

**LEAN SIX SIGMA AND INTERNAL AUDITING
AS A NEW PARADIGM FOR PERFORMANCE
IMPROVEMENT**

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**DOCTOR OF PHILOSOPHY
UNIVERSITI MALAYSIA TERENGGANU**

2016

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**Thesis Submitted in Fulfillment of the Requirement for the Degree of
Doctor Philosophy in the School of Maritime Business and Management
Universiti Malaysia Terengganu**

2016

DEDICATION

This thesis is dedicated to my late father, who taught me that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to my late mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Doctor Philosophy.

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Lean Six Sigma (LSS) has become one of the most popular standards of quality in many multinational organizations. In the current changing market scenarios, where the effects of globalization are having a greater impact on the global market, the business market feels challenged and, therefore, seeks perfection in all operational matters. Among various advanced quality management methodologies, LSS could be the one, suitable remedy for achieving operational excellence, but the number of Malaysian companies that have adopted and implemented it is still negligible.

The main objectives of the study are to provide a comprehensive literature review on the concept of LSS and internal auditing as well as to explore and examine the role of the internal auditor in LSS practices. The study uses a qualitative research approach, which, at the initial stage of data collection, makes use of the multiple-case study method. The results were analyzed and used to refine the framework, which further identified the motivation factors for

adopting LSS by several companies in Malaysia. The study highlights the critical success factors (CSFs) and also those which are impediments. The study emphasizes that the implementation of LSS can result in work culture and operational advancement, leading to financial gains.

The second phase of this study highlights the role of internal auditing in LSS, whereby the involvement of an internal auditor in LSS projects and the effective internal audit capabilities can be highly beneficial for a company to identify the processes, adding true value and leading to sustainable performance improvement in the company. Questionnaire surveys were used to gather the data. As a result, sixty five (65) internal auditors covering several categories and industries responded. The outcomes from the survey and literature proved that internal auditors are still looking for the fact that they can play important roles in LSS, but, on the other hand, there are still many roles that internal audit activities are not ready to pursue, should not pursue, or are not proactive in pursuing. Finally, the concluding framework provides an overview for the companies, particularly in Malaysia, about how to integrate internal auditing with LSS in order to achieve better results.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Doktor Falsafah.

**LEAN SIX SIGMA DAN PENGAUDITAN DALAMAN SEBAGAI SATU
PARADIGMA BAHARU UNTUK PENINGKATAN PRESTASI**

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Lean Six Sigma (LSS) telah menjadi salah satu standard kualiti yang popular dalam kebanyakan organisasi multinasional. Dalam senario pasaran yang sering berubah, kesan globalisasi telah memberikan impak yang besar di dalam pasaran global dan bagi memastikan kecemerlangan operasi seiring dengan senario pasaran, kaedah-kaedah pengurusan kualiti antaranya LSS boleh menjadi salah satu kaedah yang sesuai. Namun demikian, penerimaan dan pelaksanaan LSS oleh syarikat-syarikat yang beroperasi dan berada di Malaysia adalah masih sedikit.

Objektif utama kajian ini adalah untuk menyediakan kajian literatur yang komprehensif tentang konsep LSS dan pengauditan dalaman serta untuk meneroka dan mengkaji peranan juruaudit dalaman berkaitan amalan LSS. Kajian ini menggunakan pendekatan penyelidikan kualitatif, yang pada peringkat awal pengumpulan data menggunakan kajian pelbagai kes (*multiple-case*). Keputusan telah dianalisis dan digunakan untuk memperbaiki rangka

kerja yang seterusnya mengenalpasti faktor motivasi yang mempengaruhi LSS ke atas beberapa buah syarikat di Malaysia. Kajian ini juga menekankan faktor kejayaan kritikal (CSFs) dan faktor penghalang sebagai faktor-faktor penentu dalam pelaksanaan LSS yang mempengaruhi perubahan budaya kerja dan kemajuan operasi yang membawa kepada keuntungan.

Manakala, fasa kedua kajian ini menekankan peranan audit dalaman dalam melaksanakan LSS. Di mana, penglibatan juruaudit dalaman dalam projek-projek LSS dan juga keupayaan audit dalaman yang efektif, ianya boleh menjadi sangat berfaedah kepada syarikat bagi mengenal pasti proses penambahbaikan yang boleh membawa kepada peningkatan prestasi yang berterusan kepada syarikat. Soal selidik juga digunakan untuk mengumpul data. Hasilnya, soal selidik tersebut dijawab oleh enam puluh lima (65) juruaudit-juruaudit dalaman yang meliputi beberapa kategori dan industri. Hasil daripada kajian membuktikan bahawa juruaudit dalaman boleh terlibat dan memainkan peranan penting dalam LSS, walaubagaimanapun, terdapat banyak peranan aktiviti audit dalaman sama ada; tidak terlibat atau terlibat atau tidak memainkan peranan proaktif untuk terlibat. Akhir sekali, kesimpulan daripada hasil kerja telah memberikan gambaran keseluruhan syarikat, terutamanya di Malaysia tentang bagaimana mengintegrasikan pengauditan dalaman dengan LSS untuk mencapai keputusan yang lebih baik.