

ABSTRACT

During the last four decades, lean manufacturing paradigm and Six Sigma concept have been offering valuable solutions to modern companies in competition. Consequently, modern companies compete with each other by decreasing the prices of products and services offered by them. One of the ways of decreasing the prices of products and services is the elimination of unnecessary activities and wastes. The solutions for carrying out this task are provided by lean manufacturing paradigm. Another way of overcoming the competition is to achieve defect free production and service. This task is achievable through the application of Six Sigma concept. Thus, both lean manufacturing paradigm and Six Sigma concept have a common goal of enabling modern companies to acquire competitive strengths. Because of their common goal, frontier researchers superimposed lean manufacturing paradigm and Six Sigma concept on each other and brought out Lean Six Sigma model.

While the world has realized the need of adopting Lean Six Sigma model, there has been a change occurring in organizational scenario in the pattern of producing products and offering services. According to this change, modern large size companies have been increasingly outsourcing their activities to small and medium enterprises (SMEs). The reason for this kind of increased outsourcing is attributed to two main issues. The first reason is that, the product life cycles have become shorter and hence, large size companies are finding it uneconomical to install expensive and long lasting equipment for offering products and services. The second reason is that, the

technology obsolesces at fast pace which makes the large size companies to depend on SMEs for producing and offering technology-specific products and services. Hence, this kind of large size companies' performance is based more on the performance capabilities of SMEs than their own strengths and capabilities. As a result, during the recent years, the focus of acquiring competitive strengths has been directed towards SMEs.

One of the avenues of enabling contemporary SMEs to acquire competitive strengths is the implementation of Lean Six Sigma. This task is going to be challenging as currently, most of the SMEs are not scientifically managed, while the Lean Six Sigma fits well only in scientifically managed organizations. In this context, the need of exclusive model for implementing Lean Six Sigma in SMEs is realized. However the implementation of this model in SMEs may encounter some hurdles. This is due to reason that, SMEs suffer from numerous deficiencies. In this context, the doctoral work reported in this thesis was initiated with the primary objective of contributing a Lean Six Sigma model which will not only be suitable for implementation in SMEs, but will also be an enabler in overcoming the deficiencies prevailing in them.

The literature survey conducted during the doctoral work being reported in this thesis revealed that, the researchers have identified as many as 25 deficiencies prevailing in contemporary SMEs. It is not possible to overcome these deficiencies in contemporary SMEs within a short period so as to successfully implement Lean Six Sigma in them. Hence, Lean Six Sigma can be implemented incrementally by gradually overcoming these

deficiencies. On realizing this fact, during the doctoral work reported in this thesis, a model called DOLADMAICS (stands for Deficiency Overcoming Lean Anchored Define Measure Analyse Improve Control Stabilize) was designed to implement Lean Six Sigma in five levels. The first, second, third, fourth and fifth levels of DOLADMAICS model were designed to respectively sensitize, orient, trigger, drive and steer contemporary SMEs towards the implementation of Lean Six Sigma. After designing the conceptual features of DOLADMAICS model, the frameworks to implement in five levels were designed. Then implementation studies were conducted in three SMEs located in India. One of the implementation studies was conducted in a SME manufacturing a component called cylinder frame. This SME is referred to here as SME-X. Another implementation study was conducted in a SME manufacturing electrical motor end covers. This SME is referred to here as SME-Y.

In both SME-X and SME-Y, the implementation studies on first and second levels of DOLADMAICS model could be carried out. Though the suggestions evolved out could be implemented only partially, the smooth conduct of these implementation studies revealed the capability of first and second level of DOLADMAICS model in sensitizing and orienting the contemporary SMEs towards implementing Lean Six Sigma and thereby acquiring competitive strengths. This was discernable as after conducting both implementation studies, the sigma value was found to increase partially and waste level was found to partially decrease.

Yet another implementation study was conducted in a SME manufacturing mechanical butterfly valve bodies. This SME is referred to here as SME-Z. In SME-Z, management's support towards implementing DOLADMAICS model could not be availed. Hence, the implementation study on the first level of DOLADMAICS model could be carried out only peripherally in SME-Z. Due to the same reason, the conduct of second level of implementation study of DOLADMAICS model could not be carried out at SME-Z.

The experiences gained by conducting the implementation studies reported in this thesis corroborated the findings of global researches. According to results of these global researches, the contemporary SMEs suffer from several deficiencies which hamper the implementation of competitive strategies like Lean Six Sigma. At end of this thesis, it is suggested to conduct further researches involving the actual and complete implementation of DOLADMAICS model in contemporary SMEs. The knowledge and experiences to be gained by conducting these case studies may be utilized to refine DOLADMAICS model to enhance its practical compatibility so that Lean Six Sigma can be successfully implemented in contemporary SMEs. In the concluding remarks, it is stated that, in order to achieve this goal, the contemporary SMEs need to be motivated through a suitable mechanism for implementing DOLADMAICS model and thereby acquiring competitive strengths.