



Ain Shams University  
Faculty of Engineering

# **Moving From Quality Management to Business Excellence through an Integrated Approach**

**A Thesis**

By

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## **Abstract**

In today's highly competitive global economy, many organizations are striving business excellence by implementing Six Sigma and Lean manufacturing beside their ISO 9000 Quality Management System (QMS). However, the academic literature still contains few empirical studies for the impact of integrating Lean and Six Sigma with ISO 9000 QMS and if this will lead to business excellence.

In this study, a theoretical model is proposed and tested for the impact of Lean and Six Sigma integration with ISO 9000 using Partial Least Squares (PLS) path analysis. This empirical assessment collected 33 responses from manufacturing firms applying Lean and Six Sigma together with ISO 9000. Five constructs of business excellence were hypothesised to validate the model. The results of the analysis showed that integrating Lean and Six Sigma with ISO 9000 QMS have a significant positive impact on all constructs of business excellence.

Moreover, the survey highlighted key problems and obstacles in the way of successful integration of the three initiatives. These have been considered in the 4 phases proposed model for integration.

**Keywords:** Lean, Six Sigma, ISO 9000, Business excellence, PLS path modelling

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## **List of Acronyms**

|        |   |
|--------|---|
| ANOVA  | Analysis Of Variance                          |
| AVE    | Average Variance Extracted                    |
| BB     | Black Belt                                    |
| BCPE   | Baldrige Criteria for Performance Excellence  |
| CEO    | Chief Executive Officer                       |
| COPQ   | Cost of Poor Quality                          |
| Cp     | Process capability                            |
| CQI    | Continuous Quality Improvement                |
| CTQ    | Critical To Quality                           |
| DFSS   | Design For Six Sigma                          |
| DMADV  | Define, Measure, Analyze, Design and Verify   |
| DMAIC  | Define, Measure, Analyze, Improve and Control |
| DOE    | Design Of Experiments                         |
| DPMO   | Defects Per Million Opportunities             |
| EFQM   | European Foundation for Quality Management    |
| EU     | European Union                                |
| FMEA   | Failure modes and effects analysis            |
| FTY    | First Time Yield                              |
| GB     | Green Belt                                    |
| ISO    | International Standardization Organization    |
| JIT    | Just In Time                                  |
| LISREL | Linear Structural Relations                   |
| LSS    | Lean Six Sigma                                |
| LSS+   | Lean Six Sigma plus                           |
| LSSL   | Lean Six Sigma light                          |
| LV     | Latent Variable                               |
| MBB    | Master Black Belt                             |
| MBNQA  | Malcolm Baldrige National Quality Award       |
| MTTR   | Mean Time To Repair                           |
| MV     | Manifest Variables                            |

|       |   |
|-------|---|
| NIST  | National Institute of Standards and Technology    |
| OEE   | Overall Equipment Effectiveness                   |
| OHSAS | Occupational Health & Safety Advisory Services    |
| PLS   | Partial Least Squares                             |
| PPM   | Part Per Million                                  |
| QFD   | Quality Function Deployment                       |
| QMP   | Quality Management Principles                     |
| QMS   | Quality Management System                         |
| SEM   | Structural Equation modelling                     |
| SIPOC | Suppliers, Inputs, Process, Outputs, Customers    |
| SMDE  | Single Minute Die Exchange                        |
| SME   | Small and Medium Enterprises                      |
| STDEV | Standard Deviation                                |
| STERR | Standard Error                                    |
| SUF   | Single Unit Flow                                  |
| SWOT  | Strengths, Weaknesses, Opportunities, and Threats |
| TL    | Traditional lean                                  |
| TPM   | Total Productive Maintenance                      |
| TPS   | Toyota Production System                          |
| TQM   | Total Quality Management                          |
| TSS   | Traditional Six Sigma                             |
| VOC   | Voice Of Customer                                 |



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