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**A LEAN APPROACH TO PRODUCT DEVELOPMENT
IN SMALL AND MEDIUM MANUFACTURING
ENTERPRISES**

IN
NEW ZEALAND

A Thesis presented
in partial fulfilment of
the requirements for the
Degree of Master of Engineering in
Product Development at Massey University

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Dedicated to my Beloved Gurudeva:

Sri Sri Paramahansa Yogananda

ABSTRACT

Product Development (PD) is a multifaceted and challenging process, more so in Small and Medium Enterprises (SMEs) due to issues such as the resource constraints, high dependency on suppliers and the modern day competitiveness. For countries such as New Zealand, where 99.54 % of firms belong to the SME category, the significance of improving the PD system is enormous. These firms have to 'do a great deal with very little'. The various PD management solutions that have been successfully deployed in large companies require "alterations" or customisation for application in SMEs. The research work presented in this thesis addresses the growing interest in the application of a distinctive best practice, one of the most recent, and promising solutions to product innovation in SMEs: (Toyota's) 'Lean Product Development System'.

The Lean philosophy has proven time and again as a holistic system to enhance efficiency of the entire supply chain by optimising all internal processes; in addition to bringing about responsiveness to external environment. According to studies conducted by prominent research institutes across the world, Toyota's excellence is equally seen in its PD as in manufacturing, where projects take half the time of its US equivalents, with four times the productivity, and consistent top quality. In line with the industry trend in exploration of Lean system to PD across the world, this study focuses on:

"Evolving a broad framework for PD that incorporates Lean principles for application in Small and Medium Enterprises."

In-depth action research within a SME environment showed that Lean Product Development Systems is one solution that provides ideal balance of being a systems based, process oriented, interactive expert managed approach with a clear customer / value focus for these firms. Aspects such as flexibility of engineering infrastructure, the CAD/CAM proficiency, flat organisation structure aiding better communication, and the continuous learning attitude prevalent within SMEs corresponds closely to that in Toyota, and were identified to be great enablers for Lean deployment. On the other hand, few areas were found to pose challenges to the Lean approach within SMEs: including resource scarcity, the dependency on suppliers, and lack

of concept reuse, among others. On the whole, the findings have led to the development of a customized framework for Lean innovation in SMEs that addresses the knowledge, people, process, leadership, management, and planning elements, topped with measures to minimize effects of the identified obstacles.

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CHAPTER 1
INTRODUCTION

