CRITICAL SUCCESS FACTORS FOR SIX SIGMA DESIGN AND DEPLOYMENT TO COMPLIMENT LEAN OPERATIONAL STRATEGY TOWARDS CAPABILITY MATURITY

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Purpose of the paper

To integrate Six-Sigma and Design For Six Sigma (DFSS) includes different strategies and are critical success factors when implementing internal processes. The research objective is to (i) critically analyse critical success factors (CSF's) impacting on the integration of Lean Six Sigma (LSS) and DFSS as they are frequently misunderstood and applied in industry and to (ii) develop a framework guiding organisations towards operational excellence complemented by Lean operational strategy (LOS) applications when utilising Six Sigma and DFSS.

The design of the "newly" develop framework links together "synergistically" key components impacting on the successful implementation thereof supporting Capability Maturity Model Integration (CMMI) in terms of a business strategy. The framework also integrated the Theory of Constraints (TOC), Agile and Scrum, Lean Six Sigma (LSS), Design for Six Sigma (DFSS) in a multi-framework capability maturity model.

Related work

Literature shows that original equipment manufacturers (OEM's) in Europe, Japan and America has been giving rise to fundamentally disseminate the core concepts and opportunities within Lean, Six-Sigma and Design for Six Sigma (DFSS) to fundamentally drive operational excellence throughout the product and process life cycle. Numerous

examples exist over the past two decades in the automotive manufacturing industry where it is observed that during the design phase of products and processes that critical success factor (CSF's) of DFSS does not fully unlock the opportunity towards performance and operational excellence.

Research design

The nature of this research is primarily exploratory and descriptive. The main elements of the research are formed by Phase 1 by means of thorough literature reviews in terms of Industry4.0 technologies in Six-Sigma, DFSS, Lean Six-Sigma (LSS) and CMMI. Phase 2-survey questionnaires and interviews with industry specialists. Phase 2 targeted knowledgeable, LSS and DFSS industry participants across South Africa and internationally. The questionnaires and interviews were designed with specific objectives to determine:

i. *Research objective 1: The most significant CSF's required for LSS successful deployment in an organisation.*
ii. *Research objective 2: The most significant CSF's for successful DFSS deployment in an organisation.*
iii. *Research objective 3: The design of a framework assisting organisations to achieve successful integration of LSS, DFSS, within CMMI.*

Findings

The research results obtained assisted in the design and testing of a comprehensive integrated LSS, CSF's, DFSS and CMMI framework. The developed framework was tested at an international auto manufacturer in South Africa assisting the organisation to optimise processes and product quality coupled with product performance transcending into successful capability maturity outcomes in the pursuit of increased customer loyalty.

Practical and value

Lastly the research identified possible shortcomings of existing continuous improvement techniques used by manufacturers and as such provide critical success factors assisting organisations utilising LSS, DFSS and Industry4.0 technology in order achieve overall business excellence. The research also identified a significant contribution in terms of reduced project effort when combining Agile and Scrum within CMMI. It is anticipated that the result of the research will serve as a detailed customised implementation "framework" for both manufacturing and service industries to become more competitive.

Keywords*:* *Six-Sigma, Design For Six- Sigma, Lean Six- Sigma, Capability Maturity Model Integration, Critical Success Factors, Industry4.0*

Paper - Research Type

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