VIABILITY OF LEAN MANUFACTURING CONCEPTS IN SRI LANKAN SHIPBUILDING INDUSTRY A CASE STUDY OF COLOMBO DOCKYARD PLC

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MASTER OF BUSINESS ADMINISTRATION

IN

MANAGEMENT OF TECHNOLOGY

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University of Moratuwa

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VIABILITY OF LEAN MANUFACTURING CONCEPTS IN SRI LANKAN SHIPBUILDING INDUSTRY A CASE STUDY OF COLOMBO DOCKYARD PLC

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The Dissertation was submitted to the Department of Management of Technology of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration

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DECLARATION

I certify that this dissertation does not incorporate, without acknowledgement, any material previously submitted for a Degree or Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for inter-library loans, and for the title and summary to be made available to outside organizations.

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ABSTRACT

It has been strongly predicted that there will be a boom in the global shipbuilding industry in the near future, and a steady growth in demand at least till 2025. This gives a window of opportunity for shipyards all over the world to stabilize and expand their operations. As many large shipyards are overbooked, the small yards such as Colombo Dockyard PLC will get excellent opportunity to enter into business and expand their operations. Due to aggressive expansion programs in China and India the opportunities available for small yards will be diluted unless they build up competitive positions by improving their order winning criteria.

Sri Lankan shipbuilding industry with a dearth of natural competitive advantages will have to compete in management of resources and other geographical location factors. Lean manufacturing has been accepted as manufacturing philosophy which will deliver low cost, high quality products with low lead time. Hence, the question of this research is "How Lean manufacturing concepts can be applied in Sri Lankan Shipbuilding Industry.

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As such there has not been any research on how to apply Lean manufacturing concepts in Sri Lankan shipbuilding industry. The objectives of this research are what Lean manufacturing tools are applicable in Sri Lankan Shipbuilding industry, organizational factors which should be emphasized during lean implementation and potential barriers and drivers for Lean implementation in Sri Lankan Shipbuilding Industry.

A mix of research methodologies such as questionnaire survey, unstructured interview, structured interviews and simulation were adopted during this research. As Colombo Dockyard PLC (CDPLC) being the only international level shipyard in Sri Lanka, this research is entirely based on Colombo Dockyard PLC.

Lean assessment tools revealed that scheduling, inventory, supply, layout, process and quality are areas where the current practices of CDPLC need improvements. The simulation of current process at hull fabrication workshop was able to prove that workshop layout change, use of high efficient machinery, cellular

work group structure and Pull production would improve the output parameters of current process significantly. The non quantifiable Lean tools such as 5S and Visual Control would also improve the output parameters further. The research also revealed that Lean organizational practices objectives such as standardization, Team based organization and participation and empowerment need emphasis during Lean implementation.

Unionization, organization structure, organization communication process, current leadership and management style, supply chain issues and integration of suppliers in the process, level of integration of shipyard process were found as potential barriers for Lean implementation at CDPLC. The potential drivers for Lean implementation at CDPLC would be on time delivery, labour reduction, improvement in production capacity, reduce manufacturing cycle time and production cost. The modified LAI Hypothesized model provides guideline for Lean implementation at CDPLC diagrammatically.

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LIST OF ABBREVIATIONS

AHTS - Anchor Handling Cum Supply Vessels

ANOVA – Analysis of Variance

APICS - American Production and Inventory Control Society

CAGR - Compounded Annual Growth Rate

CDPLC - Colombo Dockyard PLC

CM - Cellular Manufacturing

CNC – Computer and Numeric Control

DWT - Dead Weight Tonnage

GDP -Gross Domestic Product

HVLV – High Variety and Low Volume

IMO – International Maritime Organization

IMVP - International Motor Vehicle Program

IT/ITES -Information Technology and Information Technology Enable Services

JIT – Just in Time

KSLAS - knowledge base Lean advisory system

LAI – Lean Aircraft Initiative

LESAT - Lean Self Assessment Tool

LM – Lean Manufacturing

LP – Lean Production

MIT - Massachusetts Institute of Technology

MOC - Material Ordering Card

NIST -National Institute of Standards and Technology

NSRP - National shipbuilding Research program

NVA – Non Value Adding Activity

OEE - Overall Equipment Efficiency

OKP - One of a kind product

ROI – Return of Investment

SME – Small and Medium scale Enterprises

SMV – Standard Minute Value

SPC - Statistical Process Control

TMC -Toyota Motor Cooperation

TPM -Total Productive Maintenance

TPS – Toyota Production System

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TQM – Total Quality Management

TTL - Enterprise Transition to Lean

VA – Value Adding Activity

VS – Visual System

VSM – Value Stream Mapping

WIP – Work in Progress

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