several products run paralel on the same workstations. Manufacturing time per product varied in large intervals.

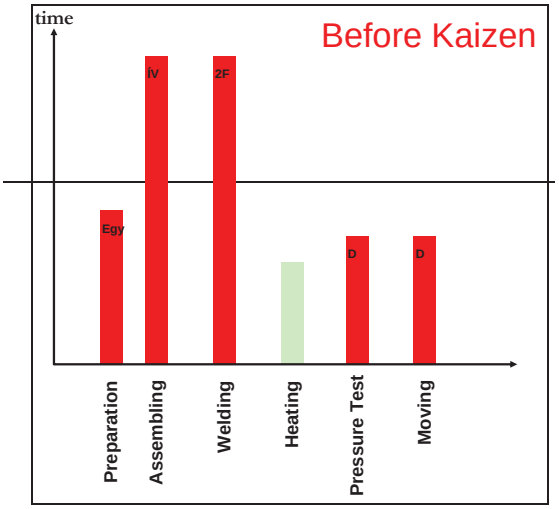
Implications
Highly unpredictable product completition times.
Permanent management supervision was necessary to manage bottlenecks.
Having to set up weekend overtime to recover deficit.

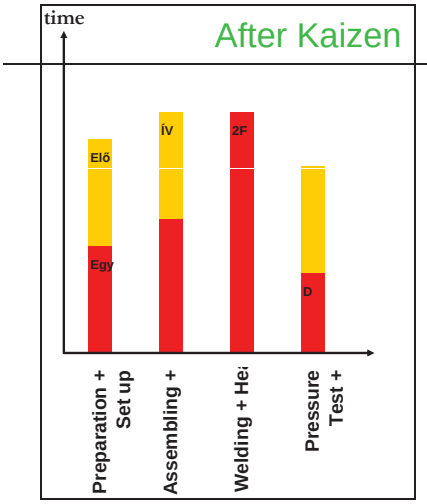
Measurement
- brush product family analysis is completed;
- representative products are selected per family;
- cycle time measurement for each selected product is done;
- manufacturing concept is defined (concering volume, diversity and flexibility);
- brush lean layout is drawn, project measures and main timeline are ready;
- new (target) capacity per line/cell is calculated;
- layout implementation is in progress;
- new equipment, tool (necessary to finalize the lines/cells) purchasing/manufacturing is in progress.

Layout Transformation



Kaizen Workshop





Kaizen workshop

Before KAIZEN

After KAIZEN

Result: 50% area reduction, one piece flow, 60% inventory reduction, FIFO

Date: 05.10.2010.

Operation	Problem	Actions	Results
Stair profile making	Stair profiles stored on pallets, moved with forklift (1,5 min moving time, 38 m)	New „Kanban" trolleys have been introduced, min max levels indicated (visual control)	Reduced transportation, Moving time is 6 sec, 5 m

Before Kaizen

After Kaizen

Stair profil supermarket, pull system

Features	Lean Management	Six Sigma
Focus	Value Added, Flow, Lead time	Process Variations, Quality Problems
Goal	Reduce waste, improve flow	Reduce Variation
Participants	Total Participation (every one), employee involvement	Six Sigma organization (MBB, BB, GB), Selected experts
Problem identification	Go to Gemba (Observation)	Data collection, measurement and analysis
Area	Any process or area where problem exists	Repetitive process, where statistical sample is available
Improvement focus	System and Culture development, improve standards and behaviors	Process improvement, process development
Improvement method	Kaizen, PDCA, VSM	DMAIC, DMADV
Implementation	Long Term Cultural Change, Kaizen	Short Term results, Project based
Approach	Learning by doing	Analytical, Statistical
Tools	Value Stream Mapping, PDCA, Kaizen, 5 Why? 5S, Standard work, 5W1H, 7QC tools, Heijunka, Takt time, line balancing, 3MU, Waste elimination, SMED, Visual management, Poka-Yoke, Lean audit	Process Mapping, SIPOC, DMAIC, project charter, 7QC tools, 7 Management tools, MSA, statistical analysis, hypthesis testing, ANOVA, FMEA, QFD, SPC, DOE, control plan, cost-benefit analysis
Knowledge sharing	Lean knowledge is shared among employees by trainings, on the job trainings and participation in different Kaizen (continuous improvement) activities (learning by doing). Standard work is one of the most important tools to share knowledge within the organization.	Six Sigma knowledge is shared within the organization through the Black Belt system and Six Sigma pilot projects. A well defined training and project methodology is supporting employee development. Process description and specification are supporting knowledge sharing.

Common principles & elements of Lean and Six Sigma

- Process thinking
- Customer Focus
- Continuous improvement, Problem solving
- PDCA
- Management by Facts
- Management participation
- Business Driven (Clear business objectives are required)
- Team work
- Training program

Critical Success Factors	Lean Management	Six Sigma
Goals	Clear strategy and strategic goal deployment is required at the beginning of the program	Project goals and, Customer expectations should be clearly defined at the beginning of the project.
Systems	Requires changes in organizational systems (like performance appraisal, rewarding, production scheduling, training, logistics, data collection)	Some systems should be changed: training, data collection and quality control & improvement systems should be in place (or developed)
Resources	Human Resource intensive, Every employee should be involved. People should be trained and involved, Time and budget should be allocated to Lean program every year to successfully implement lean elements. Physical layout changes, machine improvement and logistics may require intensive participation of Maintenance department and process engineering.	Only a limited number of people are involved in the program. Full time Master Black Belt and part time Black Belt should be trained, intensive training program. Six Sigma project should be defined and a budget should be allocated to the project according to cost benefit analysis. Appropriate data collection and measurement system should be implemented.
Prerequisites of problem solving	Clear expectations (requirements) and standards, visualization, feedback	Clear expectations (requirements), Reliable data, measurement systems
Software	Not required	Minitab or another statistical software
Management role	Management is leading changes, setting example	Management is supporting and evaluating the projects (Champions)
Employees role	Employee involvement (crucial), team leaders and shift leaders have crucial role in involving employees, every one is responsible for improving his area, methods	Employee are not involved, they may only partly be involved in (some project phases) implementing the new processes or collecting data

Critical Success Factors	Lean Management	Six Sigma
Organization	Lean committee, Champion, Lean coordinators should be nominated and trained (usually part time job)	Six Sigma Organization (Lean Champion, Master Black Belt, BB, GB) should be established and trained
Timing	Long term program, consisting of short term Kaizen actions, workshops..	Short team projects (few months, less then half year)
Knowledge	Practical experiences, Kaizen (No theoretical knowledge is required)	Theoretical Knowledge Statistical knowledge, Process Management, Quality knowledge (Expertise in methodology is required)
Behaviors	Value Added focus Go to Gemba, learning by doing, Maintain and Continuously Improve Standards Discipline, follow the standards and rules Problem awareness, Problem solving, Continuous learning Kaizen, continuous improvement Participation, team work Information & Knowledge sharing	Customer focus Management by Facts, quantify problems and results Improve Processes Analytical thinking Engineering thinking Mentoring Problem solving Team work Project management Gain stakeholders commitment “Prove it to me”
Required studies	Short lean principles, Kaizen training, Common sense and practical experience is required	Strong statistical background, Basic Quality knowledge

Both Lean and Six Sigma projects have the following CSFs

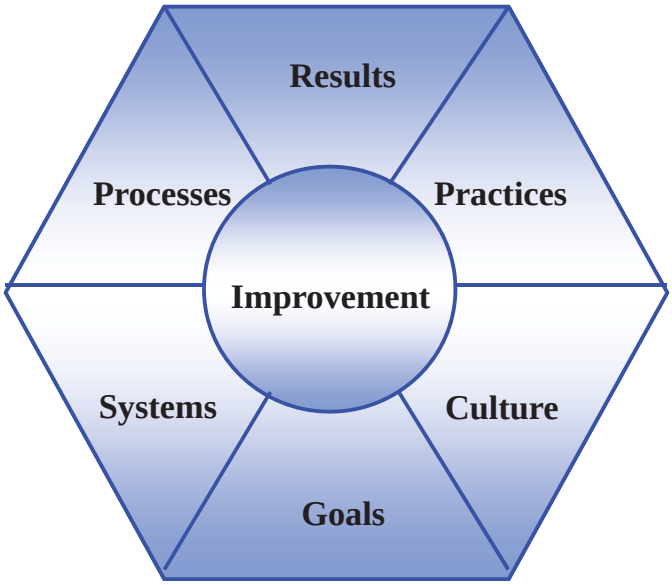
- Top Management Commitment
- Case For Change
- Clear Business Objectives (Management expectations)
- Clear Responsibilities should be defined
- Change Champion
- Change Agent
- Available time and resources
- Financial budget
- Expertise in methodology
- Involvement of key stakeholders
- Short term (visible) results
- Cooperation and team work
- Communication
- Practical training program

Change process

- Lean management is a long term (3-5 years) cultural and system change program.
- In lean implementation employee involvement has a crucial role. Lean aims at continuous improvement across the entire value-stream of operations by encouraging and empowering the entire workforce to identify and eliminate waste in their sphere of activity. It is an on-going activity involving all levels of employees to improve their processes and operations.
- Lean implementation requires behavior change in every level of the organization.
- Six Sigma is a process improvement method, a project which has a start and an end.
- In Six Sigma, a selected team of experts and stakeholders participates in the project, where the participants are carrying out a problem solving activity and a process improvement in a selected topic.
- Implementation of six sigma requires change in the knowledge (rather than behaviors) of the organization.

Approach

Systems



People

Implementation steps

- Gain Top Management commitment
- Introduce and train the Lean philosophy and methods
- Case for Change
- Prepare Lean implementation program
- Prepare the organization for Lean implementation (OD program)
- Build strong foundation (Create Basic Stability, 5S, standard work, visual control)
- Prepare Current State Map of the Value Streams
- Identify improvement points and opportunities (Bottlenecks)
- Set up Kaizen System, involve and empower people
- Proceed step by step (pilot project, Kaizen workshops)
  - Select Kaizen areas
  - Collect Data, identify waste, involve people
  - Understand and eliminate sources of waste (5 Why?)
  - Select Kaizen ideas
  - Implement Kaizen ideas
  - Test, Validate solution, Monitor performance
  - Improve existing standards
  - Share solutions, train people
- Follow the 5 Lean principles (while improving the pilot areas)!
- Continuously improve the System
- Involve the Suppliers

- Gain Top Management commitment
- Select the project
- Identify Champion, Process Owner and Team
- Train experts (Green Belt, Black Belt training)
- Define the project goals and customer deliverables (Project Charter)
- Understand the Current situation (process mapping)
- Collect data for all key variables, Validate project savings
- Identify Sources of Variation
- Analyze and determine the root cause(s) of the defects
- Understand the effects and the relationship of the key input variables to the key output variables
- Develop Potential Solutions, Evaluate and Select solutions
- Implement changes and verify that the system performs as expected
- Maintain results by introducing new control plans and standards and procedures
- Share results within the organization
- Validate project saving with a final forecast and close out project.

Further Information

Kvalikon Consulting Ltd.

Budapest, HU-1125 Istenhegyi út 63/B

Telephone: (+36-1) 201 12 35, 489 0003

E-mail: nemeth.balazs@kvalikon.hu

Web: www.kvalikon.hu