

Review On Effects Of Critical Social Factors In Application Of Lean Six Sigma For Manufacturing Industries

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Abstract: Lean Six sigma (LSS) is the modern business improvement strategy which is being applied across the sectors. LSS is predominantly used for process improvements and business turnaround which also poses several risks if not properly managed. The social risks pose several challenges to the organizations management in terms of losing key competent staff and increased resistance to change. This paper presents the different risks associated with LSS implementation and illustrates the effects of the social factors. The effects are classified as positive and negative in order to control them effectively. Managing the risks are discussed based on the positive / negative effect and recommended the review mechanism for successful LSS deployment. The key outcomes and recommendations for future research are presented at the end.

Index Terms: Lean Six sigma, Social factors, Manufacturing, Social risks, Process improvement.

1. INTRODUCTION

LEAN SIX SIGMA (LSS) is the modern era process improvement and business transformation model which is applied in almost all the sectors. Lean was evolved from Toyota production system (TPS) and Six sigma evolved from Statistical process control and eventually both are integrated in to Lean Six sigma at around 2010. The eastern (Lean) and western (Six sigma) methodologies are integrated and became popular as global methodology. Lean Six sigma application transformed many large MNC's into world class organizations through enterprise wide deployment and honed their processes to best practices. But the transformation was not happened as a miracle, it was the result of committed and motivated leadership in those organizations. Lean Six sigma compatibility with the other quality management systems used by the different organizations as part of their certifications or accreditations exhibits it as most preferential model for deployment. LSS has become so much popular that students are taking the professional training programs on Lean Six sigma and seeking career opportunities in this path. In earlier days, companies had invested lot of money in training their employees for deployment, but in contrast now a days trained manpower is readily available in the market for employment. This situation had reduced lot of burden to the companies in terms of money and time. LSS is being used for short term and long-term benefits based on the organization's requirements and maturity. But the organizations need to take up LSS as an organizations philosophy and institutionalize the culture for sustainable benefits. However, LSS has also had its risks in application. The top management must carefully assess the organizations abilities / competencies, requirements and risks before taking up / implementing LSS. The general risks

associated with implementation of LSS is presented in the below fig. 1.

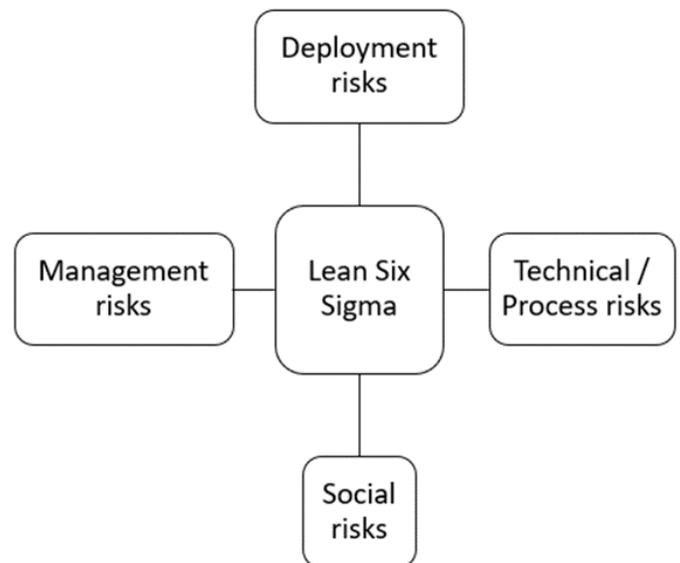


Fig. 1. General risks associated with Lean Six sigma implementation

There are several critical factors associated with their respective risks which are key for successful deployment of LSS in organizations. In this paper, the critical social factors associated with social risks in application of LSS for manufacturing industries and its effects are reviewed and discussed.

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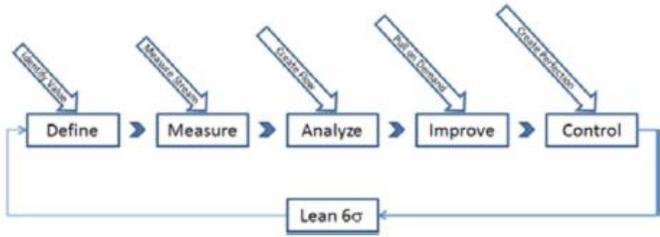


Fig. 2. Integrated LSS model

2 LITERATURE REVIEW

[1] Lean six sigma (LSS) is an integration of Six sigma and Lean manufacturing, both quality improvement programs originating from industry. Lean and Six sigma are highly complementary. Six sigma provides an integrated improvement approach that increases quality by reducing variation, defects and costs. Lean adds tools that increase process throughput by eliminating waste.

[2] Lean Six Sigma identifies waste and eliminates its source. This results in a long-term, systematic improvement of business processes. It is best adopted for a fast-growing organization and deals with complex issues. The application of Lean Six Sigma initiatives must be efficient to avoid becoming a burden. The tools should focus on results rather than implementation. It should be selected based on objectives, priorities and organizational structure. There are several advantages associated with implementation of LSS, those being financial, customers-related, employee-related, and overall quality improvement.

[3] The critical success factors for the implementation of LSS are Organizational readiness, Project selection & prioritization, Top management & employee commitment, Communication, Resources & competency and Measurement of results.

[4] The key aspects differentiating Lean Six sigma from other quality improvement initiatives is the organization and structure of quality implementation functions involving from top management to bottom level worker as a team. On the other hand, it is important to manage the human capital value stream for effective deployment.

The objectives of the human capital value stream are:

- Attract the right caliber individuals with employers' brand
- Select the best & suitable talent for the position
- Orient the employees with adequate training and engagement
- Reward the employees with the compensation at par with the market
- Develop the talent with career progression
- Manage / mentor employees on day to day activities
- Engage constructive relationship with leaving employees through obtaining their feedbacks and taking corrective actions

[5] The critical failure factors of LSS identified from a research are:

- Lack of administration disposition, responsibility and association
- Lack of preparation and instruction
- Poor project selection and prioritization

[6] The tools used in LSS can be considered as a big toolbox, where different tools are suitable for different scenarios depending on the nature of the problem or opportunity faced.

The LSS approach enables people to choose the right tools to resolve the relevant problems, either quickly in the form of Kaizen events or using more in-depth analysis as in complex projects with the renowned DMAIC methodology.

[7] Integrated LSS model for manufacturing industry is shown in the below figure 2.

[8] Based on the LSS literature review research, there is a huge gap and potential research opportunity in the area of establishing relationship between LSS and human factor. Hence, the research on social risks and its effects is selected to explore and document the findings.

3 PURPOSE

The purpose of this study is to review the critical social factors associated with the social risks in application of Lean Six sigma and critically analyze its effects during implementation in manufacturing industries.

4 ANALYSIS

Lean Six sigma is a multi-dimension, multi-function and multi-level business improvement strategy used in the organizations which require the entire participation across the company for successful results.

The social risks pose threats to a great extent which can sometimes leads to business failure. So, it is very significant for critical examination of the social factors leading to the risks. The general social risks are Life security, Financial security and Livelihood security. In LSS implementation the following are the critical factors of social risks:

- a. Cultural differences: LSS brings lots of cultural differences in terms of Work orientation, Leadership role, Employee role, Process monitoring and Performance management. These changes sometimes are difficult to accepted by the employees and even by organization (suppliers etc) due to the influence of traditional culture and general human resistance to change. The traditional vs LSS culture differences are illustrated in the below table 1.

Table 1: Traditional vs LSS cultural differences

Cultural aspect	Traditional	LSS
Work orientation	Departmental, Functional	Process flow oriented
Leadership role	Policies development and monitoring	Supportive and real time resource provision
Employee role	Only managers and specialist involvement	All levels of employee engagement
Process monitoring	Ad hoc process reviews	Systematic process reviews
Performance management	Budget reviews	Process level KPI reviews

- b. Job loss: LSS is not about getting rid of employees, but it is very crucial to reduce the fear among employees at very early stage of deployment. The common myth is "LSS is deployed for productivity improvement and in turn reduces the number of jobs". But the fact remains that, the productivity improvement leads to better utilization of the available resources and helps in expansion activities. It is also evident in rare cases, some of the short-sighted leaders use the productivity improvement benefits to job cuts and in turn effects the overall organization capabilities negatively in long run.

- c. Job re-allocation: LSS implementation sometimes results in elimination / reduction of wasteful activities which in turn outcomes the job reallocation of the employees involved in those wasteful activities. It is a common phenomenon and should be carefully handled to avoid the employee

distrust. The best way to handle this is to have proper communication with employees and management on the benefits resulted and empower them to take up the new roles in an inspired way.

- d. Performance burden: Generally, the LSS projects are initiated with the anticipated financial results and the project team shall realize it. It is very crucial to estimate the financial objectives realistically in order to achieve it. And it is also very important that the financial objectives are treated as a guidance metrics and the management should not blame the project team in case of non-realization. The management need to play a constructive role through rewarding when achieving the objectives and empower the team to analyze the causes of failures when the objectives are not achieved.

These critical factors need to be managed effectively in order to deploy the LSS program successfully in the organizations. Lack of identification or management of these factors lead to the complete failure of the LSS implementation which incurs both financial and resources loss. The organizations top management need to engage from the kick-off stage of LSS program and develop a plan to manage the several risks and factors adequately through allocation of resources and responsibilities. The effects of the critical factors on manufacturing industries during application of LSS are presented in the table 2. The effects can be in positive nature or in negative nature, so they are segregated accordingly. Before taking a call on LSS kickoff, the organizations top management should effectively review all the risks, factors and its effects. In the case of social risk factors – the positive effects need to be discussed for relevancy except for job loss effect. The effect of improvement in profitability does more harm than benefit to the organization in case of job loss and the negative effects outweigh the positive effect.

other positive effects should be diligently considered in the LSS program and the deployment plan need to accommodate the appropriate actions and measures to achieve these positive effects. Even without visualizing the factors and effects also, the LSS program may produce the desired outcomes by chance. However, with proper review and considerations the LSS program will produce much better and guaranteed results / benefits.

Table 2: Effects of the LSS critical factors in manufacturing industry

Factors	Positive effects	Negative effects
Cultural differences	1.Brings diversified thinking and practices 2.Ensues more hard-hitting reviews which assists in the robust failure analysis	1.Misinterpretation /misunderstanding of the requirements 2.Miscommunication in the team 3.General resistance for change
Job loss	1.Improves the profitability	1.Generates insecurity and distrust among employees 2.Chances of losing competent / talented personnel 3.Creates friction between management and employees and increases resistance to change
Job re-allocation	1.Improves organizational multiskilled resources	1.Chances of wrong allocation if not reviewed the competency matrix

Performance burden	Nil	properly
		1.Creates confusion and insecurity among the team in objective realization 2.Develops fear and stress on the employees which decreases their efficiency

Similarly, the negative effects need to be considered as gaps for LSS implementation and necessary actions and controls to be planned. The effects will occur at different stages of LSS implementation. So, the stage at which the action / control is to be initiated to be identified and incorporated in the risk action plan. For example, Job re-allocation takes place after the deployment of LSS and benefits realization. This stage is to be clearly identified and the appropriate action selected to be taken at this point for effective outcome. The review mechanism also to be established as part of LSS program to critically examine the gaps, outcomes and results at different stages called as gate reviews. These gate reviews also to be incorporated in the risk action plan and monitored for fulfillment.

5 CONCLUSIONS

The literature review shows that there is a research gap in social risks associated with LSS implementation and most of the research is carried on the success and failure factors rather than risk factors. This paper is an attempt to explain the critical social factors and its effects on LSS application in manufacturing industries.

The social factors and its positive and negative effects reflect the human behavioral aspects, which plays a prominent role in success of LSS program deployment. However, there are several other risks in LSS implementation our study is limited to only the social risks and its factors & effects.

The key outcomes of this study are presented below:

- Identification of LSS program risks and review of critical social factors
- Identification and classification of social factor effects
- Guidance on understanding the social factor effects and its application in LSS deployment
- Guidance on risk review mechanism for effective LSS program implementation

There are several risks associated in LSS implementation, but only limited research is carried out in this area. It is recommended for future researchers to use the results of this paper for research on other risks and its effects in LSS implementation and development of a framework in LSS risk management. Addition to the above stated areas, by using this research study the following future research opportunities can also be explored:

- Development of LSS implementation risk management tools
- Development of risk free LSS model / framework
- Development of LSS risk mitigation model

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